CHAPTER 11

PO 121 – PARTICIPATE IN CANADIAN AVIATION, AEROSPACE AND AERODROME OPERATIONS COMMUNITY FAMILIARIZATION ACTIVITIES

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 1

EO M121.01 – DISCUSS AVIATION OPPORTUNITIES

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Prepare Career Investigation Sheets located at Attachment A for each group.

Prepare Career Information Envelopes located at Attachment B for each group.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An in-class activity was chosen for TP 1 as it is an interactive way to provoke thought and stimulate interest in aviation careers among the cadets.

A group discussion was chosen for TP 2 as it allows the cadets to interact with their peers and share their knowledge about aviation careers. A group discussion helps the cadets improve their listening skills and develop as members of a team.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadets shall have discussed aviation opportunities.

IMPORTANCE

There are many career opportunities available within the aviation industry. Identifying possible opportunities stimulates an interest in the different aspects of the cadet program including aviation, aerospace, aerodrome operations and aircraft manufacturing and maintenance.

BACKGROUND KNOWLEDGE

PILOTS AND FLIGHT INSTRUCTORS

Pilots fly airplanes and helicopters to provide air transportation, training, and surveying services. Flying instructors teach flying techniques and procedures to student and licensed pilots.

Pilots and flight instructors are employed by airlines, airfreight companies, flying schools, the Canadian Forces (CF), and other public and private sector aircraft operators.

Topics such as aerodrome operations, aircraft maintenance, radio, theory of flight, navigation and meteorology will assist cadets in preparing for pilot training.

Cadet summer training qualifications include a three-week basic aviation qualification, a three-week advanced aviation qualification and gliding and power flying scholarship qualifications.

AIR TRAFFIC CONTROLLERS AND FLIGHT SERVICE SPECIALISTS

Air traffic controllers use radio communication to direct air traffic within assigned airspace. Also, they control aircraft and vehicle movement at airports. Flight service specialists provide pilots with flight information essential to aviation safety, such as weather conditions.

Air traffic controllers and flight service specialists are employed by NAV Canada and the CF.

Topics such as radio communication, aerodrome operations and air traffic control will assist cadets in preparing for air traffic control training.

Cadet summer training qualifications include a three-week basic aviation technology and aerospace qualification and a six-week advanced aviation technology qualification – airport operations.

AIRCRAFT MAINTENANCE ENGINEERS (AME)

Aircraft maintenance engineers maintain, repair, overhaul, modify and test aircraft structures and systems. The aircraft systems they work on include mechanical, hydraulic, instrument, electrical and avionics.

Aircraft manufacturing, maintenance, repair companies, airlines, the CF and other aircraft operators employ AMEs.

Topics such as aircraft maintenance will assist cadets in preparing for AME training.

Cadet summer training qualifications include a three-week basic aviation technology and aerospace qualification and a six-week advanced aviation technology qualification – aircraft maintenance.

AIR TRANSPORT RAMP ATTENDANTS

Air transport ramp attendants operate ramp-servicing vehicles and equipment, handle cargo and baggage, and perform other ground support duties.

They are employed by airlines, air services companies and the federal government.

Topics such as aerodrome operations and radio will assist cadets in preparing for groundside careers.

Cadet summer training qualifications include a three-week basic aviation technology and aerospace qualification and a six-week advanced aviation technology qualification – airport operations.

AERODROME MANAGERS

Aerodrome managers plan, organize, direct, control and evaluate the operations of an aerodrome. Some areas of responsibility may include marketing, budgeting, human resources, and managing the buildings and the land.

Aerodrome managers work for airport authorities, local governments or private airports.

Topics such as aerodrome operations and leadership will assist cadets in preparing for aerodrome management careers.

Cadet summer training qualifications include a three-week basic aviation technology and aerospace qualification and a six-week advanced aviation technology qualification – airport operations.

AEROSPACE ENGINEERS AND AIRCRAFT ASSEMBLERS

Aerospace engineers research, design, and develop aerospace vehicles, aerospace systems and their components. They also perform duties related to testing, evaluation, installation, operation and maintenance of the same.

Aircraft and spacecraft manufacturers, air transport carriers and research institutions employ aerospace engineers.

Aircraft assemblers assemble, fit and install prefabricated parts to manufacture fixed wing aircraft, rotary wing aircraft or aircraft components.

Aircraft subassembly manufacturers employ aircraft assemblers. Subassembly companies assemble the different sections of aircraft like the landing gear.

Topics such as theory of flight, aircraft maintenance and aerospace will assist cadets in preparing for design and assembly training.

Cadet summer training qualifications include a three-week basic aviation technology and aerospace qualification and a six-week advanced aviation technology qualification – aircraft maintenance.

Teaching Point 1	**Conduct an aviation careers matching activity.**
Time: 15 min	Method: In-Class Activity

ACTIVITY

OBJECTIVE

This activity is designed allow cadets to think about different aviation careers and how cadet training relates to these careers.

RESOURCES

- One Career Investigation Sheet per group.
- One set of Career Information Envelopes per group, to include:
  - job descriptions envelope;
  - employers envelope;
  - POs envelope; and
  - summer training qualifications envelope.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into six groups. Assign each group an aviation career from the following list:
   - pilots and flying instructors;
   - air traffic controllers and flight service specialists;
   - aircraft maintenance engineers;
   - air transport ramp attendants;
   - aerodrome managers; and
   - aerospace engineers and aircraft assemblers.

If there are less than 12 cadets in the class, divide them into three groups and assign each group two careers.

2. Give each group a Career Investigation Sheet and set of Career Information Envelopes. Advise each group that they will present their career to the class at the end of their investigation.
3. Have the groups open their job description envelopes. Cadets will have two minutes to:
   - read through all of the descriptions;
   - select the job description statements that match their careers; and
   - record the descriptions on their Career Investigation Sheets.
4. Have the groups open their employer envelopes. Cadets will have two minutes to:
   - read through all of the employers;
   - select the employers that someone from their career might work for. There may be many possible answers for each career;
   - record the employers on their Career Investigation Sheets; and
   - make a sensible case for the employers they have selected.
5. Have the groups open their PO envelopes. Cadets will have one minute to:
   - Read through all of the POs;
   - Select the POs that will help them prepare for their career; and
   - Record these POs on their Career Investigation Sheets.
6. Have the groups open their summer training qualifications envelopes. Cadets will have one minute to:
   - Read through all of the summer training qualifications;
   - Select the summer training qualifications that will help them prepare for their career; and
   - Record these summer training qualifications on their Career Investigation Sheets.
7. Call upon each group to present their career.

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in the activity will serve as the confirmation of this TP.

Teaching Point 2	**Lead a discussion on aviation careers.**
Time: 10 min	Method: Group Discussion

GROUP DISCUSSION

TIPS FOR ANSWERING / FACILITATING DISCUSSION:

- Establish ground rules for discussion, eg, everyone should listen respectfully; don't interrupt; only one person speaks at a time; no one's ideas should be made fun of; you can disagree with ideas but not with the person; try to understand others as much as you hope they understand you; etc.
- Sit the group in a circle, making sure all cadets can be seen by everyone else.
- Ask questions that will provoke thought; in other words avoid questions with yes or no answers.
- Manage time by ensuring the cadets stay on topic.
- Listen and respond in a way that indicates you have heard and understood the cadet. This can be done by paraphrasing their ideas.
- Give the cadets time to respond to your questions.
- Ensure every cadet has an opportunity to participate. One option is to go around the group and have each cadet answer the question with a short answer. Cadets must also have the option to pass if they wish.
- Additional questions should be prepared ahead of time.

SUGGESTED QUESTIONS:

Q1. What career interests you and why?

Q2. Does anyone know someone that works in one of these careers? What can you tell us about their job?

Q3. How do the opportunities in the air cadet program stimulate your interest in aviation, aerospace, aerodrome operations and aircraft manufacturing and maintenance?

CONFIRMATION OF TEACHING POINT 2

The cadets' participation in the activity will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in the activity will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

The myriad air cadet program activities expose cadets to various aspects of aviation, aerospace, aerodrome operations and aircraft manufacturing and maintenance. These experiences may encourage cadets to pursue an education / career in one these areas.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

A3-003 CATO 51-01 Director Cadets 3. (2011). *Air cadet program outline*. Ottawa, ON: Department of National Defence.

C3-001 *National Occupation Classification 2001 (NOC2001)*. (2001). Retrieved 23 Mar 2006 from http://www.hrdc.drhc.gc.ca/2001/e/generic/welcome.shtml

CAREER INVESTIGATION SHEET

Team Members:

Career:

Job Description:

Employers:

Related POs

Related Summer Qualifications

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CAREER INFORMATION ENVELOPES

Job Descriptions	
Fly airplanes and helicopters to provide air transportation, training, and surveying services.	Teach flying techniques and procedures to students and licensed pilots.
Direct air traffic within assigned airspace, and control moving aircraft and service vehicles at airports.	Provide pilots with flight information essential to aviation safety.
Maintain, repair, and test aircraft structures and systems.	Drive ramp equipment, handle cargo and baggage, and do other ground support jobs at airports.
Manage the operations of an aerodrome, including the people, the money, the buildings, and the land.	Design aerospace vehicles and systems.
Put together and install pre-made parts to make airplanes and helicopters.	

Employers				
Airlines	Air cargo companies	Canadian Forces	Private companies	Flying schools
NavCanada – runs all the air traffic control services in Canada	Aircraft manufacturing companies	Aircraft maintenance companies	Ground support companies	Airport management authorities
Local governments	Private airports	Aircraft and spacecraft manufacturers	Research institutions	Aircraft part manufacturers

POs				
Radio Communication	Principles of Flight	Meteorology	Propulsion	Navigation
Aerospace	Aerodrome Operations	Aircraft Manufacturing and Maintenance		

Summer Qualifications				
Basic Aviation	Advanced Aviation	Basic Aviation Technology and Aerospace	Advanced Aerospace	Advanced Aviation Technology – Airport Operations
Advanced Aviation Technology – Aircraft Manufacturing and Maintenance	Glider Pilot Scholarship	Power Pilot Scholarship		

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 2

EO C121.01 – PARTICIPATE IN A PRESENTATION GIVEN BY A MEMBER OF THE CANADIAN AVIATION, AEROSPACE OR AERODROME OPERATIONS COMMUNITY

Total Time:	60 min X 4

THERE IS NO INSTRUCTIONAL GUIDE PROVIDED FOR THIS EO

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CHAPTER 12

PO 129 – COMMUNICATE USING THE PHONETIC ALPHABET AND NUMBERS

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

EO M129.01 – RECITE THE PHONETIC ALPHABET AND NUMBERS

Total Time:	30 min

PREPARATION

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for TP 1 as it orients the cadets to identify the phonetic alphabet and numbers, generates interest and presents basic information.

A game was chosen for TP 2 as it is a fun and challenging way to review the material and have the cadets practice the skills.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadets shall have recited the phonetic alphabet and numbers.

IMPORTANCE

It is important to know how to properly use the phonetic alphabet and numbers while communicating over a radio. This skill mitigates any potential confusion when speaking over a radio. Real danger can occur from misinterpretation of messages. Cadets will use this skill during familiarization flying, airport operations activities and aircrew survival training.

Teaching Point 1	**Describe the phonetic alphabet and identify the phonetic numbers.**
Time: 10 min	Method: Interactive Lecture

PHONETIC ALPHABET

The phonetic alphabet is used because letters that sound similar might be confused when said over a radio. An example of similar sounding letters is ‘M’ and ‘N’. Therefore, each letter of the alphabet is associated with a word that is easily understood over the radio.

The phonetic alphabet is as follows:

- A – Alpha.
- B – Bravo.
- C – Charlie.
- D – Delta.
- E – Echo.
- F – Foxtrot.
- G – Golf.
- H – Hotel.
- I – India.
- J – Juliet.
- K – Kilo.
- L – Lima.
- M – Mike.
- N – November.
- O– Oscar.
- P – Papa.
- Q – Quebec.
- R – Romeo.
- S – Sierra.
- T – Tango.
- U – Uniform.
- V – Victor.
- W – Whiskey.
- X – X-Ray.
- Y – Yankee.
- Z – Zulu.

Use of the phonetic alphabet can be heard on a familiarization flight when the pilot communicates the aircraft's call letters to the tower.

PHONETIC NUMBERS

Phonetic numbers are used to avoid misunderstandings when using radio communication. Numbers are enunciated in the following manner:

- 0 – Zee-ro.
- 1 – Wun.
- 2 – Too.
- 3 – Tree.
- 4 – Fow-er.
- 5 – Fife.
- 6 – Six.
- 7 – Seven.
- 8 – Ait.
- 9 – Nin-er.

Numbers are always spoken as single digits, except for whole thousands. For example, 5 280 would be spoken "fife too ait zee-ro" and 5 000 would be spoken "fife tou-sand."

Symbols are spoken as words over the radio; eg. the word decimal, pronounced "day-see-mal", is used where there is a number with a decimal point.

Air traffic controllers use phonetic numbers to communicate to pilots what runway to use when taking off and landing.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. Why is the phonetic alphabet used?

Q2. How is "Y" pronounced using the phonetic alphabet?

Q3. How is the number four pronounced?

ANTICIPATED ANSWERS:

A1. To avoid confusion between letters that sounds alike.

A2. Yankee.

A3. Fow-er.

Teaching Point 2	**Conduct games where the cadets use the phonetic alphabet and numbers.**
Time: 15 min	Method: Game

ACTIVITY

Time: 5 min

OBJECTIVE

The objective of this game is for cadets to spell out their name using the phonetic alphabet and numbers.

RESOURCES

- Whiteboard, and
- Whiteboard markers.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Divide the class into two groups.
2. Alternating groups, have each cadet spell their first and last name using the phonetic alphabet.
3. Give each cadet a number to pronounce.
4. For each cadet that spells their name correctly and provides the correct pronunciation for the number, give the group two points (one point for their name and one point for the number).
5. The group with the most points wins the game.

SAFETY

Nil.

ACTIVITY

Time: 10 min

OBJECTIVE

The objective of this game is to solve hangman words and phrases by asking for the letters and numbers phonetically.

RESOURCES

- Whiteboard, and
- Whiteboard markers.

ACTIVITY LAYOUT

Provide the cadets with a classroom or training area with a whiteboard placed visible to all the cadets.

ACTIVITY INSTRUCTIONS

1. Divide the class into two groups.
2. Choose a word or phase and write the number of blanks on the whiteboard (incorporate numbers into the word or phrase, eg. Mission Impossible 3).
3. Draw the frame for the man to be hung on.
4. Alternating groups, have each group choose a letter or number phonetically.
5. If the letter or number is in the word or phrase, write it in the proper blank.
6. If the letter is not in the word or phrase, draw the head on the frame and write the letter on the board so it does not get chosen again.
7. Continue drawing the head, body, arms, legs and feet each time a letter is not present in the word or phrase.
8. The first group to guess the word or phrase wins.
9. If the man is completely drawn before the word or phrase is guessed, both groups lose.
10. Repeat steps 3 to 9.

SAFETY

Nil.

END OF LESSON CONFIRMATION

The cadets' participation in the games will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Knowledge of the proper way to use the phonetic alphabet and numbers is essential to ensure radio messages are transmitted and understood. This knowledge ensures the proper use of voice procedures during familiarization flying, airport operations activities and aircrew survival training.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

A3-001 A-CR-CCP-263/PT001 *From the ground up: Millennium edition* (2000). Ottawa, ON: Aviation Publishers.

CHAPTER 13

PO 130 – PARTICIPATE IN AVIATION ACTIVITIES

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 1

EO M130.01 – IDENTIFY AIRCRAFT AS MILITARY, CIVILIAN AND CADET

Total Time:	60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Review all aircraft listed to determine if any have been acquired for / retired from service.

> The training aids for this EO can be presented in a number of ways, depending on the resources available at the squadron. Images of the aircraft are located at Attachment A in a MS Word document. If the squadron has the means to use a computer / projector, the aircraft images can be accessed from a PowerPoint presentation located at Attachment B.

Set up equipment for visual presentation for TPs 1–3.

Create enough sets of matching cards for TP 4 from the set located at Attachment B. It is recommended that the cards be printed in colour on heavy stock (450 g/m^2 / 120 lb) paper. Ensure matching cards are in complete sets.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for TPs 1–3 as it orients the cadets to aircraft, generates interest and presents basic information.

A game was selected for TP4 as it is a fun and challenging way to confirm the cadets' knowledge of the material.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have identified military, civilian and cadet aircraft.

IMPORTANCE

Basic aircraft identification creates a base of understanding for further aviation topics. It adds value to additional aviation activities such as aerodrome tours, air shows and familiarization flying. It also fosters an interest in the military and civilian aviation communities by introducing cadets to aircraft commonly found in those communities.

Teaching Point 1 | **Identify Canadian military aircraft.**

Time: 15 min | Method: Interactive Lecture

CANADIAN MILITARY AIRCRAFT

Military aircraft are used for a wide variety of tasks. These tasks include training, transport, maritime patrol, defence and search and rescue. Most military aircraft are painted flat grey or camouflage for low visibility. These high visibility planes used for Search and Rescue (SAR) work are painted bright yellow and red.

Select at least 11 aircraft to present during TP1 with at least one aircraft from each category. Present aircraft common to the cadets' community.

CANADIAN CARRIERS (TRANSPORT)

CC-115 Buffalo

The CC-115 Buffalo is mainly used for SAR operations. It has short take-off and landing (STOL) capability, which is ideal for rough landing strips. It is able to fly in almost any weather. The Buffalo is painted a highly visible yellow. It has two turboprop engines, high wings and a t-tail.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=2204-CX2005-0096-393a

Figure 1 CC-115 Buffalo

CC-130 HERCULES

The CC-130 Hercules is one of the most multipurpose transport planes. It is used to airlift troops, equipment and cargo. It is also used in SAR operations and in air-to-air refuelling of fighters. With its rear cargo ramp, rugged landing gear, good short-field performance and high ground clearance of engines / propellers, the C-130 is designed to operate from unimproved airstrips in active military areas. The Hercules has four turboprop engines, high wings and a distinctively large tail.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=1956-CX2005-0096-331a

Figure 2 CC-130 Hercules

CC-138 TWIN OTTER

The highly adaptable CC-138 Twin Otter is well suited for Canada's ever-changing northern climate and terrain. This STOL utility transport aircraft can land on water, land, snow and ice. Powered by twin turboprop engines, the Twin Otter is highly manoeuvrable and has a service ceiling of over 8 000 metres. It can be outfitted with wheels, skis or floats to land on virtually any surface. The CC-138 is used in SAR missions, and transport and support roles to the Canadian Forces' northern operations. It can carry up to 20 passengers or 2 999 kg of payload, and has a range of 1 427 km.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=4209-540-IMG0075

Figure 3 CC-138 Twin Otter

CC-144 CHALLENGER

The CC-144 Challenger, DND's twin-engine, long-range executive jet, offers rapid air transportation to Canadian and international VIPs. With a range of up to 5 930 km and a maximum speed of Mach 0.83, the Challenger can quickly deliver passengers almost anywhere in the world. The Air Force's Challenger fleet includes four VIP aircraft and two utility aircraft. The utility jets are used for military transport and can be configured for medical evacuations (medevacs) when troops are in need.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=4322-761-IMG0029

Figure 4 CC-144 Challenger

CC-150 A310 POLARIS

The CC-150 Polaris is the military version of a popular civilian commercial airliner, the Airbus A310-300. The main role of the Polaris is long-range transport of personnel and equipment. It can transport up to 194 passengers or 32 000 kg of cargo. The CC-150 is a wide-body, two engine turbojet with low wings.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=5687-2007-03-19-02HQ

Figure 5 CC-150 Polaris

CC-177 (C-17) GLOBEMASTER III

CC-177 Globemasters transport large amounts of passengers and equipment over long distances in response to domestic emergencies or international crises. It provides rapid strategic delivery of troops to cargo transport of oversized combat equipment from coast to coast and to anywhere in the world - including to troops in Afghanistan. The Globemaster can be flown with night vision goggles which give it tactical advantage when flying into threatening territory. Operated by a crew of three - pilot, co-pilot and loadmaster - the CC-177, with a payload of 160 000 pounds, can fly long distances and land in remote airfields, making it a premier transporter for military, humanitarian and peacekeeping missions. The CC-177 is able to take off and land on unpaved runways as short as 3 500 feet and as narrow as 90 feet wide during the day or night.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=8223-GD2008-0786-002

Figure 6 CC-177 Globemaster III

CANADIAN FIGHTERS (CF) (DEFENCE)

CF-188 (CF-18) Hornet

The CF-18 Hornet is a high-performance twin-engine jet fighter that can perform air-to-air combat or ground-attack roles. The most visible difference of the CF version of this aircraft is a paint scheme incorporating a “spoof” canopy on the underside of the front fuselage. This “spoof” canopy is used to confuse an opponent in the heat of a dogfight as to “which side is up”. The distinctive angled twin vertical fins on the tail most easily identify the CF-18.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=7356-BN2008-0094-19

Figure 7 CF-188 Hornet

CANADIAN HELICOPTERS (CH)

CH-124 SEA KING

A ship-borne maritime helicopter, the CH-124 Sea King’s compact design boasts a fold-up rotor and tail that help it fit on the smallest warship’s deck, and its amphibious hull lends it the ability to land on water. It is powered by two turboshaft engines and is equipped with subsurface acoustic detection equipment and homing torpedoes. The Sea King lifts off from destroyers and frigates to locate and destroy submarines. Capable of flying in day or night, the CH-124 is a versatile surveillance aircraft, contributing to SAR operations, disaster relief, counter-narcotic operations, and fisheries and pollution patrols. The Sea King is to be replaced by the CH-148 Cyclone.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=8197-SW2006-0343-66

Figure 8 CH-124 Sea King

CH-139 JET RANGER

This single-engine trainer is currently used at 3 Canadian Forces Flying Training School (3 CFFTS) in Portage la Prairie, Manitoba, where the Air Force’s helicopter trainees earn their wings. Side-by-side pilot seating makes the CH-139 ideal for training. Flight controls and doors are fitted at both positions, making them easily accessible to pilot and trainer alike. The passenger / cargo compartment is located immediately behind the cockpit, providing seating for three passengers or space for cargo.

http://www.airforce.forces.gc.ca/v2/equip/ch139/index-eng.asp

Figure 9 CH-139 Jet Ranger

CH-146 GRIFFON

The CH-146 Griffon is Canada's Utility Transport Tactical Helicopter (UTTH). It performs a wide variety of roles that includes airlift of equipment and personnel, command and liaison flights, surveillance and reconnaissance, casualty evacuation, logistic transport, SAR, counter-drug operations and domestic relief operations. The Griffon has a four-blade main rotor and landing skids. It has a camouflage paint scheme.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=7848-VH2007-0004-039

Figure 10 CH-146 Griffon

CH-147 CHINOOK

The CH-147 Chinook is a twin-engine medium-to-heavy-lift helicopter re-introduced as a Canadian aircraft first deployed with the Joint Task Force Afghanistan. The CH-147 Chinook is used for troop movement and transportation of equipment and supplies with a minimum range of 100 km at maximum loading in various climatic conditions. The CH-147 Chinook provides SAR support within Canada. It has the ability to provide timely response to national emergencies in both the eastern and western regions of the country assisting in emergency response to disasters such as floods, forest fires and earthquakes. The fleet will be based primarily at CFB Petawawa with CH-147 Chinook's supporting the Canadian Manoeuvre Training Center in Wainwright Alberta, being based at CFB Edmonton.

http://www.airforce.forces.gc.ca/v2/equip/ch147d/index-eng.asp

Figure 11 CH-147 Chinook

CH-148 CYCLONE

The CH-148 Cyclone will replace the CH-124 Sea King as Canada's main ship-borne maritime helicopter. The Cyclone will conduct Surface and Subsurface Surveillance and Control, utility and SAR missions. This twin-engine helicopter is compatible with the latest high-tech naval frigates and includes several new safety features. Its aluminum and composite airframe is built with lightning-strike and high-intensity radio frequency pulse protection. The CH-148 Cyclone has a day-and-night flight capability, and can fly in most weather conditions in temperatures ranging from minus 51 to plus 49 degrees Celsius. The CH-148 Cyclone can also fly 450 km without refuelling.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=3016-PMO06-0001-B

Figure 12 CH-148 Cyclone

CH-149 CORMORANT

The CH-149 Cormorant is a SAR helicopter. It has three powerful engines that drive a five-bladed rotor. Its ice protection system allows it to operate in continuous icing conditions. It is able to withstand high winds. These features make it ideal for Canada's demanding geography and climate. The CH-149 Cormorant has rear-ramp access and a large amount of cabin space. It can carry 12 stretchers or a load of 5 000 kg. Unlike the Griffon, the CH-149 Cormorant has retractable landing gear and is painted bright yellow.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=2857-ISD01-2009

Figure 13 CH-149 Cormorant

CANADIAN TRAINERS (CT)

CT-114 Tutor

The CT-114 Tutor may be the most well known aircraft flown by the Canadian Forces (CF). It is the plane flown in the Snowbirds air demonstration squadron. The CT-114 Tutor was used as a training aircraft from 1971 until 2000. It was designed and built in Canada. The CT-114 Tutor has a single jet engine, low wings and a t-tail.

http://www.airforce.forces.gc.ca/v2/equip/ct114/index-eng.asp

Figure 14 CT-114 Tutor

CT-142 DASH-8

Navigators from around the world come to Canada to train on the CT-142 Dash-8. At the Canadian Forces Air Navigation School (CFANS) in Winnipeg, MB, this twin turboprop aircraft is used to teach students aerial navigation and tactics. Designed and produced in Canada, the CT-142 is a conversion of the popular Dash-8 airliner. It was adapted for navigation training by manufacturer Bombardier Inc. in the late 1980s.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=2177-WG2002-0257-20a

Figure 15 CT-142 Dash-8

CT-155 HAWK

The CT-155 Hawk was selected for the North Atlantic Treaty Organization (NATO) Flying Training in Canada (NFTC) program because of its similarities to frontline fighter aircraft. Student pilots graduate from the CT-156 Harvard II to this highly advanced jet trainer. Its Rolls-Royce turbofan engine powers the jet to supersonic speeds. The Hawk's sophisticated glass cockpit features a heads-up display (HUD), hands-on throttle and stick (HOTAS) controls, and integrated navigation and targeting systems. The jet can perform a wide range of high performance training missions. NFTC students train on the Hawk during the program's final stage. Once they've logged 125 flight hours, Canada's student fighter pilots are ready to join 410 Squadron, the Operation Training Unit, which flies CF-18 Hornets.

http://www.airforce.forces.gc.ca/v2/equip/ct155/index-eng.asp

Figure 16 CT-155 Hawk

CT-156 HARVARD II

This agile turboprop trainer is the aircraft of choice for the early stages of NFTC program. The CT-156 has an initial climb rate of about 1 km per minute. It can handle sustained 2G turns at an altitude of 7 500 metres. The aircraft is ideally suited to help new pilots move seamlessly from basic flight training to high-performance jet training. Its performance, cockpit layout and ejection protocols mimic those of the CT-155 Hawk jet trainer.

http://www.airforce.forces.gc.ca/v2/equip/ct156/index-eng.asp

Figure 17 CT-156 Harvard II

CANADIAN PATROL (CP)

CP-140 Aurora

The CP-140 Aurora is a maritime patrol aircraft. It carries special sensing equipment so it can detect and monitor boats and submarines. The prominent tail boom is the most obvious feature of this aircraft. It has four turboprop engines and low wings.

http://www.airforce.forces.gc.ca/v2/netpub/index-eng.asp?rid=4412-824-IMG0001

Figure 18 CP-140 Aurora

CP-140A ARCTURUS

The CP-140A Arcturus is the sister aircraft to the CP-140 Aurora. The CP-140A Arcturus is used to monitor Canada's East Coast. This long-range patrol aircraft protects our coastlines from foreign threats and illegal activity. This aircraft also fulfills many of the same roles as the CP-140 Aurora: maritime surveillance, SAR operations, drug trafficking interdiction and territorial and sovereignty patrols. It is also used for pilot and crew training.

http://www.airforce.forces.gc.ca/v2/equip/resrc/images/hst/l-g/arcturus.jpg

Figure 19 CP-140A Arcturus

CONFIRMATION OF TEACHING POINT 1

Amend the questions and answers to include the aircraft discussed in TP1

QUESTIONS:

Q1. What aircraft is this? (Show CC-130 Hercules)

Q2. What aircraft is this? (Show CT-114 Tutor)

Q3. What aircraft is this? (Show CH-146 Griffon)

ANTICIPATED ANSWERS:

A1. Military, CC-130 Hercules.

A2. Military, CT-114 Tutor.

A3. Military, CH-146 Griffon.

Teaching Point 2	**Identify civilian aircraft.**
Time: 10 min	Method: Interactive Lecture

CIVILIAN AIRCRAFT

Civilian aircraft are used in a wide variety of roles including recreational, training, and transportation of people and cargo. Civilian aircraft have a wide range of paint schemes and use more colors than military aircraft. These aircraft are seen at civilian aerodromes.

Cessna 172

The Cessna 172 is commonly used for primary flight training and familiarization flying. It is a four seat aircraft that has high wings, tricycle landing gear and a single propeller.

http://www.airliners.net/search/photo.search?id=277285

Figure 20 Cessna 172

Piper PA-28 Cherokee

Another popular recreational and training aircraft is the Piper PA-28 Cherokee. This aircraft has low wings, tricycle landing gear and a single propeller.

http://www.airliners.net/search/photo.search?id=246912

Figure 21 Piper PA-28

Boeing 737

The Boeing 737 is one of the world's most popular commercial jet transport aircraft. It is a short- to medium-range airplane. They can carry 85 to 189 passengers, depending on the model. The Boeing 737 is flown by airlines including WestJet and Sunwing. The Boeing 737 has a low-wing configuration and tricycle landing gear, like most commercial transport planes. It has two turbofan jet engines mounted under the wings.

http://www.airliners.net

Figure 22 Boeing 737

Airbus A320

The Airbus A320 is a very popular commercial jet transport aircraft. They can carry 100 to 220 passengers, depending on the model. The Airbus 320 also has a low-wing configuration, nose gear, and two turbofan jet engines mounted under the wings. The biggest difference between the Airbus and the Boeing 737 is the technology in the cockpit. Airbus uses computer technology to a greater extent than Boeing. Air Canada flies the Airbus A320, and several other Airbus models.

http://www.airliners.net/search/photo.search?id=313545

Figure 23 Airbus A320

Bombardier 415

The Bombardier 415 amphibious aircraft is the backbone of firefighting missions around the world. Launched in 1994, this high-wing, all-metal amphibian remains the only aircraft specifically designed for aerial firefighting. Its proven technology and fire-extinguishing power make it an effective machine for the job. This aircraft may also be configured for humanitarian relief, maritime SAR, surveillance and personnel transport.

http://www.aircraftinformation.info/Images/Bombardier_415_02.jpg

Figure 24 Bombardier 415

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. What aircraft is this? (Show Piper PA-28)

Q2. What aircraft is this? (Show Boeing 737)

Q3. What aircraft is this? (Show Cessna 172)

ANTICIPATED ANSWERS:

A1. Civilian, Piper PA-28.

A2. Civilian, Boeing 737.

A3. Civilian, Cessna 172.

Teaching Point 3	**Identify cadet aircraft**
Time: 5 min	Method: Interactive Lecture

CADET AIRCRAFT

Cadet aircraft are used for training and familiarization flying. They are usually painted bright yellow and blue. (The term “cadet aircraft” is intended to mean aircraft currently owned by the cadet program and does not include other aircraft cadets may use on Power Flying Scholarships (other model Cessnas, Katanas, etc.).

GLIDER

Schweitzer - SGS 2-33a Glider

The Schweitzer SGS 233A is the glider used by the Air Cadet Gliding Program for training and familiarization flying. It is a sturdy, two-place tandem (front and back seating, instead of side by side) glider, with high wings. They can be launched by auto-tow, winch or tow-plane.

http://www.aircadetleague.com/manitoba/Gliding.html

Figure 25 SGS 233A Glider

TOW AIRCRAFT

Bellanca Scout – 8GCBC

The Bellanca Scout is one of the types of tow-planes used in the Air Cadet Gliding Program. It is a two-place tandem, high wing, tail-dragger aircraft.

http://www.aircadetleague.com/manitoba/Gliding.html

Figure 26 Bellanca Scout

L19 BIRD DOG – CESSNA 305 (C305)

The L19 Bird Dog is another tow-plane used in the Air Cadet Gliding Program. Like the Scout, the Bird Dog is a two-place tandem, high wing, tail-dragger aircraft. The L19 has a rear window, and more of a bend to the fuselage than the Scout.

http://www.aircadetleague.com/manitoba/Gliding.html

Figure 27 L19 Bird Dog

Cessna 182P

The Cessna 182P is another tow plane used in the Air Cadet Gliding Program. Like the Bird Dog, it has a rear window but has four seats instead of two. Unlike either the Scout or the Bird Dog, which are both tail-draggers, it has a tricycle landing gear.

http://www.cadets.ca/regions/pac/air-aviation.aspx?id=95360&terms=cadet+tow+plane

Figure 28 Cessna 182P

CONFIRMATION OF TEACHING POINT 3

QUESTIONS:

Q1. What aircraft is this? (Show L19 Bird Dog)

Q2. What aircraft is this? (Show Schweitzer SGS 233A)

Q3. What aircraft is this? (Show Bellanca Scout)

ANTICIPATED ANSWERS:

A1. Cadet, L19 Bird Dog.

A2. Cadet, Schweitzer SGS 233A.

A3. Cadet, Bellanca Scout.

Teaching Point 4 — **Conduct an aircraft identification game.**

Time: 25 min — Method: Game

OBJECTIVE

The objective of this activity is to have the cadets practice identifying military, civilian and cadet aircraft by participating in a memory matching game.

RESOURCES

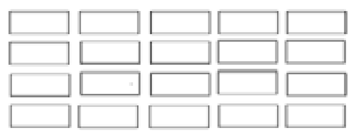
- One set of aircraft identification matching cards located at Attachment B per group.

ACTIVITY LAYOUT

Set up the classroom with large flat areas, one for each group, to play the game.

ACTIVITY INSTRUCTIONS

1. Divide cadets into groups of four or less.
2. Issue each group one set of aircraft identification matching cards. The cards should be laid out in a five by four grid, face down (as illustrated in Figure 30).



Note. Created by Director Cadets 3, 2009 Ottawa, ON: Department of National Defence.

Figure 29 Five by Four Card Grid

3. Have the first cadet turn two cards over:
   (a) if it is not a match, the cards are turned back face down and the turn passes to the next cadet.
   (b) if it is a match:
      (1) but the cadet is unable to identify the aircraft; the cards are turned back over and the turn passes to the next cadet; or
      (2) and the cadet identifies the aircraft; the cadet keeps the two cards, and takes another turn.
4. The game can be repeated as time allows, mixing up the cards.

Circulate among the groups to supervise and assist as necessary.

Answer questions the cadets have about the game.

Ensure cadets are able to correctly identify the matching pairs before removing them from the grid.

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 4

The cadets' participation in the game will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in the activity game will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK/READING/PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Aircraft identification is a fun way of getting involved in aviation. Cadets can apply this knowledge during aviation field trips, familiarization flying and any time they see aircraft.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

A3-007 Canadian Forces. (2009). Retrieved 24 Jul 2009, from http://www.airforces.forces.gc.ca/v2/equip/index-eng.asp

AIRCRAFT IDENTIFICATION MATCHING GAME CARDS





Canada

Canada




C-FCXU	C-FCXU
	


CANJET
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7


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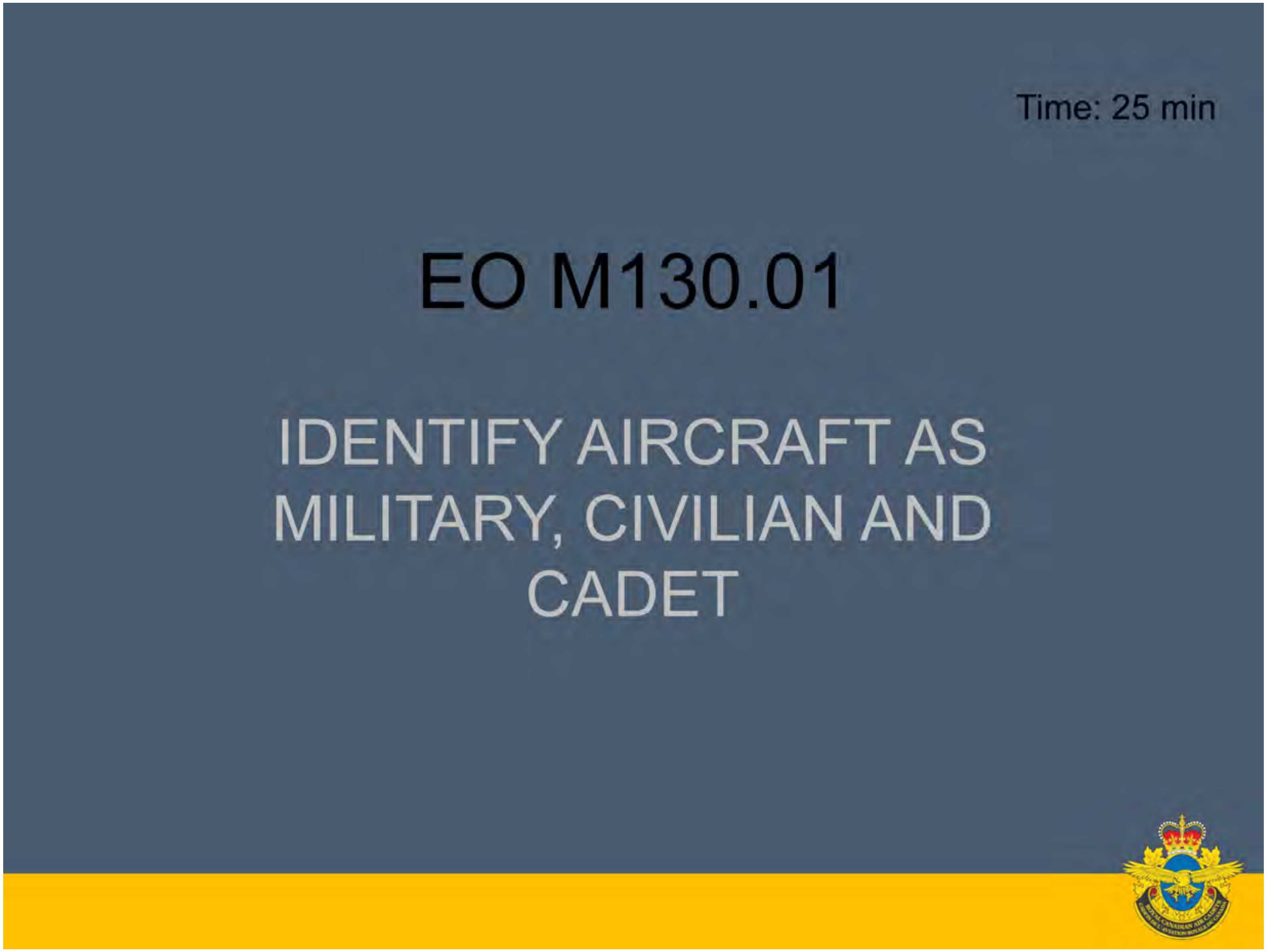
C-GSSD


4
C-GSSD

CC-115 Buffalo 	CC-130 Hercules 	CC-138 Twin Otter 	CC-144 Challenger 	CC-150 Polaris 
CC-177 Globemaster 	CF-188 Hornet 	CH-124 Sea King 	CH-139 Jet Ranger 	CH-146 Griffon 
CH-147 Chinook 	CH-148 Cyclone 	CH-149 Cormorant 	CT-114 Tutor 	CT-142 Dash-8 

CT-155 Hawk 	CT-156 Harvard II 	CP-140 Aurora 	CP-140A Arcturus 	Cessna 172 
Piper PA-28 Cherokee 	Boeing 737 	Airbus A320 	Bombardier 415 	Schweitzer SGS 2-33A 
	Bellanca Scout 	L19 Bird Dog – Cessna 305 (C305) 	Cessna 182P 	


Time: 25 min
EO M130.01
IDENTIFY AIRCRAFT AS MILITARY, CIVILIAN AND CADET

Military Aircraft Categories

- Carriers – CC (Transport)
- Fighters - CF
- Helicopters - CH
- Trainers - CT
- Patrol – CP

M130.01 – Identify Aircraft as Military, Civilian and Cadet

Carrier (Transport) Aircraft

- CC-115 Buffalo
- CC-130 Hercules
- CC-138 Twin Otter
- CC-144 Challenger
- CC-150 A320 Polaris
- CC-177 (C-17) Globemaster III

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CC-115 BUFFALO

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CC-130 HERCULES

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CC-138 TWIN OTTER

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CC-144 CHALLENGER

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CC-150 A320 POLARIS

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CC-177 (C-17) GLOBEMASTER III

M130.01 – Identify Aircraft as Military, Civilian and Cadet

Fighter Aircraft

- CF-188 (CF-18) Hornet

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CF-188 (CF-18) HORNET

M130.01 – Identify Aircraft as Military, Civilian and Cadet

Helicopters

- CH-124 Sea King
- CH-139 Jet Ranger
- CH-146 Griffon
- CH-147 Chinook
- CH-148 Cyclone
- CH-149 Cormorant

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CH-124 SEA KING

M130.01 – Identify Aircraft as Military, Civilian and Cadet


CH-139 JET RANGER
307
M130.01 – Identify Aircraft as Military, Civilian and Cadet


CH-146 GRIFFON
M130.01 – Identify Aircraft as Military, Civilian and Cadet

CH-147 CHINOOK

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CH-148 CYCLONE

M130.01 – Identify Aircraft as Military, Civilian and Cadet


CH-149 CORMORANT
M130.01 – Identify Aircraft as Military, Civilian and Cadet

Patrol Aircraft

- CP-140 Aurora
- CP-140A Arcturus

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CP-140 AURORA

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CP-140A ARCTURUS

M130.01 – Identify Aircraft as Military, Civilian and Cadet

Training Aircraft

- CT-114 Tutor
- CT-142 Dash-8
- CT-155 Hawk
- CT-156 Harvard II

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CT-114 TUTOR

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CT-142 DASH-8

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CT-155 HAWK

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CT-156 HARVARD II

M130.01 – Identify Aircraft as Military, Civilian and Cadet

WHAT KIND OF AIRCRAFT ARE THESE?

M130.01 – Identify Aircraft as Military, Civilian and Cadet

M130.01 – Identify Aircraft as Military, Civilian and Cadet

M130.01 – Identify Aircraft as Military, Civilian and Cadet

M130.01 – Identify Aircraft as Military, Civilian and Cadet

Civilian Aircraft

- Cessna 172
- Piper PA-28 Cherokee
- Boeing 737
- Airbus A320
- Bombardier 415

M130.01 – Identify Aircraft as Military, Civilian and Cadet

CESSNA 172

M130.01 – Identify Aircraft as Military, Civilian and Cadet

PIPER PA-28 CHEROKEE

M130.01 – Identify Aircraft as Military, Civilian and Cadet

BOEING 737

M130.01 – Identify Aircraft as Military, Civilian and Cadet

AIRBUS A320

M130.01 – Identify Aircraft as Military, Civilian and Cadet

BOMBARDIER 415

M130.01 – Identify Aircraft as Military, Civilian and Cadet


WHAT KIND
OF
AIRCRAFT
ARE THESE?
M130.01 – Identify Aircraft as Military, Civilian and Cadet

M130.01 – Identify Aircraft as Military, Civilian and Cadet

M130.01 – Identify Aircraft as Military, Civilian and Cadet

M130.01 – Identify Aircraft as Military, Civilian and Cadet

Cadet Aircraft

- Schweitzer SCG 2-33A
- Bellanca Scout 8 GCBC
- L19 Bird Dog – Cessna 305 (C305)
- Cessna 182P

M130.01 – Identify Aircraft as Military, Civilian and Cadet

SCHWEITZER SCG 2-33A

M130.01 – Identify Aircraft as Military, Civilian and Cadet

BELLANCA SCOUT 8 GCBC

M130.01 – Identify Aircraft as Military, Civilian and Cadet


L19 BIRD DOG – CESSNA 305
M130.01 – Identify Aircraft as Military, Civilian and Cadet

CESSNA 182P

M130.01 – Identify Aircraft as Military, Civilian and Cadet

WHAT KIND OF AIRCRAFT ARE THESE?

M130.01 – Identify Aircraft as Military, Civilian and Cadet

M130.01 – Identify Aircraft as Military, Civilian and Cadet

M130.01 – Identify Aircraft as Military, Civilian and Cadet

M130.01 – Identify Aircraft as Military, Civilian and Cadet

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 2

EO M130.02 – DESCRIBE THE MAIN COMPONENTS OF AN AIRPLANE

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Create enough puzzle envelopes for each group with puzzle pieces as outlined at Attachments A to D. It is recommended that the cards be printed on heavy stock (450 g/m^2 / 120 lb) paper.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for this lesson as it allows the cadets to identify and describe the major components of an airplane and it generates interest in the subject.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have described the main components of an airplane.

IMPORTANCE

A basic understanding of the components of an airplane provides a foundation for further aviation learning. It creates a familiarity that contributes to the cadets' appreciation of the familiarization flying and aviation tour experiences.

Before starting the class, split the cadets into groups as described in the activities. This allows for the class to be conducted within time limits.

Teaching Point 1 | **Define aircraft and airplane. Describe the fuselage.**

Time: 5 min | Method: Interactive Lecture

DEFINITIONS

Aircraft

"An aircraft is a device that is used or intended to be used for flight in the air. Some examples of aircraft are hot air balloons, blimps, gliders, planes, helicopters, and hang-gliders."

Aviation Safety Board, 2007.

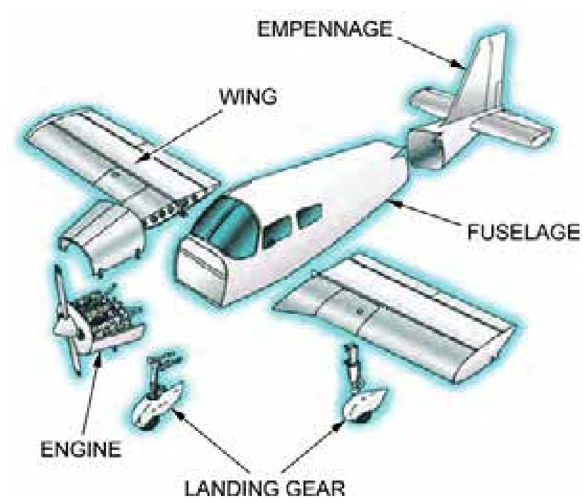
Airplane

"An airplane is a power-driven, heavier-than-air aircraft deriving its lift in flight from aerodynamic reactions (lift) on surfaces that remain fixed under given conditions of flight (wings)."

MacDonald, 2006.

FUSELAGE

The fuselage is the body of the aircraft, designed to accommodate the crew, passengers and cargo. The cockpit or crew flight deck is the part of the fuselage where the pilot and flight crew operate the aircraft. The fuselage is the structural body to which the wings, the tail section, landing gear and (in most small aircraft) the engine are attached.



Note: From Free Online Private Pilot Ground School. (2007). Private Pilot Ground School. Retrieved December 14, 2011 from http://www.free-online-private-pilot-ground-school.com/aircraft-structure.html

Figure 1 Airplane Components

ACTIVITY

Time: 1 min

OBJECTIVE

This objective of this activity is to familiarize the cadet with the five components of an airplane.

RESOURCES

Basic Airplane Component Puzzle Pieces, one set per group.

ACTIVITY LAYOUT

Divide the class into groups of four or less. Cadets will work in the same groups for all the puzzle activities.

ACTIVITY INSTRUCTIONS

1. Provide each group with an envelope of puzzle pieces.
2. Give the groups one minute to put together the puzzle.

SAFETY

Nil.

INSTRUCTOR GUIDELINES

- Confirm the puzzles are assembled correctly.
- Assist cadets experiencing difficulty with the activity.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in this activity will serve as confirmation of this TP.

Teaching Point 2	**Describe the wings.**
Time: 5 min	Method: Interactive Lecture

See Figure 1 – Airplane components to reference the location of these parts.

WINGS

The fuselage is fitted with a wing on each side. The primary purpose of the wings is to support the aircraft in flight by producing lift.

The **wing root** is where the wing meets the fuselage.

The **wing tip** is the part farthest from the fuselage.

The **leading edge** is the front edge of the wing running from wing root to wing tip. The trailing edge is the back edge of the wing running from wing root to wing tip.

Ailerons are moveable surfaces that are hinged to the trailing edge of each wing, close to the wingtip. The ailerons control roll. Roll is the banking of the aircraft to the left and the right. The ailerons move in opposite directions to each other.

Flaps are moveable surface that are hinged to the trailing edge of each wing, closer to the wing root than the ailerons. They can be used during landing and take-off to provide more controlled flight at slower airspeeds. Flaps are operated with a lever or hand-wheel in the cockpit.

ACTIVITY

Time: 1 min

OBJECTIVE

The objective of this activity is to familiarize the cadet with the fuselage and wings.

RESOURCES

Fuselage and Wing Puzzle Pieces, one set per group.

ACTIVITY LAYOUT

Cadets will work in the same groups as the previous puzzle activity.

ACTIVITY INSTRUCTIONS

1. Provide each group with an envelope of puzzle pieces.
2. Give the groups one minute to put together the puzzle.

SAFETY

Nil.

INSTRUCTOR GUIDELINES

- Confirm the puzzles are assembled correctly.
- Assist cadets experiencing difficulty with the activity.

CONFIRMATION OF TEACHING POINT 2

The cadets' participation in this activity will serve as confirmation of this TP.

Teaching Point 3	**Describe the empennage.**
Time: 5 min	Method: Interactive Lecture

EMPENNAGE

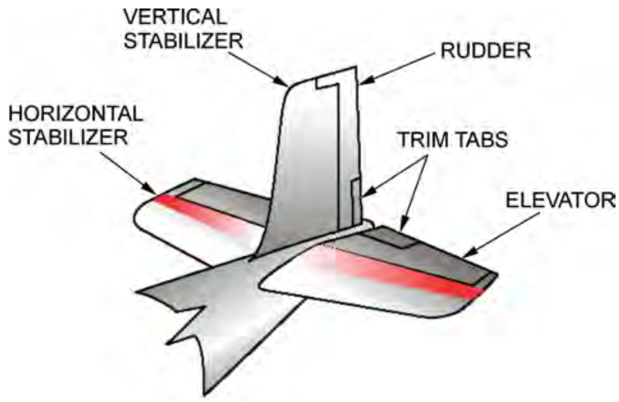
The empennage refers to the whole tail section of a plane. It includes the horizontal stabilizer, elevator, vertical stabilizer, and rudder.

The **horizontal stabilizer** is at the back of the aircraft, and helps keep the aircraft stable as it flies through the air. The horizontal stabilizer does not move.

The **elevator** is hinged to the horizontal stabilizer and is operated by moving the control column forward and backward. The elevator controls pitch. Pitch is the up and down movement of the aircraft's nose.

The **vertical stabilizer**, also called the fin, is an upright surface on the empennage. It helps keep the aircraft stable as it flies through the air. The vertical stabilizer does not move.

The **rudder** is hinged to the fin and is operated by the rudder pedals in the cockpit. The rudder controls yaw. Yaw is the side-to-side movement of the aircraft.



Note: From Free Online Private Pilot Ground School. (2007). Private Pilot Ground School. Retrieved December 14, 2011 from http://www.free-online-private-pilot-ground-school.com/aircraft-structure.html

Figure 2 Empennage Components

ACTIVITY

Time: 1 min

OBJECTIVE

The objective of this activity is to familiarize the cadet with the empennage.

RESOURCES

Empennage Puzzle Pieces, one set per group.

ACTIVITY LAYOUT

Cadets will work in the same groups as the previous puzzle activity.

ACTIVITY INSTRUCTIONS

1. Provide each group with an envelope of puzzle pieces.
2. Give the groups one minute to put together the puzzle.

SAFETY

Nil.

INSTRUCTOR GUIDELINES

- Confirm the puzzles are assembled correctly.
- Assist cadets experiencing difficulty with the activity.
- This puzzle will attach to the puzzle from TP2.

CONFIRMATION OF TEACHING POINT 3

The cadets' participation in this activity will serve as confirmation of this TP.

Teaching Point 4	**Describe the landing gear.**
Time: 5 min	Method: Interactive Lecture

LANDING GEAR

Landing gear on an airplane is like the tires on a car. The landing gear supports the aircraft when it is on the ground and absorbs the shock of landing. All aircraft have their landing gear under the main part of the fuselage or wings. Landing gear can be fixed or retractable. Fixed gear is attached to the airplane in a permanent position. Retractable gear can fold up into the wings or the fuselage.

There are two main landing gear configurations. Both configurations have the main wheels or main gear toward the middle of the aircraft. In a nose wheel configuration (also called tricycle) there is another wheel or gear under the nose. In a tail wheel configuration (also called conventional or tail dragger) there is another wheel or gear under the tail.

Note: From Bush-Planes.com. Best bush planes: flying. Retrieved December 14, 2011 from http://www.bush-planes.com/index.html

Figure 3 Nose Gear v. Tail Gear

CONFIRMATION OF TEACHING POINT 4

The cadets' participation in this activity will serve as confirmation of this TP.

Teaching Point 5	**Describe the propulsion system.**
Time: 5 min	Method: Interactive Lecture

PROPULSION SYSTEM

Power is produced by an internal combustion engine (the same as a car) with a two or three bladed propeller or a gas turbine (jet) engine. A jet can be used to power a propeller – this is called a turboprop engine.

The cowling (also called the nacelle) is like the hood of a car. It encloses the engine and streamlines the airplane to reduce drag. The cowling provides cooling of the engine by ducting cool air around the engine.

ACTIVITY

Time: 1 min

OBJECTIVE

This objective of this activity is to familiarize the cadet with the landing gear and propulsion system.

RESOURCES

Landing Gear and Propulsion System Puzzle Pieces, one set per group.

ACTIVITY LAYOUT

Cadets will work in the same groups as the previous puzzle activity.

ACTIVITY INSTRUCTIONS

1. Provide each group with an envelope of puzzle pieces.
2. Give the groups one minute to assemble the puzzle.

SAFETY

Nil.

INSTRUCTOR GUIDELINES

- Confirm the puzzles are assembled correctly.
- Assist cadets experiencing difficulty with the activity.
- This puzzle will attach to the puzzle from TP3.

CONFIRMATION OF TEACHING POINT 5

The cadets' participation in this activity will serve as confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in the activities will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING/PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Being able to describe the main components of an airplane gives the cadets the knowledge needed to appreciate and successfully participate in further aviation lessons.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

A3-001 A-CR-CCP-263/PT-001 *From the ground up: Millennium edition (28th edition)*. (2000). Ottawa, ON: Aviation Publishers.

C3-023 *Electronic Code of Federal Regulations Title 14: Aeronautics and Space, Section 1.1 (2005)*. Retrieved 25 April 2006 from www.ecfr.gpoaccess.gov

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C3-348 FAA-Aircraft-Certification.com. *Your complete guide to FAA aircraft certification*. (2007). Retrieved October 17, 2011, from http://www.faa-aircraft-certification.com/faa-definitions.html#H

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 3

EO M130.03 – CONSTRUCT A MODEL AIRPLANE

Total Time:	60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering this lesson.

Prepare a completed model airplane and collect model material and tools.

Photocopy Paper Model Assembly Instruction located at Attachment A and Attachment B, one for each cadet.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An in-class activity was chosen for TP 1 as it is an interactive way to present the content and the construction of a model airplane.

A group discussion was chosen for TP 2 as it allows the cadets to interact with their peers and share their knowledge about building a model airplane.

INTRODUCTION

REVIEW

The review for this lesson is EO M130.02.

OBJECTIVES

By the end of this lesson the cadet shall have constructed a model airplane.

IMPORTANCE

Cadets have learned to identify the components of an airplane. This knowledge will be useful during familiarization flights, hangar visits, and other aviation activities. Being able to construct a model airplane provides cadets a method of confirming their knowledge of airplane components.

Teaching Point 1 | **Construct a model airplane.**

Time: 45 min | Method: In-Class Activity

ACTIVITY

Time: 30 min

OBJECTIVE

The objective of this activity is to have the cadets construct a model airplane.

> The purpose of this model is to incorporate the major components as discussed in M130.02 – NOT to build a flying model. With the propeller and landing gear attached, this model will be too heavy to fly. The assembly time provided in this lesson does not allow sufficient drying time to produce an airworthy model. Aerodynamic features of assembly have been omitted for simplicity.

RESOURCES

- Paper model template (one per cadet),
- Instruction sheet located at Attachment A (one per cadet),
- Thumbtack (one per cadet),
- 1” binder clip (one per cadet),
- Scissors (one pair per cadet),
- Glue stick (one stick per two cadets), and
- Markers (to be shared by all cadets).

ACTIVITY LAYOUT

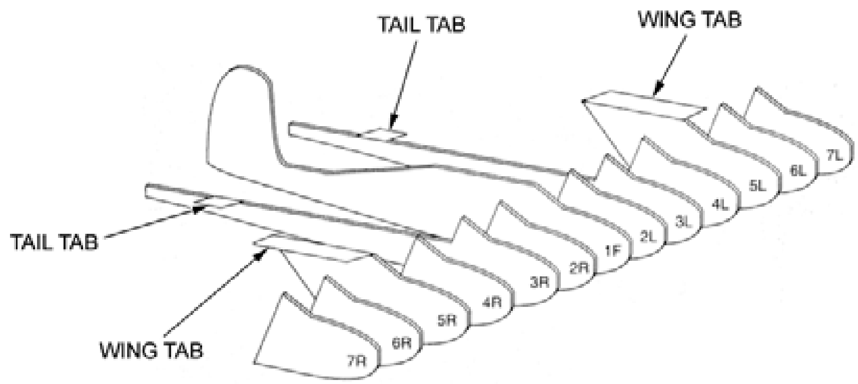
Nil.

> Supervise the cadets’ work to ensure that they are following the instructions provided.
>
> While supervising and assisting as needed, ask cadets to identify parts of the airplane.
>
> Ensure cadets identify the leading and trailing edges of the wings and attach the wings facing the correct direction
>
> Ask other instructors to assist in supervising the activity and assisting in answering questions.

ACTIVITY INSTRUCTIONS

1. Provide the cadets with the instructions sheet located at Attachment A.
2. Have the cadets cut out all the airplane pieces. Cadets must be careful not to mix their pieces with others around them.

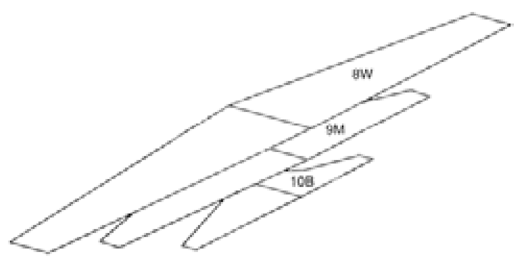
3. Have the cadets assemble the fuselage by gluing pieces 1F through 7R and 7L to build up fuselage layers, carefully aligning parts. Ensure that the entire contacting surface of a smaller piece being fastened to a larger one is completely covered with glue.



Adapted from Fabulous Paper Gliders

Figure 1 Fuselage Assembly

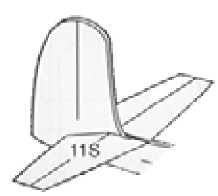
4. Have the cadets assemble the wings by gluing 9M to the bottom of wing part 8W. Glue 10B to the bottom of 9M making sure the wing parts are aligned along the centreline. Fold down the wing tabs on the fuselage, and apply glue to them. Fasten the wing assembly to the fuselage.



Adapted from Fabulous Paper Gliders

Figure 2 Wing Assembly

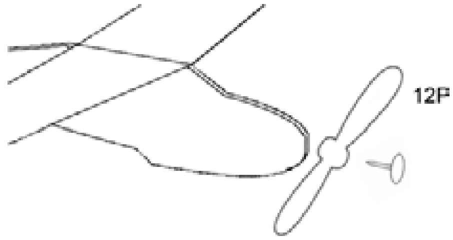
5. Have the cadets assemble the tail by folding down the tail tabs on the fuselage, and applying glue to them. Fasten the horizontal stabilizer 11S to the fuselage.



Adapted from Fabulous Paper Gliders

Figure 3 Tail Assembly

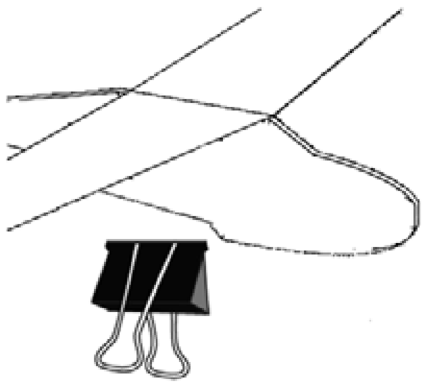
6. Have the cadets attach the propeller by piercing the centre of 12P with the thumbtack, and pushing the thumbtack into the centre of the fuselage assembly.



Adapted from Fabulous Paper Gliders

Figure 4 Propeller Assembly

7. Have the cadets attach the landing gear by clipping the binder clip to the bottom of the fuselage, underneath the wings.



Adapted from Fabulous Paper Gliders

Figure 5 Landing Gear Assembly

8. Have the cadets color the model as desired.

9. Have the cadets clean up, discarding all scrap paper and return materials.

Once the activity has been completed, examine the model airplanes to ensure that all of the components are assembled correctly.

SAFETY

Care should be taken when handling the thumbtacks, scissors, and glue.

INSTRUCTOR GUIDELINES

Nil.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in the assembly of an airplane will serve as the confirmation of this TP.

Teaching Point 2 — **Participate in a group discussion on parts of an airplane and constructing the model airplane.**

Time: 5 min — Method: Group Discussion

TIPS FOR ANSWERING/FACILITATING DISCUSSION:

- Ask questions that help facilitate discussion; in other words, avoid questions with yes or no answers.
- Prepare questions ahead of time.
- Be flexible (you are not bound to only the prepared questions).
- Encourage cadets to participate by using praise such as “great idea” or “excellent response, can anyone add to that?”.
- Try to involve everyone by directing questions to non-participants.

SUGGESTED QUESTIONS:

Q1. What did you learn about airplane parts from this activity?

Q2. How did this activity help you understand airplanes better?

CONFIRMATION OF TEACHING POINT 2

The cadets' participation in the group discussion will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

Review the components of an airplane with the following questions, using the model created by the cadets as a training aid. Point out the various components of an airplane discussed in the previous class.

SUGGESTED QUESTIONS:

Q1. What is the purpose of the landing gear?

Q2. Where are the ailerons located?

Q3. What movement does the rudder produce?

SUGGESTED ANSWERS:

A1. The landing gear supports the aircraft when it is on the ground and absorbs the shock of landing.

A2. Ailerons are hinged to the trailing edge of each wing, close to the wingtip. .

A3. The rudder controls the movement called yaw. Yaw is the side-to-side movement of the aircraft.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Model building is an excellent opportunity to apply theoretical knowledge. Being able to identify and describe the main components of an airplane allows the cadets to more actively participate aviation activities.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

A3-001 A-CR-CCP-263/PT-001 *From the Ground Up: Millennium Edition* (2000). Ottawa, ON: Aviation Publishers Co. Limited.

C3-017 ISBN 1-895569-23-0 Schmidt, N. (1998). *Fabulous Paper Gliders*. Sterling Publishing: New York, NY.

PAPER MODEL ASSEMBLY INSTRUCTIONS

1. Cut out all the airplane pieces. Be careful not to mix your pieces with others.

2. Glue pieces 1F through 7R and 7L to build up fuselage layers, carefully aligning parts. Ensure that the entire contacting surface of a smaller piece being fastened to a larger one is completely covered with glue.

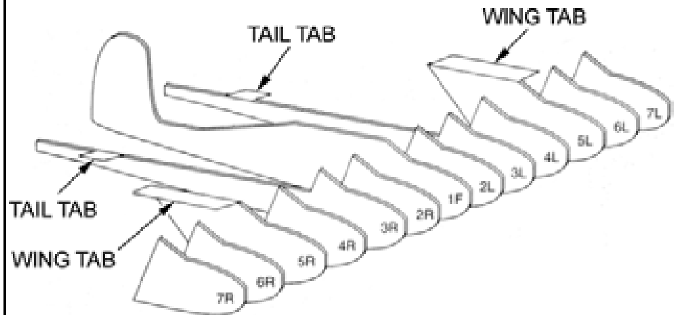


Figure A-1 Fuselage Assembly

3. To assemble the wings, glue 9M to the bottom of wing part 8W. Then glue 10B to the bottom of 9M. Make sure the wing parts are aligned along the centreline. Fold down the wing tabs on the fuselage, and apply glue to them. Fasten the wing assembly to the fuselage.

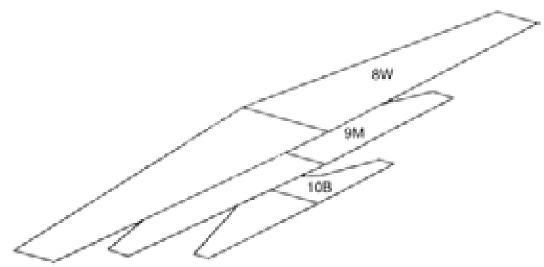


Figure A-2 Wing Assembly

4. To assemble the tail, fold down the tail tabs on the fuselage, and apply glue to them. Fasten the horizontal stabilizer 11S to the fuselage.

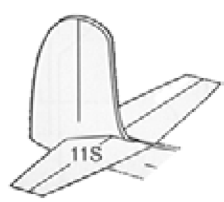


Figure A-3 Tail Assembly

5. To attach the propeller, pierce the centre of 12P with the thumbtack, and push the thumbtack into the centre of the fuselage assembly.

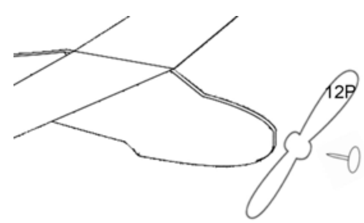


Figure A-4 Propeller Assembly

6. To attach the landing gear, clip the binder clip to the bottom of the fuselage, underneath the wings.

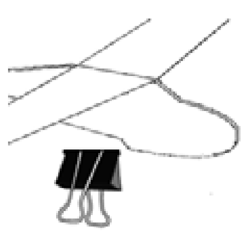


Figure A-5 Landing Gear Assembly

7. Color the model as desired.

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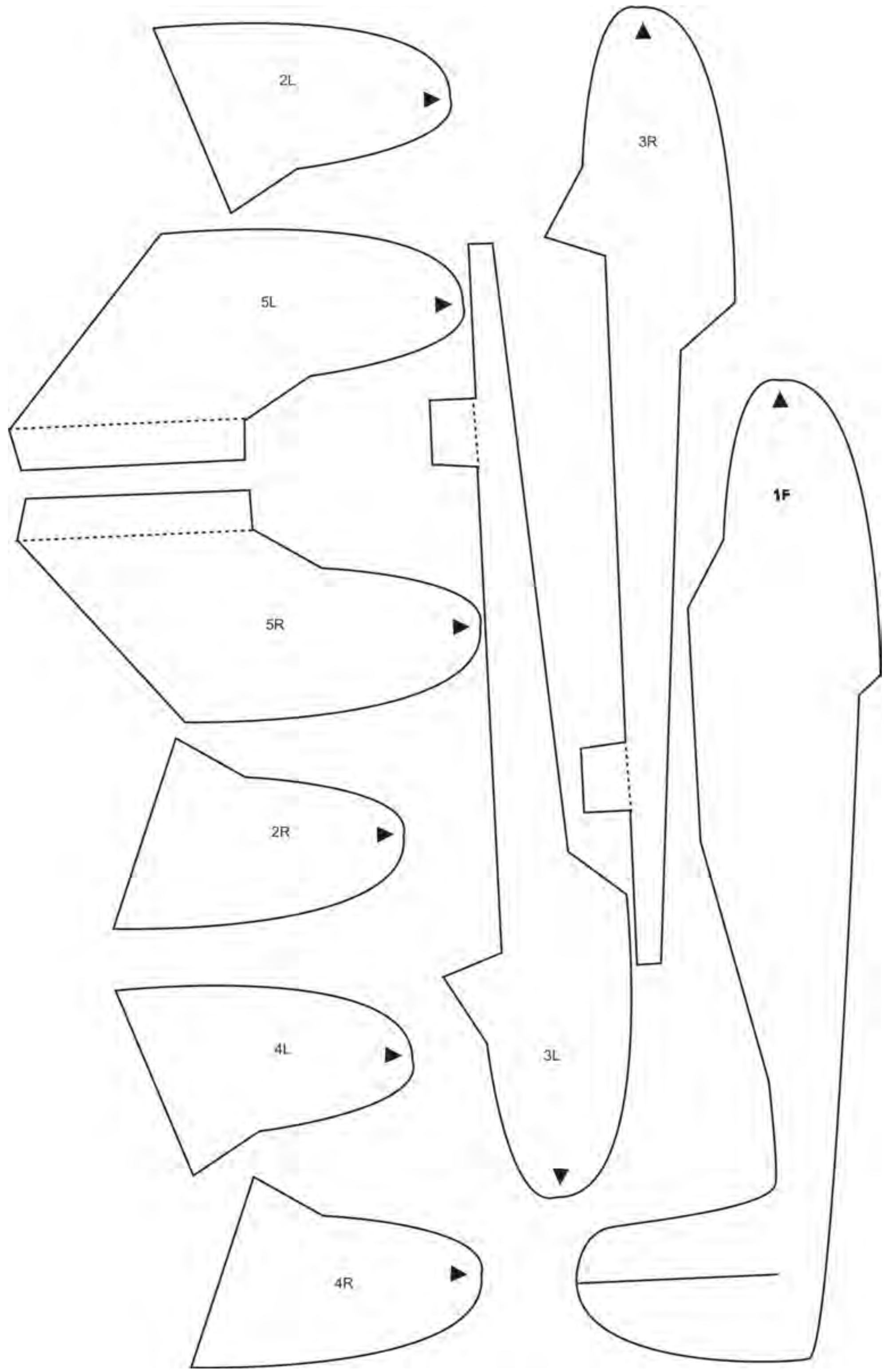
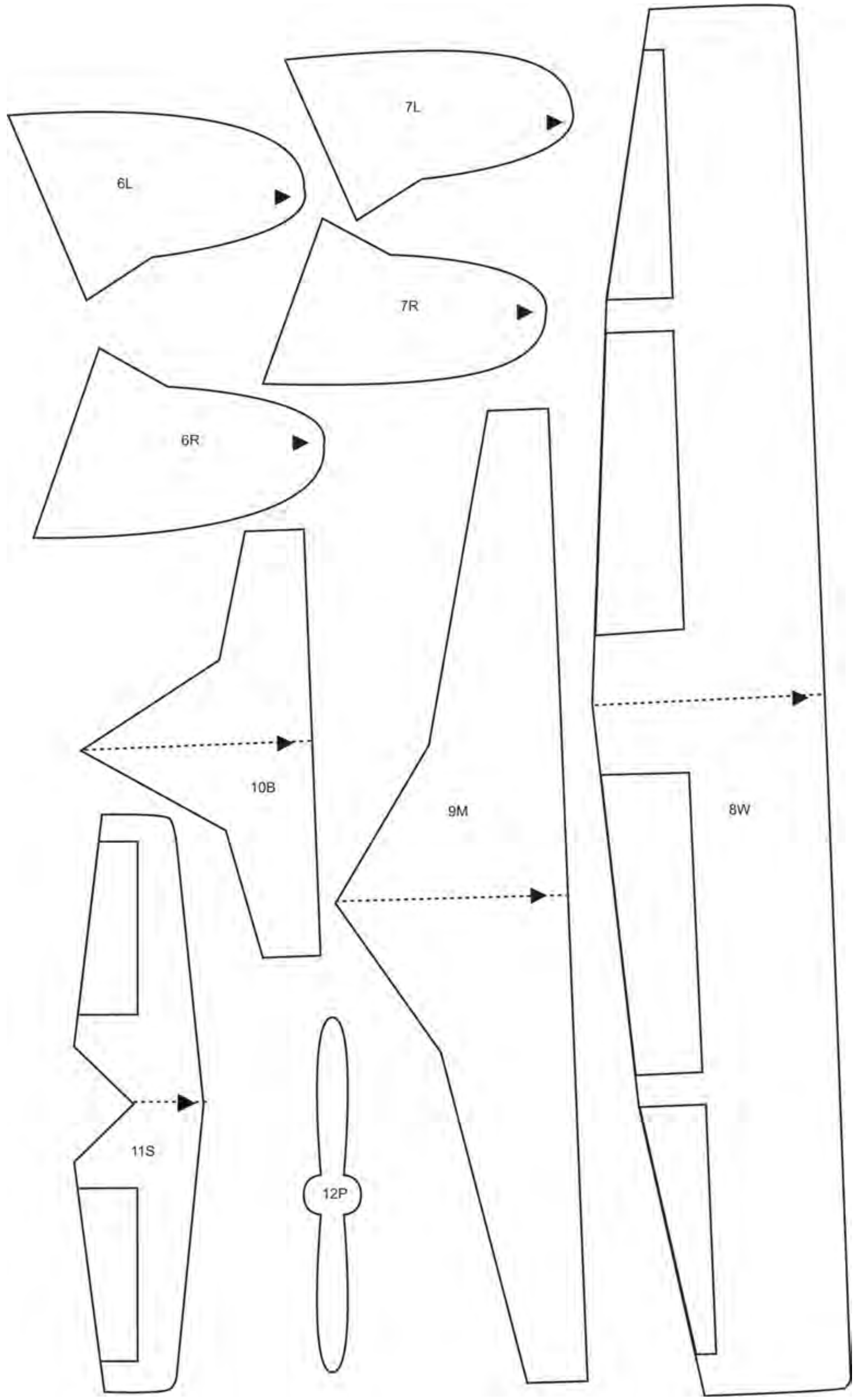

2L
3R
5L
1F
5R
2R
4L
3L
4R


7L
6L
7R
6R
10B
9M
8W
11S
12P

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 4

EO M130.04 – WATCH AN *ON CANADIAN WINGS* SEGMENT

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering this lesson.

Prepare a suitable classroom area with available media.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An in-class activity was chosen as it is an interactive way to present the content.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have watched an *On Canadian Wings* segment.

IMPORTANCE

Discovering Canadian aviation history will give cadets a better understanding of the current role of aviation in Canada. Knowledge gained in this lesson will assist in stimulating an interest in the RCAF.

Teaching Point 1 | **Watch an *On Canadian Wings* segment.**

Time: 25 min | Method: In-Class Activity

ACTIVITY

Time: 25 min

OBJECTIVE

The objective of this activity is to become familiar with Canadian aviation history through watching an episode of *On Canadian Wings*.

RESOURCES

Select one video segment. The video segments include the following information:

EPISODE: CANADA'S FIRST FLIGHT

The shaky flights of flying machines sow the seeds for military aviation. Soon hundreds of Canadian flying cadets are shown dashing around in their biplanes. Canada's first aircrews are on their way to war.

Length (00:13:26)

EPISODE: AERIAL WARFARE

Canadian aircrews serve in fighter squadrons at Dunkirk and go into action against German Zeppelins, seaplanes and U-boats. Canadian flying aces Major Billy Bishop, Major Raymond Collishaw and Major Billy Barker become household names.

Length (00:12:22)

EPISODE: THE BIRTH OF A NATIONAL AIR FORCE

With little fanfare, the RCAF comes into being on April 1, 1924. As war clouds loom over Europe, the new air force is on active service. The RCAF grows to the fourth largest air force of the allied nations.

Length (00:11:58)

EPISODE: THE AERODROME OF DEMOCRACY

Canadian squadrons see sustained combat in the Battle of Britain and help to keep the sea lanes from Canada to England open. RCAF schools across Canada train more than 150,000 Commonwealth air and groundcrews.

Length (00:12:48)

EPISODE: SOME OF THE FEW

Flying aces F/L Buzz Beurling, Wing Commander Johnnie Johnson and Flight Lt. D.E. Hornell are immortalized with a string of spectacular wartime successes.

Length (00:12:22)

EPISODE: BOMBS OVER EUROPE

The famous No. 6 Bomber Group is formed as the bomber offensive heats up over Europe. Squadron Leader Ian Bazalgette and Pilot Officer Andrew Mynarski each earned a Victoria Crosses (VC).

Length (00:12:55)

EPISODE: FAST TIMES FOR THE GOLDEN JETS

Canadian aircrews are again involved in combat over Korea. The Golden Hawks formation flying team of F86 Sabres – the Spitfires of the jet age, dazzle audiences around the world.

Length (00:12:37)

EPISODE: A TIME OF TRANSITION

Canada develops the Avro Arrow – a supersonic jet fighter that could out fly anything in the world. The Diefenbaker government mysteriously cancels the project and destroys all drawing and prototypes.

Length (00:11:57)

EPISODE: THERE SHALL BE WINGS

Canada's air force support North Atlantic Treaty Organization (NATO) and United Nations (UN) operations in the Balkans, the Middle East, Africa, Central America and Haiti, and humanitarian relief worldwide.

Length (00:13:00)

ACTIVITY LAYOUT

Arrange the room to ensure all cadets are able to see and hear the video segment.

ACTIVITY INSTRUCTIONS

1. Introduce the video segment to be shown.
2. Show the complete video segment.
3. Following the segment, have the cadets answer questions specific to the chosen segment.

SAFETY

Nil.

INSTRUCTOR GUIDELINES

Choose one of the following sets of questions to pose, based on the segment selected.

CONFIRMATION OF TEACHING POINT 1

SUGGESTED QUESTIONS:

Canada's First Flight

Q1. Who were the founding members of the Aerial Experimental Association?

Q2. What was the name of the aircraft they initially used?

Q3. In which year did the first aviation policy appear?

Q4. How many people were members of the Canadian aviation corps?

A1. Alexander Graham Bell, J.A.D. McCurdy, Casey Bothman.

A2. The Silver Dart.

A3. 1907.

A4. Three People.

Aerial Warfare

Q1. How long did the strategic bombing campaign last?

Q2. How many zeppelins were destroyed during World War 1 (WW 1)? How many by Canadians?

Q3. Who was Billy Bishop and what did he do?

A1. One Year.

A2. 12 destroyed, 6 of them by Canadians.

A3. Billy Bishop was one of the first Canadian aviation aces. He had 72 confirmed victories and was decorated with the Victoria Cross.

The Birth of a National Air Force

Q1. What major event occurred in 1920?

Q2. What was the goal of military aviation at that time?

Q3. Where was the largest pilot training camp situated?

Q4. In 1937 the RCAF was given a very precise mandate, what was that mandate?

A1. The CAF was dismantled.

A2. Cartography, medical evacuations, ice patrols, surveillance and fighting forest fires.

A3. Borden, Ontario.

A4. To defend Canadian airspace.

The Aerodrome of Democracy

Q1. What was Canada's role at the beginning of WW 2?

Q2. Most of the pilots were trained on which aircraft?

Q3. How many Squadrons were initially based in Halifax?

Q4. How many U-boats did the RCAF sink?

A1. Canada was an immense centre of pilot training for the Commonwealth nations.

A2. Tiger Moth.

A3. Five.

A4. Twenty-seven.

Some of the Few

Q1. Name the ace of Canadian aces during WW II?

Q2. Which Canadian squadron was victorious over the most enemy aircraft in 1944 and how many aircraft did they shoot down?

Q3. Name the two new types of aircraft used by Canada as the end of the war approached.

A1. Buzz Beurling.

A2. 418 Sqn with 103 confirmed victories.

A3. Mustang, Typhoon, and Mosquito.

Bombs over Europe

Q1. What was the first Canadian bomber Squadron and when was it created?

Q2. Which bombers did Canadians use?

Q3. Who was the commander of the first all-Canadian Squadron in Great Britain?

A1. 405 Sqn was formed in April 1941.

A2. Wellington, Halifax, Lancaster, Liberator, and Mosquito.

A3. Johnny Fauquier.

Fast times for the Golden Jets

Q1. In 1948, Canada acquired numerous aircraft. What were they and how many were acquired?

Q2. Canada was divided, due to resources, into several search and rescue regions. How many regions and how many aircraft were assigned to this task?

Q3. What was the name of the aircraft and the training base used in the formation of the first military aviation demonstration team?

Q4. Canada began the construction of its own all-Canadian aircraft. What was its name?

A1. Eighty-five Vampires.

A2. Five regions and 34 aircraft.

A3. Blue Devils flew Vampires at St-Hubert, Quebec (QC).

A4. CF-100 Canuck.

A Time of Transition

Q1. What aircraft was supposed to replace the CF-100?

Q2. Following the failure of the Avro Arrow, which aircraft did Canada buy?

Q3. What major event occurred in 1968?

Q4. New aircraft appeared during this period. Name at least 3 of them.

A1. The Avro Arrow.

A2. F-101 Voodoo.

A3. The unification of the three branches of the Canadian Forces.

A4. Caribou, Buffalo, Hercules, Tutor, Dassault Falcon, Sea King, and CF 5 Freedom Fighter.

There Shall be Wings

Q1. In which year was the aerial command group formed?

Q2. In which year did the first CF-18 (CF-188 Hornet) arrive in Canada?

Q3. How many Canadian CF-18s were sent to serve during the Gulf War?

A1. 1975.

A2. 1981.

A3. Twenty-four.

END OF LESSON CONFIRMATION

The cadet's participation in the activity will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Discovering Canadian aviation history will give cadets a better understanding of the current role of aviation in Canada. Knowledge gained in this lesson will assist in stimulating an interest in the RCAF.

INSTRUCTOR NOTES / REMARKS

The instructor shall choose only one segment to watch for the mandatory period.

The instructor may choose to view and discuss additional segments as part of complementary training, C130.03 (Watch an *On Canadian Wings* Segment).

REFERENCES

C3-039 Squires, C. (1999). *On Canadian wings* [Series]. Winnipeg, MB: PWGSC.

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 5

EO C130.01 – PARTICIPATE IN A WALK-AROUND AIRCRAFT INSPECTION

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Ensure access to single engine, non-high performance airplane.

Arrange for 1 qualified pilot per 10 cadets (maximum group size) to conduct the inspection.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An in-class activity was chosen for TP 1 as it is an interactive way to present a walk-around aircraft inspection.

A group discussion was chosen for TP 2 as it allows the cadets to interact with their peers and share their knowledge about and experience with walk-around aircraft inspection.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have participated in a walk-around aircraft inspection.

IMPORTANCE

Carefully inspecting an airplane before flight is one way the pilot ensures that the airplane is operational and safe. The walk-around inspection is an opportunity to apply knowledge of major airplane components. It is an introduction to the culture of safety that surrounds aviation.

Teaching Point 1 **Supervise a walk-around aircraft inspection.**

Time: 20 min Method: In-Class Activity

BACKGROUND KNOWLEDGE

This information is representative only. Always refer to and follow the recommendations of the manufacturer in carrying out any inspections and procedures. Individual models of airplane may have special procedures and inspection guidelines that may vary from the information given in this guide.

GENERAL

Flight safety includes the possession of knowledge, using common sense, and self-discipline. Thorough inspections and following established procedures allows a pilot to ensure that important safety considerations are not overlooked. One of these practices is conducting a walk-around inspection of the aircraft before a flight. The purpose of the walk-around is to notice any damage or condition that may pose a safety hazard to the flight. A walk-around can identify problems early in the flight preparation process, so that changes can be made if necessary (eg, minor repairs, changing aircraft, etc.). If any damage is noticed, it should be brought to the attention of an aircraft maintenance engineer, and noted in the aircraft's technical logbook. It is ultimately the pilot's decision whether an aircraft is in condition to fly. It is always better to make a decision on the side of safety, than to be caught in a potentially dangerous situation while flying.

CABIN

Before beginning the external inspection of the airplane, there are some preparatory things to be done inside the cabin.

Control locks should be removed. The control lock is a device that makes the control column / yolk immobile, so that the control surfaces (ailerons and elevators) do not move in the wind.

The pilot should ensure that the ignition is off, to avoid an unintended engine start.

The master switch controls power to the electrical systems in the airplane. The master switch should be turned on to supply power to the fuel gauges and the flaps. The fuel level indicated on the fuel gauges should be noted. This indicated level is cross-checked with a visual check of the actual fuel levels. The flaps should be fully lowered. The master switch should then be turned off to avoid draining the battery.

WINGS

Aircraft that are parked outside overnight are usually tied down to anchors beneath the wings and tail. The wing tie-downs should be removed from the airplane. There may be external control locks placed over the ailerons to prevent movement. These should be removed.

The flap sliders should be inspected to ensure secure attachment and minimal "play" or unwanted freedom of movement.

The aileron attachment points should be inspected to ensure security. The ailerons should be moved through their full range of motion to confirm correct and free movement.

All wing surfaces, the leading edge, and the trailing edge should be checked for dents, tears, cracks, wrinkles, bulges or missing rivets.

A small amount of fuel should be drained from the fuel tank drain valve and visually checked to see if there is any water or sediment in the fuel. Water appears as bubbles at the bottom of the cup as water is heavier than fuel. The fuel should also be checked to see that it is the correct fuel grade. Different grades of fuel are different colours. One hundred low lead is the fuel grade most commonly used in light aircraft, and is coloured blue.

The fuel levels should be visually confirmed by removing the fuel cap and using a dipstick. The fuel cap must be properly secured after checking the fuel.

The pitot tube is connected to the instruments in the cockpit. In order for it to work properly, it must be clear of obstructions.

FUSELAGE

The baggage compartment should be checked to see if there is anything stored there that may be required for the flight, such as a survival kit. Knowing what is on board the airplane is important for calculating the weight and balance.

All fuselage surfaces should be checked for dents, tears, cracks, wrinkles, bulges or missing rivets.

The static port is connected to the instruments in the cockpit. In order for it to work properly, it must be clear of obstructions.

EMPENNAGE

If the aircraft is tied down, the tie-downs from the tail must be removed. External control locks should be removed.

All empennage surfaces should be checked for dents, tears, cracks, wrinkles, bulges or missing rivets.

The rudder and elevator attachment points should be inspected to ensure security. The rudder and elevator should be moved through their full ranges of motion to confirm correct and free movement.

LANDING GEAR

Wheel chocks are used to keep the airplane from rolling while parked. They should be removed.

The wheels and brakes should be checked to ensure there is no excessive wear or fluid leaks.

The tires should be checked to ensure they are properly inflated and there are no signs of excessive wear or damage.

ENGINE

Extra caution should always be exercised around the propeller arc. The propeller should be checked for damage or evidence of a propeller strike. This could indicate damage to the engine.

The openings to the cowling should be checked for obstructions, particularly bird or animal nests.

The oil level is checked with a dipstick, and should be within the prescribed limits. The cap and dipstick must be secured after checking the oil.

A small amount of fuel should be drained from the main fuel strainer to clear any water or sediment that may have accumulated.

ACTIVITY

Time: 20 min

The cadets should be guided through a complete walk-around inspection. The instructor / pilot should cover all of the relevant information provided in the background information section of this guide.

OBJECTIVE

The objective of this activity is designed to familiarize the cadet with the procedures of a walk-around aircraft inspection.

RESOURCES

- Single engine, non-high performance airplane,
- Operator's manual inspection checklist for the aircraft type,
- Fuel dipstick, and
- Fuel drain cup.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into groups of ten or less. Brief all cadets on the safety guidelines before beginning the inspection.
2. If there is more than one group inspecting one plane, they should start at opposite points (eg, opposite wings, or nose and tail).
3. Have the groups walk around and conduct an aircraft inspection.

SAFETY

- Caution should always be exercised around the propeller arc.
- Indentify boundaries.
- Only the aircraft involved in the lesson can be touched.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in the activity will serve as the confirmation of this TP.

Teaching Point 2 — **Lead a group discussion about what the cadets learned and found interesting.**

Time: 5 min — Method: Group Discussion

BACKGROUND INFORMATION

Background Information

You have had the opportunity to participate in a walk-around aircraft inspection during which you saw the process to inspection various parts of the aircraft. The walk-around aircraft inspection can identify problems that require minor repairs or changing the aircraft that is not serviceable.

DISCUSSION QUESTIONS

TIPS FOR ANSWERING / FACILITATING DISCUSSION:

- Establish ground rules for discussion, eg, everyone should listen respectfully; don't interrupt; only one person speaks at a time; no one's ideas should be made fun of; you can disagree with ideas but not with the person; try to understand others as much as you hope they understand you; etc.
- Sit the group in a circle, making sure all cadets can be seen by everyone else.
- Ask questions that will provoke thought; in other words avoid questions with yes or no answers.
- Manage time by ensuring the cadets stay on topic.
- Listen and respond in a way that indicates you have heard and understood the cadet. This can be done by paraphrasing their ideas.
- Give the cadets time to respond to your questions. Ensure every cadet has an opportunity to participate. One option is to go around the group and have each cadet answer the question with a short answer. Cadets must also have the option to pass if they wish.
- Additional questions should be prepared ahead of time.

Cadets can be divided into more than one group to conduct the group discussion. This enables all cadets the opportunity to participate in the discussion if the initial group is too large. Assistant instructors will be needed to conduct this activity.

SUGGESTED QUESTIONS:

Q1. Why is it important to conduct a walk-around aircraft inspection?

Q2. What would a pilot do if damage to the airplane is noticed?

Q3. How would a pilot change the walk-around procedure if the pilot was in a hurry to go flying?

(The pilot wouldn't! Procedures, checklists, and inspections are too important!)

Other questions and answers will develop throughout the discussion stage. The group discussion should not be limited to the suggested questions.

Reinforce those answers given and comments made during the group discussion, ensuring the teaching point is covered. Cadets should be given time to share information, experiences and feelings about the aircraft inspection.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

The walk-around inspection is one of the procedures followed to ensure the safety of a flight. Carefully following procedures on every flight is very important to ensure nothing is overlooked. Safety is paramount in aviation.

INSTRUCTOR NOTES / REMARKS

This lesson should be conducted by a qualified pilot / in conjunction with familiarization flying.

REFERENCES

A3-001 A-CR-CCP-263/PT-001 *From the ground up: Millennium edition (28th edition)*. (2000). Ottawa, ON: Aviation Publishers.

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 6

EO C130.02 – IDENTIFY INTERNATIONAL AIRCRAFT

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Prepare PowerPoint presentation or a slideshow with pictures located at Attachment A.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for this lesson to orient the cadets to identifying international aircraft and generate interest.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have identified international aircraft.

IMPORTANCE

Being able to identify international aircraft supports the aim of stimulating an interest in the aviation community. Cadets can use this knowledge when visiting an aerodrome, at a local air show, or while attending a CSTC.

Teaching Point 1	**Describe American aircraft.**
Time: 15 min	Method: Interactive Lecture

F/A-22A RAPTOR

The F/A-22A Raptor is the United States Air Force's (USAF) newest fighter aircraft. Its combination of stealth, supercruise, manoeuvrability and integrated avionics represents an exceptional leap in war fighting capabilities. Its primary role is air dominance. The Raptor performs both air-to-air and air-to-ground missions. Also, it produces more thrust than any current fighter. The combination of the increased thrust and its unique aerodynamic design allows the aircraft to cruise at supersonic speeds without using afterburner. The Raptor is manufactured by Lockheed-Martin and is powered by two Pratt & Whitney F119-PW-100 turbofan engines with afterburners.

United States Air Force website, http://www.af.mil

Figure 1 F/A-22A Raptor

United States Air Force website, http://www.af.mil

Figure 2 F/A-22A Raptor

A-10 THUNDERBOLT II

The A-10 Thunderbolt II is the first USAF aircraft specially designed for close air support of ground forces. The A-10 can be used against all ground targets including tanks and other armoured vehicles. Its wide combat radius and short takeoff and landing capability permit operations in and out of locations near front lines. The Thunderbolt is distinguished by its 30mm GAU-8/A Gatling gun. This weapon is mounted on the nose, can fire 3 900 rounds per minute and can defeat an array of armoured vehicles. The A-10 is manufactured by Fairchild Republic Company and is powered by two General Electric TF34-GE-100 turbofans mounted high on the rear of the aircraft.

United States Air Force website, http://www.af.mil

Figure 3 A-10 Thunderbolt II

United States Air Force website, http://www.af.mil

Figure 4 A-10 Thunderbolt II

F-117A NIGHTHAWK

The F-117A Nighthawk is the world's first operational aircraft designed to use low observable stealth technology. This technology allows the aircraft to not be easily detected by radar. This precision strike aircraft penetrates high threat airspace and uses laser-guided weapons systems against critical targets. The Nighthawk created a revolution in military warfare by incorporating low observable technology into operational aircraft. It has a sleek design that allows for its stealth technology to be very effective. The F-117A is manufactured by Lockheed-Martin and is powered by two GE F404 non-afterburning engines.

United States Air Force website, http://www.af.mil

Figure 5 F-117A Nighthawk

United States Air Force website, http://www.af.mil

Figure 6 F-117A Nighthawk

B-52 STRATOFORTRESS

The B-52 is a long-range heavy bomber that can perform a variety of missions. The bomber is capable of flying at high subsonic speeds at altitudes up to 50 000 feet. It can carry nuclear or precision-guided weapons. The B-52 is a large aircraft with a length of 159 feet 4 inches and a wingspan that measures 185 feet. The Stratofortress is manufactured by Boeing Military Airplane Company and is powered by eight Pratt & Whitney TF33-P-3/103 turbofan engines.

United States Air Force website, http://www.af.mil

Figure 7 B-52 Stratofortress

United States Air Force website, http://www.af.mil

Figure 8 B-52 Stratofortress

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. What is distinctive about the A-10 Thunderbolt II?

Q2. What type of weapons systems does the F-117A Nighthawk use against critical targets?

Q3. How long is the wingspan of the B-52 Stratofortress?

ANTICIPATED ANSWERS:

A1. The nose mounted 30mm Gatling gun.

A2. Laser guided.

A3. One hundred and eighty-five feet.

Teaching Point 2	**Describe British aircraft.**
Time: 5 min	Method: Interactive Lecture

EF-2000 TYPHOON

The Typhoon is an agile, single seat, multi-role aircraft optimized for high altitude supersonic air combat. It is also capable of operating at lower levels in an air-to-ground role. Its low weight and high thrust means it can reach 36 000 feet in less than two minutes from a standing start. The engine intake is mounted on the bottom of the fuselage. A tall sharply swept tail is at the rear of the fuselage with twin-engine pipes directly below. The Typhoon is manufactured by Eurofighter and is powered by two Eurojet EJ200 turbofan engines.

Royal Air Force image website, http://www.defenceimages.mod.uk

Figure 9 EF-2000 Typhoon

Royal Air Force image website, http://www.defenceimages.mod.uk

Figure 10 EF-2000 Typhoon

Royal Air Force image website, http://www.defenceimages.mod.uk

Figure 11 EF-2000 Typhoon

JAGUAR GR3

The Jaguar is a dual-role advanced operational trainer and tactical support aircraft. It is a fighter-bomber that is capable of using 1 000 lb general-purpose bombs that are guided to their targets by lasers. The Jaguar has a long sleek fuselage with a large swept tail fin and rudder. It has short-span swept wings that are mounted on top of the fuselage. The internal jet engines have intakes on either side of the fuselage behind the cockpit. The raised bubble canopy is set above the sharply pointed nose. The Jaguar is manufactured by Sepecat and is powered by two Rolls-Royce Adour turbofan engines.

Airliners.net, http://www.airliners.net

Figure 12 Jaguar GR3

Airliners.net, http://www.airliners.net

Figure 13 Jaguar G3

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. Where is the Typhoon's sharply swept tail located?

Q2. Where is the engine intake mounted on the Typhoon?

Q3. Where is the canopy located on the GR3 Jaguar?

ANTICIPATED ANSWERS:

A1. At the rear of the upper fuselage.

A2. On the underside of the fuselage.

A3. Above the sharply pointed nose.

Teaching Point 3	**Describe Russian aircraft.**
Time: 5 min	Method: Interactive Lecture

MIG-29 FULCRUM

The MiG-29 Fulcrum is an all weather, single seat fighter interceptor flown by the Russian Air Force. The MiG-29's wings are swept back and tapered with square tips. It is equipped with twin jet engines mounted low and to the sides of the fuselage. Diagonal shaped air intakes give the aircraft a box like appearance. The fuselage is made of a long, thin, slender body. The MiG-29 is manufactured by the Moscow Air Production Organization and is powered by two Klimov / Sarkisov RD-33 turbofans.

Airliners.net, http://www.airliners.net

Figure 14 MiG-29 Fulcrum

Airliners.net, http://www.airliners.net

Figure 15 MiG-29 Fulcrum

ANTONOV AN-124-100

The Antonov AN-124-100 is a civil certified long-range commercial freighter. It is widely used for the carriage of outsize and very heavy pieces of air cargo that other aircraft cannot accommodate. Pieces of cargo have included the space launcher, satellites, helicopters, large wheeled vehicles and a 109 tonne locomotive. The AN-124 has the largest payload and the largest interior of any airplane in the world. It features a double deck fuselage layout with the upper deck containing the cockpit and personnel compartments. The lower deck is a massive pressurized cargo compartment. The AN-124 is manufactured by O.K. Antonov and is powered by four D-18T series 3 engines.

Airliners.net, http://www.airliners.net

Figure 16 Antonov AN-124-100

Airliners.net, http://www.airliners.net

Figure 17 Antonov AN-124-100

CONFIRMATION OF TEACHING POINT 3

QUESTIONS:

Q1. How are the MiG-29 Fulcrum's wings shaped?

Q2. What is the MiG-29's fuselage made of?

Q3. Name one of the large pieces of cargo the AN-124 has carried.

ANTICIPATED ANSWERS:

A1. Swept back and tapered with square tips.

A2. A long, thin, slender body.

A3. The space launcher, satellites, helicopters, large wheeled vehicles and a 109 tonne locomotive.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Cadets have identified American, British and Russian aircraft. Being able to identify these aircraft supports the aim of stimulating an interest in the aviation community. Cadets can use this knowledge when visiting an aerodrome, when at a local air show, or while attending CSTC training.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

C3-009 *United States Air Force*. (2006). Retrieved March 21, 2006, from http://www.af.mil/factsheets.asp

C3-010 *Royal Air Force*. (2006). Retrieved March 20, 2006, from http://www.raf.mod.uk/equipment.html

C3-011 *Federation of American Scientists*. (2006) Retrieved March 21, 2006, from http://www.fas.org/nuke/guide/russia/airdef/mig-29.htm

C3-012 *Antonov airlines*. (2006). Retrieved March 21, 2006, from http://www.antonovairlines.co.uk/antonov/military-logistics/antonov-124.asp


AFRC
NO


www.DefenceImages.mod.uk


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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 7

EO C130.03 – WATCH AN *ON CANADIAN WINGS* SEGMENT

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering this lesson.

Prepare a suitable classroom area with available media.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An in-class activity was chosen for this lesson as it is an interactive way to present the content.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have watched an *On Canadian Wings* segment.

IMPORTANCE

Discovering Canadian aviation history will give cadets a better understanding of the current role of aviation in Canada. Knowledge gained in this lesson will assist in stimulating an interest in the RCAF.

Teaching Point 1 — **Watch an *On Canadian Wings* segment.**

Time: 25 min — Method: In-Class Activity

ACTIVITY

Time: 25 min

OBJECTIVE

The objective of this activity is to become familiar with Canadian aviation history through watching an episode of *On Canadian Wings*.

RESOURCES

Select one video segment. The video segments include the following information:

EPISODE: CANADA'S FIRST FLIGHT

The shaky flights of flying machines sow the seeds for military aviation. Soon hundreds of Canadian flying cadets are shown dashing around in their biplanes. Canada's first aircrews are on their way to war.

Length (00:13:26)

EPISODE: AERIAL WARFARE

Canadian aircrews serve in fighter squadrons at Dunkirk and go into action against German Zeppelins, seaplanes and U-boats. Canadian flying aces Major Billy Bishop, Major Raymond Collishaw and Major Billy Barker become household names.

Length (00:12:22)

EPISODE: THE BIRTH OF A NATIONAL AIR FORCE

With little fanfare, the RCAF comes into being on April 1, 1924. As war clouds loom over Europe, the new air force is on active service. The RCAF grows to the fourth largest air force of the allied nations.

Length (00:11:58)

EPISODE: THE AERODROME OF DEMOCRACY

Canadian squadrons see sustained combat in the Battle of Britain and help to keep the sea lanes from Canada to England open. RCAF schools across Canada train more than 150,000 Commonwealth air and groundcrews.

Length (00:12:48)

EPISODE: SOME OF THE FEW

Flying aces F/L Buzz Beurling, Wing Commander Johnnie Johnson and Flight Lt. D.E. Hornell are immortalized with a string of spectacular wartime successes.

Length (00:12:22)

EPISODE: BOMBS OVER EUROPE

The famous No. 6 Bomber Group is formed as the bomber offensive heats up over Europe. Squadron Leader Ian Bazalgette and Pilot Officer Andrew Mynarski each earned a Victoria Crosses (VC).

Length (00:12:55)

EPISODE: FAST TIMES FOR THE GOLDEN JETS

Canadian aircrews are again involved in combat over Korea. The Golden Hawks formation flying team of F86 Sabres – the Spitfires of the jet age, dazzle audiences around the world.

Length (00:12:37)

EPISODE: A TIME OF TRANSITION

Canada develops the Avro Arrow – a supersonic jet fighter that could out fly anything in the world. The Diefenbaker government mysteriously cancels the project and destroys all drawing and prototypes.

Length (00:11:57)

EPISODE: THERE SHALL BE WINGS

Canada's air force support North Atlantic Treaty Organization (NATO) and United Nations (UN) operations in the Balkans, the Middle East, Africa, Central America and Haiti, and humanitarian relief worldwide.

Length (00:13:00)

ACTIVITY LAYOUT

Arrange the room to ensure all cadets are able to see and hear the video segment.

ACTIVITY INSTRUCTIONS

1. Introduce the video segment to be shown.
2. Show the complete video segment.
3. Following the session, have the cadets answer questions specific to the chosen segment.

SAFETY

Nil.

INSTRUCTOR GUIDELINES

Choose one of the following sets of questions to pose, based on the segment selected.

CONFIRMATION OF TEACHING POINT 1

SUGGESTED QUESTIONS:

Canada's First Flight

Q1. Who were the founding members of the Aerial Experimental Association?

Q2. What was the name of the aircraft they initially used?

Q3. In which year did the first aviation policy appear?

Q4. How many people were members of the Canadian aviation corps?

A1. Alexander Graham Bell, J.A.D. McCurdy, Casey Bothman.

A2. The Silver Dart.

A3. 1907.

A4. Three People.

Aerial Warfare

Q1. How long did the strategic bombing campaign last?

Q2. How many zeppelins were destroyed during World War 1 (WW 1)? How many by Canadians?

Q3. Who was Billy Bishop and what did he do?

A1. One Year.

A2. 12 destroyed, 6 of them by Canadians.

A3. Billy Bishop was one of the first Canadian aviation aces. He had 72 confirmed victories and was decorated with the Victoria Cross.

The Birth of a National Air Force

Q1. What major event occurred in 1920?

Q2. What was the goal of military aviation at that time?

Q3. Where was the largest pilot training camp situated?

Q4. In 1937 the RCAF was given a very precise mandate, what was that mandate?

A1. The CAF was dismantled.

A2. Cartography, medical evacuations, ice patrols, surveillance and fighting forest fires.

A3. Borden, Ontario.

A4. To defend Canadian airspace.

The Aerodrome of Democracy

Q1. What was Canada's role at the beginning of WW 2?

Q2. Most of the pilots were trained on which aircraft?

Q3. How many Squadrons were initially based in Halifax?

Q4. How many U-boats did the RCAF sink?

A1. Canada was an immense centre of pilot training for the Commonwealth nations.

A2. Tiger Moth.

A3. Five.

A4. Twenty-seven.

Some of the Few

Q1. Name the ace of Canadian aces during WW II?

Q2. Which Canadian squadron was victorious over the most enemy aircraft in 1944 and how many aircraft did they shoot down?

Q3. Name the two new types of aircraft used by Canada as the end of the war approached.

A1. Buzz Beurling.

A2. 418 Sqn with 103 confirmed victories.

A3. Mustang, Typhoon, and Mosquito.

Bombs over Europe

Q1. What was the first Canadian bomber Squadron and when was it created?

Q2. Which bombers did Canadians use?

Q3. Who was the commander of the first all-Canadian Squadron in Great Britain?

A1. 405 Sqn was formed in April 1941.

A2. Wellington, Halifax, Lancaster, Liberator, and Mosquito.

A3. Johnny Fauquier.

Fast times for the Golden Jets

Q1. In 1948, Canada acquired numerous aircraft. What were they and how many were acquired?

Q2. Canada was divided, due to resources, into several search and rescue regions. How many regions and how many aircraft were assigned to this task?

Q3. What was the name of the aircraft and the training base used in the formation of the first military aviation demonstration team?

Q4. Canada began the construction of its own all-Canadian aircraft. What was its name?

A1. Eighty-five Vampires.

A2. Five regions and 34 aircraft.

A3. Blue Devils flew Vampires at St-Hubert, Quebec (QC).

A4. CF-100 Canuck.

A Time of Transition

Q1. What aircraft was supposed to replace the CF-100?

Q2. Following the failure of the Avro Arrow, which aircraft did Canada buy?

Q3. What major event occurred in 1968?

Q4. New aircraft appeared during this period. Name at least 3 of them.

A1. The Avro Arrow.

A2. F-101 Voodoo.

A3. The unification of the three branches of the Canadian Forces.

A4. Caribou, Buffalo, Hercules, Tutor, Dassault Falcon, Sea King, and CF 5 Freedom Fighter.

There Shall be Wings

Q1. In which year was the aerial command group formed?

Q2. In which year did the first CF-18 (CF-188 Hornet) arrive in Canada?

Q3. How many Canadian CF-18s were sent to serve during the Gulf War?

A1. 1975.

A2. 1981.

A3. Twenty-four.

END OF LESSON CONFIRMATION

The cadet's participation in the activity will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Discovering Canadian aviation history will give cadets a better understanding of the current role of aviation in Canada. Knowledge gained in this lesson will assist in stimulating an interest in the RCAF.

INSTRUCTOR NOTES / REMARKS

One segment will already have been viewed in M130.04 (Watch an *On Canadian Wings* Segment) and squadrons may choose other segments for viewing in any of the complementary periods. A thirty-minute period is required for each additional segment selected. To view all segments, eight additional periods are required. It is not necessary to watch all the segments.

REFERENCES

C3-039 Squires, C. (1999). *On Canadian wings* [Series]. Winnipeg, MB: PWGSC.

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 8

EO C130.04 – TOUR A LOCAL AVIATION MUSEUM

Total Time:	90 min

THERE IS NO INSTRUCTIONAL GUIDE PROVIDED FOR THIS EO

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 9

EO C130.05 – ATTEND A LOCAL AIR SHOW

Total Time:	180 min

THERE IS NO INSTRUCTIONAL GUIDE PROVIDED FOR THIS EO

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CHAPTER 14

PO 140 – PARTICIPATE IN AEROSPACE ACTIVITIES

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 1

EO M140.01 – LAUNCH A WATER ROCKET

Total Time:	90 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001*Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Photocopy and prepare Water Rocket Launch System; see instructions located at Attachment A, if required.

Prepare a Water Rocket launch site; see instructions located at Attachment B.

Practice assembling the Water Rocket launch System and launching water rockets before this lesson.

Water Rocket Safety Orders are located at Attachment C.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for TP 1 to orient the cadets to Newton's Laws of Motion.

An in-class activity was chosen for TP 2 as a fun way to have the cadets launch a water rocket in a safe and controlled environment.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet will have launched a water rocket.

IMPORTANCE

This lesson will demonstrate for the cadets Newton's Laws of Motion and they will this in action when they launch a water rocket.

Teaching Point 1	**Explain and Discuss Newton's Three Laws of Motion.**
Time: 15 min	Method: Interactive Lecture

Newton's Laws of Motion

The three laws of motion were first compiled by Sir Isaac Newton in his work *Philosophiæ Naturalis Principia Mathematica*, first published on July 5, 1687. Newton used them to explain and investigate the motion of many physical objects and systems.

Newton's laws of motion are three physical laws that form the basis for classical mechanics. They describe the relationship between the forces acting on a body and its motion due to those forces. A force can be defined as a push or a pull on an object.

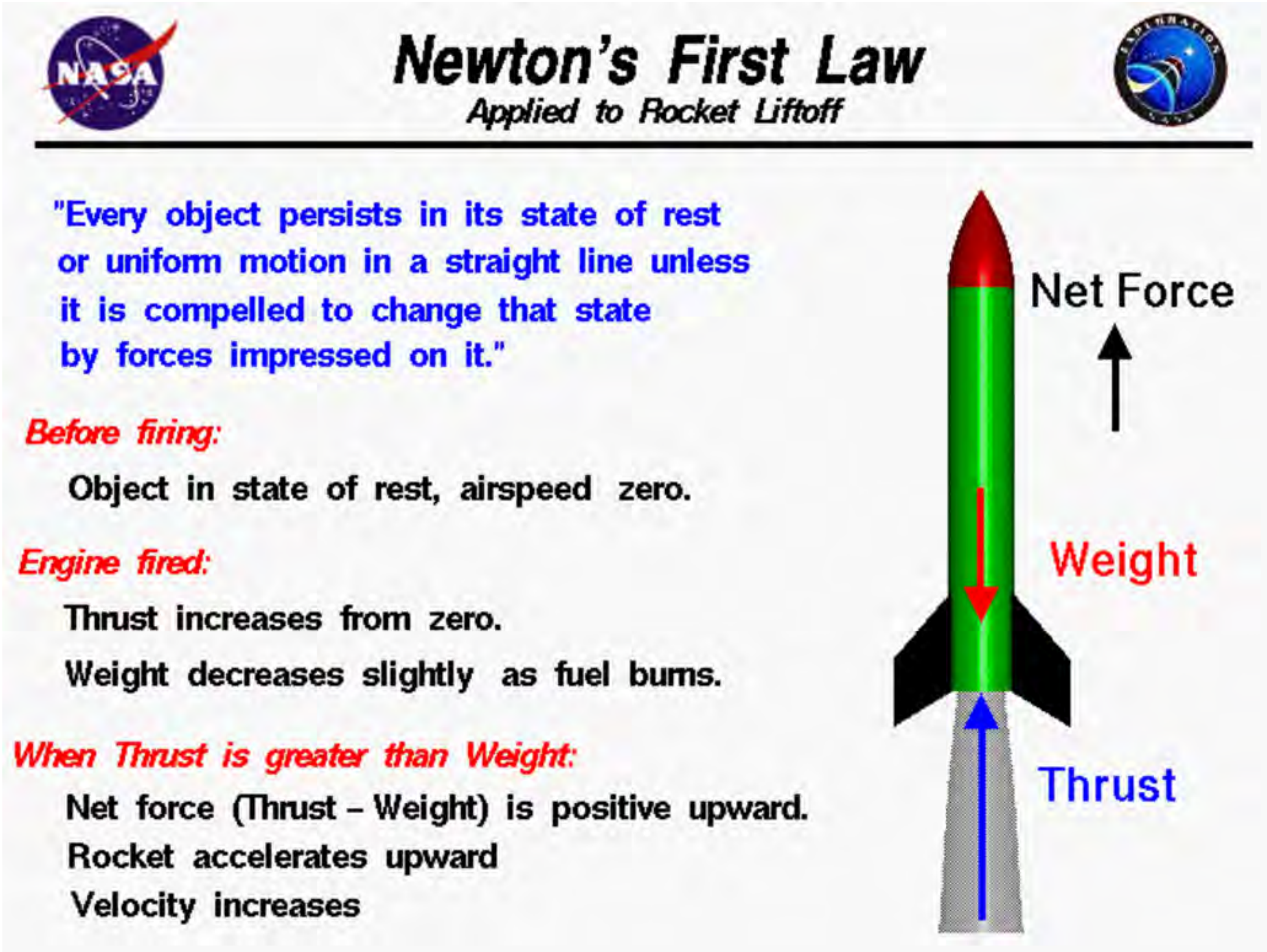
Demonstrate force by pushing and pulling an object (book, pen, etc.) in a straight line across a flat surface.

Newton's First Law of Motion, or the Law of Inertia.

Newton's first law states that every object remains at rest or in uniform motion in a straight line until an external or internal force is applied to the object. This is also the definition of inertia.

Inertia is the resistance of any physical object to a change in its state of motion or rest, or the tendency of an object to resist any change in its motion.

Point to a movable object at rest. The object is following Newton's First Law of Motion.



Note: From NASA (2011). Newton's First Law. Retrieved December 7, 2011 from http://exploration.grc.nasa.gov/education/rocket/newton1r.html

Figure 1 Newton's First law

If there is no force acting on an object then the object maintains a constant velocity. If that velocity is zero, then the object remains at rest. If an external force is applied, the velocity changes because of the external force.

Constant velocity can only happen in a vacuum like space. On Earth, air and / or gravity creates resistance or friction, slowing the object down.

This first law gives a frame of reference for the other laws of motion by establishing that an object at rest or in motion can have its state of rest or motion altered by external or internal forces.

Examples of this Law are:

- The pen placed on a flat level desk will not move as the forces of friction and gravity are acting on it.
- A satellite in outer space continues on its trajectory unless the gravity of an object it passes alters its trajectory.
- The Water Rocket on the Launch Tower will not move (other than a slight wobble due to air resistance from wind) as gravity keeps it on the launch tower until it is pressurized and launched.

Newton's Second Law of Motion

Newton's second law of motion explains how an object changes velocity if external forces are applied to it.

1. The law states that if a force is applied to an object, it accelerates or changes its velocity, and it changes its velocity in the direction of the force.

An object accelerates in the direction that the force is applied.

2. The acceleration is directly proportional to the force applied. If an object is pushed, it causes it to accelerate. If the object is pushed three times harder, the acceleration is three times greater.
3. The acceleration is inversely proportional to the mass of the object. If two objects are pushed equally, and one of the objects has five times more mass than the other, it accelerates at one fifth the acceleration of the other.

If the mass of an object increases, the acceleration decreases proportionately.

Some of the forces that can change an objects state are:

- gravity,
- air resistance,
- friction,
- external or internal force.

A formula to help explain this is:

F=*ma*

Where F is equal to the force, measured in Newton Metres and m is equal to the mass of the object. A is equal to the acceleration of the object.

Rockets during launch burn some of their propellant and therefore become lighter, changing their mass. As the rocket mass changes or becomes lighter, and the rocket engine continues to produce the same amount of thrust, the rocket accelerates.

Newton's Third Law of Motion

Newton's Third Law of Motion states that for every action or force in nature there is an equal and opposite reaction. This force is proportionate to the mass of the objects involved

When the trigger is pulled on a firearm, the gunpowder explodes, pushing the projectile or bullet out of the barrel. The force applied to the projectile is the same as the force applied to the firearm. The mass of the firearm is less than the mass of the projectile resulting in less force applied to the shooter.

A rocket engine forces gasses or propellant out its nozzle, pushing the rocket in the opposite direction.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. What is Newton's First Law of Motion?

Q2. What is Newton's Second Law of Motion?

Q3. What is Newton's Third Law of Motion?

ANTICIPATED ANSWERS:

A1. Newton's first law states that every object remains at rest or in uniform motion in a straight line until an external or internal force is applied to the object.

A2. Newton's second law of motion explains how an object changes velocity if it is pushed or pulled upon.

A3. Newton's Third Law of Motion states that for every action or force in nature there is an equal and opposite reaction.

Teaching Point 2	**Have the cadets launch a water rocket.**
Time: 65 min	Method: In-Class Activity

ACTIVITY

OBJECTIVE

The objective of this activity is to demonstrate Newton's Laws of Motion in a dynamic and interesting way.

RESOURCES

- An outdoor area 10 by 20 square metres,
- A water rocket launch system,
- A pump to supply compressed air to the launch system (a bicycle pump or tire inflator is best)
- A two litre soda bottle in good condition (no deep scratches or obvious defects). Only use carbonated drink type bottles. Water bottles are not strong enough to be used on a pressurized system,
- Safety glasses one per cadet instructors, and
- Water to launch the water rocket several times.

ACTIVITY LAYOUT

Setup the launch site using the instructions included in Attachment B.

Brief the cadets as per Attachment B Launch Site Setup.

ACTIVITY INSTRUCTIONS

For both launches use the same air pressure, 50 to 60 Psi. For the first launch, load the 2 litre soda bottle onto the launch system without water in it to demonstrate thrust with air as the propellant mass.

1. Mount the empty two-litre soda bottle on the water rocket launch tower.
2. Explain to the cadets that the bottle is demonstrating Newton's First Law of Motion as it is stationary and the only force currently applied is gravity.
3. Pressurize the launch tower to 50 to 60 psi.
4. Have the cadets count down from five and launch the soda bottle.

The force of the air escaping from the soda bottle pushes the bottle into the air. This demonstrates two of Newton's Laws of Motion.

The First Law of Motion is demonstrated as the rocket is at rest on the tower.

The Second Law of Motion is demonstrated as the rocket lifts off. The force of the air escaping pushes the bottle in a linear direction off the launch tower.

The Third Law of Motion is demonstrated as the reaction of the air being pushed out of the bottle forces it away from the launch tower.

5. Recover the soda bottle and fill it one third full with water.
6. Reload the soda bottle onto the launch tower.
7. Pressurize the launch tower to the same pressure as the empty bottle launch.
8. Have the cadets count down from five and launch the water rocket.

For the second launch, load the two litre soda bottle onto the launch system after filling it one third full with water to demonstrate thrust with water as the part of the propellant. The mass of the bottle with the water in it slows the rocket down on launch, but the mass of the water being forced out of the bottle pushes the bottle much higher. As the bottle gets lighter, it accelerates faster until the propellant and pressure diminish. Even after the water has evacuated the bottle, the air pressure left in the bottle continues to provide thrust to the bottle until it is exhausted.

9. Have the cadets discuss the difference between the two launches.

SAFETY

Water Rocket Safety Orders are located at Attachment C.

END OF LESSON CONFIRMATION

The cadets' participation in the activity will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Newton's Laws of Motion apply to everything around us. In rocketry, these laws govern the entire flight profile of a rocket before, during and after launch.

INSTRUCTOR NOTES / REMARKS

Cadets qualified as Advanced Aerospace may serve as assistant instructors.

The water rockets may be launched indoors in an area easy to clean up (eg, gymnasium floor) or out of doors in favourable weather.

REFERENCES

C3-266 Science Toy Maker. (2008). Making (and using) an overhead water rocket launcher. Retrieved October 1, 2008, from http://www.sciencetoymaker.org/waterRocket/buildWaterRocketLauncher.htm

C3-291 Retter, Y. (2008). *Water Rocket – Skewer Design*. Retrieved November 21, 2008, from http://www.geocities.com/yoramretter/SkewerDesign-v02.html

C3-351 National Aeronautics and Space Administration. (2008). *Adventures in Rocket Science*. Retrieved October 27, 2011, from http://www.nasa.gov/pdf/265386main_Adventures_In_Rocket_Science.pdf

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CONSTRUCTING A WATER ROCKET LAUNCH SYSTEM

Material List

Quantity	Part No.	Item	Length
1	A1	½-inch CPVC tube	7 inches
1	A2	¾ x ½ CPVC reducer	
1	A3	¾-inch CPVC tube	40 inches
1	A4	¾-inch female CPVC adapter	
1	A5	¾-inch male CPVC adapter	
1	A6	¾-inch CPVC tube	3 inches
1	B1	tire stem valve (for a ½-inch hole)	
2	B2, C1	¾-inch CPVC end cap	
2	B3,C2	¾-inch CPVC tube	24 inches
2	B4, C3	¾-inch CPVC T-joint	
1	B5	¾-inch CPVC tube	19 inches
1	B6	¾-inch CPVC ball valve	
1	C4	¾-inch CPVC tube	7 inches
1		8 x 2 inch sticky (Duct) tape	
10		6 to 7 inch long cable ties	
1		¾-inch O-ring, or soft hose washer	
2		#12 steel hose clamp	
1		1¼-inch ABS coupler	
1		braided string	
1		2-litre soda bottle	
1		CPVC Cement	
1		CPVC Solvent / Cleaner	
1		Heavy weight (eg. sand bag)	

One 10 foot length of ¾ inch CPVC schedule 40 tube will build one launch system.

7 inches of ½ inch CPVC tube is required for the bottle guide for each launch system.

Only use PET plastic soda bottles designed for carbonated drinks in good condition. Do not substitute a water PET bottle for a soda bottle. Bottles with deep scratches, hard creases, or more than 10 pressurized launches will not be used. Indicate the number of launches on the bottle with an indelible marker. Do not use sandpaper, hot melt glue, solvent based glue or any other chemical or heat that may weaken the soda bottle.

The launch system will be able to launch 500 millilitres to 2 litre carbonated soda bottles.

Tool list

Pliers,

Saw,

Scissors,

Drill,

Drill bits for ½ inch and 1/8 inch holes,

Hand file, and

Source of compressed air with a gauge (eg. bicycle pump, tire inflator or compressor).

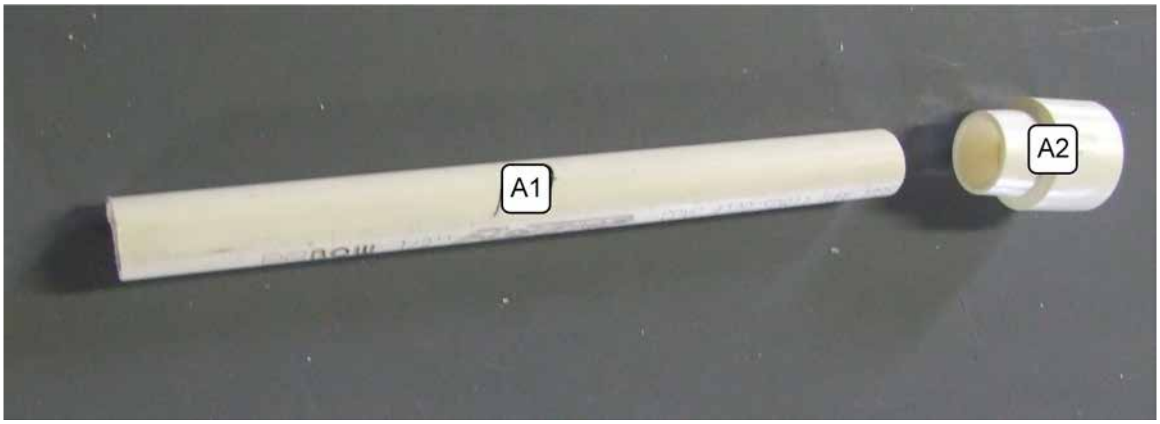
Assembling the Water Rocket Launch System

The launch system will be assembled in 3 sections of tubing, and a bottle clamp and release system

Section A

Section A consists of:

- A1 – ½-inch CPVC tube, 7 inches
- A2 – ¾ x ½ CPVC reducer



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 1-A Section A, A1 and A2

- A3 – ¾-inch CPVC tube, 40 inches
- A4 – female ¾-inch CPVC adapter
- A5 – male ¾-inch CPVC adapter
- A6 – ¾-inch CPVC tube, 3 inches

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

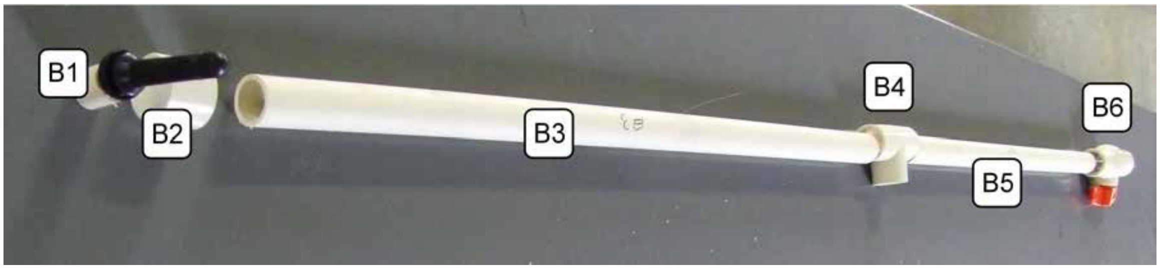
Figure 2-A Section A: A3, A4, A5 and A6

Section B

Section B consists of:

- B1 – tire valve stem
- B2 – ¾-inch CPVC end cap
- B3 – ¾-inch CPVC tube, 24 inches
- B4 – ¾-inch CPVC T-joint

- B5 – ¾-inch CPVC tube, 19 inches
- B6 – 1 ¼-inch CPVC ball valve



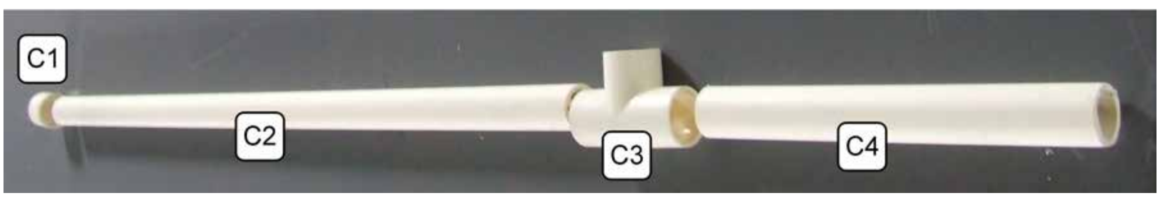
Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 3-A Section B: B1, B2, B3, B4, B5, and B6

Section C

Section C consists of:

- C1 – ¾-inch CPVC end cap
- C2 – ¾-inch CPVC tube, 24 inches
- C3 – ¾-inch CPVC T-joint
- C4 – ¾-inch CPVC tube, 7 inches



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 4-A Section C: C1, C2, C3 and C4

Cut the ¾-inch CPVC pipe as close to 90 degrees as possible. This allows the most glue surface area possible, and makes a solid reliable join.

Deburr the cut edges with a file or sandpaper and when gluing the pieces together, clean all joint surfaces with CPVC Solvent / Cleaner before gluing.

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 5-A Deburring the end of the tube with a hand file.

When gluing, apply CPVC Cement to both ends to be joined, join ends and twist joint clockwise until resistance is felt. Use only enough glue to coat the two parts. Avoid excess glue as this can melt the inside of the tube or fitting, weakening it. The cement sets in less than 30 seconds so be sure to align the parts quickly and accurately.

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

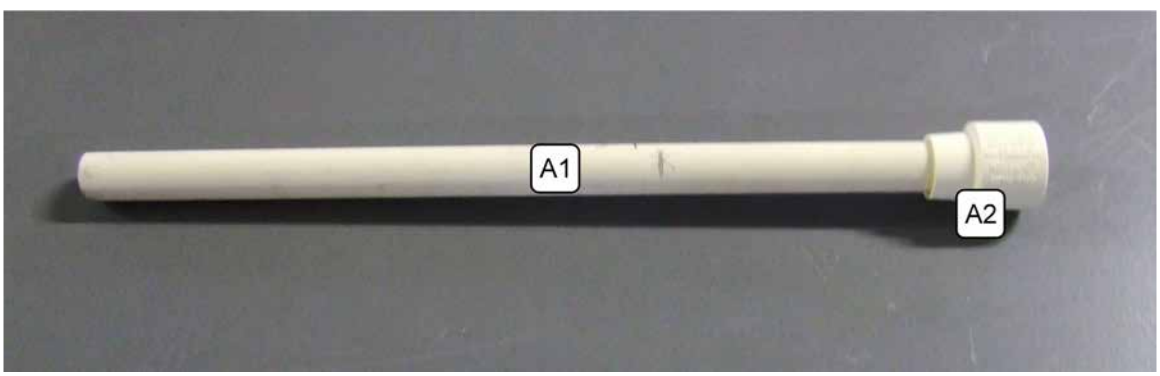
Figure 6-A Applying cleaner or glue to the joint surfaces before gluing.

Building Directions

Section A

Apply CPVC Cement and join:

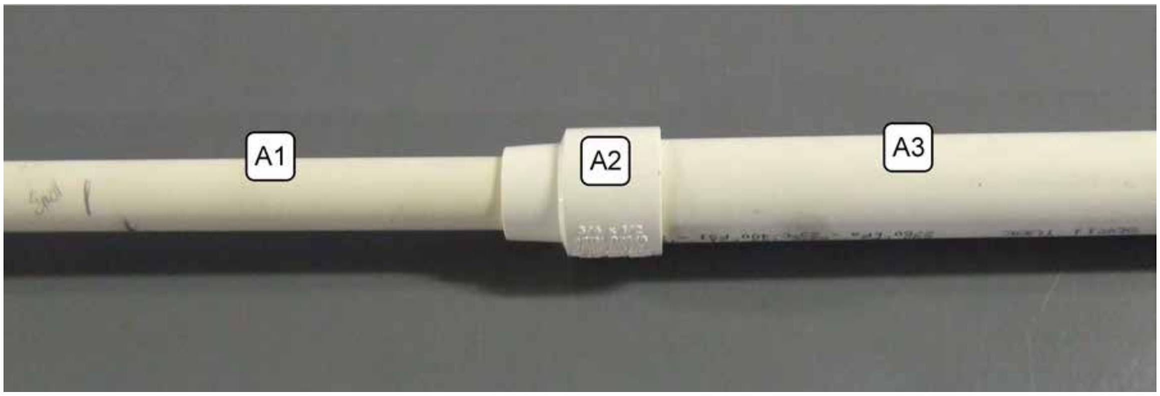
- bottom part A1 (½-inch CPVC tube, 7 inches) to A2 (½-inch end of ¾ x ½ inch CPVC reducer);



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 7-A Section A, A1 and A2

- A2 (¾-inch end of ¾ x ½ inch CPVC reducer) to A3 (¾-inch CPVC tube, 40 inches);



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

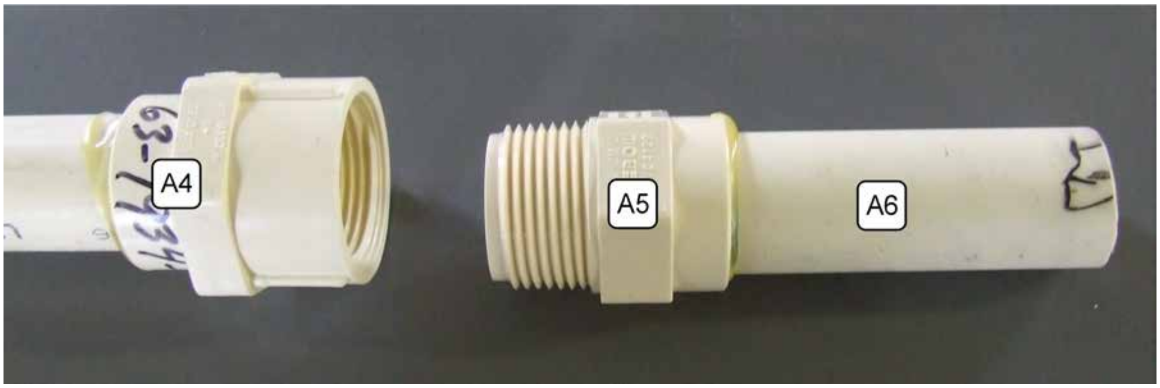
Figure 8-A Section A, A1, A2 and A3

- A3 ¾-inch CPVC tube, 40 inches) to A4 (¾-inch female CPVC adapter); and

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 9-A Section A, A3 and A4

- A6 (¾-inch CPVC tube, 3 inches) to A5 (¾-inch male CPVC adapter).



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 10-A Section A, A4, A5 and A6

Do not allow glue to touch the threaded portion or the gasket surfaces of A4 (¾-inch female CPVC adapter) and A5 (¾-inch male CPVC adapter).

Use the male / female adapter joint to disassemble the water rocket launcher for transport and storage.

Section B

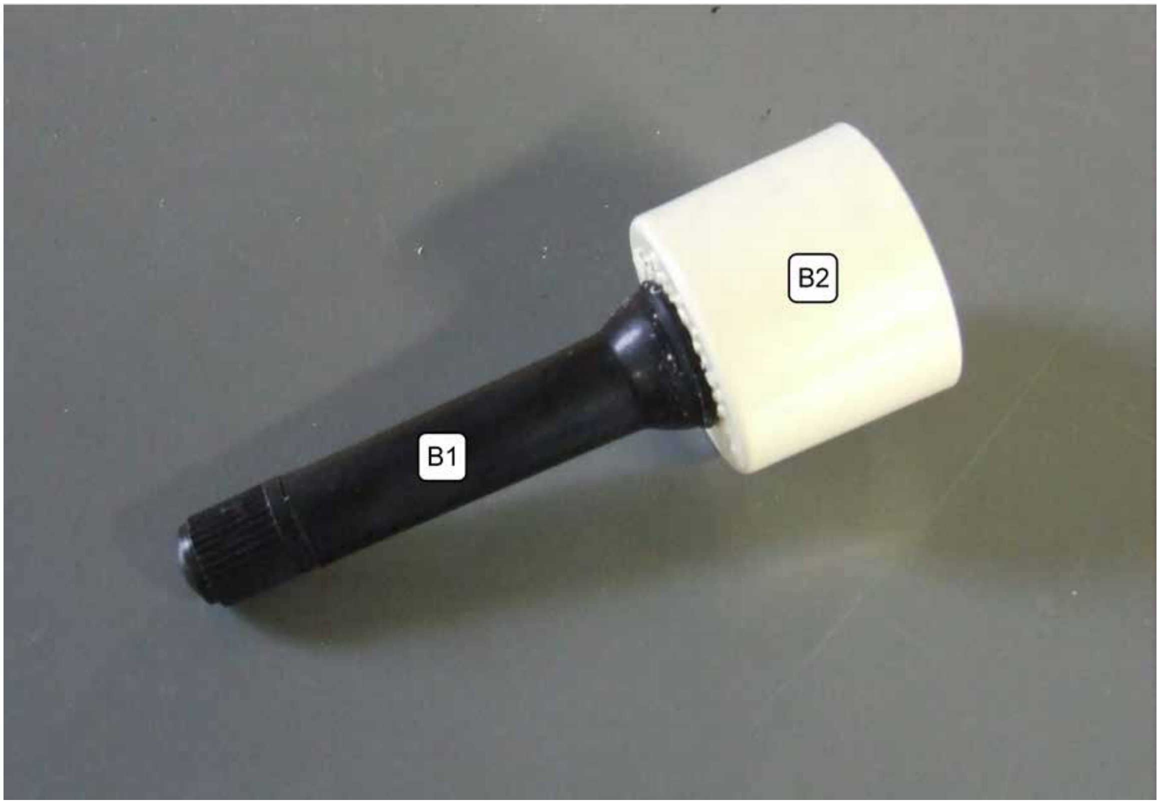
Prepare B2 (¾-inch CPVC end cap) for the tire valve stem:

- Drill a ½ inch hole in B2 (¾-inch CPVC end cap). Drill at a slow speed and hold the end cap in a vise or pair of pliers.

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 11-A Section B, Drilling the hole for the tire valve stem.

- Pull B1 (tire valve stem) through the ½ -inch hole from the inside in B2 (¾-inch CPVC end cap) until the valve stem is seated on the end cap.

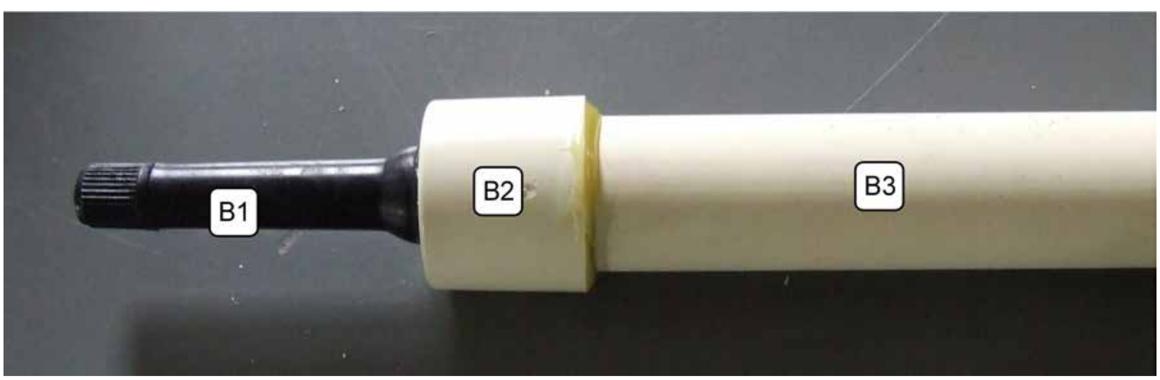


Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 12-A Section B, Tire Valve Pulled Through B2

Apply CPVC Cement and join:

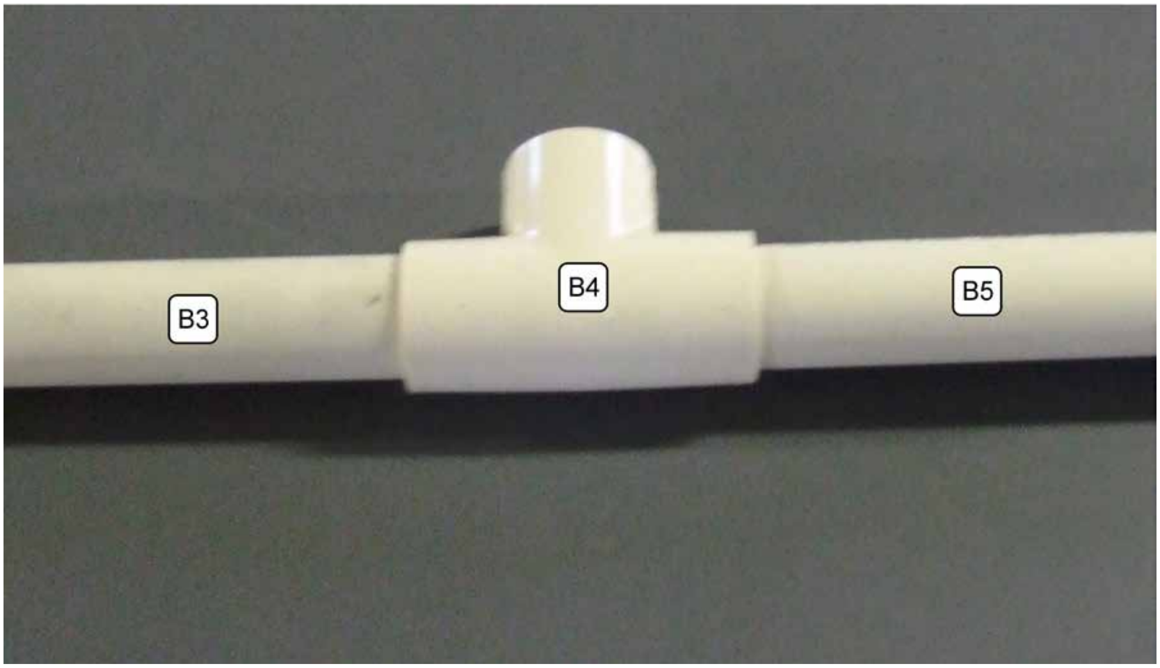
- B2 (¾-inch CPVC end cap with tire stem valve) to B3 (¾-inch CPVC tube, 24 inches);



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 13-A Section B, B1, B2 and B3

- B3 (¾-inch CPVC tube, 24 inches) to B4 (¾-inch CPVC T-joint);
- B4 (¾-inch CPVC T-joint) to B5 (¾-inch CPVC tube, 19 inches); and

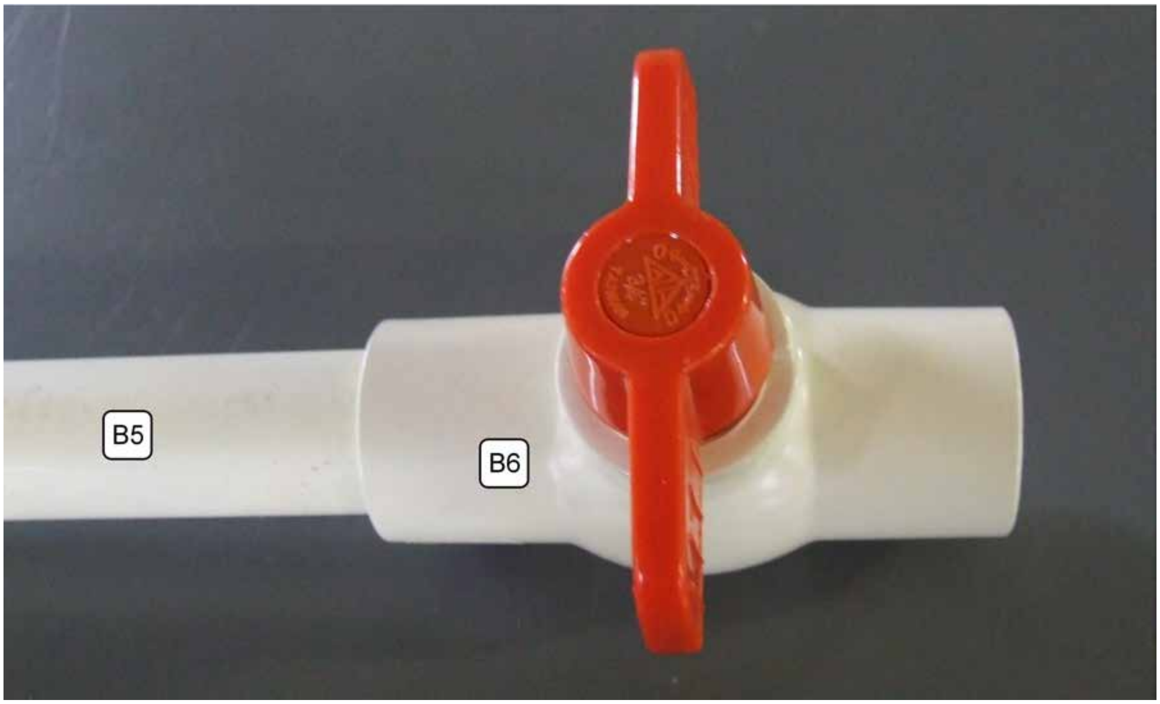


Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 14-A Section B, B3, B4 and B5

- B5 (¾-inch CPVC tube, 19 inches) to B6 (¾-inch CPVC valve). Ensure that the valve handle is clocked 90? to B4 (¾-inch CPVC T-joint).

Clocking is aligning the parts along their centre axis. The handle of B6 (¾-inch CPVC valve) points vertically and the open centre female connection of B4 (¾-inch CPVC T-joint) points horizontally



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

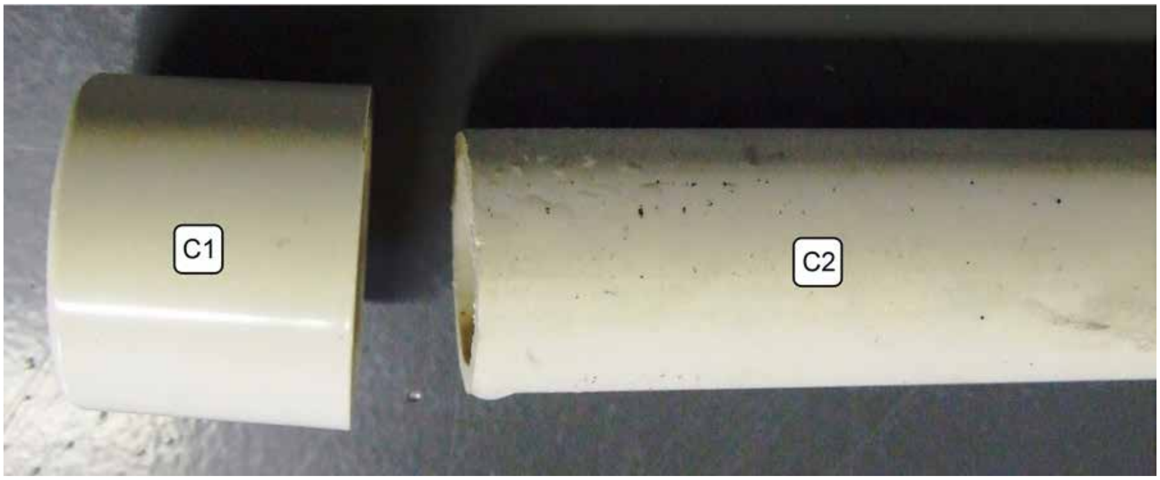
Figure 15-A Section B, B5 and B6

The CPVC valve is a safety measure to be used to depressurize the launcher in the event of a misfire or for pressure testing the bottle clamp and release system.

Section C

Apply CPVC Cement and join:

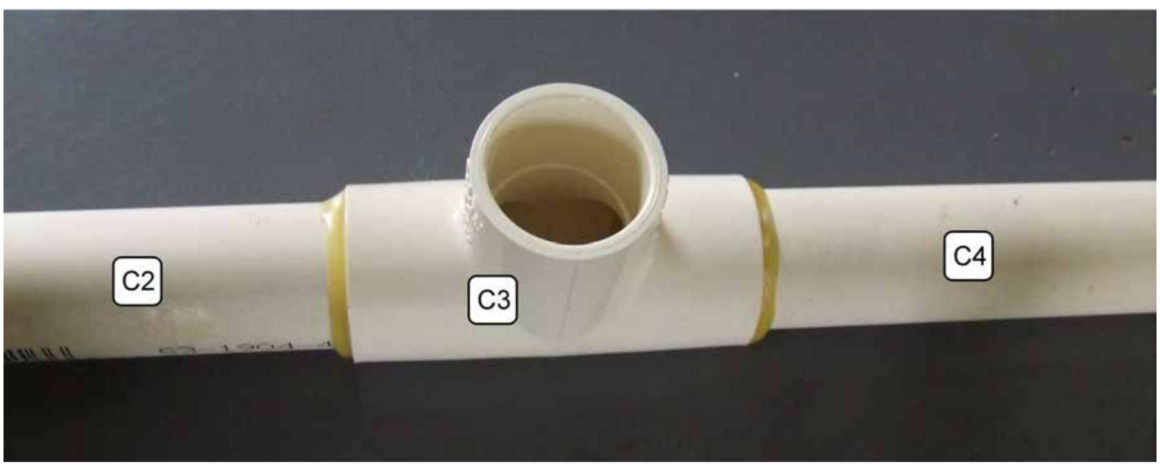
- C1 (¾-inch CPVC end cap) to C2 (24 inches of ¾-inch CPVC tube);



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 16-A Section C, C1 and C2

- C2 (24 inches of ¾-inch CPVC tube) to C3 (¾-inch CPVC T-joint); and
- C3 (¾-inch CPVC T-joint) to C4 (7 inches of ¾-inch CPVC tube).



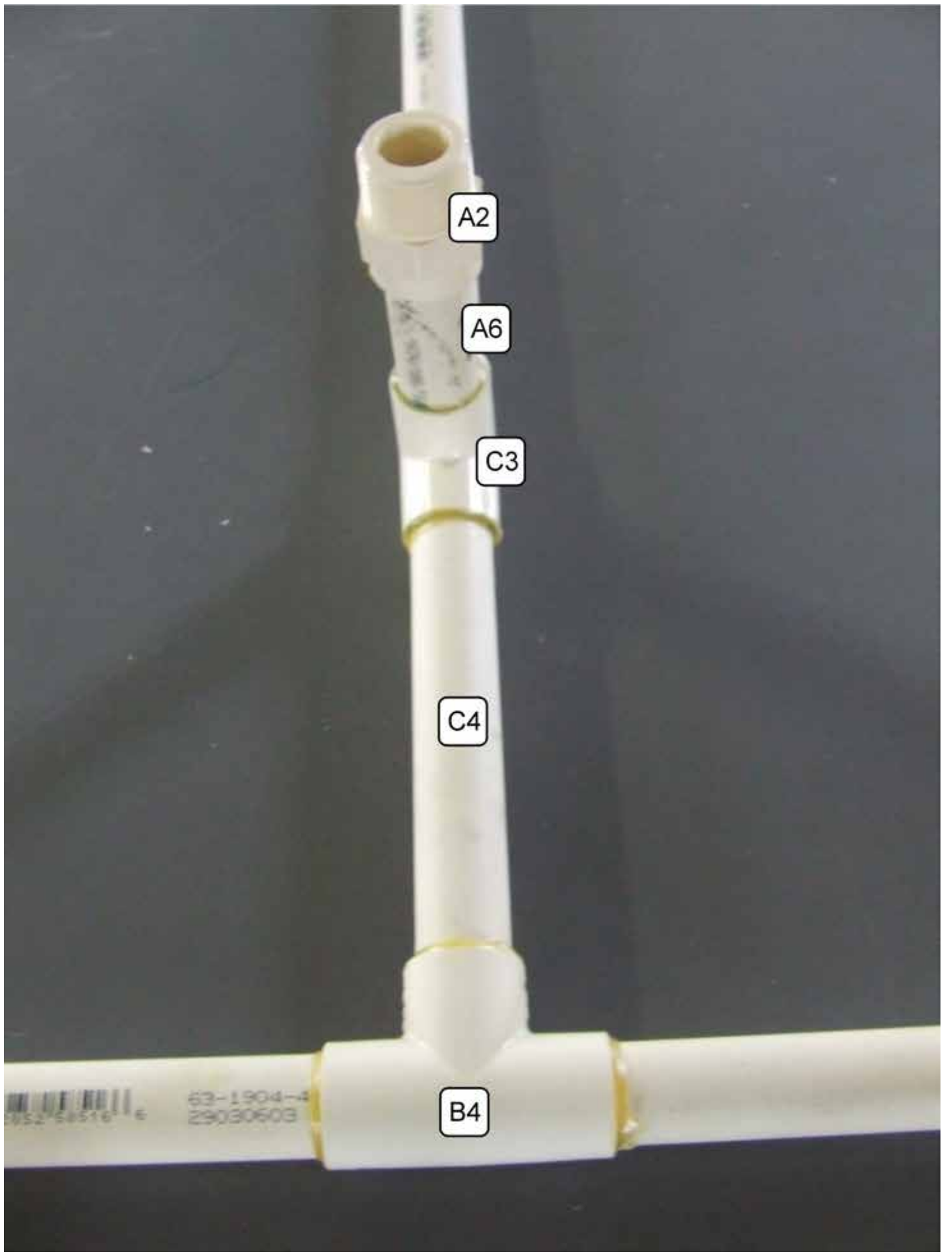
Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 17 Section C, C2, C3 and C4

Base Assembly

To build the base, apply CPVC Cement and join:

- A6 (3 inches of ¾-inch CPVC tube) of section A to C3 (¾-inch CPVC T-joint) of section C.
- B4 of section B to C4 of section C, make sure that section A is perpendicular to section B; and

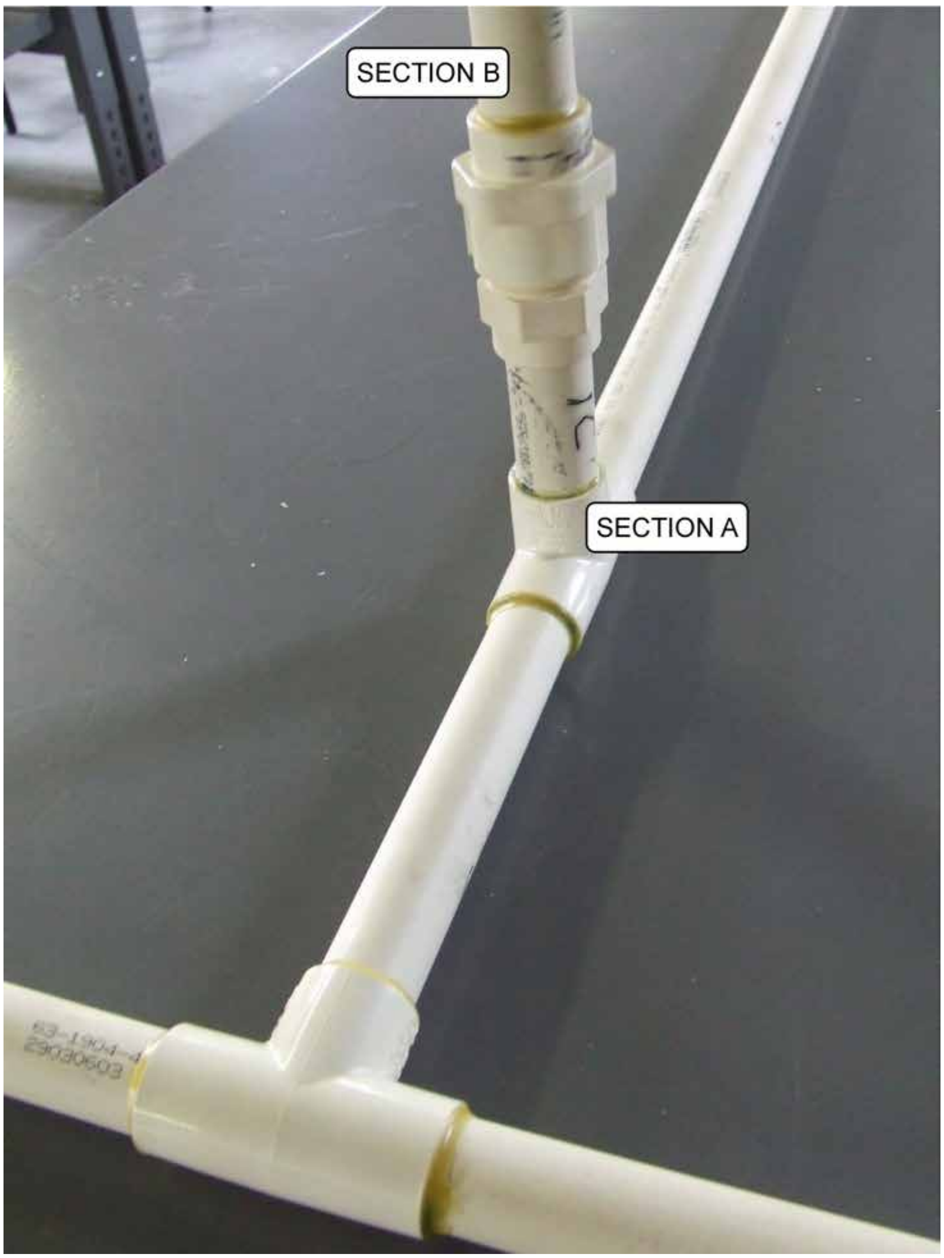


Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 18-A Sections A, B and C Joined Together

To assemble the water rocket launcher, join section A with section B.

If during the glue process the parts fail to align properly because the glue has set too fast, cut off the misaligned part, purchase and glue a ¾ to ¾ CPVC coupler between the two parts and realign.



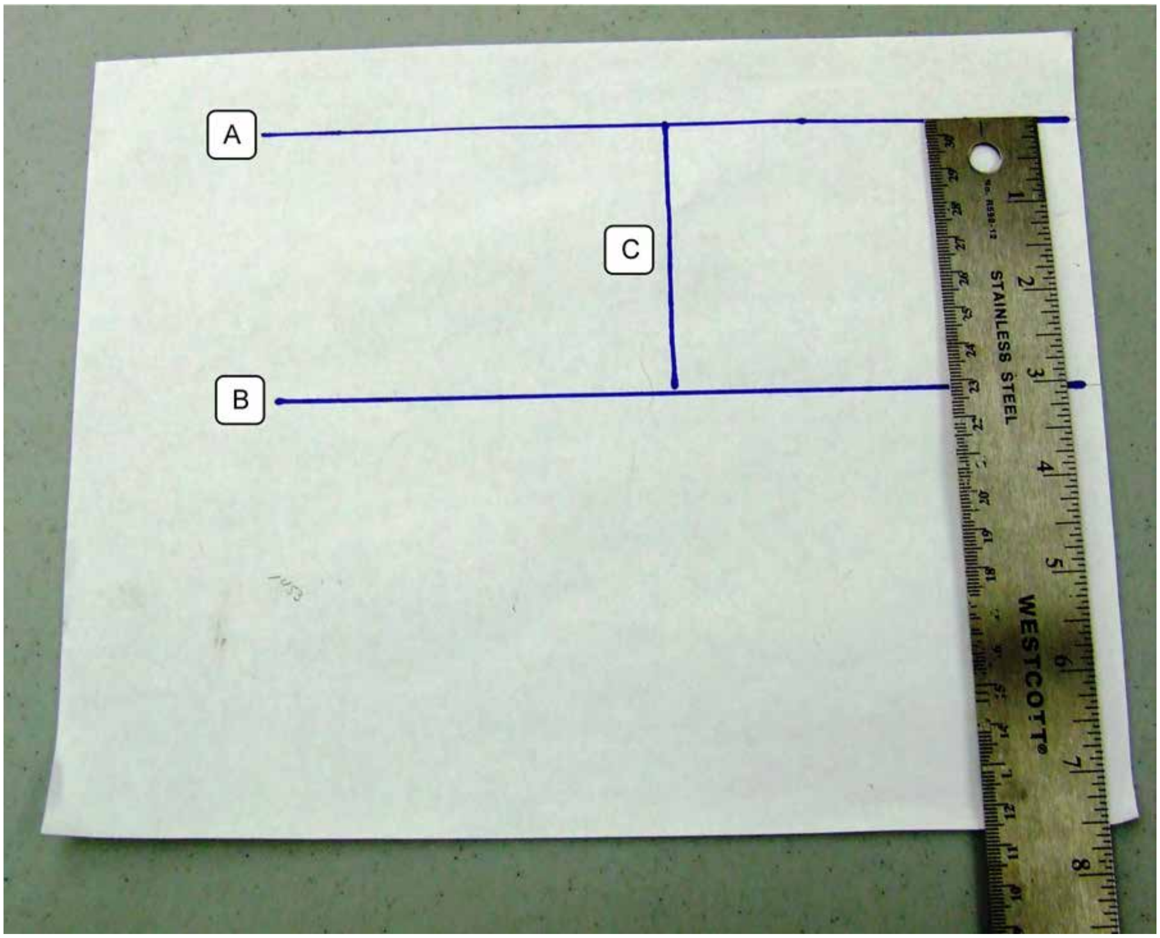
Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 19-A Section A joined with Section B.

Bottle Clamp and Release System

To assemble the Bottle Clamp Release System

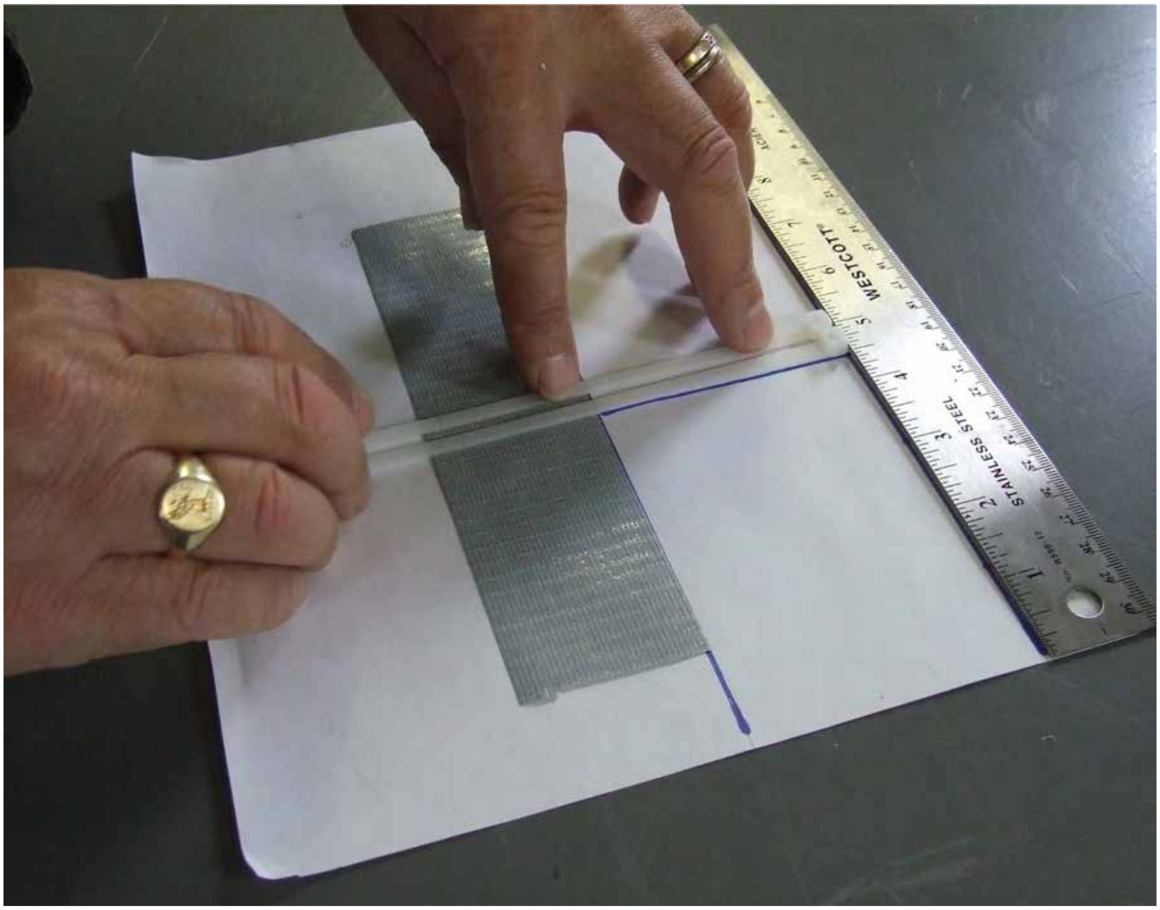
- Draw two parallel lines, six inches long on a piece of 8½” x 11” paper. Line A is one inch below the top edge of the paper and line B is three inches below line A. Use the corner of a second sheet of 8½ “x 11” paper as a square to mark a perpendicular line, line C, between lines A and B.



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 20-A Laying Out the Cable Tie Position

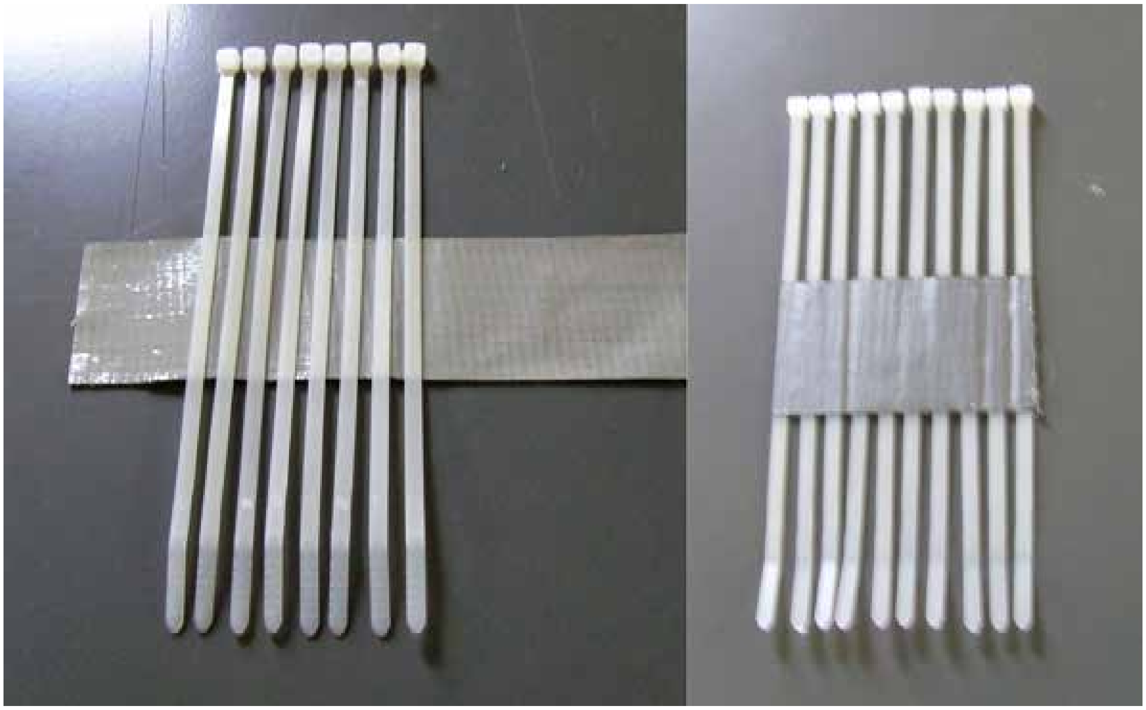
- Lay the ruler along line A and lay the tape, sticky side up along line B. Ensure the ruler will not move off of line A by using tape or a weight. Place the ties across the tape with the head touching the ruler and check that the cable ties are perpendicular to lines A and B. Start at line C laying the cable ties 2 mm between each tie.



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 21-A Placing the Cable Ties on the Duct Tape

- Fold the tape ends over the exposed portion of the ties so that no adhesive is showing.



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 22-A Cables Ties Adhered to the Duct Tape

- Place the O-ring or hose washer over the ½-inch side of A2 (¾” x ½” coupler) until it rests on the shoulder of A2. The O-ring or hose washer may have to be stretched to fit onto the shoulder of A2.

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 23-A Position of the O-Ring or Hose Washer on A2

- Place the 2 hose clamps on A (3¾-inch CPVC tube). Slide the bottle over the end of A1 (½-inch CPVC tube) and seat it against the O-ring or hose washer. Wrap the cable ties around the pipe so that the head of each cable tie faces inward and catches the lip of the bottle, holding the bottle tight to the O-ring or hose washer. Place the hose clamps over the cable ties and tape and tighten them so that the heads of the cable ties exert equal pressure around the ridge on the bottle. This makes an airtight seal between the bottle and the O-ring or hose washer.

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 24-A Cable Ties Holding the Soda Bottle

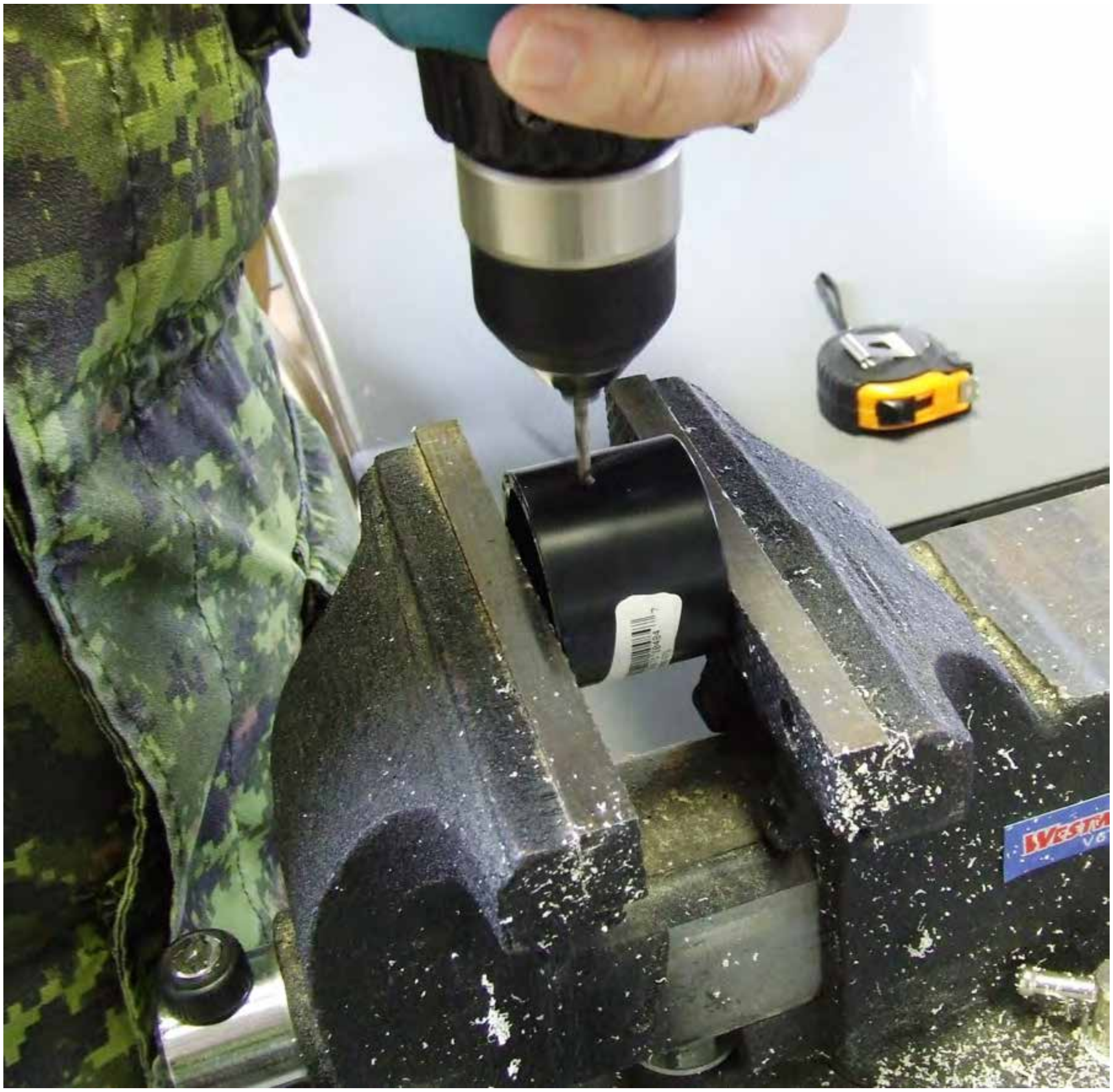
If the bottle leaks at the O-ring or hose washer, adjust the cable ties up or down on A3 (¾-inch CPVC tube) so the lip of the bottle is securely and evenly seated on the O-ring or hose washer. Lock the cable ties in this position by tightening the hose clamps around the duct tape.

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 25-A Tie Cables Clamped to A3

Bottle Release Mechanism

- Drill two 1/8-inch holes on opposite sides of the 1¼-inch ABS coupler.



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 26-A Drilling 1/8-inch Holes in the ABS Coupler

- Use scissors to cut the top and bottom off a 2-litre soda bottle. Use the centre section to make a plastic spring. Flatten the bottle section without creasing it and cut a 1¼ inch hole centered through both sides. Drill 1/8-inch holes on either side of the 1¼-inch holes through both sides.

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

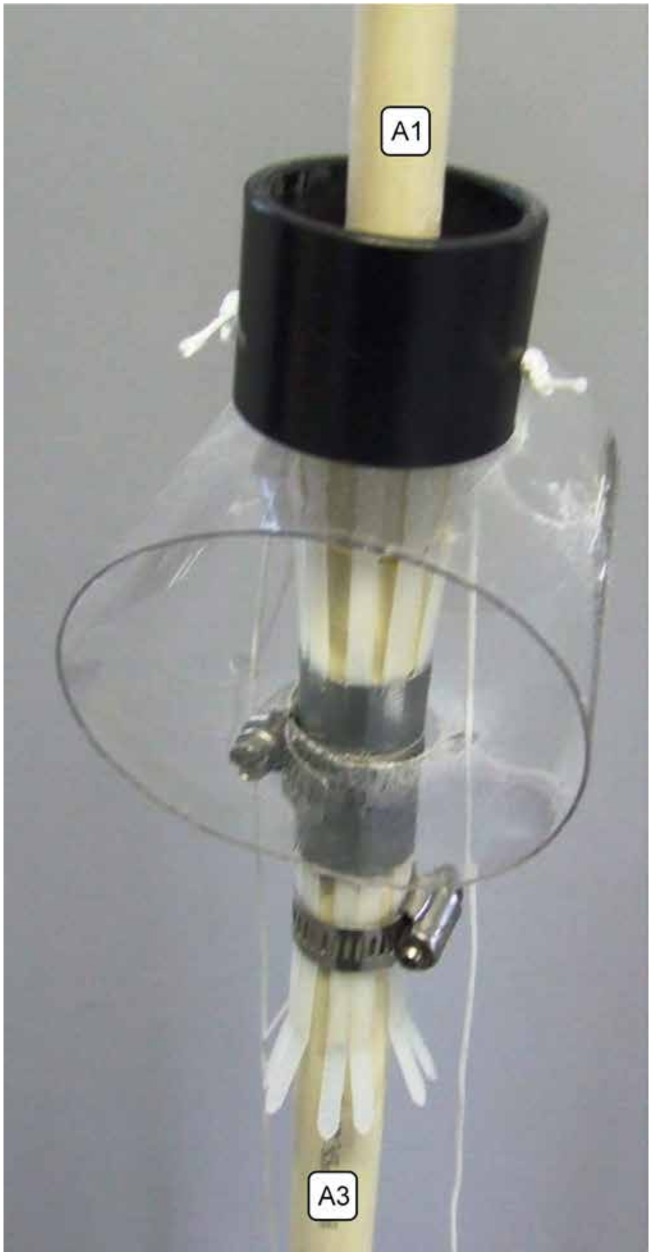
Figure 27-A Cutting the Hole in the Plastic Spring for Section A

- Slide the plastic spring over the end of pipe A1 (½-inch CPVC tube), over the cable ties and up against the hose clamps.

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 28-A Sliding the Spring over the Cable Ties

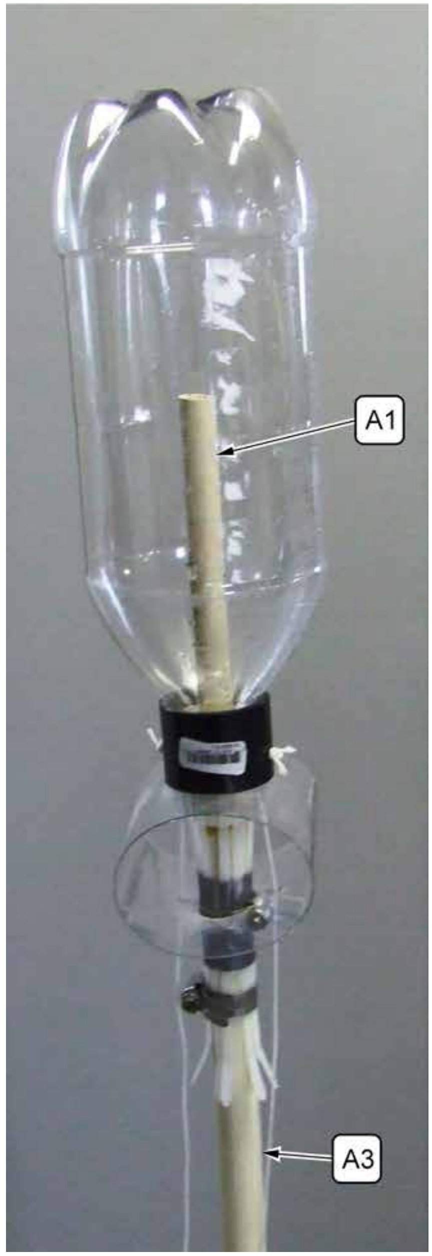
- Slide the 1¼-inch ABS coupler over A1 (½-inch CPVC tube), over the cable ties and up against the plastic spring. Thread the braided string through the holes of the plastic spring and tie the ends to the holes drilled in the 1¼-inch ABS coupler.



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 29-A Couple Installed over Cable Ties and Against the Plastic Spring

- Place a bottle in position on the launch tower. Pull the launch cords to lower the coupler and press the bottle neck onto the O-ring or hose washer. Then release the cord allowing the coupler to slide up, pressing the cable tie ends over the collar on the bottle, locking the bottle in place.



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 30-A Soda Bottle Installed on Launch System

Add a small amount of air pressure to test the bottle seal for leakage then depressurize the launcher. If air escapes around the lip of the bottle, gently rock the bottle on the tower. If the bottle continues to leak, the height of the cable ties on the upright A3 may need to be adjusted by loosening the clamps, and moving the cable ties up or down A3 to seal the bottle properly. The O-ring or hose washer should be compressed enough to seal the bottle to approximately 70 Psi.

- Test the release mechanism by pulling on the string to ensure the ABS coupler drops allowing the cable ties to open. When the string is released, the spring should push the coupler up and over the cable ties.

Launch Preparation

- Fill a bottle 1/3 full with water.

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 31-A Loading the Soda Bottle onto the Launch System

- Lay the launcher on its side and slide the bottle onto the end of the A1 (½-inch CPVC tube). Pull down on the trigger so that the bottle can seal against the O-ring or hose washer and the cable ties catch the lip of the bottle. Release the string and let the coupler slide back over the cable ties to hold the bottle in place. Sit the launcher upright and adjust the bottle to stop any leaking.

Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 32-A Soda Bottle Ready for Launch

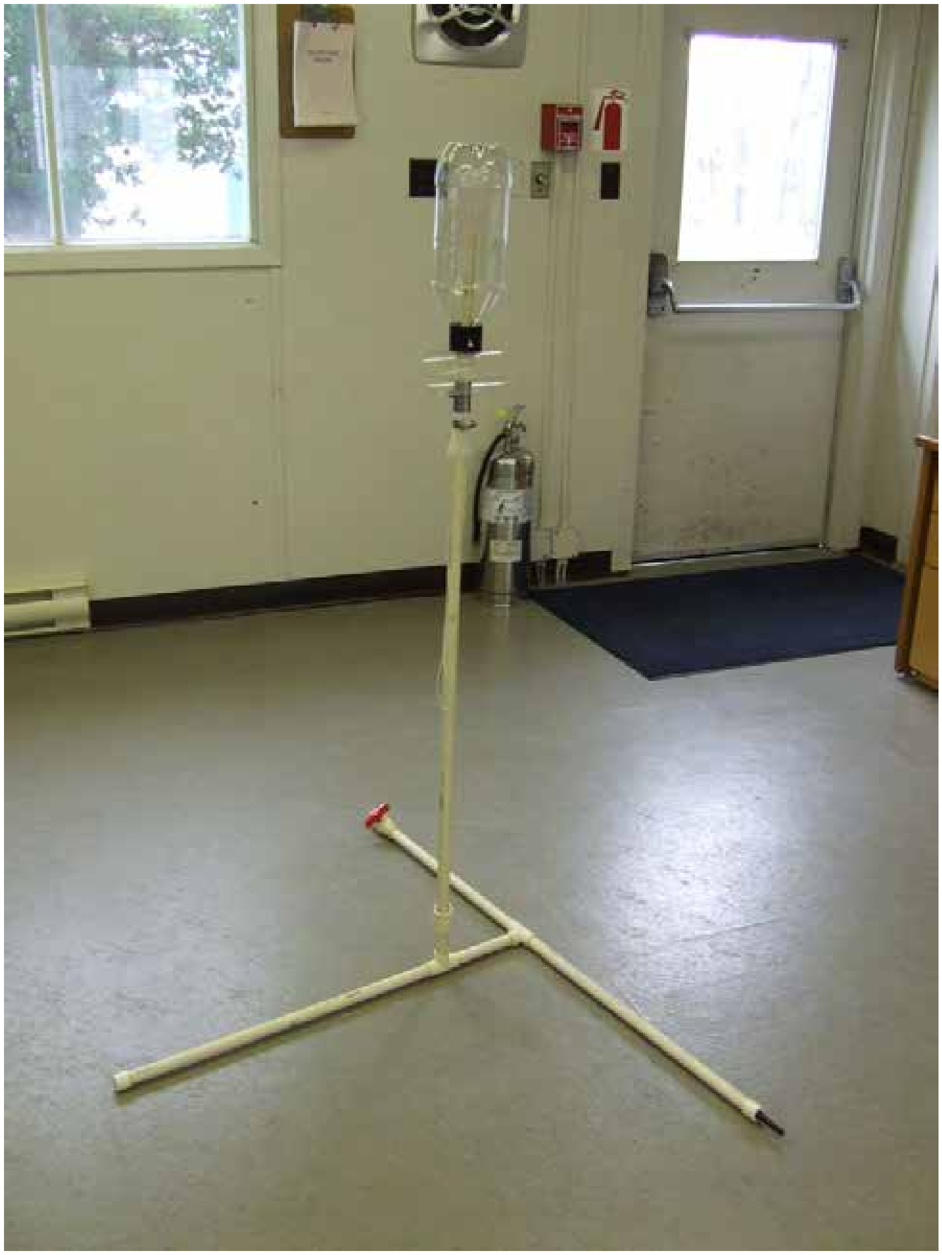
Place a weighted object (sand bag) on the launcher to hold it in an upright position.

- Run the launch cord under the tubing of the launcher so that when pulled, the cord pulls downwards on the collar of the launch tower.

- Attach the selected method for inflating air into the bottle to part B1 (tire valve stem). Method for inflating up to 70 Psi of air can include:
    - a foot air pump,
    - a bicycle air pump, or
    - a compressor.

Do not exceed 70 Psi.

When inflating air into the bottle launcher, the faster the air is added, the less amount of water leakage.



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 33-A Assembled Water Rocket Launch System

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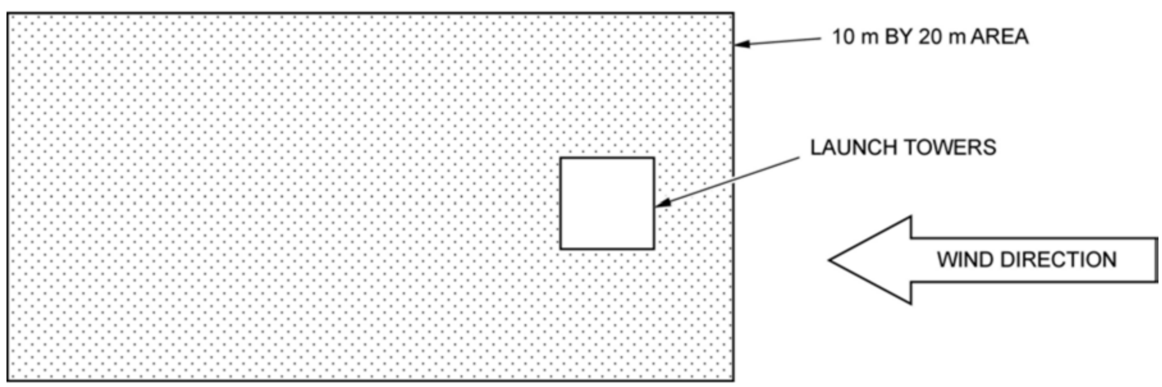
LAUNCH SITE SET-UP

1. Have the cadets participate in a safety briefing before the launch site is set up, covering the following points:

   - All launch systems will be placed in “safe” mode between each flight.
   - When a rocket is descending out of control, launch site personnel will point at the rocket and repeat the phrase “heads up” until the rocket has landed.
   - No horseplay will be tolerated.
   - A safe rendezvous point will be clearly indicated. In the event of an emergency, launch site staff will move all cadets and staff to this point.
   - The area required for launching model rockets should be at least 10 m by 20 m. The spectators should be located in an area at least 20 m from the launch tower. Bleachers at a baseball field or soccer field are suitable.
   - The rocket can reach a height of 60 m (200 feet) at apogee and can be flown safely from the suggested field size.

2. Set up rocket launch site as per Figure 5A-1. Wind direction should be accounted for by placing the tower closer to the windward side of the field.



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 1-B Layout for a Water Rocket Launch Site

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WATER ROCKET SAFETY ORDERS

1. **Definitions.** For the purposes of this safety order, a 'Water Rocket' is defined as any rocket whose thrust is generated by expansion of a compressed air. An inert fluid such as water is used for thrust augmentation. A soda bottle refers to a Polyethylene Terephthalate (PET) soda bottle between 500 ml and 2 l.

2. **Scope.** This order applies to water rockets used in cadet activities having a pressure chamber volume greater than 500 ml or a launch pressure exceeding 35 psi.

3. **Materials.** The pressure chamber of the rocket shall be a PET plastic soda bottle between 500ml and 2l. Only lightweight, non-metal parts shall be used for the nose, body, and fins.

4. **Compressed Gas Safety.** A safe distance shall be maintained at all times between persons and pressurized water rockets or launchers. The recommended safe distance is as follows:

Launch Pressure	With Eye Protection	Without Eye Protection
Up to 60 psi	10'	20'
Above 60 psi	20'	40'

5. **Pressurization System.** A small portable compressor, 12 volt tire inflator or bicycle pump is used to pressurize the launch system. The pressure shall not exceed 70 pounds per square inch.

6. **Launcher.** The launcher shall hold the rocket to within 30 degrees of vertical to ensure that it flies nearly straight up. It shall provide a stable support platform against wind and any triggering forces, and allow the rocket to be pressurized and depressurized from a safe distance. Launchers shall be constructed from materials rated for at least 3 times the intended launch pressure.

7. **Launch Safety.** A countdown prior to launch ensures that spectators are paying attention and are a safe distance away. If the rocket does not launch when triggered, all persons shall stay at a safe distance from the launch tower until it has been depressurized by launch staff.

8. **Size and Weight.** A water rocket whose mass (excluding water) exceeds 454 grams (1 lb) shall be considered a "Large Model Rocket" for the purpose of compliance with Federal Aviation Administration regulations. Rockets used in cadet activities shall exceed 454 grams (1 lb), or be longer than the length of two soda bottles.

9. **Flight Safety.** Water rockets shall not be directed at targets, into clouds, or near airplanes or other vehicles. Water rocket payloads shall not include flammable, explosive, dangerous (metal, rock, or other potentially hazardous objects) or live vertebrae.

10. **Launch Site.** Water rockets shall be launched outdoors, in an open area at least 100 feet on a side (for rockets with using a launch pressure of 60 psi or less), or 500 feet on a side (for rockets using higher pressure).

11. **Recovery System.** A recovery system such as a streamer, parachute, or tumble recovery can be used for rockets launched with over 60 psi, with the intent to return it safely to earth without damage.

12. **Recovery Safety.** Recovery shall not be attempted from power lines, tall trees, or other dangerous places.

13. **Load Fraction.** Water rockets shall be launched with a load fraction not exceeding .33. Load Fraction is the ratio of the water volume to the total volume of the motor. For example, 0.66 litres of water in a 2-liter soda bottle, one third full, the load fraction is 0.33.

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 2

EO C140.01 – LAUNCH A FOAM ROCKET

Total Time:	60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Make photocopies of the handouts located at Attachments A and B for each group of four cadets.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

A practical activity was chosen for TPs 1 and 2 as it is an interactive way to demonstrate rocket propulsion to cadets. This activity contributes to the understanding of rocketry in a fun and challenging setting.

A group discussion was chosen for TP 3 as it allows the cadets to interact with their peers and share their knowledge, opinions, and feelings about their experiences launching foam rockets.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have constructed and launched a foam rocket.

IMPORTANCE

It is important for cadets to build and launch foam rockets to understand rocket propulsion, and learn rocket construction techniques in a group setting.

Teaching Point 1	**Have the cadets, in groups of four, construct a foam rocket.**
Time: 25 min	Method: In-Class Activity

Ballistics is the study of the flight of projectiles after the power phase has terminated, moving under their own momentum and the external forces of gravity and air resistance. The effects of gravity and air resistance cause the projectile to move in an arc, as gravity pulls it towards the centre of the Earth and air resistance slows the projectiles velocity. To obtain orbit, the projectile must balance its speed to counteract the effects of gravity.

The foam rocket flies ballistically and receives its entire thrust from the force produced by the elastic rubber band. When the rubber band is stretched and released, the rubber band quickly returns to its original length, launching the foam rocket in the process.

Once in flight, the foam rocket coasts. The mass of the foam rocket does not change in flight. Rockets used in space exploration consume propellants and their total mass diminishes.

Gravity and drag or friction, affect the projectiles' motion and course within the atmosphere.

The launch of a foam rocket is a good demonstration of Newton's Third Law of motion.

The contraction of the rubber band produces an action force that propels the rocket forward while exerting an opposite and equal force on the launcher.

For this activity, the launcher is a meter stick.

> Be sure the range-measuring cadet measures where the rocket touches down and not where the rocket ends up after sliding or bouncing along the floor / ground.

During flight, the fins stabilize the foam rocket. The fins, like feathers on an arrow, keep the rocket pointed in the desired direction.

If launched straight up, the foam rocket points upward until it reaches the top of its flight. Both gravity and air drag act as brakes. At the very top of the flight, the rocket momentarily becomes unstable. The momentum slows and gravity overcomes the velocity of the rocket. At apogee, the rocket begins its downward phase returning to Earth, and stabilizes as its velocity increases and air flows over the fins.

When launched at an angle of less than 90 degrees, the foam rocket is remains stable through the entire flight. Its path is an arc whose shape is determined by the launch angle. For high launch angles, the arc is steep, and for low angles, it is broad.

A launch angle of less than 90 degrees will cause the rocket to land a distance from the launch site. Gravity, launch angle, initial velocity, and atmospheric drag affect how far the rocket will land from the launch site.

Gravity causes the foam rocket to decelerate as it climbs upward and then causes it to accelerate as it falls back to the ground. The launch angle works with gravity to shape the flight path. Initial velocity and drag affects the flight time.

> After launching, cadets are to compare the launch angle to the range or distance the foam rocket lands from the launch site. Launch angle is the independent variable. Gravity can be ignored because the acceleration of gravity remains the same for all flight tests.

ACTIVITY

OBJECTIVE

The objective of this activity is to have the cadets construct a foam rocket.

RESOURCES

Each team will construct one foam rocket and one launcher

- 30-cm long piece of polyethylene foam pipe insulation (for ½ inch pipe),
- Rubber band size 64,
- Bristol board,
- 3-7 to 8 inch cable ties,
- 75-cm string,
- 25-cm string,
- Scissors,
- Meter stick,
- Metal washer, nut or other small weight that can be attached to a string,
- Quadrant plan,
- Masking tape,
- Rocket construction instructions located at Attachment A,
- Launcher Quadrant Pattern located at Attachment B, and
- Launch record sheet located at Attachment C.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

Construct the Rocket

1. Using scissors cut one 30-cm piece of foam tubing for each team.
2. Have the cadets cut four equally spaced slits at on end of the foam tubing. Ensure the slits are perpendicular to the centre of the foam tube and longitudinally straight along the foam tube. The slits should be 8 to 10-cm long. The fins will be mounted through these slits.
3. Have the cadets tie the 75-cm string into a 30-cm long loop.
4. Have the cadets using the cable tie, attach the rubber band to the string by passing it through the centre of the rubber band and string. Pull the cable tie until the loop holding the string and rubber band is approximately one to two-cm.
5. Have the cadets pass the rubber band, cable tie and string assembly through the foam tube so the string is at the end with the slits (tail of the rocket) and the rubber band is at the other end (the nose of the

rocket). The cable tie that attaches the rubber band to the string should be approximately 3-cm from the end of the foam tube.

Note. From Foam Rockets Educator Guide, by NASA, 2008. Retrieved December 7, 2011, from http://www.nasa.gov/pdf/280754main_Rockets.Guide.pdf

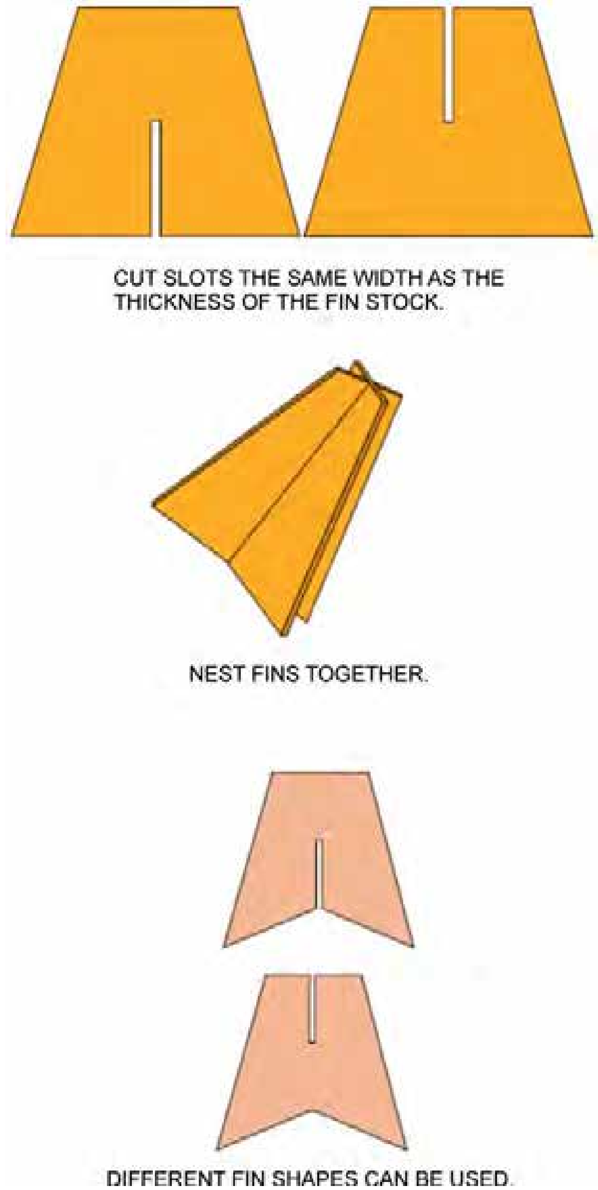
Figure 1 Exploded View of the Foam Rocket

6. Have the cadets place a cable tie around the nose of the rocket and cinch it tight. It should be over the cable tie that attaches the string to the rubber band. This cable tie should prevent the string rubber band and cable tie that is in the rocket from being pulled out. Trim the outer cable tie excess.

Remind the cadets to NOT pull on the string or the rubber band unless the rocket is on the launch system. If the string or rubber band is pulled out of the foam rocket, remove the cable ties at the nose and tail of the rocket, reinsert the string, cable tie and rubber band, and place new cable ties at the nose and tail of the rocket.

7. Cut out fins from a sheet of Bristol board according to the pattern located at Attachment A. Allow some leeway in design but constrain the fins to 10-cm long and 12-cm wide total. Notch both fins as indicated on the Foam Rocket Instruction Sheet, so one fin can slide over the other fin. Slide the assembled fins into the slits cut into the tail of the foam rocket. Make sure the string hangs out the end of the rocket after the fins are in place.

8. Place a cable tie around the foam tube after the fins and cinch it tight, holding the fins in place. Trim the cable tie flush.



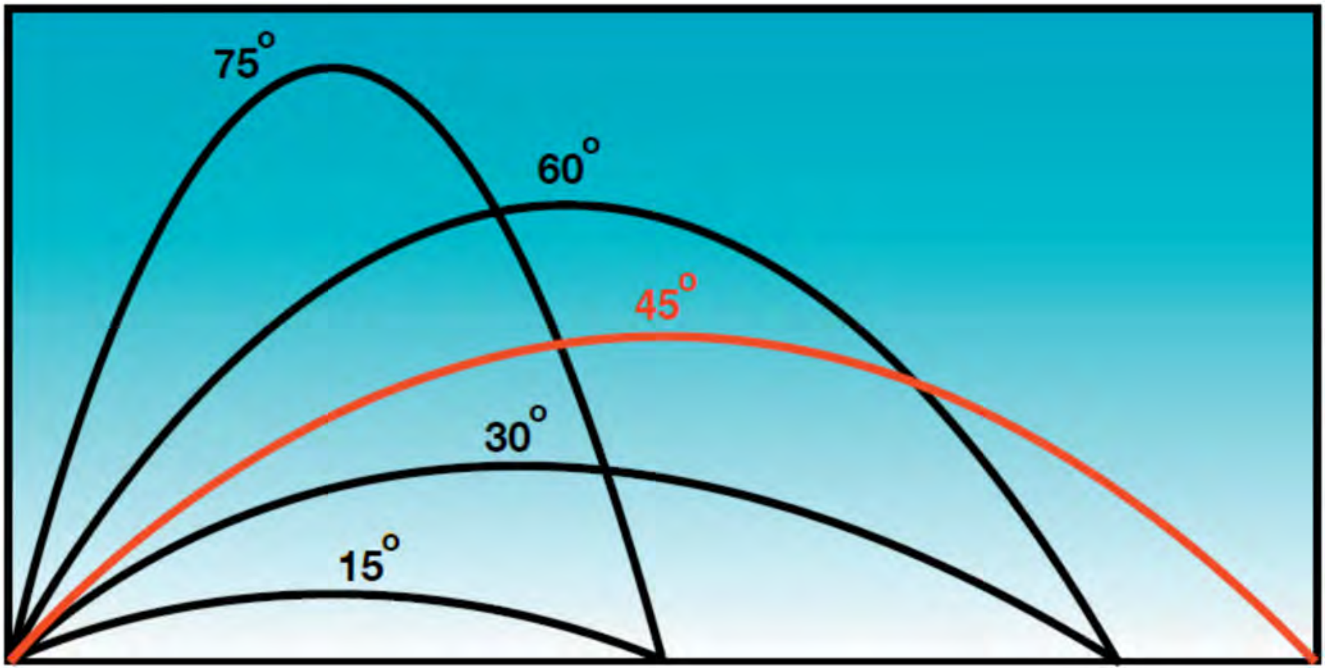
Note. From Foam Rockets Educator Guide, by NASA, 2008. Retrieved December 7, 2011, from http://www.nasa.gov/pdf/280754main_Rockets.Guide.pdf

Figure 2 Fin Construction Details

Construct the Launcher

1. Have the cadets cut out the quadrant pattern and fold along the dashed line.

2. Have the cadets tape the quadrant pattern to the metre stick so the black dot is 60-cm from the end of the stick. Have the cadets tape the 25cm string to the quadrant pattern so the string hangs freely from the black dot. Have the cadets attach a small weight (wash, nut or other small weight) to the free end of the 25-cm string.



Note. From Foam Rockets Educator Guide, by NASA, 2008. Retrieved December 7, 2011, from http://www.nasa.gov/pdf/280754main_Rockets.Guide.pdf

Figure 3 Rocket Trajectories

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. What is ballistics?

Q2. What stabilizes the foam rocket during flight?

Q3. What are the four forces that affect a foam rocket during flight?

ANTICIPATED ANSWERS:

A1. Ballistics is the study of the flight of projectiles after the power phase has terminated, moving under their own momentum and the external forces of gravity and air resistance.

A2. During flight, the fins stabilize the foam rocket. The fins, like feathers on an arrow, keep the rocket pointed in the desired direction.

A3. Gravity, launch angle, initial velocity, and atmospheric drag affect how far the rocket will land from the launch site.

Teaching Point 2	Have the cadets, in groups of 4, launch the foam rockets and record the launch data.
Time: 25 min	Method: In-Class Activity

ACTIVITY

OBJECTIVE

The objective of this activity is to have the cadets launch foam rockets and record the launch data.

RESOURCES

- Foam rocket launcher, one per group,
- Experiment data sheet located at Attachment B, one per group,
- Launch record sheet located at Attachment C, one per group, and
- Foam rocket. one per team,

ACTIVITY LAYOUT

Select a large room with a high ceiling for the launch range, such as a cafeteria or gymnasium or set up the activity out of doors.

Place masking tape markers on the floor / ground at 1 meter intervals starting at 5 meters and going to 20 meters.

If it is a calm day, the investigation can be conducted outside. Although the rockets can be launched outside on windy days, the wind becomes an uncontrollable variable that will invalidate the results.

ACTIVITY INSTRUCTIONS

In this activity, control will be how much the rubber band is stretched when launching the rockets. The rocket must be launched with exactly the same amount of force each launch in order to acquire accurate data.

The experimental variable will be the angle of launch. Cadets will compare the launch angle with the distance the rocket travels.

The cadets will each be given a title and responsibility for the experiment. The experiment will be conducted in four series of four launches.

1. Launch Officer – will attach the rocket to the launcher by placing the rubber band over the end of the launcher and pull the string back until the tail of the rocket reaches the 60-cm mark on the launcher. Tilt the launcher until it is pointing upwards at an angle of between 10 and 80 degrees. The launch officer will stand at the start mark and release the rocket when the launch command is given.
2. Launch Director – Record the angle on a copy of Attachment B. Give the launch command. Record the distance the rocket travels.
3. Range Officer – Measure the distance from the launcher to where the rocket hit the floor (not where it slid or bounced to). Report the distance to the launch director.

4. Recovery Officer – Return the rocket to the launcher for the next launch.
5. Repeat the launch procedure three more times changing the angle for each launch and record the distance for each launch.
6. Conduct the activity three more times switching the team members' jobs for each launch.

Assuming cadet groups are careful in their control of launch angles and in the stretching of the launch band, they will observe that their farthest flights will come from launches with an angle of 45 degrees. They will also observe that launches of 30 degrees, for example, will produce the same range as launches of 60 degrees. Twenty degrees will produce the same result as 70 degrees, etc. (Note: Range distances will not be exact because of slight differences in launching even when teams are very careful to be consistent. However, repeated launches can be averaged so that the ranges more closely agree with the illustration.)

The countdown is a warning that a rocket is about to be launched. When counting down, do so in a loud voice so everyone can hear.

SAFETY

Each step during a pre-launch and launch sequence is important. Personnel at a launch must always be aware of what is happening.

Teaching Point 3	**Conduct an activity debriefing.**
Time: 5 min	Method: Group Discussion

BACKGROUND KNOWLEDGE

The point of the group discussion is to draw the following information from the group using the tips for answering / facilitating discussion and the suggested questions provided.

The foam rocket experiment has demonstrated the effects of gravity and air resistance on flight. The launch angle determines the distance the rocket will travel from the launch tower. With an increase in power, a rocket can be launched and accelerated with enough force to continuously fall toward Earth. This is a basic orbit. If the rocket is outside the atmosphere, air resistance is removed from the equation and gravity will continue to pull the rocket towards the Earth. Force must be applied periodically to ensure the speed is maintained allowing the rocket to remain in orbit.

GROUP DISCUSSION

TIPS FOR ANSWERING / FACILITATING DISCUSSION:

- Establish ground rules for discussion, eg, everyone should listen respectfully; don't interrupt; only one person speaks at a time; no one's ideas should be made fun of; you can disagree with ideas but not with the person; try to understand others as much as you hope they understand you; etc.
- Sit the group in a circle, making sure all cadets can be seen by everyone else.
- Ask questions that will provoke thought; in other words avoid questions with yes or no answers.
- Manage time by ensuring the cadets stay on topic.
- Listen and respond in a way that indicates you have heard and understood the cadet. This can be done by paraphrasing their ideas.
- Give the cadets time to respond to your questions.
- Ensure every cadet has an opportunity to participate. One option is to go around the group and have each cadet answer the question with a short answer. Cadets must also have the option to pass if they wish.
- Additional questions should be prepared ahead of time.

SUGGESTED QUESTIONS:

Q1. What launch angle gave the longest distance?

Q2. Why is it important to use the same amount of force for each launch?

Q3. What would happen if the amount of launch force is increased?

Q4. How can ballistics be used to achieve orbit?

Other questions and answers will develop throughout the group discussion. The group discussion should not be limited to only those suggested.

Reinforce those answers given and comments made during the group discussion, ensuring the teaching point has been covered.

END OF LESSON CONFIRMATION

The cadets' launch of a foam rocket will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

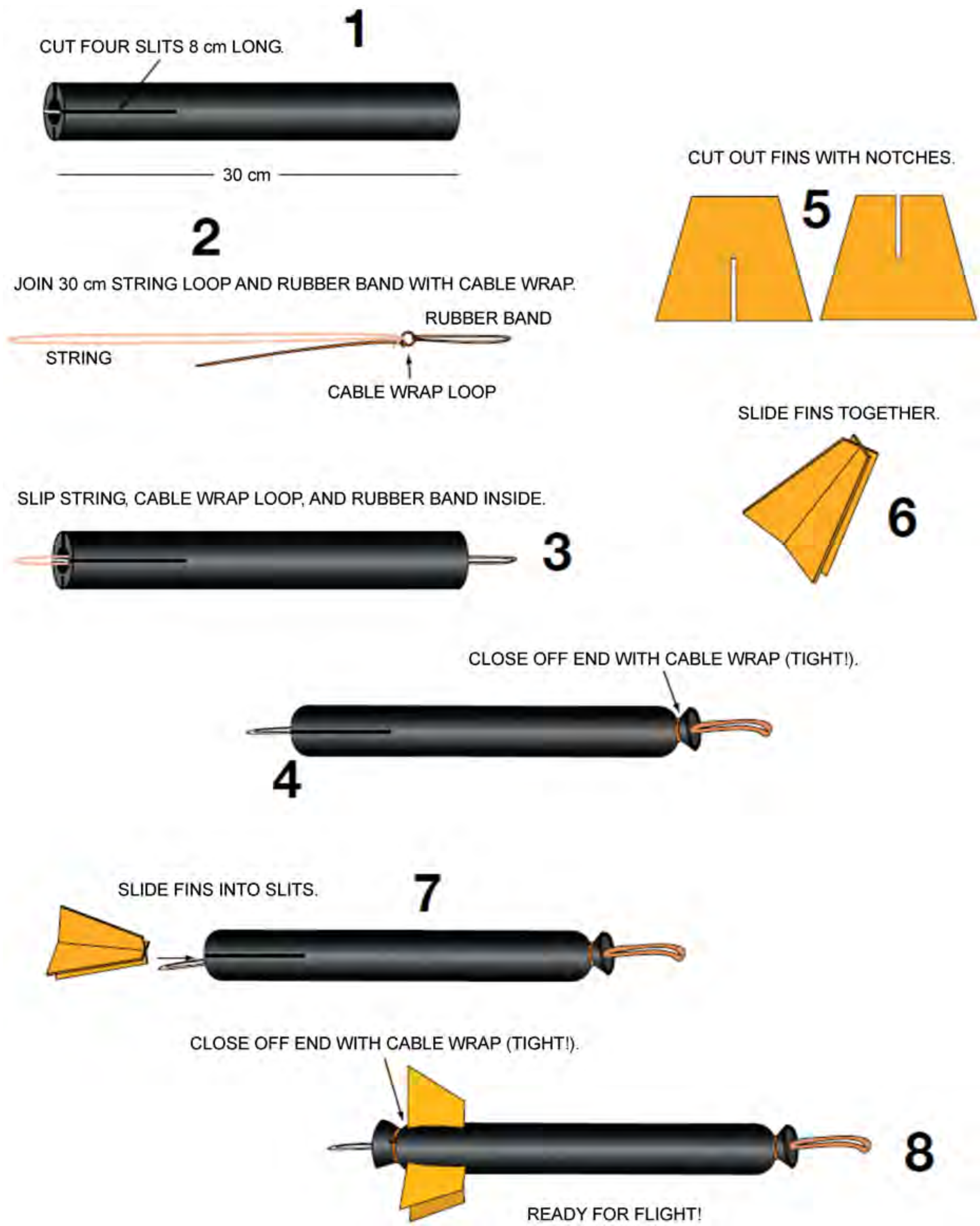
This is a dynamic way to demonstrate rocket propulsion and ballistics.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

C3-349 *Rocket Activity, Foam Rocket*. Retrieved October 1, 2008, from http://www.nasa.gov/pdf/295787main_Rockets_Foam_Rocket.pdf



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure A-1 Foam Rocket Instruction Sheet

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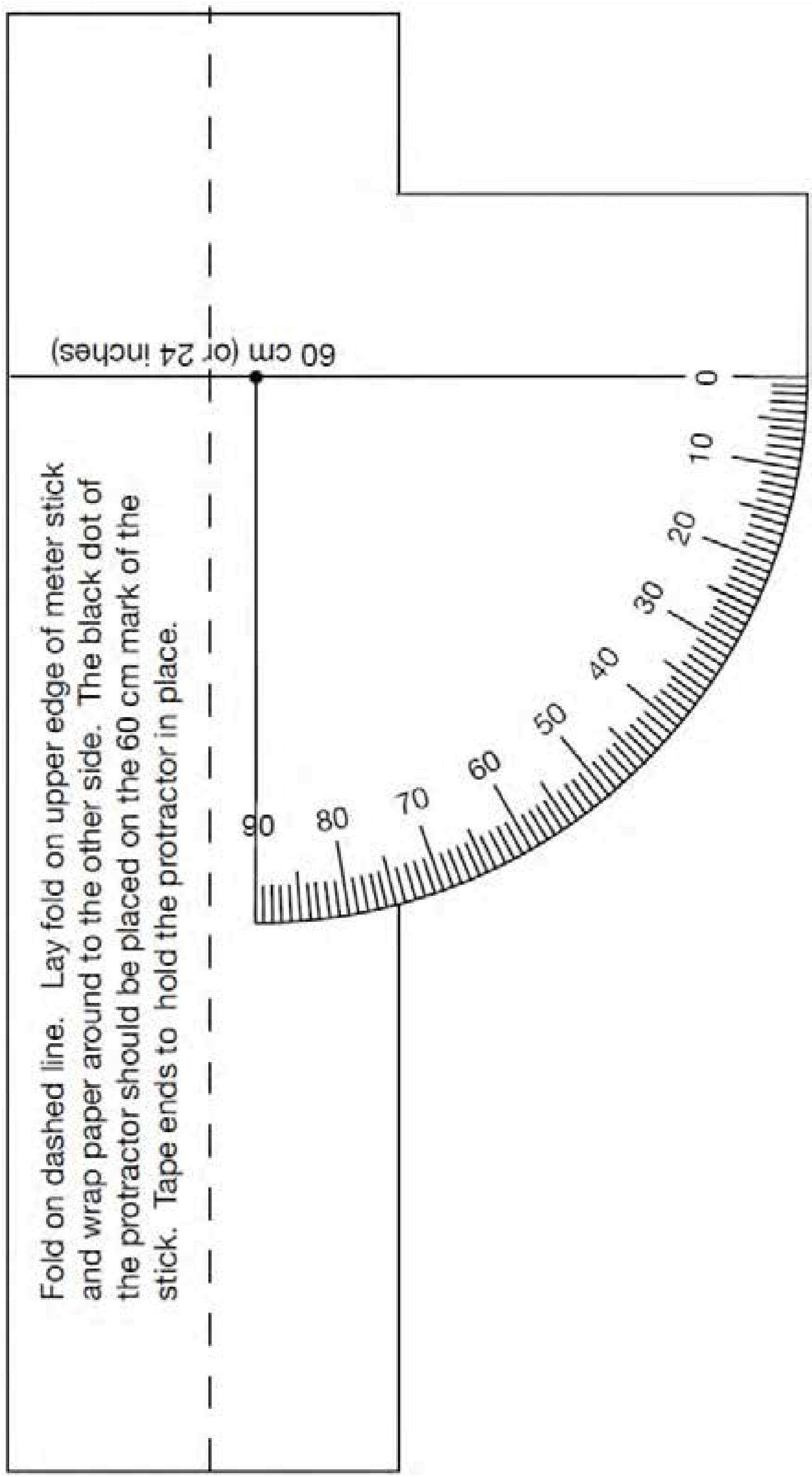
LAUNCHER QUADRANT PATTERN



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Rocket Range Experiment

Assign duties to team members. You will need the following positions (team members switch positions after each series of launches):

Launch Director

Launch Officer

Range Officer

Recovery Officer

TEAM NAME

____

TEAM MEMBERS

____

____

____

____

____

First Launch:

Launch Officer – attach the rocket to the launcher by placing the rubber band over the end of the launcher and pull the string back until the tail of the rocket reaches the 60-cm mark on the launcher. Tilt the launcher until it is pointing upwards at an angle of between 10 and 80 degrees. Release the rocket when the launch command is given.

Launch Director – Record the angle on the data table. Give the launch command. Record the distance the rocket travels.

Range Officer – Measure the distance from the launcher to where the rocket hit the floor (not where it slid or bounced to). Report the distance to the launch director.

Recovery Officer – Return the rocket to the launcher for the next launch.

Repeat the launch procedure three more times changing the angle for each launch.

Conduct the activity three more times switching the team members' jobs for each launch.

Compare the data for the four experiments.

LAUNCH EXPERIMENT 1	
LAUNCH ANGLE	DISTANCE

LAUNCH EXPERIMENT 2	
LAUNCH ANGLE	DISTANCE

LAUNCH EXPERIMENT 3	
LAUNCH ANGLE	DISTANCE

LAUNCH EXPERIMENT 4	
LAUNCH ANGLE	DISTANCE

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 3

EO C140.02 – DISCUSS SLEEP PATTERNS IN SPACE

Total Time:	60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001 *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

The activities in this lesson take place over a two week period.

Photocopy the Reaction Time Sheet located at Attachment A, two copies for each cadet.

Photocopy the Multiple Rulers Sheet located at Attachment B and cut into individual rulers for each cadet.

Photocopy the Sleep Log Sheet located at Attachment C for each cadet.

Photocopy the Fraction Wheel for 24 Hours located at Attachment D for each cadet.

Photocopy the Fraction Wheel for One Complete Day located at Attachment E for each cadet (copy onto a sheet coloured differently from Attachment D).

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for TP1 to orient the cadets to the problems astronauts face sleeping in space.

An in-class activity was chosen for TPs 2 and 3 to allow the cadets to experience some of the factors facing astronauts sleeping in space.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have discussed sleep patterns in space.

IMPORTANCE

This lesson will introduce the cadets to sleep patterns and how stressors affect astronauts sleeping in space.

Teaching Point 1	**Explain sleep patterns in space.**
Time: 10 min	Method: Interactive Lecture

SLEEP PATTERNS

Sleep for humans is a recurring state that is characterized by a lack of consciousness, lack of sensory activity and all voluntary muscles are inactive. It is not the same as resting, and awakening is possible, unlike hibernation or a coma. It is also a time that the body rejuvenates its immune, nervous, skeletal and muscular systems.

Sleep has a major impact on overall quality of life and affects how a person looks, feels and performs on a daily basis.

The Effects of Lack of Sleep

Lack of sleep may cause fatigue, daytime sleepiness, clumsiness, weight loss or weight gain and most importantly, deficits in attention and working memory. This can lead to errors in daily routine that can range from forgetting an ingredient while preparing a meal to falling asleep while driving.

For sleep to be effective, the length and soundness of the sleep are critical. To rejuvenate the body, a teenager needs at least 8½ hours, and on average 9¼ hours, a night of uninterrupted sleep. If sleep is interrupted, there is not enough time for the body to complete all of the phases needed for muscle repair, memory consolidation and release of hormones regulating growth and appetite. This affects concentration, decision making, and impedes the ability to participate successfully in school and social activities.

Types of Sleep

Sleep follows a pattern of alternating between REM (rapid eye movement) and NREM (non-rapid eye movement) sleep throughout a typical night in a 90-minute cycle that repeats itself.

NREM sleep takes place during three quarters of the sleep period and is the first step in falling asleep. NREM sleep is the body preparing for REM sleep and in its final stages it starts the body's restoration process. During NREM sleep, the body stabilizes and lowers blood pressure, breathing slows, temperature drops, muscles relax, and hormones are released that are essential for growth and development.

REM sleep takes place approximately 90 minutes after falling asleep and recurs every 90 minutes, getting longer later in the night. It provides energy to the brain, induces rapid eye movement and turns off voluntary muscles. It is the dream state.

Astronauts must sleep while on missions in space, but the excitement of a space mission, the inevitable motion sickness and a zero gravity environment can play havoc with an astronaut's sleep patterns. Without the effects of gravity, an astronaut can sleep in any position as long as they do not move around. Tossing and turning would send an unrestrained astronaut careening all around the cabin.

Astronauts aboard the space station use sleeping bags to restrain their movement when they need to sleep. The sleeping bags are attached to the walls of the space station. Sleep stations are spread throughout the space station.

Due to the cramped living conditions in space, the astronauts are packed into a small area where they can hear each other. Snoring has been documented on one of the missions when a medical doctor was wired to record his sleep patterns.

A circadian rhythm is a daily cycle of biological activity based on a 24-hour period and influenced by regular variations in the environment, such as the alternation of night and day. Circadian rhythms include sleeping and waking in animals, flower closing and opening in angiosperms, and tissue growth and differentiation in fungi.

We are accustomed to the circadian rhythms here on earth with the 24 hour day and night cycle. The International Space Station (ISS) orbits the Earth every 90 minutes so the sun setting cannot be used as an indicator of when to sleep. Astronauts can use a sleep blindfold, but may still be disturbed by the artificial light where they are sleeping. To overcome all of the problems of sleeping in space, astronauts may use sleeping pills to ensure they get an appropriate amount of sleep.

Note: From CSA (2011). CSA Astronaut Robert Thirsk Sleeping in the Japanese Module of the ISS. Retrieved December 7, 2011 from http://www.asc-csa.gc.ca/eng/astronauts/living_sleeping.asp

Figure 1 CSA Astronaut Robert Thirsk sleeping in the Japanese module of the ISS

The astronauts are scheduled for an 8 hour sleep period when each mission "day" comes to an end. The waking and sleeping cycle is an artificial substitute for the day night cycle on earth

Teaching Point 2 | **Have the cadets participate in an activity where they measure their current state of alertness.**

Time: 15 min | Method: In-Class Activity

ACTIVITY

Time: 15 min

OBJECTIVE

The objective of this activity is to have the cadets test their reaction time when well rested and after a lack of sleep and discuss their findings.

RESOURCES

- Reaction Time Sheet located at Attachment A, and
- Individual ruler located at Attachment B.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Have each cadet assess, on a scale of one to ten, how sleepy they are—with “one” being not sleepy, “five” being somewhat sleepy and “ten” being ready to fall asleep instantly.
2. Divide the cadets into pairs.
3. Distribute copy of Attachment A and a ruler from Attachment B to each cadet.
4. Within each pair, have the first cadet hold a ruler with centimetres (between the thumb and forefinger) vertically at the 30 mark with the 0 mark toward the floor.
5. Have the second cadet position their forefinger and thumb at the 0 end of the ruler without touching it, so that they will be able to grab the ruler easily by closing their finger and thumb together.
6. Have the second cadet observe the ruler carefully and then have the first cadet release the ruler.
7. Have the second cadet close their thumb onto the ruler to stop it as soon as it moves.
8. Have the cadet mark the place where the partner’s fingers were when they stopped the ruler. The cadet should discard the first result if the ruler moved less than five centimetres.
9. Have the cadets repeat the release / catch process 20 times and record and average the results the Reaction Time Sheet.
10. Have the cadets change places and repeat the test.
11. Have the cadets as a class review the average values of the reaction times. Have cadets think about what really is being measured in the activity, and how distance in centimetres reflects reaction times.
12. Have cadets calculate the average value of their reaction times and the average value of their sleepiness scores.

To calculate the average, add the values together and divide the sum by the number of values.

Example: If sleepiness score is a “3” and the average reaction time is ___, add 3 + ___ and divide the sum by ___ (number of values.) Discuss reaction time variance and alertness level.

13. Ask the cadets to identify the normal range of reaction times in their class population.

The cadets will take the ruler and data sheet home for the next two weeks and record their reaction time and calculate their average reaction times during each trial (night and morning).

14. Inform cadets that they will need to ask someone at home to help them with this activity, and suggest that the cadets perform this activity on a Friday or Saturday night so as not to disrupt their weekly routines.

15. Have cadets ask their parent(s) / guardian(s) for permission to stay up one or two hours beyond their normal bed time.

16. Instruct cadets to perform 20 trials of reaction times tests before they go to bed. Inform them that they must be feeling tired and ready to go to bed before doing this exercise. (Ask cadets to evaluate how sleepy they feel using the same scale as in the previous activity.)

17. Direct the cadets to repeat the activity after they have each had a good night’s sleep. (Again, ask them to evaluate how sleepy they feel using the same scale as in the previous activity.)

18. Have the cadets take home a copy of Attachment C Sleep Log Sheet and fill it in over the next 14 days. They will record how many hours they slept by filling in the columns for each day.

Teaching Point 3 — **Conduct an activity where the cadets discuss their sleep patterns from the proceeding two weeks.**

Time: 25 min — Method: In-Class Activity

This activity takes place 14 days after the previous TP.

ACTIVITY

Time: 25 min

OBJECTIVE

The objective of this activity is to have the cadets use the data recorded over the previous two weeks to assemble graphs and a fraction wheel to be used when discussing their sleep patterns.

RESOURCES

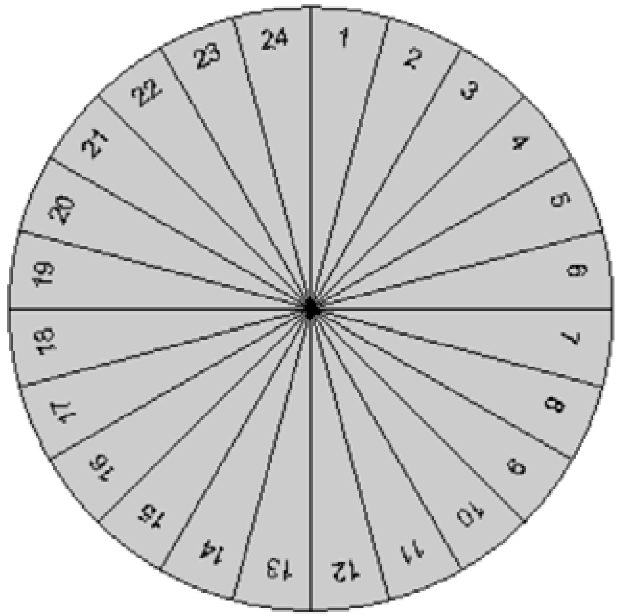
- Sleeping pattern graph,
- Sheet of white paper,
- Sheet of light coloured paper,
- Drawing compass,
- Protractor,
- Different coloured felt tip markers,
- Pair of scissors, and
- Pencil.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Have the cadets discuss their sleep patterns they have recorded on the Reaction Time Sheet located at Attachment A.
2. Have the cadets, cut out the 16 cm diameter circle located at Attachment D out of a piece of white paper. Have them cut one radius line from the edge to the centre.
3. Have the cadets, using felt tip markers, indicate the 24 hours in a day by writing each hour in each segment.

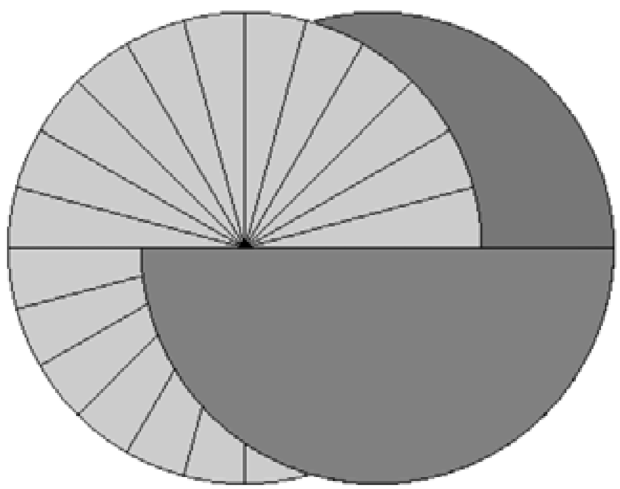


Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 2 Hours Indicated on Fraction Wheel

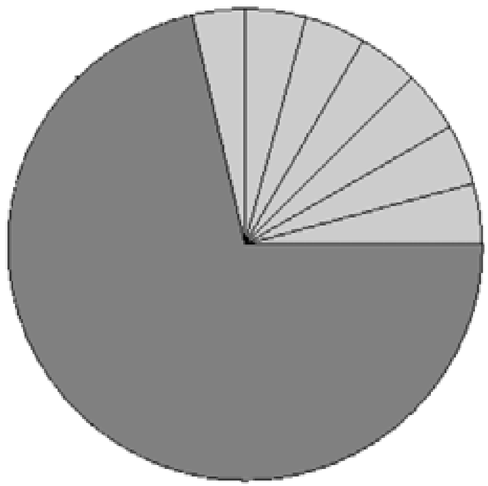
4. Have the cadets cut out the circle located at Attachment E out of a piece different coloured paper. Have them cut the 24 / 1 radius line from the edge to the centre.

5. Have the cadets slide the radius cuts of Attachment D and E together, with the lower numbers on Attachment D visible, so the two pieces make one circle.



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 3 Fraction Wheel Assembly



Note. Created by Director Cadets 3, 2011, Ottawa, ON: Department of National Defence.

Figure 4 Fraction Wheel Assembled

6. The Fraction Wheel is used to indicate the fraction of hours slept in a 24 hour period. Rotating circle E will show different amounts of circle D. If circle E represents one, as in the whole of one, then any parts of C showing will be a fraction of E. The circles are based on a 24 hour period, with D representing the 24 hours in one day and E demonstrating one day. Any part of D showing will be the indicated number of hours as a fraction of one day.

7. Ask the cadets to set their Fraction Wheel to the average number of hours of daylight within Earths light dark cycle (12 hours). Write the number as a fraction, 12/24. Have the cadets move their fraction wheels to the average number of hours they slept over the last 14 days.

8. Have the cadets calculate the fraction of the day that they slept on average, on the least amount of sleep day and on the most amount of sleep day.

9. Ask the cadets to compare their fractions and see how many cadets are getting enough sleep.

10. Have the cadets discuss the findings of the experiment.

Use the following questions to stimulate discussion.

Q1. What are some of the environmental constraints that can prevent sleep?

Q2. What can an astronaut do in space to ensure adequate sleep?

Q3. What can lack of sleep cause?

Q4. Where do astronauts sleep on the space station?

SAFETY

Nil.

END OF LESSON CONFIRMATION

The cadets' participation in the activity will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Sleep is an important factor in maintaining a healthy and efficient lifestyle. Lack of sleep causes many accidents and slows our day to day efficiency. Astronauts need to adjust to the challenges of sleeping while in space.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

C3-350 The science of Sleep and Daily Rhythms. (2009). *Sleep Patterns*. Retrieved December 13, 2011, from http://www.nsbri.org/default/Documents/EducationAndTraining/MiddleSchool/Sleep/TSO_Sleep.pdf

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REACTION TIME SHEET

NAME		DATE	

CENTIMETRES WHEN CAUGHT

25																				
24																				
23																				
22																				
21																				
20																				
19																				
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1																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

ATTEMPTS AT CATCHING THE RULER

TIREDNESS	1	2	3	4	5	6	7	8	9	10

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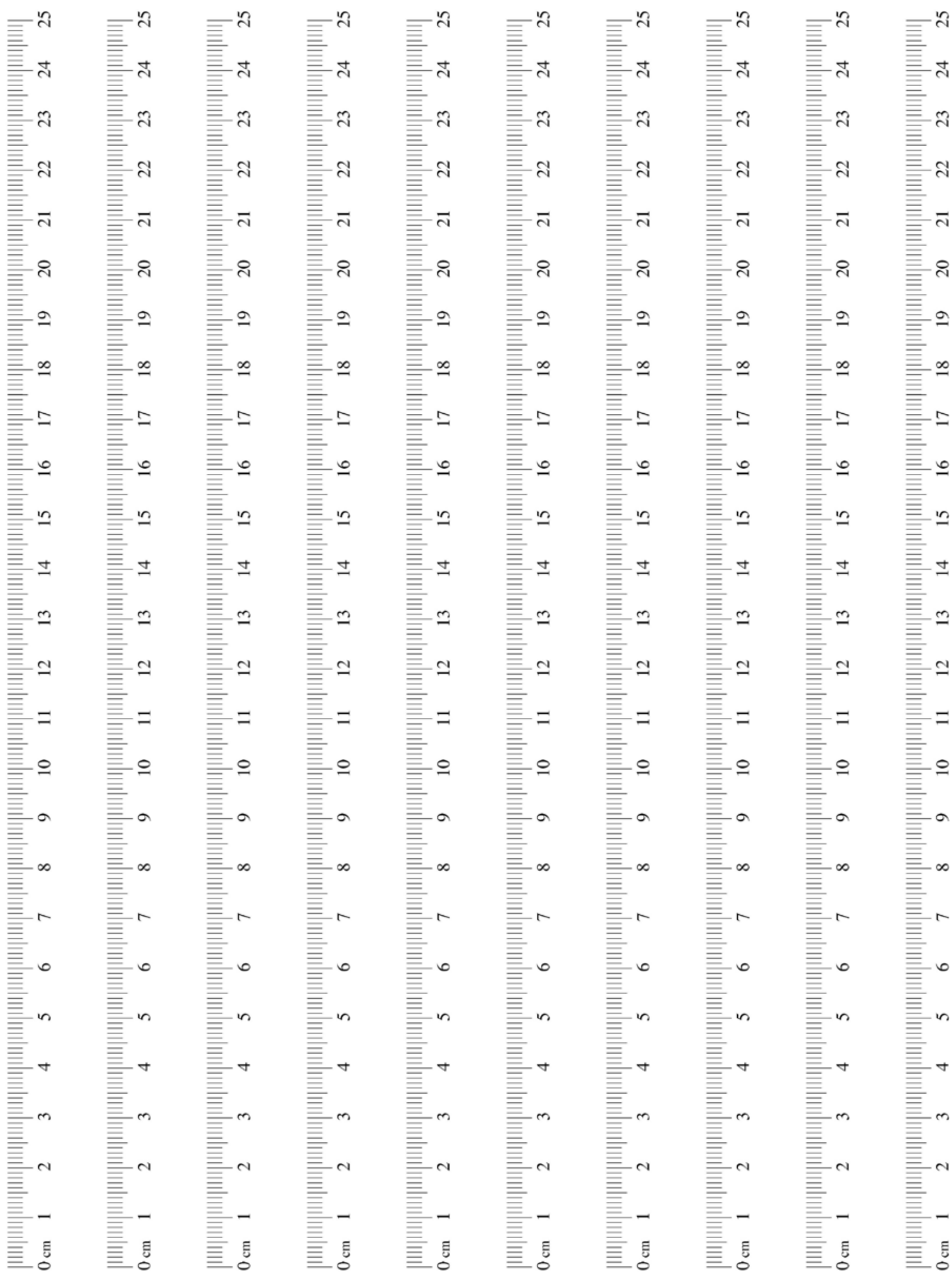

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SLEEP LOG SHEET

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
DATE														
1200A														
0100														
0200														
0300														
0400														
0500														
0600														
0700														
0800														
0900														
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1400														
1500														
1600														
1700														
1800														
1900														
2000														
2100														
2200														
2300														
TOTAL														

Using the Sleep Log

Colour in the square representing the time you went to sleep and the time you woke up. Only count the hours.

With another colour, fill in the squares between the time you went to sleep and the time you awoke. Fill in any squares where you took a nap. Record the number of hours you slept for each 24 hour period in the TOTAL line.

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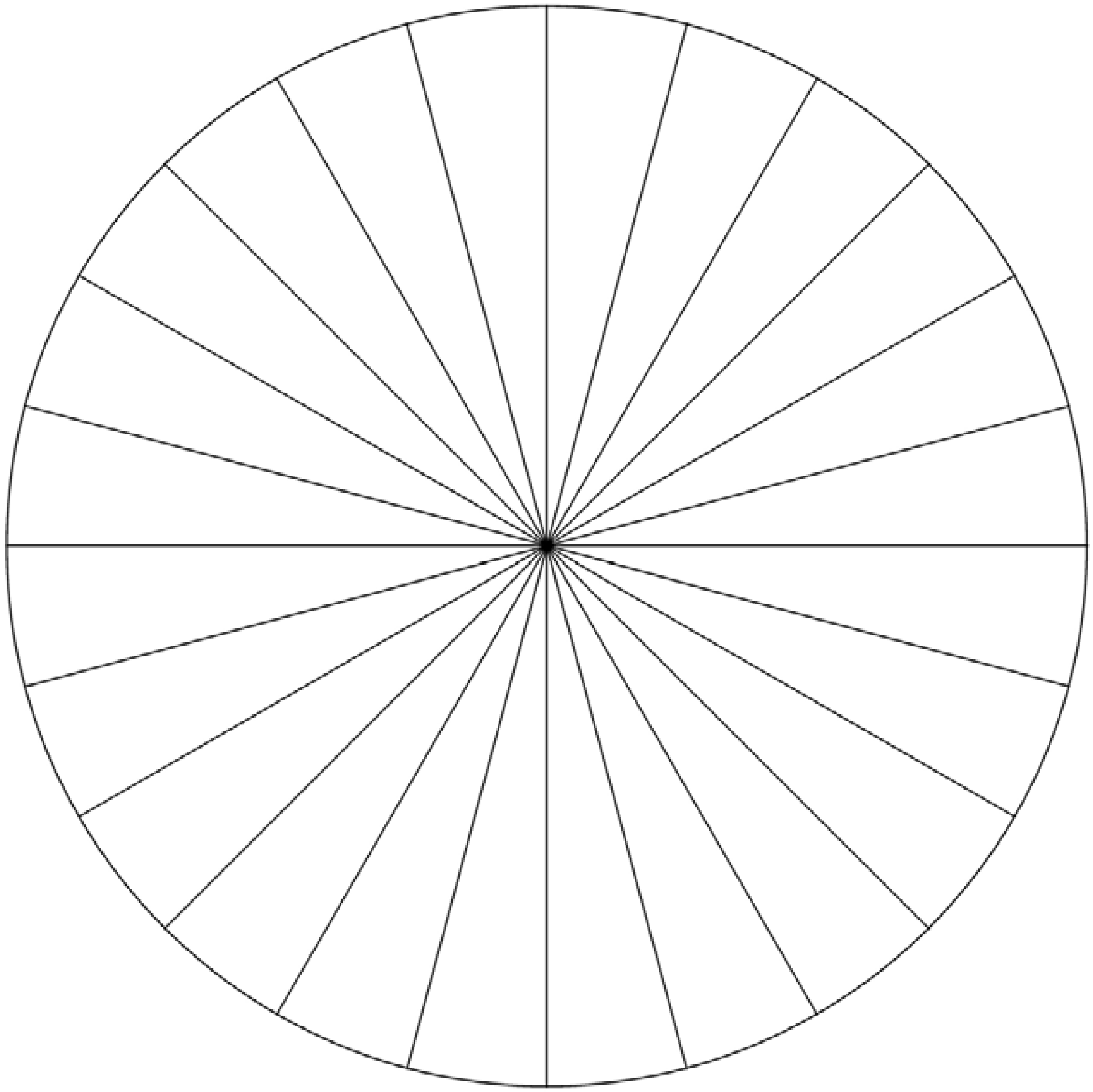
FRACTION WHEEL FOR 24 HOURS



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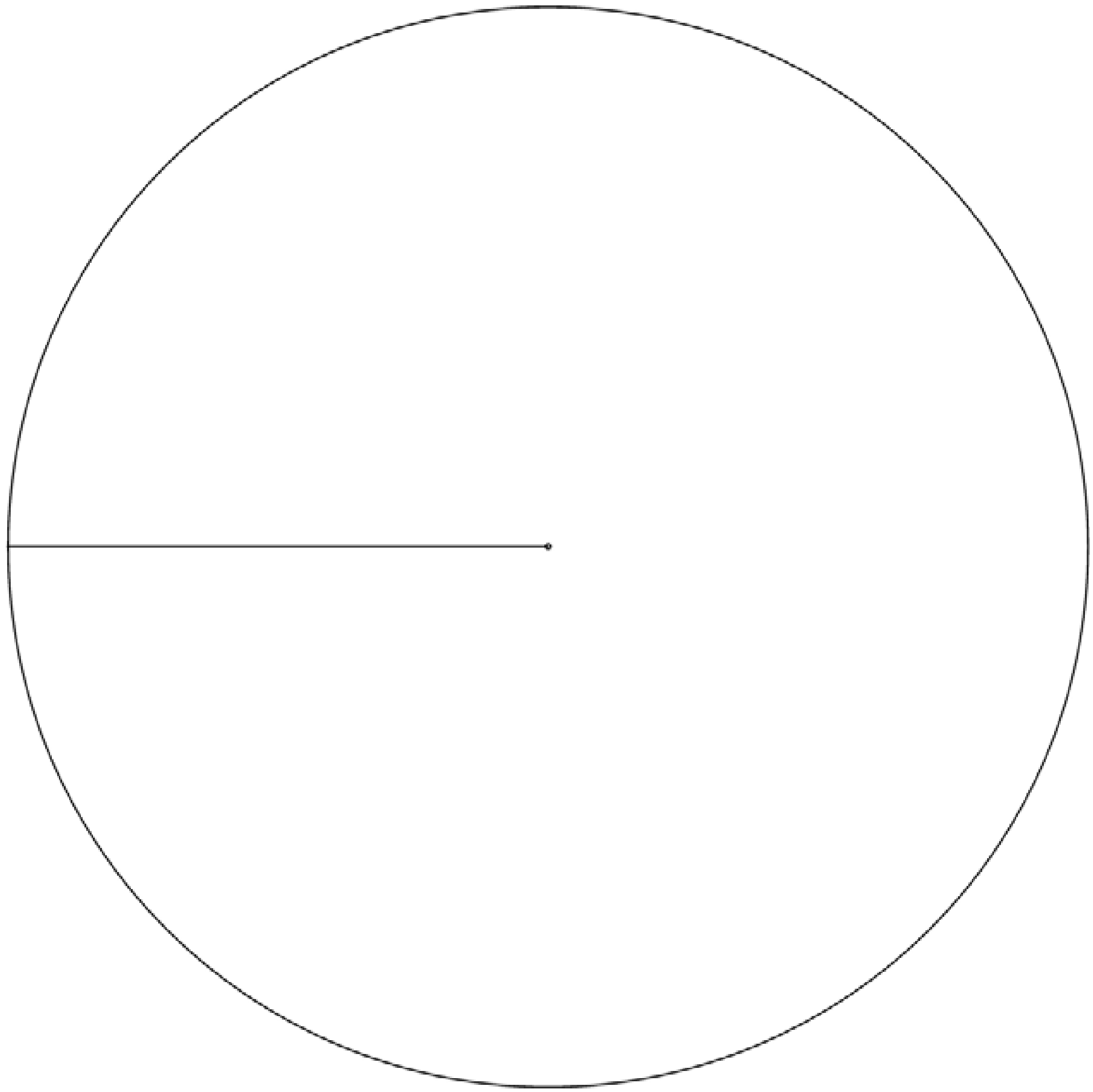
FRACTION WHEEL FOR ONE COMPLETE DAY



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CHAPTER 15

PO 160 – PARTICIPATE IN AERODROME OPERATIONS ACTIVITIES

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 1

EO M160.01 – IDENTIFY MAJOR AERODROME COMPONENTS

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instruction guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Photocopy and cut the game pieces located at Attachment B.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for TPs 1–3 as it allows the instructor to introduce basic information to the cadets.

An in-class activity was selected for TP 4 as it is an interactive way to confirm the cadets' comprehension of the material.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall identified the major components of an aerodrome.

IMPORTANCE

Knowing the various components of an aerodrome will assist cadets in identifying them during aviation and aerodrome operations activities.

Teaching Point 1	Define the terms aerodrome and airport.
Time: 5 min	Method: Interactive Lecture

AERODROME

Around the world there is an intricate system of aeronautical facilities designed to facilitate the efficient movement of air traffic, called aerodrome. Many aerodromes vary widely in the facilities and the services they offer. However, there are certain standard features that apply to every aerodrome.

“An aerodrome is any area of land or water designed for the arrival, departure and movement of aircraft” (Macdonald, 2000).

AIRPORT

“An airport is a licensed aerodrome, which possesses a certificate stating it has met all airport safety standards” (Macdonald, 2000).

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. What is the definition of an aerodrome?

Q2. What makes an airport different from an aerodrome?

ANTICIPATED ANSWERS:

A1. An aerodrome is any area of land or water, designed for the arrival, departure and movement of aircraft.

A2. An airport possesses a certificate stating it has met all airport safety standards.

Teaching Point 2	Explain components of the airside of an aerodrome.
Time: 5 min	Method: Interactive Lecture

Images of the various parts of an aerodrome are located at Attachment A.

This section refers to runway, taxiway and apron.

RUNWAY

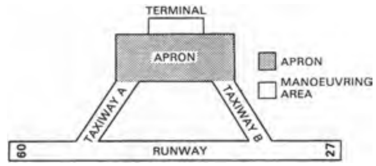
The runway is the area where aircraft take off and land. A runway may be made of pavement, grass, gravel, dirt or snow among other materials. Runways are identified by numbers and by the white lights that run along each side.

TAXIWAY

The taxiway is the area used by an aircraft to manoeuvre around the aerodrome between aprons and runways. Letters normally designates taxiways. At aerodromes with lighting, taxiways are defined by blue lights along each side.

APRON

The apron, also known as the tarmac or ramp area, is the part of an aerodrome intended to accommodate the loading and unloading of passengers and cargo. It is also the area used for refuelling, servicing and parking of aircraft.



Note. From Royal Canadian Air Cadet Manual, Proficiency Level One Handbook, Cadets Canada, 1998.

Figure 1 Aerodrome Movement Areas

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. What colour lights identify the sides of the runway?

Q2. What is the purpose of a taxiway?

Q3. What other names are used to refer to the apron?

ANTICIPATED ANSWERS:

A1. White lights.

A2. The taxiway is the area used by an aircraft to move from the apron to the runway.

A3. The apron can be referred to as the tarmac or the ramp area.

Teaching Point 3	**Explain components of an aerodrome.**
Time: 10 min	Method: Interactive Lecture

Images of the various parts of the aerodrome are located at Attachment A.

This section refers to control tower, terminal buildings, windsock, flying school and hangars.

CONTROL TOWER

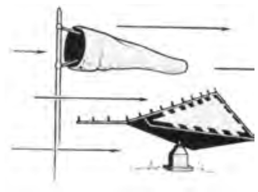
Some aerodromes have a control tower to ensure the safe and efficient movement of aircraft. The air traffic controllers in the tower are responsible for a number of procedures. These include take off and landing procedures, circuit procedures and ground manoeuvring of aircraft.

TERMINAL BUILDINGS

Terminal buildings are used for passengers arriving and departing. They are also used for baggage and cargo handling. Terminal buildings are located on the apron.

WINDSOCK

All aerodromes have at least one windsock or wind-t. The windsock is used by pilots to determine wind direction and speed. The approximate wind speed is indicated by the amount the windsock is extended. The wind-t is designed like an arrow whose small end points into the wind. They are found on the airfield, beside the runway.



Note. From The Ground Up: Millennium Edition, A.F. MacDonald, 2000.

Figure 2 Windsock and Wind-T

FLYING SCHOOL

Flying schools are used as training facilities for current pilots and those that want to learn how to fly.

HANGARS

Hangars are used to store aircraft to protect them from weather conditions that might damage their components. Hangars are also used to facilitate work while conducting maintenance tasks on the aircrafts.

CONFIRMATION OF TEACHING POINT 3

QUESTIONS:

Q1. What is the purpose of the control tower?

Q2. What does a windsock indicate?

Q3. What is the importance of flying schools?

ANTICIPATED ANSWERS:

A1. The purpose of the control tower is ensuring the safe and efficient movement of aircraft, through use of the air traffic controllers working within the tower.

A2. A windsock indicates wind direction and speed.

A3. Flying schools are used as training facilities for current pilots and those that wish to learn how to fly.

Teaching Point 4	**Have the cadets identify components of an aerodrome.**
Time: 5 min	Method: In-Class Activity

ACTIVITY

OBJECTIVE

The objective of this activity is to confirm that the cadets are able to correctly identify various components of an aerodrome.

RESOURCES

Nil.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into groups of four.
2. Distribute to the cadets the games pieces located at Attachment B.
3. Have the cadets match the different components of the aerodrome with their names and short definition.
4. Supervise the cadets as they are completing the activity.
5. Once the cadets have completed the activity, confirm the matches made by the cadets using the answer key located at Attachment C.

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 4

The cadets' participation in the activity will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in the activity will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

The various areas of an aerodrome serve different purposes. As cadets, knowing the various components of an aerodrome will assist in identifying the components during aviation and airport operations activities.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

A3-001 A-CR-CCP-263/PT-001*From the ground up: Millennium edition* (2000). Ottawa, ON: Aviation Publishers Co. Limited.

C3-022 ISBN 0-19-541731-3 *The Canadian Oxford dictionary* (2001). Don Mills, ON: Oxford University Press.

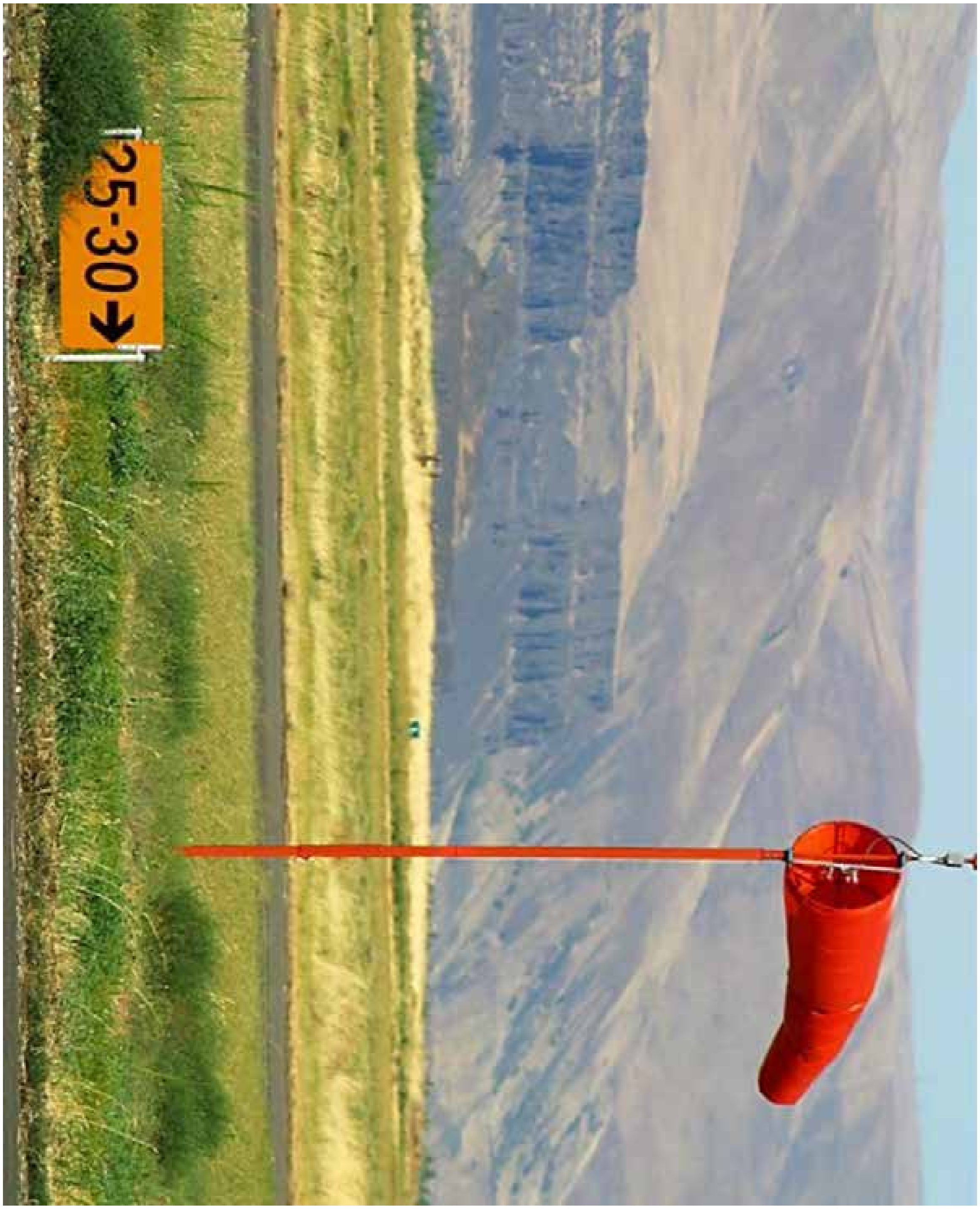
Runway

Taxiway

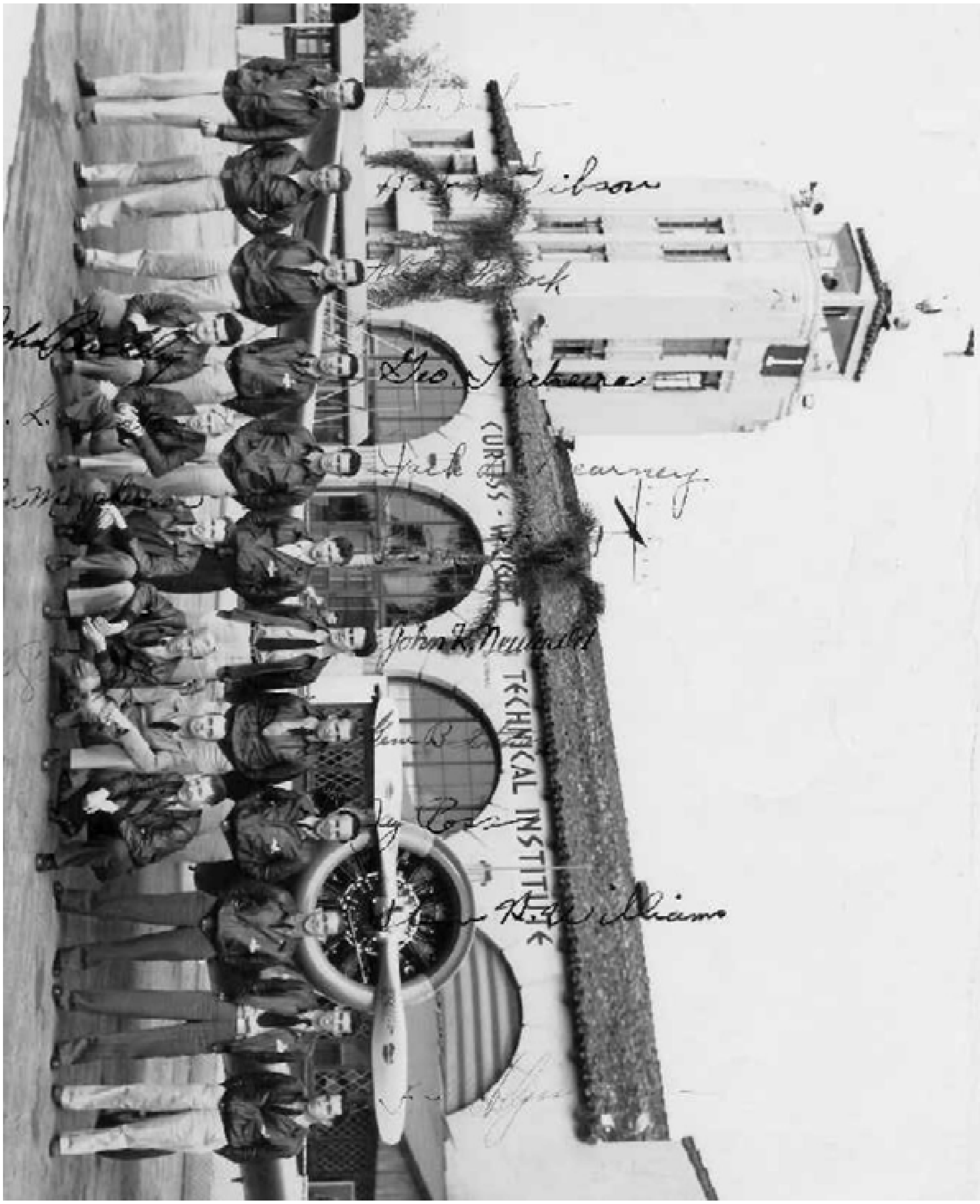
Apron

Control Tower

Terminal Building

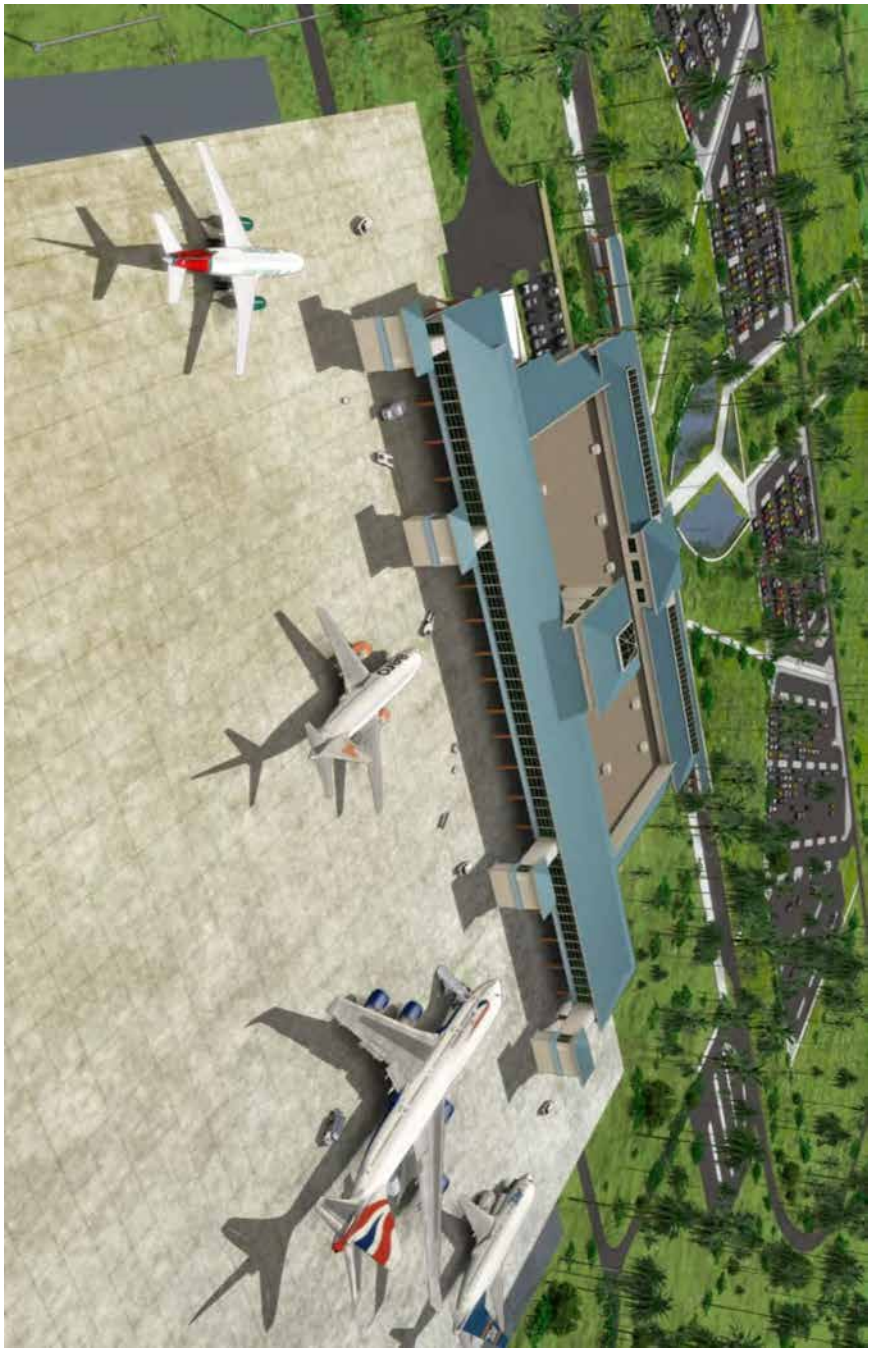


Windsock

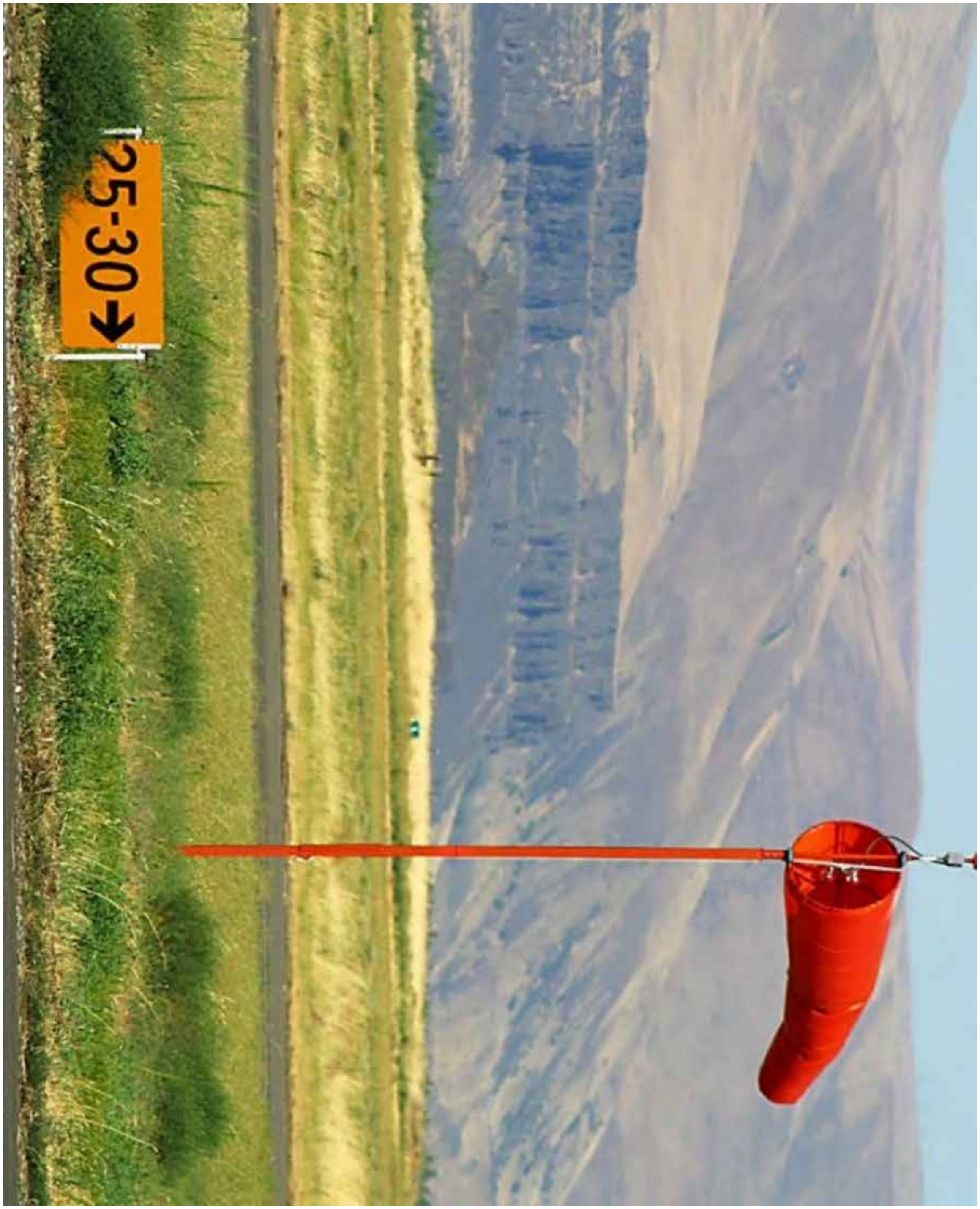


Hangar


27




WORLD'S BUSIEST CONTROL TOWER
WORLD'S BUSIEST CONTROL TOWER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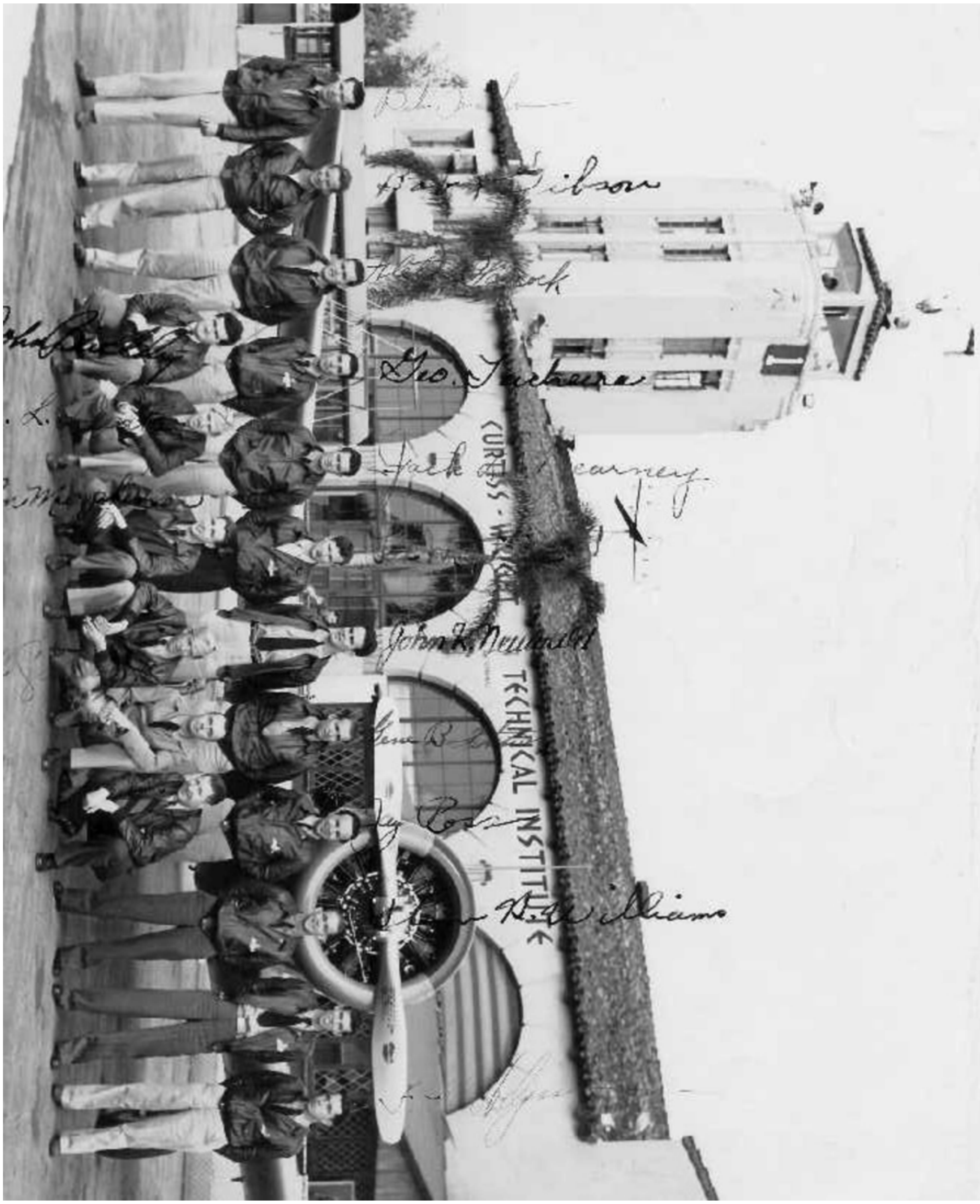

TECHNICAL INSTITUTE

RUNWAY
APRON
TAXIWAY
FLYING SCHOOL
WINDSOCK
HANGAR
TERMINAL
CONTROL TOWER

Where the aircraft lands and takes off.
Designated by letters.
Used for refuelling, servicing and parking.
Used for passenger arrivals and departures.
Indicates the direction and speed of the wind.
Where to learn how to fly.
Used to protect the aircraft from the elements.
Location of those responsible for a number of procedures on the ground and in the air.

ANSWER KEY

Runway

Where the aircraft lands and takes off.

Taxiway

Designated by letters

Apron

Used for refuelling, servicing and parking.

Control Tower

Location of those responsible for a number of procedures on the ground and in the air.

Terminal

Used for passenger arrivals and departures.

Windsock

Indicates the direction and speed of the wind.

Flying school

Where to learn how to fly.

Hangar

Used to protect the aircraft from the elements.

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 2

EO M160.02 – IDENTIFY FEATURES OF A RUNWAY

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located at A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

The training aids for this EO can be presented a number of ways, depending on the resources available at the squadron. A model runway can be constructed out of construction paper or Bristol board. If desired, Attachment A can be photocopied and distributed to the cadets.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture method was chosen for TP 1–3 as it allows the instructor to present basic information to the cadets.

An in-class activity was selected for TP4 as it is an interactive way to confirm the cadets' comprehension of the material.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have identified features of a runway.

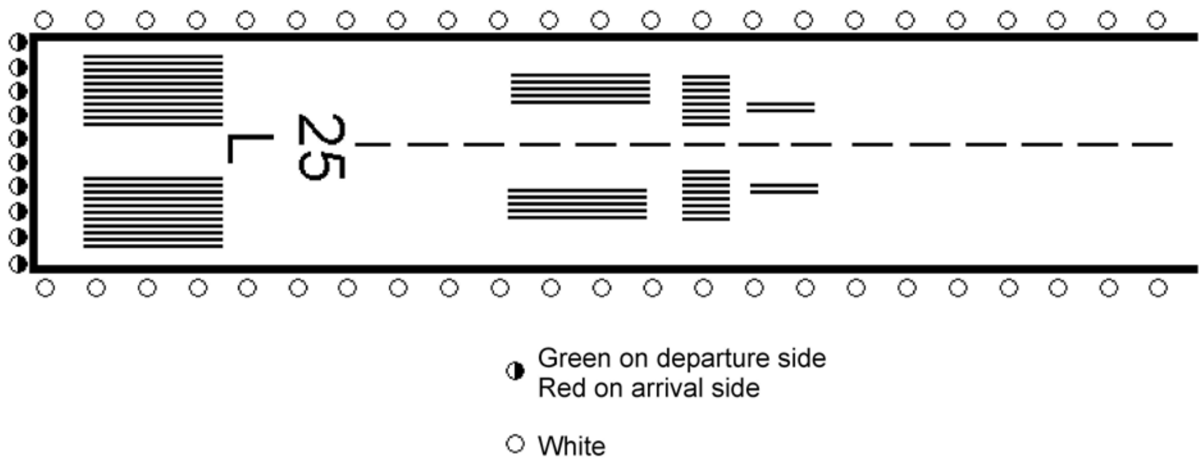
IMPORTANCE

Understanding the features of a runway will be helpful during tours and familiarization flights. In the aviation industry, pilots and air traffic controllers require this information to perform their jobs.

Teaching Point 1	**Discuss runway lights.**
Time: 5 min	Method: Interactive Lecture

RUNWAY LIGHTS

Both sides of a runway are marked by white lights. These lights are used to indicate the borders of the runway. They also contain red / green lights at the ends of the runway. These lights are double-sided with red on one side and green on the other. The red side of the lights faces toward the runway, or departure side, and indicates the end of the runway. The green side faces away from the runway, or arrival side, and indicates the start of the runway to aircraft that are landing.



Note. Director Cadets 3, 2011, Ottawa, ON: Department of National Defence

Figure 1 Runway Lights

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. What colour lights define the runway on each side?

Q2. What is the importance of the red / green lights?

ANTICIPATED ANSWERS:

A1. White lights.

A2. They indicate the end of the runway (red side) and the start of the runway for the aircraft preparing to land (green side).

Teaching Point 2	Discuss runway numbering.
Time: 10 min	Method: Interactive Lecture

RUNWAY NUMBERING

The runway number is indicated in large print as a two-digit number at the end of the runway. Runways are numbered according to their magnetic direction and are rounded off to the nearest ten degrees. Once rounded, the hundreds and tens digits are used to number the runway. For example, a runway that points in the direction of 266 degrees magnetic would be numbered 27. The highest runway number possible is 36 (360 degrees).

If two runways run parallel to each other they are identified as left or right by adding an L or an R next to the runway number. Two parallel runways heading north / south would be numbered 36L (left) and 36R (right).

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. How are runways numbered?

Q2. If a runway points in the direction of 176 degrees magnetic, how would it be numbered?

Q3. How are parallel runways numbered?

ANTICIPATED ANSWERS:

A1. Magnetic direction.

A2. 18 (Round 176 to 180, and use only the hundreds and tens digits).

A3. By adding L and R next to the runway number.

Teaching Point 3	Discuss runway markings and lights.
Time: 5 min	Method: Interactive Lecture

RUNWAY MARKINGS

Runways have other important markings that have specific purposes.

Centreline. White dashed lines designate the centre of the runway. Pilots use these markings to line up the aircraft to the middle of the runway during landing.

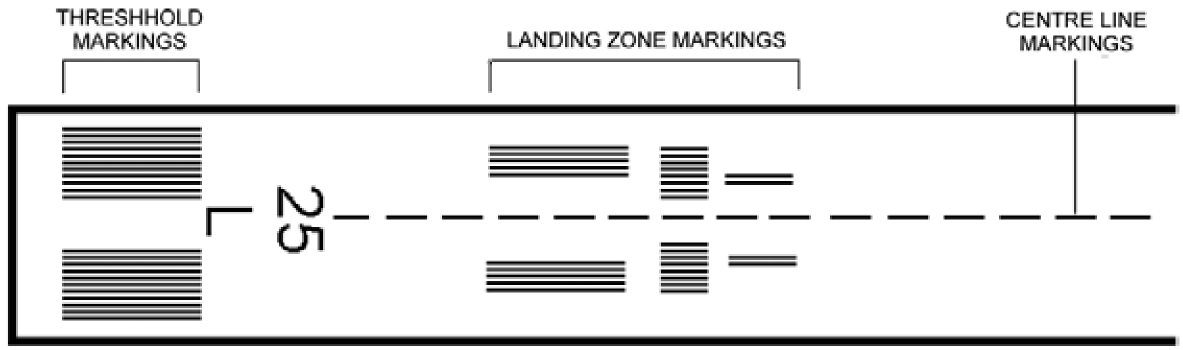
Landing zone markings. Provide the pilot with a general area where it is desirable to touch down.

Threshold markings. Indicate the beginning and the end of the runway using white lines at the threshold.

Danger Markings. Indicate areas that may be dangerous or unserviceable. These areas are signified by large white Xs on the unserviceable runways or taxiways.

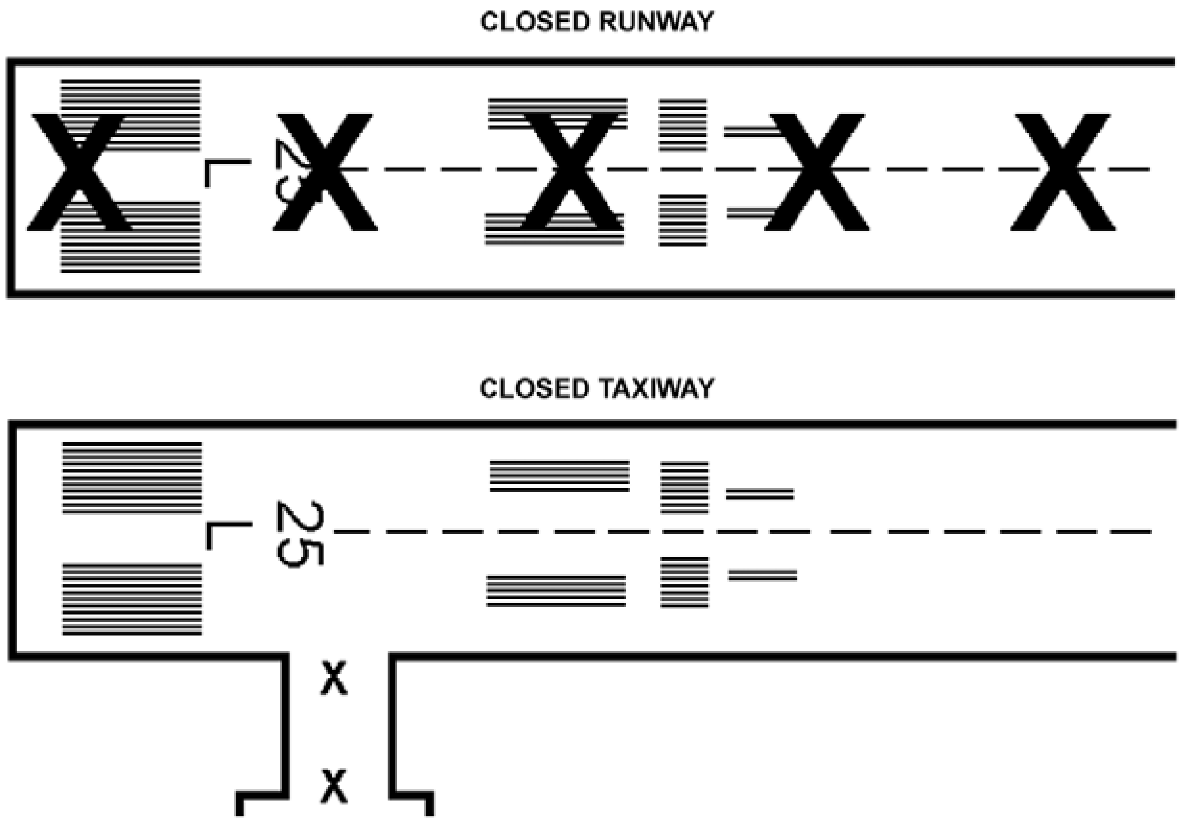
Obstruction lights. Identify possible structures that may obstruct a plane while attempting to take off / land.

Windsocks: Lit so pilots can use them at night.



Note. Director Cadets 3, 2011, Ottawa, ON: Department of National Defence

Figure 2 Runway Markings



Note. Director Cadets 3, 2011, Ottawa, ON: Department of National Defence

Figure 3 Runway Danger Markings

CONFIRMATION OF TEACHING POINT 3

QUESTIONS:

Q1. What are the markings that indicate the beginning and the end of the runway?

Q2. What does a large white X signify on a runway or a taxiway?

Q3. What is the purpose of obstruction lights?

ANTICIPATED ANSWERS:

A1. Threshold markings.

A2. Areas which may be dangerous or unserviceable.

A3. Obstruction lights are used to identify structures that may obstruct a plane while attempting to take off or land.

Teaching Point 4	**Have the cadets identify various features of a runway.**
Time: 5 min	Method: In-Class Activity

ACTIVITY

OBJECTIVE

The objective of the activity is to confirm the cadets can identify the features of a runway.

RESOURCES

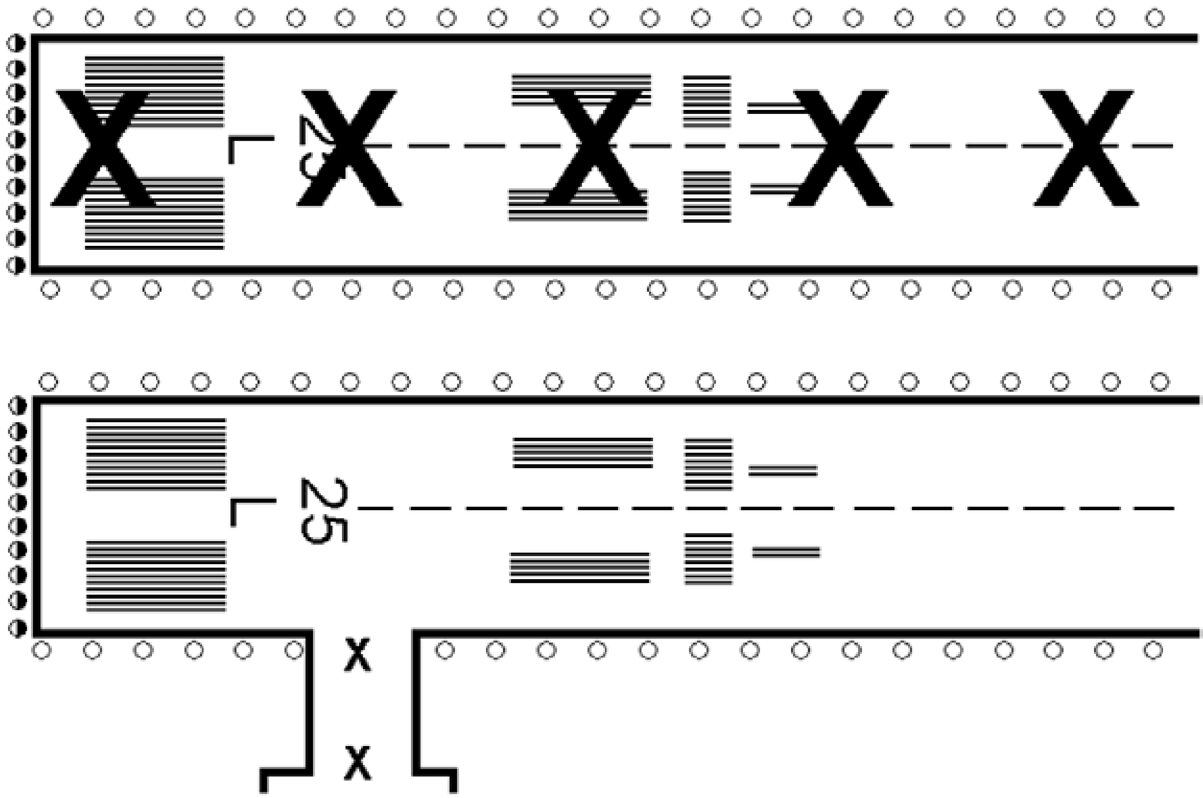
- Flipchart paper, and
- Flipchart markers.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into groups of four.
2. Give each group a sheet of flipchart paper and flipchart markers.
3. Have each group create a runway using the materials provided. The runways must include:
   (a) threshold markings,
   (b) red / green lights,
   (c) runway numbers,
   (d) centre line,
   (e) aerodrome landing markings,
   (f) danger markings, and
   (g) white lights.



Note. Director Cadets 3, 2011, Ottawa, ON: Department of National Defence

Figure 4 Complete runway markings

4. The groups have five minutes to complete the assignment.

5. Confirm that each group included all the features.

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 4

The cadets' participation in the activity will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in the activity will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Being familiar with the various features of runways can assist cadets in a number of areas of training. Understanding the features of a runway enhances cadet knowledge of aerodrome components and gives further insight into the runways’ role in take off and landing procedures.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

A3-001 A-CR-CCP-263/PT-001*From the ground up: Millennium edition* (2000). Ottawa, ON: Aviation Publishers Co. Limited

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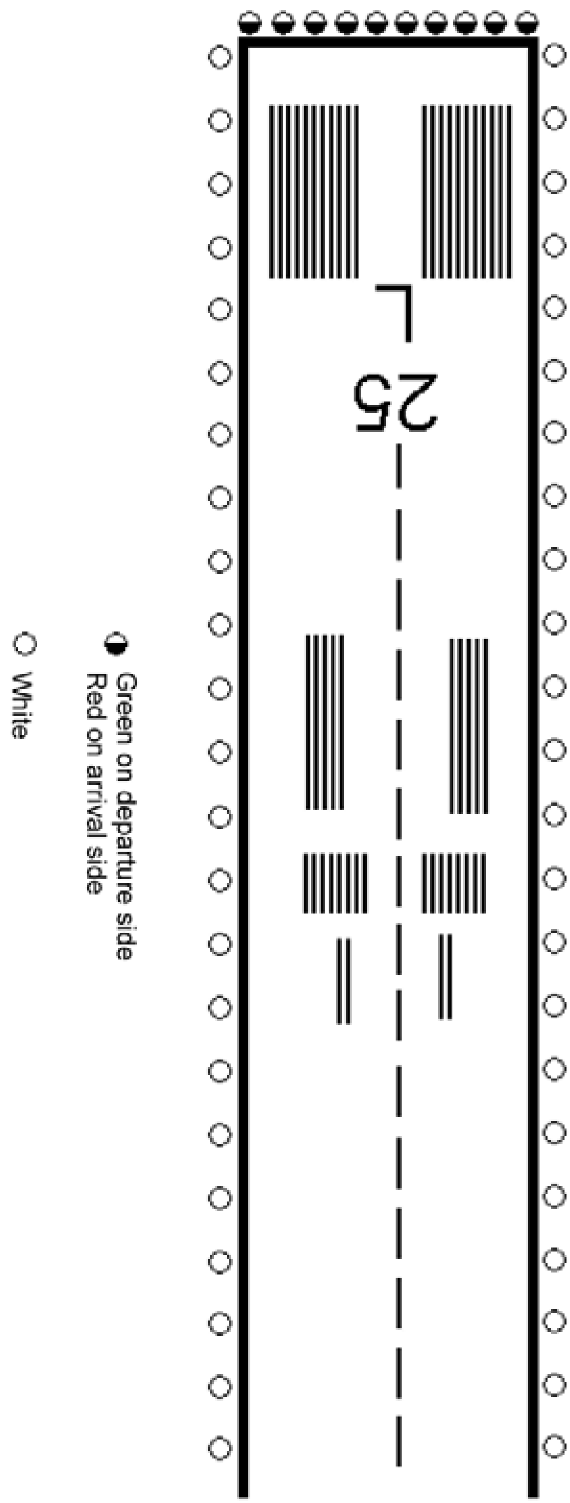
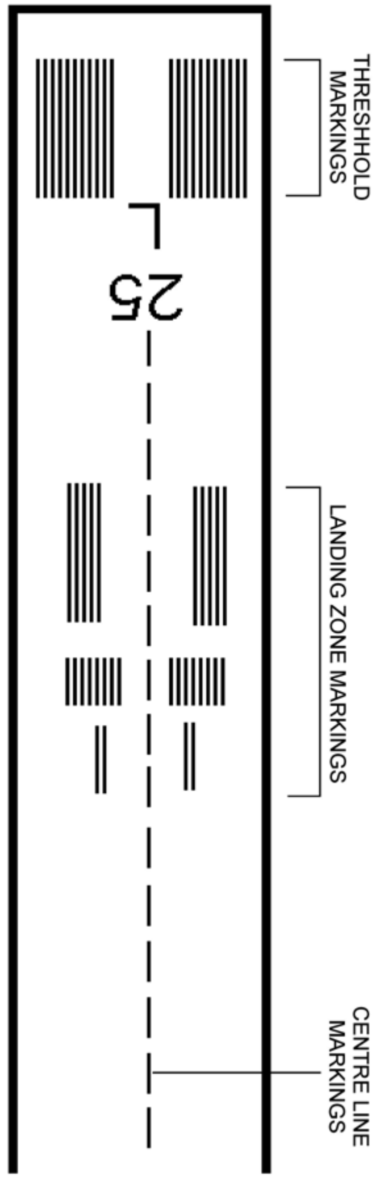
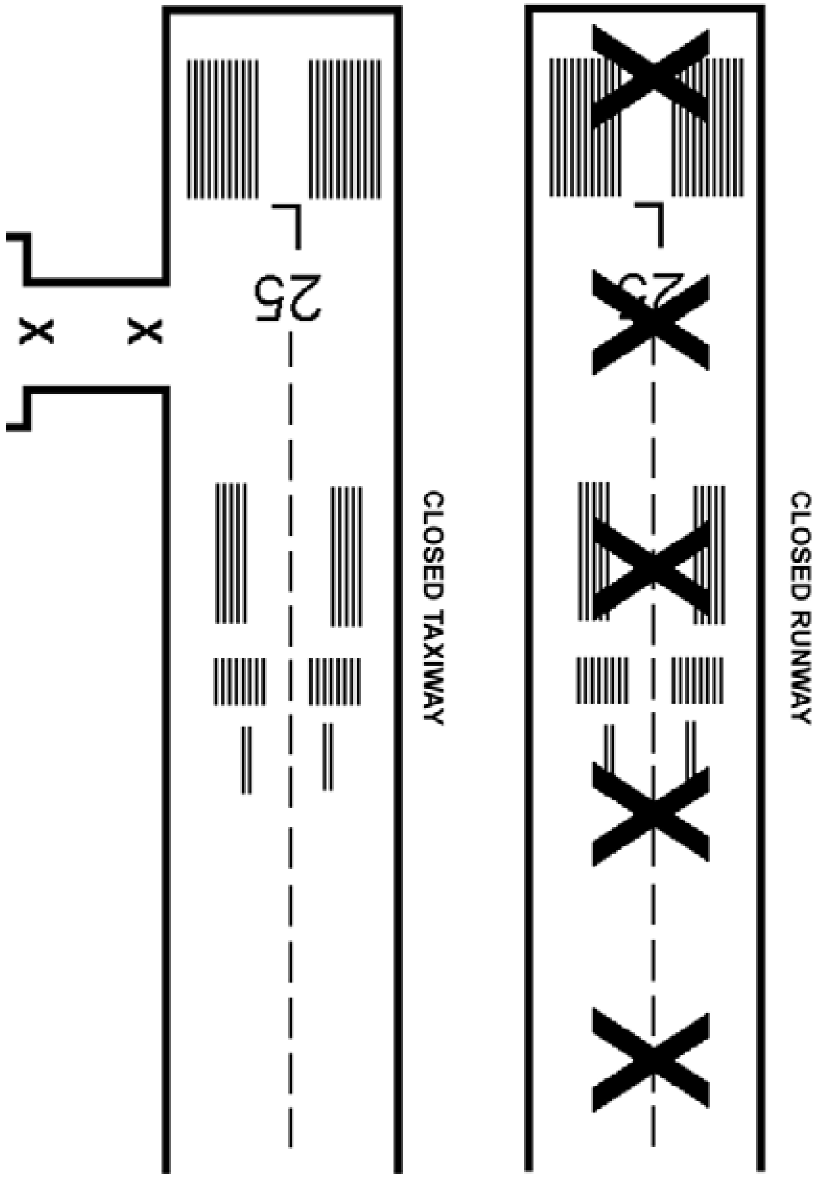
RUNWAY LIGHTS





RUNWAY MARKINGS



DANGER MARKINGS

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 3

EO M160.03 – CONSTRUCT A MODEL AERODROME

Total Time:	60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located at A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An in-class activity was selected for this lesson as it is a fun and interactive way to confirm the cadets' comprehension of the material.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have constructed a model aerodrome.

IMPORTANCE

Cadets will visit aerodromes as part of participating in various aircraft and aerodrome operations activities. This lesson will help them identify the major features of the aerodrome.

Teaching Point 1	**Have the cadets construct a model aerodrome.**
Time: 50 min	Method: In-Class Activity

OBJECTIVE

The objective of this activity is to confirm the information taught during the previous two lessons on aerodrome operations.

RESOURCES

The materials recommended for the construction of the model aerodromes are:

- Bristol board,
- construction paper,
- cardboard,
- small boxes (shoe box size),
- white chalk,
- stick pins,
- colour markers,
- scissors,
- glue, and
- masking tape.

Other materials may be used beyond this list if available at the squadron.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Place the cadets into groups of four to five.
2. Distribute the materials to each group.
3. Have each group start with four pieces of Bristol board (two by two taped together) to form the base of their aerodrome.
4. Show the cadets the diagram located at Attachment A for the ideal placement of the components of an aerodrome.
5. Have each group construct a model aerodrome.
6. Have each group tour each aerodrome and compare ideas on how they were constructed.

While cadets are encouraged to be creative with the materials provided, the instructor may recommend the following uses for the resources listed above:

- cardboard, poster board and small boxes – can be used for the construction of small buildings;
- white chalk – can be used for runway numbering and markings on Bristol board;
- multi-coloured markers – can be used for labelling the various components and adding specific details to them;
- construction paper – can be used with cardboard/small boxes if a specific colour for the building/component is required;
- stick pins – can be used for the lighting at an aerodrome (taxiway and runway lights); and
- glue and masking tape – can be used to hold the various components together.

SAFETY

Nil.

INSTRUCTOR GUIDELINES

- Ensure the cadets share the supplies when creating model aerodromes.
- Assist groups in getting started if they are having difficulty.
- Supervise the cadets' work to ensure that they are following the instructions listed above.
- Once the activity has been completed, the instructor should examine the model aerodromes to ensure that all of the components are labelled properly and in their proper locations.
- After this activity has been completed, the instructor should carry on with the reflection/questioning stage.

Make use of all teachable moments throughout the model construction process. Make sure to cover material from M160.01 and M160.02.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in the activity will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in the activity will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Cadets will have an opportunity to visit various aerodromes during aviation and aerodrome activities. They will now be familiar with major aerodrome components.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

A3-001 A-CR-CCP-263/PT-001 *From the Ground Up: Millennium Edition* (2000). Ottawa, ON: Aviation Publishers Co. Limited.

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 4

EO C160.01 – TOUR A LOCAL AERODROME

Total Time:	90 min

THERE IS NO INSTRUCTIONAL GUIDE PROVIDED FOR THIS EO

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CHAPTER 16

PO 170 – DISCUSS AIRCRAFT MAINTENANCE AND MANUFACTURING

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 1

EO C170.01 – WATCH *HOW IT'S MADE* SEGMENTS

Total Time:	60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instruction guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering of the lesson.

Review the *How It's Made* segments and select seven segments to show during the lesson.

Prepare a suitable classroom area with an available media.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An in-class activity was chosen for this lesson as it is an interactive way to provoke thought and stimulate interest among cadets.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have watched *How It's Made* segments.

IMPORTANCE

Discovering the aircraft maintenance and manufacturing industry will give the cadets a better understanding of how aircraft are prepared for and serviced for flight, including different career opportunities.

BACKGROUND KNOWLEDGE

SEGMENT: AIRCRAFT ENGINES

See how aircraft engines are built.

Length (00:05:05)

SEGMENT: AIRCRAFT PROPELLERS

See how aircraft propellers are made.

Length (00:04:59)

SEGMENT: AIRCRAFT WOODEN PROPELLERS

See how aircraft wooden propellers are built.

Length (00:06:00)

SEGMENT: AIRPLANE CONSTRUCTION

See how the construction of a small airplane is done.

Length (00:04:45)

SEGMENT: AIRPLANE LANDING GEAR

See how the construction and assembly of an airplane landing gear is done.

Length (00:04:46)

SEGMENT: HELICOPTERS

See how the construction and assembly of a helicopter is done.

Length (00:04:42)

SEGMENT: GLIDERS

See how the construction and assembly of a glider is done.

Length (00:05:01)

SEGMENT: JET TURBINE BLADES

See how the production of jet turbine blades is done.

Length (00:04:53)

Teaching Point 1	**Discuss major components of the aircraft maintenance and manufacturing industry.**
Time: 5 min	Method: Interactive Lecture

The terms maintenance and manufacturing refer to very clearly defined fields.

MAINTENANCE

Aircraft maintenance refers to any work being done on an aeronautical product after the issuance of a certificate of airworthiness, to include:

- overhaul,
- repairs,
- required inspection or modification, and
- removal or installation of components.

This does not include elementary work or servicing.

MANUFACTURING

Aircraft manufacturing refers to any work being done on an aeronautical product before the issuance of a certificate of airworthiness, to include:

- making,
- assembly, and
- fabrication.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. What is considered aircraft manufacturing?

Q2. What kind of work is included in aircraft maintenance?

ANTICIPATED ANSWERS:

A1. Any work done on an aeronautical product before the issuance of a certificate of airworthiness.

A2. Overhaul, repair, required inspection or modification, and removal or installation of components on an aeronautical product.

Teaching Point 2	**Watch and discuss *How It's Made* segments.**
Time: 40 min	Method: In-Class Activity

Before the start of the lesson review the *How It's Made* segments. This will facilitate the discussion after each segment and will enable an optimal use of the time allotted for this TP.

After each segment, using the questions and answers provided below, confirm the cadets' comprehension of the segment.

SEGMENT: AIRCRAFT ENGINES

Q1. Why is redundancy built in an aircraft engine?

Q2. Why is a testing propeller attached to engine during testing?

Q3. What is checked in the oil filter after testing?

A1. To ensure that each system as a backup to maximise safety.

A2. To keep the engine cool during the testing phase.

A3. The oil filter is checked for foreign debris.

SEGMENT: AIRCRAFT PROPELLERS

Q1. Why are propellers made of aluminum?

Q2. What happens to defective pieces during the manufacturing process?

Q3. Why are the back of the blades painted black?

A1. Because aluminum is a light-weight and durable material.

A2. The defective pieces are either repaired or scrapped if they cannot be repaired.

A3. To prevent the sun from reflecting off the propeller and blinding the pilot.

SEGMENT: AIRCRAFT WOODEN PROPELLERS

Q1. What are wooden propellers made of?

Q2. What is the airfoil on a propeller?

Q3. What are the two sides of a propeller blade?

A1. The propellers are made of laminated maple.

A2. The airfoil is the side of the propeller blade that is shaped like aircraft wing.

A3. The pitch and the airfoil.

SEGMENT: AIRPLANE CONSTRUCTION

Q1. What are the airplanes made of and why?

Q2. What is the process called curing?

Q3. What is used to cut holes in the planes fuselage?

A1. An airplane can be made out of fiber glass and Carbone fiber.

A2. Curing refers to the process of cooking the different materials at very high temperature in order to solidify the glue.

A3. The holes in the airplanes fuselage are cut using a very high pressure jet of water and sand.

SEGMENT: AIRPLANE LANDING GEAR

Q1. What is the oil used for during the machining process?

Q2. What is recycled during the manufacturing of the landing gear?

Q3. What is used to protect the landing gear from corrosion?

A1. Oil is used to reduce the heat produce by friction during the machining process.

A2. Metal chips created during the machining process.

A3. The different parts of the landing gear are plated with Cadmium in order to protect them from corrosion.

SEGMENT: HELICOPTERS

Q1. How many hours of work are required to build a helicopter?

Q2. What is the body of the aircraft made of?

Q3. What is brake cable used for?

A1. The construction of a helicopter requires about 700 hours or 110 days.

A2. The fuselage of the helicopter is made out of carbon fibre.

A3. Brake cable is used to prevent bolts from loosening due to vibrations.

SEGMENT: GLIDERS

Q1. What created the bases for the fuselage of the glider?

Q2. What kind of glue is used to bond the wings together?

Q3. Why is the wing cut in two after its assembly?

A1. The bases for the fuselage is created using Kevlar fibre.

A2. The wings are bonded together using epoxy resin.

A3. The wing is cut in two in order to facilitate transportation.

SEGMENT: JET TURBINE BLADES

Q1. What are the blades of a jet engine used for?

Q2. Are the blades machined or moulded?

Q3. What indicates imperfections during the inspection process?

A1. The turbine blades are used to generate air pressure inside the jet engine in order to create a mixture of air and gas that will be ignited to create thrust.

A2. The blades are moulded using a dye.

A3. The imperfections will show up as little fluorescent spots under a black light.

CONFIRMATION OF TEACHING POINT 2

The cadets' participation in the in-class activity will serve as the confirmation for this TP.

END OF LESSON CONFIRMATION

The cadets' participation in the activity in will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

The field of aircraft manufacturing and maintenance is ripe with exciting careers in building and maintaining aircraft. The *How It's Made* segments introduce you to some of the possibilities. You will explore these areas more in other proficiency level and summer training activities.

INSTRUCTOR NOTES / REMARKS

Nil.

REFERENCES

C3-288 Production MAJ, *How It's Made* capsules, Canada.

C3-345 Transport Canada. (2011). *Canadian Aviation Regulations 2011-1*. Retrieved October 25, 2011, from http://www.tc.gc.ca/eng/civilaviation/regserv/cars/part1-subpart1-1104.htm

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 2

EO C170.02 – TOUR A LOCAL AVIATION MAINTENANCE FACILITY

Total Time:	90 min

THERE IS NO INSTRUCTIONAL GUIDE PROVIDED FOR THIS EO

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CHAPTER 17

PO 190 – PARTICIPATE IN AN AIRCREW SURVIVAL EXERCISE

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 1

EO M190.01 – PACK PERSONAL EQUIPMENT FOR AN AIRCREW SURVIVAL EXERCISE

Total Time:	60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Prepare a properly packed rucksack or backpack IAW the principles outlined in this lesson.

Ensure the rucksack or backpack includes all of the materials discussed in this lesson.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture method was chosen for TP 1 to orient the cadets on how to select field clothing and generate an interest in the subject.

A demonstration and performance method was chosen for TP 2 as it allows the instructor to explain and demonstrate packing personal equipment skills the cadet is expected to acquire while providing an opportunity for the cadets to practice the skill under supervision.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall be expected to select and pack appropriate personal equipment for field training.

IMPORTANCE

Selecting and packing the appropriate clothing is a key element of field training. Weather can be a large factor in a survival situation. Selecting the right clothing can help prevent unnecessary injury and weather-related illnesses. Improper packing techniques can cause discomfort and possible injury.

Teaching Point 1 **Explain how to select field clothing.**

Time: 30 min Method: Interactive Lecture

THE LAYERING PRINCIPLE

The Core Layer (Upper Body)

This layer lies next to the skin. It should consist of a wool or synthetic undershirt or a long-sleeved thermal top. The garment should be close fitting but not tight. It should be made of a material that absorbs perspiration and moves it away from the skin. This layer must be kept as clean as possible to prevent dirt from clogging the pores of the fabric.

The Second Layer

The second layer should be loose fitting and should keep the blood vessels of the neck and wrists protected and warm. It could consist of a zip-up top with a high neck or a shirt with a collar. Sleeves should be able to be rolled up and cuffs should be able to be buttoned. In hot weather, this layer may be used as an outer layer.

The Outer Layer

The outer layer should be a jacket that is both wind resistant and waterproof depending on the climate. For example, in the Arctic, a padded, windproof parka is required for protection against cutting winds and extreme cold. It must be able to vent to avoid overheating. In temperate areas, rain is the most common cause of cold or discomfort. Waterproof outerwear should be worn.

Underwear (Lower Body)

Long thermal underwear is only necessary in temperatures below freezing. In the Arctic a “groin patch” of impermeable material prevents wind chill in that area. If underwear gets wet, it eventually dries. However, this problem can be avoided by wearing waterproof pants. In mild weather this layer may consist of cotton shorts.

PANTS

Pants should allow freedom of movement and should be able to dry quickly. In very wet conditions, using a belt helps to prevent chaffing at the waist. Waterproof pants can be worn to help protect legs from rain, but may cause overheating. In very cold conditions, quilted over-trousers should be zipped over pants and boots for added protection.

Show examples of each piece of clothing during the explanation if available.

ADVANTAGES AND DISADVANTAGES OF FABRICS

Wool

Advantages. Wool has insulating properties even when wet. It remains comfortable until it is soaked and smolders rather than melts when exposed to excessive heat.

Disadvantages. It is heavy when wet and takes time to dry. When it is worn next to skin, it may cause itching, and may shrink when washed.

COTTON

Advantages. Cotton is durable, breathable and absorbs moisture. It is a good fabric for underwear and items worn next to the skin in warm climates.

Disadvantages. It may be heavy when wet and can shrink if it is dried at high temperatures. It may tear and burn easily. Also, it is not windproof.

Fleece or Pile

Advantages. As an outer layer, fleece forces moisture away from the body while keeping it warm. It is lightweight, hardwearing and does not absorb moisture.

Disadvantages. Fleece is not windproof and does not compress easily. It can collect balls of fluff on the outside after long use.

Synthetic Fabrics

Advantages. These fabrics allow sweat to evaporate while keeping rain and other moisture out. They are usually windproof and an excellent choice for an outer layer.

Disadvantages. The seams may come apart in water. In very wet conditions, the fabric pores may become clogged. The evaporation of sweat from the outside of the fabric may result in heat loss.

An acronym that can be used to remember the principles when selecting and wearing clothing in the field.

COLD – Keep the garment **C**lean. Avoid **O**verheating. Wear it **L**oose and **L**ayered. Keep it **D**ry.

FOOTWEAR

Thick socks made of either wool or fiber-pile cotton are vital. Socks keep feet warm, dry and prevent footwear from rubbing against skin. Rubbing can cause blisters and chafing. In cold weather two pairs of socks, an outer layer and an inner layer, should be worn. The inner layer forces moisture away from the foot and move it to the outer layer to keep the foot dry. Socks should be changed daily before bed.

BOOTS

Boots with a hard sole and good cushion are just as important as socks. Being comfortable and stable makes for a more enjoyable time in the field. Ankle support is important in the prevention of ankle injury.

WEATHER CONDITIONS

It is important to be prepared for any type of weather. Wearing a toque, scarf and mitts during cold weather prevents heat from being lost through the head. Mittens prevent injuries such as frostbite by keeping hands warm and blood circulating. During warm conditions, it is important to wear sunscreen and a hat to protect from the sun. Extended exposure to the sun can cause burns and sunstroke.

ACTIVITY

Time: 10 min

OBJECTIVE

The objective of this activity is to have the cadets dress up one of their peers in clothing for the field and the climate.

RESOURCES

- Clothes that represent the layering principle, to include:
  - a core layer,
  - a second layer,
  - an outer layer,
  - underwear, and
  - pants.
- Clothing that is made of different types of fabric, to include:
  - wool,
  - cotton,
  - fleece or pile, and
  - synthetic fabrics.
- Appropriate footwear.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Lay out the clothing according to its category prior to starting the activity.
2. Assign a cadet to be the “model”.
3. Question the cadets on what piece of clothing the cadet should put on first in accordance with the layering principle.
4. Continue until the cadet in fully clothed for the field.
5. When the cadet is dressed, question the cadets on the advantages and disadvantages of the type of clothing chosen for each layer (this might be easier when the cadet is taking each layer off).

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in the activity will serve as the confirmation of this TP.

Teaching Point 2 | **Explain, demonstrate and have the cadets pack personal equipment for the field.**

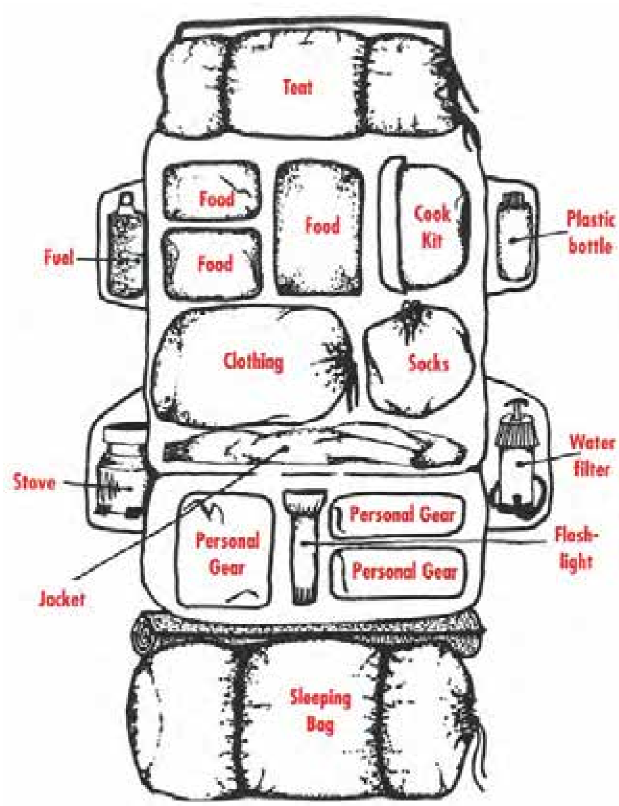
Time: 25 min | Method: Demonstration and Performance

PACKING PERSONAL EQUIPMENT

While packing kit, ensure to place a large plastic bag inside the pack prior to packing it. This blocks moisture from reaching the contents. Each item should also be placed in a separate bag with the extra air removed to save space.

Place items in the pack by priority, with the most frequently used items on top or where easily accessible. The equipment needs to be placed in the pack so the weight is distributed and balanced appropriately. A poorly balanced pack can cause fatigue. The heaviest items should be placed near the bottom or the back of the pack to avoid back strain.

Ensure all items are secured to the pack to avoid losing items and having to constantly stop for adjustments.



Note. From Basic Essentials Backpacking, by Harry Roberts, 1989, Guildford, CT: The Globe Pequot Press.

Figure 1 A well-organized back pack

The tent should be placed on top of the pack with the sleeping bag and pad firmly attached under the backpack.

Food, clothing and a cooking kit are examples of what to place in the backpack itself.

Clothing should include extra socks, undergarments and polypropylene / synthetic t-shirt and pants.

Personal gear could include a first aid kit, waterproofed matches, flashlight, emergency candle and hygienic items. Items such as water bottle, stove, fuel canister, flashlight and a water filter can fit in the side pouches of the bag.

Demonstrate the packing of a backpack with the cadets performing the skill. The following activity will assist in allowing the cadets to practice the skill. Where the instructional environment does not allow for this option deliver it using the demonstration method.

ACTIVITY

Time: 15 min

OBJECTIVE

The objective of this activity is to have the cadets practice effective techniques of packing personal equipment prior to participating in an aircrew survival exercise.

RESOURCES

- Rucksack / backpack (one per cadet),
- Sleeping bag (one per cadet), and
- Materials provided by the instructor.

ACTIVITY LAYOUT

1. The cadets shall pack their own bag during this time following the instructor's example.
2. The cadets are to use all materials that are given to them to pack their rucksack / backpack.
3. The cadets are to ensure their rucksack / backpack weight is evenly distributed.

ACTIVITY INSTRUCTIONS

1. Have the cadets pack their own rucksack / backpack using the materials provided by the instructor.
2. Upon completion, the instructor is to inspect the rucksack / backpack to verify all equipment is packed properly and that the weight is evenly distributed.

SAFETY

Nil.

Supervise the cadets' packing method closely. It is advisable to have other instructors assigned to provide additional supervision and feedback to cadets during this activity.

If the cadets do not bring their own kit, ensure that an interactive demonstration of each packing step is given.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. Why should a large plastic bag be placed inside the backpack prior to packing it?

Q2. What does a poorly balanced backpack cause?

ANTICIPATED ANSWERS:

A1. This blocks the moisture from getting at the contents.

A2. A poorly balanced pack can cause fatigue.

END OF LESSON CONFIRMATION

The cadets' participation in the activities will serve as confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Cadets have identified the appropriate clothes to bring with them to the field and how to effectively pack them. Selecting and packing approximately will help prevent fatigue and cold while in the field. Weather can be a large factor influencing survival. If one selects the right clothing, unnecessary injury and weather illnesses can be prevented. Improper packing techniques can cause discomfort and possible injury. It is important to ensure that equipment is packed properly prior to leaving for an aircrew survival exercise.

INSTRUCTOR NOTES / REMARKS

This EO is to be delivered at the squadron on the training night prior to the weekend aircrew survival exercise.

REFERENCES

C3-021 ISBN 0-7715-9035-0 McManners, H. (1994). *The complete wilderness survival manual*. Toronto, ON: McMillan Canada.

C3-024 ISBN 0-7627-0476-4 Roberts, H. (1999). *Basic essentials backpacking*. Guildford, CT: The Globe Pequot Press.

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 2

EO M190.02 – MAINTAIN PERSONAL EQUIPMENT AND HYGIENE IN THE FIELD

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Prepare a packed rucksack / backpack.

Prepare resources for practicing field hygiene.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for this lesson to orient the cadets to maintaining personal equipment and personal hygiene and generate an interest in the subject.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadets shall have maintained their personal equipment and hygiene in the field.

IMPORTANCE

Caring for personal equipment and knowing how to safely use a knife prevents unnecessary injury. Practicing field hygiene principles contributes to the successful conduct of an aircrew survival exercise by preventing illness and maintaining a safe environment.

Teaching Point 1	**Explain how to care for personal equipment.**
Time: 5 min	Method: Interactive Lecture

CARE FOR PERSONAL EQUIPMENT

All articles of clothing shall be kept as clean as possible. Dirt can get through some clothing and reach the skin. Sweat and dirt may cause skin irritation. The dirt may also get into the fibres of the fabric and destroy the insulation value. This potential loss of insulation is why undergarments must be changed daily.

Socks should be changed frequently. Wet or dirty socks can cause blisters and other skin irritation. Wash socks in lukewarm water. Carefully rinse out all of the soap, squeeze out the water, and stretch the socks back into shape. Socks should be kept in good repair and holes mended as soon as they appear.

Boots should be properly maintained by keeping them dry and soft. Boots should never be placed too close to the fire.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. Why must undergarments be changed daily?

Q2. What are the steps to take when laundering socks?

Q3. How are boots maintained?

ANTICIPATED ANSWERS:

A1. Dirt can get through some clothing and reach the skin. Combined with sweat, the dirt may cause considerable irritation.

A2. When laundering socks, use lukewarm water. Carefully rinse out all of the soap, squeeze out the water, and stretch the socks back into shape.

A3. By keeping them dry and soft and not to place them close to the fire.

Teaching Point 2	**Explain knife safety in the field.**
Time: 10 min	Method: Interactive Lecture

CARE OF KNIVES IN THE FIELD

A knife should be kept sharp and carried in a suitable sheath. It should be returned to its sheath immediately after use and remain there when not in use. Always position the sheath on a waist belt towards the back of the hip. This positioning prevents the knife from being driven into the groin during a fall. Never angle the blade in another person's direction. Always pass a knife closed or by presenting the handle to the person receiving it. Ensure the person receiving the knife is ready to accept the knife before letting go. Ensure that the sharp side of the blade is facing up when passing the knife. Always ensure knives are put away or safely stored.

SHARPENING

Sharpen a knife as soon as it becomes dull. Use a quality sharpening stone and apply lubricant as specified for the stone. To reshape an edge use a 400 grit sharpening stone. A 1 000 grit sharpening stone and above will sharpen the edge. A honing stone is used to polish the cutting edge and is above 2 000 grit. To polish a blade that has stains on it, use wood ash as it does not scratch the blade. Use the following steps when sharpening a knife with a sharpening stone:

1. Apply a light coating of oil (if it is whetstone or oil stone) to the stone to lubricate and protect the surface. The oil helps keep bits of stone and steel – called slurry – on the surface of the stone. The slurry helps the cutting action of the stone. Ceramic and diamond stones can be used dry or wetted with water.
2. If a combination stone is being used, start with the coarsest grit side.

A hollow ground blade will be sharpened only at the cutting edge at a combined angle 20-30 degrees.

3. To sharpen a hollow ground blade, hold the knife with the back edge of the knife off the sharpening stone at 10-15 degrees.
4. To sharpen a flat ground blade, place the bevel flat on the stone. This registers the blade at the proper angle for sharpening.
5. Start where the blade meets the handle and draw the full length of the blade across the stone while moving the blade from one end of the stone to the other. Apply steady pressure. Repeat this eight times on each side.
6. Repeat the process using the fine side of the sharpening stone.
7. Using a honing stone and honing oil, hone the blade, alternate each stroke with the opposite side of the blade for eight strokes maintaining the same angle as before.
8. If a wire edge forms – a thin wire of steel at the very edge of the blade – repeat the same motion on a piece of cardboard or honing stone until the wire edge falls off.
9. Test for sharpness by cutting something or by looking at the edge of the blade for reflections from unsharpened areas, not by drawing the fingers across the blade.
10. Clean and dry the stone following the manufactures' instructions.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. How should a knife be stored and kept?

Q2. Why is the sheath positioned on the waist belt towards the back of the hip?

Q3. When passing the knife, which way should the blade be facing?

ANTICIPATED ANSWERS:

A1. A knife should be kept sharp and carried in a suitable sheath.

A2. This positioning prevents the knife from being driven into the groin during a fall.

A3. Up.

Teaching Point 3 **Explain how to maintain hygiene in the field.**

Time: 10 min Method: Interactive Lecture

FIELD HYGIENE REQUIREMENTS

Keeping healthy is an important factor for survival in the field. Strict hygiene routines should be practiced personally and at the survival site. Garbage and latrines shall be kept away from the site to avoid the threat of insects and illness. Proper hygiene practices also ensures drinking water is not contaminated.

WASHING

To keep clean, use soap and water while in the field. Special attention should be given to the groin area, scalp and between the toes. These areas are susceptible to rash and fungus infections. A daily shower with hot water and soap is ideal. If a shower is not feasible, keep hands as clean as possible. The face, armpits, crotch and feet should be washed and dried at least once a day. If soap is unavailable, wood ash can be used as a substitute. Washing daily can prevent the growth and spread of germs.

DENTAL CARE

Teeth should be cleaned with a toothbrush and toothpaste after every meal and before bed. Table salt or baking soda can be used as a substitute for toothpaste. If a toothbrush is not available, a green twig can be chewed to a pulpy consistency. The mouth should be rinsed with water after every meal.

WASTE DISPOSAL

It is important to manage waste effectively. Wet and dry garbage shall be separated into different sealed containers. It should be stored downwind and a suitable distance from the site. Water that is used to clean dishes, bodies, teeth or clothes is called grey water. This water must be disposed of by placing it in containers located near the washstands or latrines. Solid garbage shall be packed out of the site. If it is packed in it should be able to be packed out. It is the responsibility of each member to ensure that no trace of waste is left behind.

Where appropriate, the instructor shall indicate the locations associated with this teaching point. These include but are not limited to:

- washstand,
- latrines,
- port-o-potties,
- grey water disposal area, and
- wet and dry garbage disposal area.

CONFIRMATION OF TEACHING POINT 3

QUESTIONS:

Q1. If a shower is not available, what parts of the body should one ensure to clean?

Q2. What can be used as a substitute for toothpaste?

Q3. What is grey water?

ANTICIPATED ANSWERS:

A1. Hands, faces, armpits, crotch and feet.

A2. Table salt or baking soda.

A3. Water that has been used to clean clothes, dishes, teeth, bodies etc.

END OF LESSON CONFIRMATION

QUESTIONS:

Q1. What is the proper action to take when sharpening a knife?

Q2. Where should the knife blade not be pointed?

Q3. What is grey water?

ANTICIPATED ANSWERS:

A1. Place the blade on the stone and pull it toward you in a circular motion and repeat this action many times. Ensure that this motion is completed an equal number of times on both sides.

A2. In another person's direction or at yourself.

A3. Water that has been used to clean clothes, dishes, teeth, bodies etc.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Cadets have learned how to care for their personal equipment, using a knife and maintaining personal hygiene in the field. Caring for personal equipment and safely using a knife while in the field is of the utmost importance.

INSTRUCTOR NOTES / REMARKS

This EO is to be delivered at the squadron on the training night prior to the aircrew survival exercise.

REFERENCES

C3-003 ISBN 1-896713-00-9 Tawrell, P. (1996). *Camping and wilderness survival: The ultimate outdoors book*. Green Valley, ON: Author.

C3-021 ISBN 0-7715-9035-0 McManners, H. (1994). *The complete wilderness survival manual*. Toronto, ON: McMillan Canada.

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 3

EO M190.03 – OBSERVE SITE POLICIES AND PROCEDURES

Total Time:	60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Research animals indigenous to the aircrew survival exercise location.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for this lesson to give direction on policies and procedures of an aircrew survival exercise site.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have observed all site policies and procedures during an aircrew survival exercise.

IMPORTANCE

It is important to know and follow established site policies and procedures to ensure the site is maintained and functioning in a smooth and safe manner.

Teaching Point 1 | **Describe safety issues related to field training.**

Time: 10 min | Method: Interactive Lecture

GENERAL SAFETY

Cadets should be aware that running, engaging in horseplay or wandering off from the group is not acceptable behaviour during field training.

Include any other general safety concerns regarding the site.

MEDICAL PROCEDURES

In case of a medical emergency, all members need to be aware of what actions to take. Members need to know where the first aid area is located, what to do in a medical emergency, where to get medications, the muster point in case of an evacuation and who is in charge.

ENVIRONMENTAL PROCEDURES

It is extremely important that the environment is respected while conducting an aircrew survival exercise. Garbage and grey water should be disposed of in designated areas. Cutting down live trees, including breaking branches is not acceptable. Doing this may hinder the growth of the tree. In case of an environmental spill, cadets should advise staff members immediately and local authorities should be contacted.

Include any other environmental procedures regarding the site.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. What is not acceptable behaviour in the field?

Q2. What medical procedures need to be known by personnel?

Q3. Why should branches not be broken off a live tree?

ANTICIPATED ANSWERS:

A1. Running, engaging in horseplay and wandering off from the group.

A2. Where the first aid area is located, what to do if they come across a medical emergency, the muster point in case of an evacuation and who is in charge.

A3. It may hinder the growth of the tree.

Teaching Point 2 | **Explain fire regulations in place at the training site.**

Time: 10 min | Method: Interactive Lecture

FIRE PROCEDURES

All personnel need to be aware of what to do in case of a fire. If a member notices a fire they should shout “fire, fire, fire” and use a siren or whistle to sound an alarm. Upon hearing the alarm, all personnel should meet at the designated muster point. The member who noticed the fire should present themselves to the senior officer on site.

MUSTER POINT

The muster point is the area designated for all people at the site to gather together in case of a fire or other emergency. It should be located away from hazardous areas and near the best route out of the campsite.

FIRE FIGHTING EQUIPMENT

The fire pit location should contain basic fire fighting equipment such as fire extinguishers, fire brooms and buckets.

Show each area presented above and ensure everyone is clear on the fire regulations for the aircrew survival exercise site.

ACTIVITY

Time: 5 min

OBJECTIVE

The objective of this activity is to conduct a fire drill.

RESOURCES

Nil.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Choose a cadet to “find” the fire.
2. Have that cadet shout “fire, fire, fire.”
3. Have the rest of the group report to the muster point.
4. Debrief the cadets on the fire drill.

SAFETY

Ensure the area is free of obstacles that may cause cadets to fall or hurt themselves during the fire drill.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. What is the muster point?

Q2. What fire fighting equipment should be present at the campsite?

Q3. What should one do when noticing a fire?

ANTICIPATED ANSWERS:

A1. The muster point is the area designated for all people who are at the campsite to gather together in case of a fire or other emergency.

A2. Basic fire fighting equipment such as extinguishers, fire brooms and buckets.

A3. Shout "fire, fire, fire" and move to the muster point. The member who noticed the fire should present themself to the senior officer.

Teaching Point 3	**Give an overview of the layout of the site.**
Time: 15 min	Method: Interactive Lecture

This teaching point should be presented at each of the locations listed. Have a sample exercise site completed.

COMMAND POINT / HEADQUARTERS

The command tent should be located in a centralized area and all personnel at the site should know its location.

FIRST AID AREA

The first aid area must be equipped with at least one stretcher, a well-stocked first aid kit and any additional equipment needed to treat minor injuries.

SLEEPING AREAS

Tents are usually divided into two groups, one for males and one for females. All tents should be erected at least ten feet apart with the doors opposite the prevailing winds.

FIRE PIT

Fire pits must be at least 100 meters away from the campsite and strictly in open areas. Permission to have a fire pit must be granted by local authorities and the forest fire rating must be checked prior to lighting a fire.

LATRINES

If at all possible before building a latrine, make use of an outhouse that may already be available. If a latrine must build be built, IAW local regulations, construct it as least 100 meters away from the campsite and not close to water.

PETROLEUM, OILS AND LUBRICANTS (POL) POINT

POL stands for petroleum, oils and lubricants. The storage area for these materials must be located at a reasonable distance from the bivouac site. Access to this area is limited.

WATER POINT

Drinking water should be obtained from a reliable source. Always boil water that is collected in the field to purify it. If collecting water from a fast moving stream, always get water upstream from washing and laundry areas.

WET AND DRY GARBAGE AREAS

Garbage should be bagged and removed from the bivouac site. There should be separate areas for wet and dry garbage and these areas should be marked clearly. Grey water should be disposed of in this area as well.

Identify any other areas that may be used during the exercise.

CONFIRMATION OF TEACHING POINT 3

QUESTIONS:

Q1. What does POL stand for?

Q2. Where should the fire pit be located?

Q3. If collecting water from a fast moving stream, where should it be collected?

ANTICIPATED ANSWERS:

A1. Petroleum, oils and lubricants.

A2. Fire pits must be at least 100 meters away from the campsite and strictly in open areas.

A3. Upstream from the washing and laundry areas.

Teaching Point 4	**Discuss safety measures with regards to animals.**
Time: 15 min	Method: Interactive Lecture

POTENTIAL ANIMALS

There is potential to run into many different animals during an aircrew survival exercise. Some of these animals may include:

- bears,
- cougars,
- rattlesnakes,
- moose,
- bison,

- elk, and
- wolves.

With each of these animals it is important to be aware of preventive measures to avoid them and what actions to take if an encounter occurs.

BEARS

Preventive measures to avoid an encounter with a bear include:

- looking for signs that a bear may be close. Signs include tracks and scat in the area;
- have the kitchen separate from the training site. Bears are attracted to food so having the kitchen separate may deter the bear from entering the training site; and
- making noise to deter the bear from coming in the general area.

Defensive measures to take in an encounter with a bear include:

- using pepper spray;
- using a shotgun;
- grouping everyone together to expand presence; and
- playing dead versus fighting fiercely.

COUGARS

Preventive measures to avoid an encounter with a cougar include:

- hiking in groups; and
- making noise to deter the cougar from entering the general area.

Defensive measures to take in an encounter with a cougar include:

- not running;
- grouping together to expand presence;
- speaking loudly;
- providing an escape route for the animal;
- facing the cat and maintaining eye contact;
- fighting back if attacked; and
- if attacked from behind, throwing the cat overhead and forward.

RATTLESNAKES

Preventive measures to avoid an encounter with a rattlesnake include:

- watching where steps are taken;
- looking closely before parting bushes;
- using a stick, not hands, when turning over stones or rocks;
- wearing stout boots; and
- checking bedding and backpacks before using.

Defensive measures to take in an encounter with a rattlesnake include:

- do not tease or pick up;
- do not make sudden movements, back off slowly and remain calm;
- if bitten, back away immediately and immobilize the bitten area, below the heart if possible; and
- do not tie a tourniquet or attempt to suck out the venom. Report to the nearest hospital as soon as possible.

WOLVES

Preventive measures to avoid an encounter with a wolf include:

- cooking and washing dishes away from the campsite; and
- hanging food and garbage away from sleeping area.

Defensive measures to take in an encounter with a wolf include:

- looking larger, raising and waving arms;
- making noise;
- throwing objects, like sticks, rocks, pots and pans;
- backing away slowly, do not move away from the animal; and
- keeping direct eye contact.

MOOSE, ELK AND BISON

Moose, elk and bison are only likely to charge when threatened or crowded. To prevent an attack distance should be kept from the animal.

CONFIRMATION OF TEACHING POINT 4

QUESTIONS:

Q1. What are some of the animals that an individual may encounter on an aircrew survival exercise?

Q2. What defensive measures should an individual take when encountering a bear?

Q3. What preventive measures should an individual take to avoid encountering a wolf?

ANTICIPATED ANSWERS:

A1. Some of these animals may include:

- bears,
- cougars,
- rattlesnakes,
- moose,
- bison,
- elk, and
- wolves.

A2. The defensive measures to take in an encounter with a bear include:

- using pepper spray;
- using a shotgun;
- grouping everyone together to expand presence; and
- playing dead versus fighting fiercely.

A3. The preventive measures to avoid an encounter with a wolf include:

- cooking and washing dishes away from the campsite; and
- hanging food and garbage away from sleeping area.

END OF LESSON CONFIRMATION

The end of lesson confirmation consists of the class walking to each of the locations in the exercise site and explaining each of them. A different cadet should be chosen to explain each of the locations.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

It is important to know and follow established site policies and procedures to ensure the site is maintained and functioning in a smooth and safe manner. Knowing what do to do in case of a fire and knowing where the different areas of the exercise site are located ensures the weekend exercise runs as smooth as possible.

INSTRUCTOR NOTES / REMARKS

The directives outlined in CATO 11-08 *Environmental Protection and Stewardship* are to be adhered to during this training.

REFERENCES

A3-010 A-CR-CCP-121/PT-001 Cadets Canada. (2000). *Royal Canadian army cadet reference book*. Ottawa, ON: Cadets Canada.

C3-003 ISBN 1-896713-00-9 Tawrell, P. (1996). *Camping and wilderness survival: The ultimate outdoors book*. Green Valley, ON: Author.

C3-006 ISBN 0-07-135437-9 Hall, A. (2001). *The essential backpacker: A guide for the foot traveller*. Blacklick, OH: Ragged Mountain Press.

C3-007 ISBN 0-684-85909-2 Harvey, M. (1999). *The national outdoor leadership school's wilderness guide*. New York, NY: Simon & Schuster.

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 4

EO M190.04 – DISCUSS SURVIVAL PSYCHOLOGY

Total Time:	60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Prepare the case study material for the activity in TP 3.

Prepare the role-play material for the activity in TP 4.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for this lesson to orient the cadets to survival psychology and to generate an interest in the subject.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have discussed survival psychology.

IMPORTANCE

One of the most important requirements for someone in a survival situation is the ability to accept the reality of the situation and react appropriately. Knowing how to react in a survival situation gives an individual confidence to survive. The cadets should know what they would experience physically and emotionally if they were lost and in a survival situation. Knowing the procedure when lost and how to deal with fear promotes survival in the situation.

Teaching Point 1	**Explain the role of fear in a survival situation.**
Time: 5 min	Method: Interactive Lecture

The following activity is designed to get the cadets thinking about fear. Ensure the following points that produce fear are discussed during the activity: death, being alone, animals / bugs, darkness, weakness, failure, discomfort, the unknown, and unidentified sounds.

ACTIVITY

Time: 5 min

OBJECTIVE

The objective of this activity is to have the cadets think about things they could be afraid of in a survival situation.

RESOURCES

Nil.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Have the cadets brainstorm things they may be afraid of in a survival situation.
2. Discuss how equipment, knowledge, and task focus can help reduce fear.

SAFETY

Nil.

BACKGROUND KNOWLEDGE

REACTIONS TO FEAR

Fear is a normal reaction in a survival situation and it can aid or hinder individuals, depending on their reaction. It can lead to hopelessness and decreased self-confidence as well as reducing the will to survive. Fear, however, can release adrenaline, giving greater strength and stamina, reducing pain sensation, giving the ability to think clearly and helping to act purposively. Accepting fear as a natural reaction to a threatening situation leads to productive behaviour. Because of this, fear can greatly increase chances for survival.

DEALING WITH FEAR

The factors most commonly reported to help decrease or control fear are:

- having confidence in a leader if in a group or in one's self if alone;
- having confidence in the equipment; and
- concentrating on the job to be done.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in this activity serves as confirmation of this TP.

Teaching Point 2 **Explain taking action when lost: stopping, thinking, observing and planning.**

Time: 10 min Method: Interactive Lecture

THE 'STOP' ACRONYM

Taking immediate action when lost in the wilderness is critical to dealing with fear. In such a situation, the STOP acronym should be employed.

STOP

When lost, stopping prevents the person from moving further away from the area a search crew may cover. It is also important to stop, to think effectively, and not make errors due to hasty decisions.

THINK

It is critical to think about what actions should be taken once a person realizes they are lost. Consider the danger and consequences of either staying or moving on. Consider the possible dangers that could occur and analyze the weather, terrain and available resources when deciding on the actions to be taken.

OBSERVE

Conduct a self-analysis to identify symptoms of any physical ailments such as fatigue, increased heart rate, or shivering. Check for psychological ailments such as extreme stress or fear. Observe surroundings for resources, weather potential, terrain, and landmarks that may provide information on the current location.

PLAN

After thinking and observing all aspects of the situation, plan a course of action that best utilizes the available resources.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. What are the four main actions to take when lost in the wilderness?

Q2. Why is it important to stop if lost?

Q3. During the thinking portion of STOP, what are some important things to keep in mind?

ANTICIPATED ANSWERS:

A1. Stop, Think, Observe and Plan.

A2. It is important to stop to think and avoid making errors due to hasty decisions.

A3. It is important to identify any immediate and future dangers, as well as weighing the pros and cons of staying put versus continuing on.

Teaching Point 3 | **Explain the survival pattern and how to employ it in a survival situation.**

Time: 15 min | Method: Interactive Lecture

GENERAL

The survival pattern is a procedure used in a survival situation. It is a method of prioritizing tasks.

The pattern is presented in a particular sequence during this lesson; however, the pattern can vary depending on the situation and changes in priority. For example, if lost while hiking with a group, the first procedure in the pattern done should be to signal (blow the whistle) because there are people near by.

FIRST AID

The most important thing to address in a survival situation is any injury. Treating injuries can prevent them from worsening, reduce pain and allows for more involvement in survival activities.

FIRE

Fire serves many purposes in a survival situation. It can provide warmth, boost morale, and a sense of security. It is also a method for creating signals, purify water and cook food.

SHELTER

Shelter allows a person to be warm and dry from the elements. Even if the current weather conditions are favourable, it is not always possible to know when and how the weather conditions may change. Therefore, building a shelter early is very important. It also provides the psychological comfort of having a home base.

SIGNALS

Signals should be constructed to attract search teams and can take many different forms. Signal fires with a heavy amount of dark smoke are visible from a long distance during the day or night. Other ground to air signals should be large and stand out from the surroundings, or be placed in nearby open areas. A mirror or other reflecting object is an excellent tool for signalling.

FOOD AND WATER

Survival without water only last a few days. A lack of water can lead to dehydration, which reduces the ability to concentrate. This is dangerous as clear thinking is essential in a survival situation. Water from any ground source should be purified before drinking.

A person can live for weeks without food. Excessive hunger can cause confusion and a lack of judgement. Prolonged starvation results in loss of energy, loss of mental clarity, increased susceptibility to disease, difficulty maintaining body temperature, and eventually death. A balanced and varied diet can improve morale in a survival situation.

ACTIVITY

Time: 10 min

OBJECTIVE

The objective of this activity is to have cadets apply STOP and the survival pattern in a provided scenario.

RESOURCES

One copy of a survival scenario per group, found in Attachment A (laminated, if possible).

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into two groups.
2. Provide each group with a survival scenario.
3. Give the cadets five minutes to read the scenario and answer the questions provided.
4. Have one cadet from each group share their answers with the class.

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 3

The cadets' participation in this activity will serve as confirmation of this teaching point.

Teaching Point 4	Explain the seven enemies of survival and how to combat them.
Time: 20 min	Method: Interactive Lecture

GENERAL

Pain, cold, thirst, hunger, fatigue, boredom, and loneliness are enemies of survival. In a survival situation, these feelings are more severe and more dangerous than in normal situations. Having knowledge of these feelings and their effects can assist in overcoming and controlling them.

PAIN

Pain is nature's way of identifying problems. However, pain can subside if an individual is pre-occupied. Pain may go unnoticed if an individual's mind is occupied with plans of survival. Once a person gives into pain, it weakens the drive to survive. A special effort should be made to keep an individual's hopes up and keep working.

COLD

Cold lowers the ability to think and to complete necessary tasks for survival. Focusing on being cold can interfere with the goal of survival. Cold can numb both the mind and body. It can also lead to serious medical problems. Find ways to get and stay warm, like building a fire, getting dry, layering clothes, and keeping busy.

THIRST

Water is vital for survival. Dehydration can lead to serious medical problems, and can eventually be fatal. Even when thirst is not extreme, it can dull the mind. Drink regularly, and try to find sources of water.

HUNGER

Hunger is dangerous because it can lessen the ability for rational thought. Both thirst and hunger increase a person's susceptibility to the weakening effects of cold, pain and fear. Prolonged hunger can lead to serious medical problems and can eventually be fatal. Manage food supplies, set snares, fish, and collect edible plants.

FATIGUE

Even a moderate amount of fatigue can reduce mental ability. Fatigue can make people careless as it becomes increasingly easy to adopt the feeling of just not caring. This is one of the biggest dangers in survival. While fatigue can be caused by over-exertion, it may also be caused by hopelessness, losing sight of goals, dissatisfaction, frustration or boredom. Fatigue may represent an escape from a situation that has become too difficult. Recognizing the dangers of a situation can provide the strength to go on. Watch exertion levels, set goals, and stay busy.

BOREDOM AND LONELINESS

Boredom and loneliness represent the final two enemies of survival. They are perhaps two of the toughest enemies of survival, mainly because they are unexpected. When nothing happens, when something is expected and does not happen, or when a person must stay still, quiet, and alone, these feelings develop. They can cause discouragement and a lack of will to go on. Invent games, stay active, and create projects.

ACTIVITY

Time: 5 min

OBJECTIVE

The objective of this activity is to have the cadets act out the seven enemies of survival.

RESOURCES

- Slips of paper with one of the seven enemies of survival on each.
- Container from which to draw the slips (bag, hat, etc.).

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Randomly select a cadet to draw the first slip.
2. Have the cadet silently act out the enemy of survival shown on their slip.

3. Have the rest of the cadets guess which enemy is being acted out.
4. Select another cadet, until all the enemies have been portrayed.

SAFETY

Nil.

END OF LESSON CONFIRMATION

QUESTIONS:

Q1. What factors cause fear?

Q2. What factors reduce fear?

Q3. What does STOP stand for?

ANTICIPATED ANSWERS:

A1. Hopelessness and helplessness.

A2. Confidence in equipment, person (or leader), focusing on the tasks at hand.

A3. Stop, Think, Observe, and Plan.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

One of the most important requirements for someone in a survival situation is the ability to accept the reality of the situation and react appropriately. If cadets are able to react calmly to a survival situation and develop a sensible plan, they are more likely to experience success.

INSTRUCTOR NOTES / REMARKS

The directives outlined in CATO 11-08 *Environmental Protection and Stewardship* are to be adhered to during this training.

REFERENCES

A3-016 B-GG-217-001/PT-001 Director Air Operations and Training. (1978). *Down but not out*. Ottawa, ON: Department of National Defence.

C3-005 ISBN 0-89886-814-9 Sierra Club San Diego Chapter. (1999). *Wilderness basics: The complete handbook for hikers & backpackers*. Portland, OR: The Mountaineers Books.

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Survival Scenario

You are on a camping trip with your family. It is a pleasant day in mid-October. The campsite is far from town, and your family is the only one there. At 3 pm, you decide to go on a short hike. You start off along a clearly marked trail. When you see a rabbit, you follow it off into the woods. When the rabbit finally goes down a hole, you realize you are lost. You don't know which direction the trail or the campsite is. You have been gone from the campsite for about two hours. You are lost in the woods.

In your backpack, you have:

- a one litre bottle of water,
- a sandwich bag of trail mix, and
- a bird identification book.

You are wearing jeans, a t-shirt and a light jacket. The wind is picking up, and it looks like rain.

QUESTIONS

1. What is the first thing you should do?

2. Think about the consequences of staying where you are, or wandering through the woods. What are the pros and cons of each?

3. Consider the key elements of the survival pattern – first aid, fire, shelter, signals, and food and water. What is your plan?

4. What kind of things would you want to observe about your surroundings?

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Suggested Answers for Survival Scenario – Instructor Use Only

1. What is the first thing you should do? STOP.

2. Think about the consequences of staying where you are, or wandering through the woods. What are the pros and cons of each?

Staying		Walking	
Pros	**Cons**	**Pros**	**Cons**
Effective use of time to develop and implement effective survival pattern. Staying in one place makes you easier to find. Prevents you from going farther away from potential search parties. Familiar with the nearby surroundings.	There may be hazards with the current location. There may be little or no resources at the current location. There is no chance of finding your way to civilization if you do not leave. Boredom could develop.	Could find your way to civilization – if you know the direction to travel. Could find better site for setting up shelter and signals.	Get more lost. Move away from a location where people can find you. End up unprepared for nightfall. Wasting energy. Increase risk of injury. Inadequate clothing or shoes.

3. What kind of things would you want to observe about your surroundings?

- Physical dangers.
- Flooding hazards.
- Food and water sources.
- Location for shelter.
- Signs to help determine location.
- Evidence of animals.
- Fire resources.
- Shelter resources.

4. What is your plan?
First Aid. There are no injuries, so this is not a concern.
Build a fire. This is good for signalling and warmth in the short term.
Build a shelter. Stay dry in case it rains.
Signals. If there is an open area, lay ground-to-air signals. Build additional signal fires.
Water. Stay hydrated. Find additional water sources before the litre runs out.
Food. Ration the trail mix. Find additional sources of food.

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 5

EO M190.05 – IDENTIFY TYPES OF SHELTERS

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Select two sites, as described in the activity section of teaching point one.

Survey the survival site to see if there are fallen trees or caves present to use as visual aids during the lesson.

Create an a-frame shelter and a lean-to shelter for demonstration purposes during the class.

If the materials are available, erect an arctic bell tent, modular tent section and/or civilian-pattern tent for demonstration purposes during the class.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for this lesson to orient the cadets to types of shelters.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have identified types of shelters.

IMPORTANCE

In a survival situation, it is important to be able to construct an effective shelter. A shelter protects a person from weather, animals and insects. Shelters also provide warmth, shade, comfort and is an important component of the survival pattern.

Teaching Point 1 | **Explain the importance of site selection.**

Time: 10 min | Method: Interactive Lecture

Before presenting the information provided below, ask the cadets what they feel is important when selecting a site for a shelter. Do not confirm or correct their responses at this time. It is simply a lead off question to get them thinking.

LAND CONSIDERATIONS

Site selection should begin before dark if possible. The shelter should be built near a source of water, building materials (trees, boughs) and fuel. Specific land considerations include:

- the area must be large enough for the type of shelter planned,
- the area should not be at the bottom of a hill because of possible water runoff,
- the area should be relatively flat, but slightly sloped to allow drainage, and
- dry river gullies should be avoided, because of possible water collection in the gully.

WATER CONSIDERATIONS

Water plays an important role in site selection. Specific water considerations include avoid building too close to:

- water, to avoid insects, and
- the drinking water source, to prevent contamination.

ANIMAL AND INSECT CONSIDERATIONS

Animals and insects can also cause problems at the site. Specific animal and insect considerations are:

- avoid setting up a shelter where there are animal trails or standing water,
- fast flowing streams will have fewer insects than still water, and
- avoid areas infested with ants or bees.

OTHER CONSIDERATIONS

Other considerations to keep in mind when selecting a site include:

- there should be an open area nearby to construct signals,
- the entrance of the shelter should face the sun to add warmth and increase morale,
- avoid collecting thick wood for creating fires because it is harder to dry,
- try to find a natural windbreak or a place that is away from strong wind currents,
- avoid swampy terrain, and
- if a fire is to be built, it should be located at the opening of the shelter, and it should be done at a distance.

ACTIVITY

Time: 5 min

OBJECTIVE

The objective of this activity is to have the cadets identify a good site for shelter construction.

RESOURCES

Nil.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

- Show the cadets the two sites; one a good site and the other a poor site.
- Ask the cadets to choose the best site and indicate why they made that choice.
- Ask them to identify faults in the poor site for shelter construction.

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. Why should the site not be located at the bottom of a hill?

Q2. Why should the site not be built too close to the drinking water source?

Q3. Why should there be an open area near the shelter when selecting the site?

ANTICIPATED ANSWERS:

A1. To avoid possible water runoff.

A2. To avoid contamination of the drinking water source.

A3. To maintain an area for construct signals.

Teaching Point 2	**Describe natural shelters.**
Time: 5 min	Method: Interactive Lecture

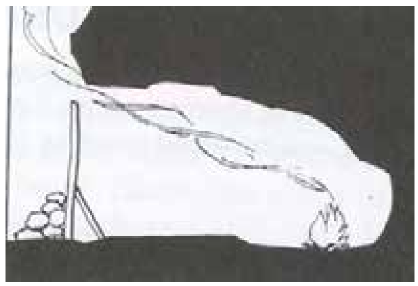
The instructor should find examples of each type of natural shelter on the training site. If possible, deliver this teaching point proximal to the shelters. The instructor should have pictures of the shelters to show the class, in case one or both of the natural shelters cannot be found in the area.

NATURAL SHELTERS

Natural shelters are effective to use in situations where there are limited resources. Different types of natural shelters can be used for short term and / or long term shelters.

CAVES

Caves may serve as long-term shelters and do not take energy to build. They are also good waterproof shelters. The entrance should be sealed off with items such as rocks, logs, or wattle (boughs and broken branches). When building a fire, ensure to place it at the back of the cave so smoke goes out the opening. If the fire is placed by the opening, the smoke blows back into the cave.



Note. From The SAS Survival Handbook, by John Wiseman, 1999, London, England: HarperCollins Publishers.

Figure 1 Cave Shelter

FALLEN TREE

A fallen tree can make a great temporary shelter. When using a fallen tree as a shelter, ensure that the tree is stable and will not fall further. Also, be aware of other falling trees in the area. Coniferous trees with pine branches are the best because of the dense branch structure. The branches can be woven for protection.

Note. From The SAS Survival Handbook, by John Wiseman, 1999, London, England: HarperCollins Publishers.

Figure 2 Fallen Tree Shelter

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. Name two types of natural shelters.

Q2. When lighting a fire inside a cave, what should be kept in mind?

ANTICIPATED ANSWERS:

A1. Cave and fallen trees.

A2. The fire should be lit towards the back of the cave so the smoke goes out the opening.

Teaching Point 3 **Describe improvised shelters.**

Time: 5 min Method: Interactive Lecture

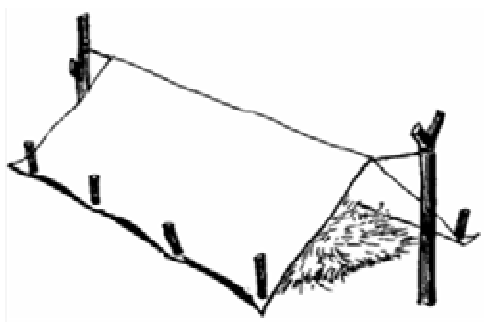
Prior to instructing the lesson, the instructor must ensure there is an a-frame shelter and a lean to shelter on site to use as visual aids to the class. Directions as to how to properly set up the shelters listed below are provided in Attachment A.

IMPROVISED SHELTERS

Improvised shelters are used in situations where immediate protection from the elements is required. They are shelters that can be constructed quickly from various materials. The a-frame and lean-to are two types of improvised shelters that are very effective in protecting against the elements. A type of a-frame shelter is the hootchie-style shelter.

A-FRAME SHELTER

An a-frame shelter is a simple shelter that can be constructed with a groundsheet or waterproof poncho. The groundsheet or poncho can be tied to two wood stakes by twine or roots found on the site. The construction of this shelter will be further detailed in an upcoming lesson.

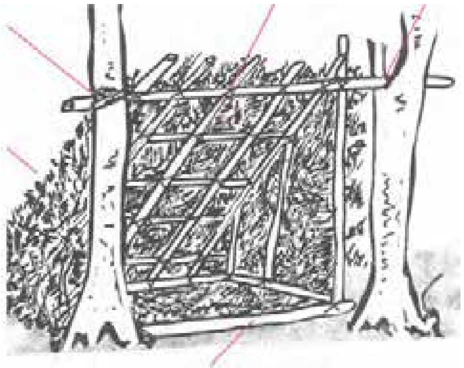


Note. From The SAS Survival Handbook, by John Wiseman, 1999, London, England: HarperCollins Publishers.

Figure 3 A-Frame Shelter

LEAN-TO SHELTER

A lean-to shelter is constructed by using a horizontal crosspiece between two trees, with a panel of boughs or saplings used as a roof.



Note. From The SAS Survival Handbook, by John Wiseman, 1999, London, England: HarperCollins Publishers.

Figure 4 Lean-to-Shelter

CONFIRMATION OF TEACHING POINT 3

QUESTIONS:

Q1. When are improvised shelters important to use?

Q2. What materials are needed to construct an A-frame shelter?

Q3. What are the main components of a lean-to shelter?

ANTICIPATED ANSWERS:

A1. When permanent shelters are not available. In situations where immediate protection from the elements are required.

A2. A ground sheet/waterproof poncho and twine/roots.

A3. A lean-to shelter is composed of a horizontal cross-piece between two trees, with a panel of boughs or saplings used as a roof.

Teaching Point 4	**Describe tentage.**
Time: 5 min	Method: Interactive Lecture

TENTAGE

Tentage is a permanent type of shelter that is useful for coping with the elements.

The instructor is encouraged to emphasize certain types of tentage below, based on what types of tents are available to the squadron during this exercise. When setting up the types of tentage mentioned below to use as training aids, the instructor is encouraged to refer to Attachment A for proper directions.

ARCTIC TENT

An arctic tent is a tent that can provide adequate shelter for up to ten people. It is composed of a center pole, which goes through the top of the tent. The tent is then pegged down on all corners and tightened to provide optimal space inside.

MODULAR TENT

Modular tentage is often used as a sleeping or classroom setting for a large number of people. It is also effective in providing shade during hot days. It is erected in sections by using a combination of metal frames and canvas covering.

CIVILIAN-PATTERN TENTS

Civilian-pattern tents are a third type of tentage that can be used for sleeping quarters. Civilian-pattern tents vary in shape and size and are constructed to accommodate anywhere between 1 and 10 people.

CONFIRMATION OF TEACHING POINT 4

QUESTIONS:

Q1. For how many people can an arctic shelter provide shelter?

Q2. What are the uses of modular tents?

ANTICIPATED ANSWERS:

A1. It is composed of a center pole, which is erected through a hole in the top of the tent. The tent is then pegged down on all corners and tightened to provide optimal space inside.

A2. Modular tentage can be used as sleeping quarters, a classroom setting, and can also provide shade during hot days.

END OF LESSON CONFIRMATION

All cadets will be required to assist in the construction of various shelters during the aircrew survival exercise. This lesson leads to the construction of an A-frame style shelter and no formal end of lesson confirmation activity is required. The instructor should pose questions to the group to confirm the information presented in this EO was understood.

QUESTIONS:

Q1. What are the various types of factors that need to be remembered when selecting a site?

Q2. When are natural shelters effective to use?

Q3. What are two types of improvised shelters?

Q4. What are three types of tentage?

ANTICIPATED ANSWERS:

A1. Land considerations, water considerations, animal and insect considerations and other considerations.

A2. In a situation where limited resources are available.

A3. A-frame shelter and lean-to shelter.

A4. Arctic tents, modular tents, and civilian-pattern tents.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Constructing shelter is a key component of a successful survival pattern. In such a situation, protection against the elements and against wildlife or insects is extremely important. Knowing how to properly select a site, and furthermore how to construct a shelter effectively will significantly assist someone in such a scenario.

INSTRUCTOR NOTES / REMARKS

All shelters listed should be setup prior to the lesson being taught.

The directives outlined in CATO 11-08 *Environmental Protection and Stewardship* are to be adhered to during this training.

REFERENCES

A3-009 A-CR-CCP-107/PT-002. Director Cadets 3 (1979). *Royal Canadian Army Cadet CTP winter adventure training manual*. Ottawa, ON: Department of National Defence.

A3-012 B-GG-302-002/FP-001 DAD. (1982). *Basic cold weather training*. Ottawa, ON: Department of National Defence.

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C3-003 ISBN 1-896713-00-9 Tawrell, P. (1996). *Camping and wilderness survival: The ultimate outdoors book*. Green Valley, ON: Author.

C3-004 ISBN 1-85227-866-8 Davies, B. (1999). *SAS encyclopedia of survival*. London, England: Virgin Publications.

ERECT AN A-FRAME SHELTER

1. Select a level area with good drainage.
2. Ensure the area is free of hazards, (i.e., overhanging branches that may fall, too close to roadways etc).
3. Zip two shelter halves together, ensuring flap covers zipper.
4. Attach cord to the grommets at both ends near the joined zipper.
5. Suspend both ends from trees or other objects so that the centre is approximately waist high.
6. Stretch out the sides and secure them using sticks.
7. Attach cord to the middle grommets on each side and tie the cord to pull the side out and give more room to the inside.
8. When possible, dig a drainage trench on both sides.

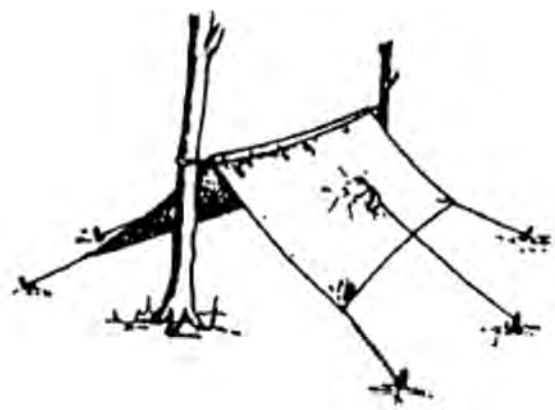


Figure A-1 A-Frame Shelter

LEAN TO SHELTER

1. To build a lean-to, two trees must be found with fairly firm, level ground between them. These trees are called the uprights. The distance between these two trees will be the opening of the lean-to.
2. Next, a ridgepole must be found. This must be a fairly thick pole, around fist size in thickness, and should be long enough to reach from one upright to the next.
3. The ridgepole should be placed behind the uprights from the viewpoint of the person facing the uprights. Natural notches in the uprights may be perfect to hold the ridgepole. If these are not available, the ridgepole will be laced onto the uprights using the square lashing. (It may be a good idea to lash the ridgepole on even when using natural notches to ensure the pole is secure). After the square lashing is completed, the ridgepole should be very secure. In fact, the people who will be using the shelter should be able to sit on it and it should not move.
4. The height of the ridgepole should be the height of the waist of the tallest person if a group will be staying in the shelter. This will make the shelter opening fairly low, which will help conserve heat inside the shelter. For a one person lean-to, the ridgepole should be placed lower, at mid thigh height.
5. Find approximately 8 poles about 5-7 cm in diameter. These will serve as the pole framework for the lean-to and will be known as the spars. They will be tied onto the ridgepole using the square lashing, and will run from the ridgepole to the ground. Spread these evenly, going from just inside one upright to the other.

6. The number and the height of the people living in the lean-to will determine the length of the spars. For a group, the spars should be slightly longer than the height of the tallest person. If the shelter will sleep one person, the spars should be about the same height as the chest of that person.

7. Find approximately 8 small flexible poles that will run horizontally across the spars. These will be known as the ribs. The length of these should be that of the distance between the two spars closest to the uprights. These ribs should be woven horizontally through the spars. If long enough ribs cannot be found shorter ones can be used. Weave the shorter ribs as far as possible and then start at the point ended with a new piece.

8. A pole around the same thickness as the ridgepole should be found and laid on top of the bottom of the spars. This is known as the foot log.

9. Vertical poles will be placed from the ground to the spars on the furthest sides of the lean-to. These do not need to be laced onto the spars. They should be tall enough to reach from the ground to the spar, and since the spar is on a slope, the vertical poles will need to be of varying heights.

10. Place boughs with the stem toward the ridgepole and the top of the bough upwards (the glossy side).

11. Make a row going right across the bottom with the boughs close together.

12. For the next layer, lay the boughs into the first layer; again with the top of the bough facing up.

13. Repeat step 12 until the top is reached and the boughs cover the lean-to like shingles cover a roof.

14. Weave the stems of more boughs into the layers that now cover the lean-to. These layers should be thick enough to be waterproof; about 15cm thick is a suggestion.

15. For the sides of the lean-to, boughs can be placed as in the steps above until the ground is reached.

16. If a fire has been made, extend boughs about a foot down the front of the lean-to to keep out rain or wind, but allow the heat from the fire to enter.

17. Boughs can also be used to cover a part of the front as described above if there is no fire. Just leave an opening for a door in case quick exit is required.

CIVILIAN-PATTERN TENTS

Civilian-pattern tents come in various sizes and forms and, therefore, have different ways to be erected. Users should read the information booklets provided with the tent in order to correctly erect it.

ARCTIC TENT ASSEMBLY AND PITCHING

1. Lay out the outer tent, flat apex in the centre and panels outwards with the inside facing upwards, and the door zipper fastened.

2. Lay out the inner tent liner on top of the outer tent, with the inside facing upwards.

3. Attach the top and bottom stovepipe toggles. By lining up the stovepipe openings of the outer and inner liner and attaching the top and bottom toggles, then the inner and outer portions are positioned properly.

4. Working either way, attach the remaining toggles. Use the corners of the tent as checkpoints to make sure no toggle was missed. Continue until all toggles are through the seam grommets of the inner liner.

5. Thread the long or the lower drying line through the drying line keepers. To get the drying line keepers through the inner seam splits, feel through the liner at the peak or centre of the doorway, follow up the seam on the panel of the outer tent, when you reach the drying line keeper, insert it through the split seam of the liner and thread the drying line on. There is a keeper on every seam. This means there are 10 keepers for the lower drying lines.

6. Thread on the short or upper drying line. Start at the door seam again and carry out the same drill as for the lower drying line. There will be a keeper on each side of this one and then one on every second seam. This means that there will be six drying line keepers on the top.

7. Insert the spike of the tent pole through the apex of the inner and outer tents and lash these three securely.

8. Attach the five bottom tie-down pegs. To do this, run a rope through the bottom wall eyelets of the outer and inner tents, tying the pegs to the outside.

9. Attach the wall guy lines to the guy line loops on the outer tents. To do this, thread the guy lines through one hole of the runner then through the guy line loop of the tent and back through the outer hole of the runner. Tie a figure of eight knot on this end of the guy line to prevent it from slipping out of the runner hole. The other end of the guy line is threaded through the eye of the peg of the line and is prevented from being pulled out of the peg by a slipknot. This method of attaching guy lines must be used as the rope will invariably freeze in the peg hole and to reverse of the above procedure will prevent tightening of guy lines. In addition, when the ground is too hard, or snow too soft and deep, the pegs can be secured by wrapping several turns of the guy line to the centre of the peg and either freeze the peg in the snow or place a large stone or log on top of the peg.

10. Attach the five top guy lines in the same manner.

11. The tent is now assembled and ready for use, however, when the tent is pitched and the doors are opened quite often the zippers become disengaged. To prevent this, close the zipper and near the top of the door, sew the track of the zipper together. This will act as a stopper, preventing the zipper from becoming disengaged. Do this to the outer and the inner tent zippers.

12. The fly screen is of no use in cold weather and should be rolled up and secured by the ties running each way from the door to the outside corners. Roll and secure this screen, only after the tent has been pitched. If done when the tent is struck, the tent will be misshapen when pitched.

13. To prevent the guy lines from being left hanging loose and becoming tangled, roll the guy rope around the tent peg and in the guy rope loop. In most cases the guy rope loops are sewn too far down and the loop is not large enough for the peg to fit in. To overcome this, thread short pieces of the rope through the guy line loops and tie with a square knot. Adjust the knot so the peg will fit securely in it.

STRIKING AN ARCTIC TENT

1. Members take positions. One person is inside at the tent pole. Three people are at the guy ropes located above the left side tie-down point, above the right side tie-down point, and above the back tie-down point. One person is supervising the procedure and giving orders.

2. The order “pull pole” is given.

3. The person inside the tent pulls the bottom of the pole towards the door and lowers the tip to the rear of the tent. That person disconnects the lower section or telescopes the pole, depending on which pole is being used.

4. The member at the back guy rope grasps the apex of the tent.

5. The person at the pole backs out of the door, carrying the pole sections and base plate, and zippers the door closed.

6. The two persons at the right and left side guy ropes roll up the guys and secure them to the tent. They pull out the remaining pegs, roll up the guys and secure them to the tent.

7. The members pull the tent to the rear and spread it out on the ground.

8. The order “shake out” is given. Members spread around the tent, shake the snow/ice/sand/etc. out and fold the tent p for stowing.

FOLDING AN ARCTIC TENT FOR STORAGE

1. Lay out the tent with the tent door up and in the centre and with zippers closed.
2. Make sure there are no double folds on the underside.
3. Hold the apex securely: the first long fold is made by folding the wings to the centre, with the pegs straight up and down.
4. Straighten and flatten out.
5. Fold in snow flaps across the base.
6. Make the second long fold, repeating the action as for the first long fold.
7. Straighten and flatten out.
8. Make the third long fold.
9. Straighten and flatten out;
10. Fourth long fold – flip folds one on top of the other.
11. Make the first cross fold: fold in base at the top of wall.
12. Make the second cross fold by folding the apex into the base of the inserted pole section allowing approximately 4 inches of loose fold at the base of the pole section to avoid wear and tear: top of pole should be offset.
13. Third cross fold – place the folds one on top of the other.
14. Insert in the bag (base plate and spare pegs have already been placed in the bag).
15. Place the remaining two pole sections in the bag alongside the tent.
16. Tie up the top of the tent bag.

PITCHING AND ANCHORING A MODULAR TENT

The key stages for pitching and anchoring a modular tent are as follows:

1. Lay the frame parts on the ground and erect the arch frames (A frames), leaving the uprights folded and placed at equal distances one from the other.

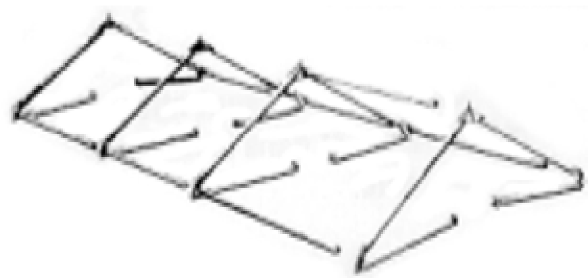


Figure A-2 A Frame

2. Join the tie beams (purloins) to each of the arches at the summit and roof edges, locking them into place.

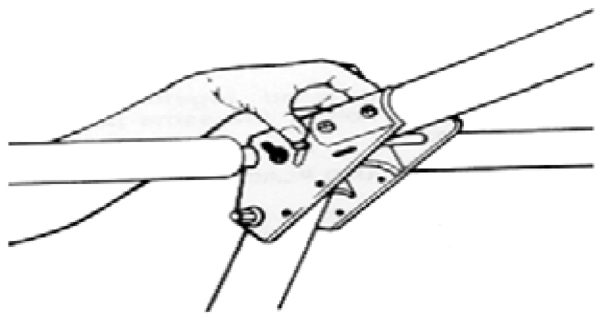


Figure A-3 Joining of the Tie Beams

3. Generally using one person per arch, raise one side of the frame.

Figure A-4 Raising One Side

4. Before lacing the tent canvas together, close all doors. Lace the tent canvas together, placing them on the frame and attaching them at the top of the arches.

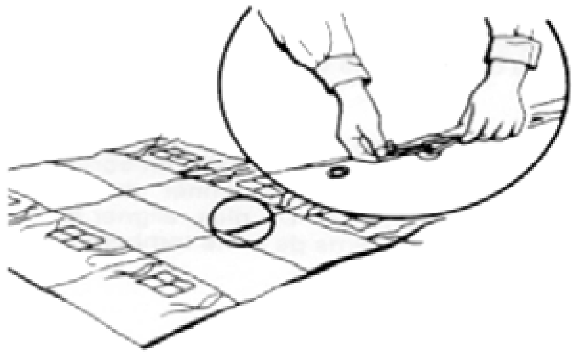


Figure A-5 Lacing the Tent Canvas

Figure A-6 Half of the Tent Is Laced

5. Raise the other side of the frame.
6. Attach the stays without tensioning them and lace the rest of the canvas.
7. Using straps, attach the canvas and lining to the ties on the edges of the roof.
8. Align the arches and adjust the canvas.
9. Raise the tent completely.
10. Drive pickets in each foot from the outside.
11. Tension the stays.
12. Attach the ground canvas using sandbags or earth.
13. Dig drainage trenches as required.

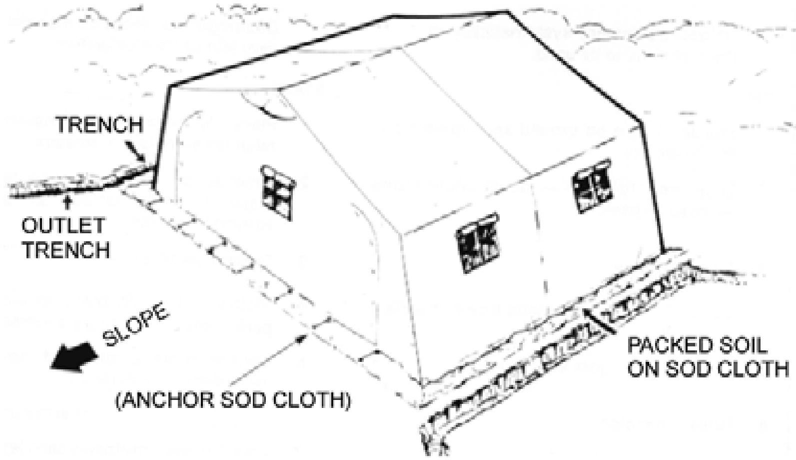


Figure A-7 Modular Tent

STRIKING A MODULAR TENT

1. Release cables and anchors and remove them if the wind is not too strong. Otherwise, leave them in place until the tent has been disassembled.
2. Remove earth or sandbags covering the ground sheet.
3. Undo adjusting stays from the edge of the roof.
4. Unlace the sides of the tent and lower one side.
5. Remove the lining strapped to the frame, and fold it.
6. Lower the other side of the tent, unlace tent parts, remove them from the frame and fold them.
7. Disassemble the frame and pack the components.
8. Take necessary steps to clean and dry components as required, with the shortest possible delay.

FOLDING THE CENTRE CANVAS

1. After having removed the canvas from the frame, close the windows and doors.
2. Stretch the canvas inside a building on the floor, on a dry and clean surface.
3. Clean the canvas and ground sheet using a broom.
4. Fold the ground sheet towards the centre.
5. Fold the canvas on its length towards the centre of the sheet, until the canvas is long and narrow.
6. Fold the canvas in the other direction towards the centre.

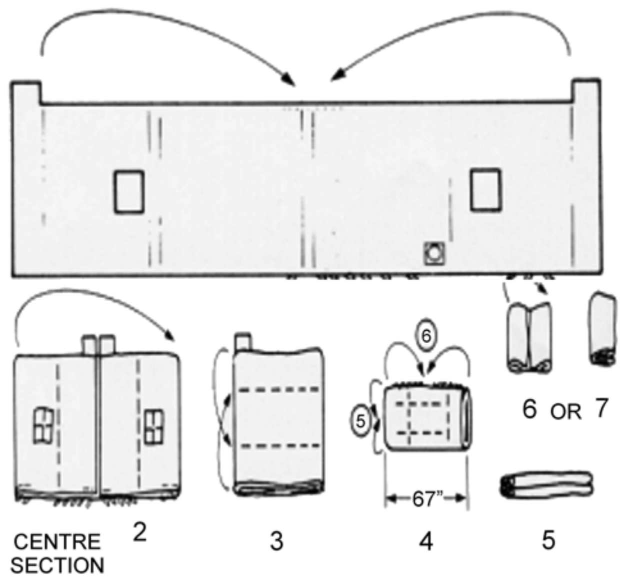


Figure A-8 Folding of the Centre Section

FOLDING THE OUTSIDE WALLS (DOORS)

1. As for the central canvas, clean the canvas and fold the ground sheet towards the inside.
2. Fold the point towards the inside part.
3. Fold the canvas towards the centre and secure it.

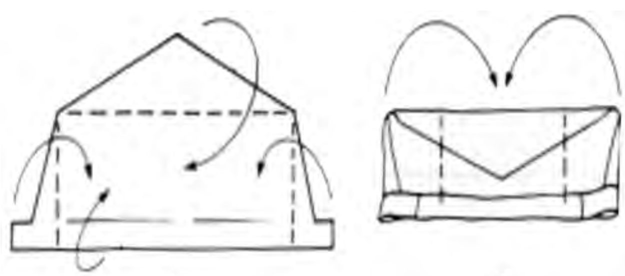


Figure A-9 Folding The Outside Walls

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 6

EO M190.06 – LIGHT, MAINTAIN AND EXTINGUISH A FIRE

Total Time:	90 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Prepare a fire ready to be lit.

Prepare examples of types of fires.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for TPs 1, 3 and 4 to illustrate the application of rules, principles and concepts of fire safety, elements of fire and types of fires.

A demonstration and performance was chosen for TPs 2 and 5 as it allows the instructor to explain and demonstrate site location and layout, lighting, maintaining and extinguishing a fire.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall be expected to apply fire safety principles and light, maintain and extinguish a fire.

IMPORTANCE

Safety is a key concern when dealing with fire. Cadets must understand and apply principles of fire safety before they begin the steps in lighting. Fire is also the second step in the survival pattern and may be the difference between living and expiring while in a survival situation.

Teaching Point 1 | **Explain principles of fire safety.**

Time: 5 min | Method: Interactive Lecture

OBEY FOREST FIRE DANGER RATING SYSTEM

In cooperation with various fire management agencies, the Canadian Forest Service manages the Forest Fire Danger Rating System. The system uses weather, fuel and topographic data to rate the potential for forest fire ignition and to predict forest fire behaviour. The Forest Fire Danger Rating System must be at a suitable level prior to starting a fire. Never light a fire when the rating is high, very high or extreme. The slightest spark could cause a forest fire.

Note. From "Natural Resources Canada" by Canadian Forest Service, 2009, The Atlas of Canada. Retrieved October 26, 2011, from http://atlas.nrcan.gc.ca/auth/english/maps/environment/naturalhazards/forest_fires/firedangerrating/1

Figure 1 Forest Fire Danger Rating System

STRONG WINDS

If wind speed is high, the fire will be at risk of spreading if not properly managed. Strong winds can carry sparks away from the fire pit and start an unwanted fire. The fire should be placed in a location where it is effectively sheltered from strong winds.

SIZE OF FIRE

The fire shall be a suitable size so control can be maintained at all times. Never allow a fire to get larger than four feet wide and three feet high. Fires that are too large can burn out of control, and cause forest fires or personal injury. If a fire becomes too large, stop adding fuel and let the fire cool down.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. What is the Forest Fire Danger Rating System?

Q2. What might happen if a fire is placed in an area with strong winds?

Q3. Why maintain a suitable size fire?

ANTICIPATED ANSWERS:

A1. The Forest Fire Danger Rating System uses weather, fuel and topographic data to rate the potential for forest fire ignition and to predict forest fire behaviour.

A2. It is at the risk of spreading.

A3. Fires that are too large can burn out of control, and cause forest fires or personal injury.

Teaching Point 2 | **Explain, demonstrate and have the cadets determine an appropriate site location and layout for a fire.**

Time: 15 min | Method: Demonstration and Performance

SITE LOCATION

Avoid windy areas because the fire can flare up and burn out of control. A reflector or a windbreak can be built out of green wood or rocks. The advantage of a reflector is that it concentrates the heat in the desired direction. Areas near water tend to have higher winds.

Clear the ground of all inflammable material before starting the fire. The material should be raked towards the centre of the site where the dead leaves, pine needles and other debris can be burned.

Do not build the fire against an old log or tree trunk. The log may smoulder and catch fire in a breeze.

Do not build the fire below the boughs of a tree. The boughs will dry from the heat and may catch fire.

The fire should be a suitable distance from any shelter in case the wind changes direction.

SITE LAYOUT

Surround the fire with dry rocks. They will help contain the fire so it may be properly maintained. Do not use rocks that have been submerged in water. Water expands as it is heated and may cause the rocks to explode. If rocks are unavailable, dig a pit approximately one half foot deep and four feet wide. This pit helps prevent of the fire from spreading.

Appropriate fire fighting equipment shall be placed in close proximity to the fire.

Deliver this teaching point around a properly constructed fire site.

ACTIVITY

Time: 10 min

OBJECTIVE

The objective of the activity is to allow the cadet to practically apply the principles learned by constructing an effective fire site.

RESOURCES

- Suitable location for a fire site,
- Rake,
- Shovel,
- Rocks,

- Fire extinguisher,
- Gerry can,
- Water pack,
- Water,
- Bucket of sand,
- Wire broom,
- Axe, and
- Fire bell.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

- Divide cadets into small groups.
- Direct cadets to find an appropriate location for a fire by applying the site location principles.
- Provide cadets with a rake and shovel, and have them clear the ground and dig a pit that will accommodate their fire.
- Have the cadets gather dry rocks and surround their fire pit.

SAFETY

Ensure cadets safely use the equipment.

After the cadets have completed the activity they should return to the original fire site for the next portion of the lesson.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. Why is it unwise to build a fire near an old log or a tree trunk?

Q2. Why must the rocks that surround the fire not be submerged in water?

Q3. What equipment should be in close proximity to the fire site?

ANTICIPATED ANSWERS:

A1. They may smoulder and catch fire.

A2. Water expands when heated and the rock may explode.

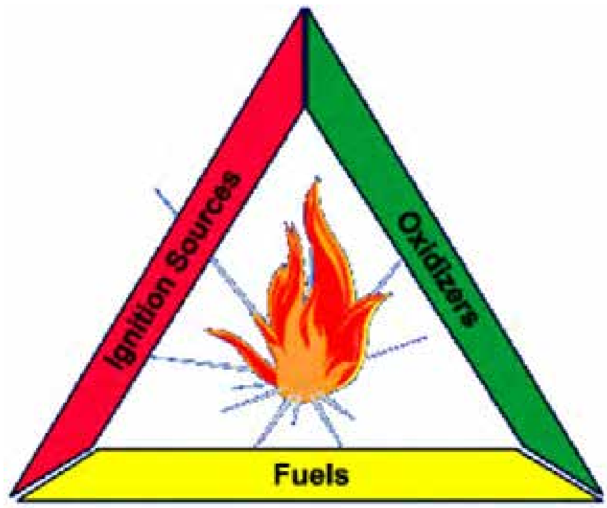
A3. Fire fighting equipment.

Teaching Point 3 **Identify the required elements of a fire.**

Time: 5 min Method: Interactive Lecture

ELEMENTS OF A FIRE

The three required elements for a fire include oxygen, spark / heat and fuel.



Note. From "Covidien Energy-based Professional Education", 2006, The Fire Triangle, 2010, by Covidien AG, October 26, 2011, from http://www.valleylabeducation.org/fire/pages/fire-12.html

Figure 2 Fire Triangle

Oxygen is required for a fire to stay lit. A spark is required to initially start the fire. The heat produced by the embers keeps the fire going. Fuel is anything that burns, such as wood.

If any one of the elements is removed, the fire will extinguish. When lighting a fire, always ensure adequate ventilation, enough fuel and a hot enough source to ignite the fuel.

Demonstrate how oxygen, heat / spark and fuel are all needed to start a fire and keep it lit.

Using a candle, a match and a large water glass, explain that without the match (spark) the candle (fuel) cannot be lit. Light the candle and place the empty water glass over the candle to prevent air (oxygen) from reaching it. The flame will extinguish.

CONFIRMATION OF TEACHING POINT 3

QUESTIONS:

Q1. What are the three required elements of a fire?

Q2. If one element is removed, what happens to the fire?

ANTICIPATED ANSWERS:

A1. Oxygen, spark / heat and fuel.

A2. The fire will go out.

Teaching Point 4	**Describe types of fires.**
Time: 15 min	Method: Interactive Lecture

WARMTH AND COMFORT FIRES

Warmth and comfort fires can help to conserve body heat and save needed calories. These fires can be helpful in keeping away wild animals and insects. Warmth and comfort fires are the most practical fires, as they consume little fuel and burn slowly.

SIGNAL FIRES

Signal fires should produce heavy black smoke to attract potential rescuers. This black smoke can be generated by the addition of green branches, rubber, plastic or heavy oil to an already well-established fire.

COOKING FIRES

Cooking fires should be set flat on the ground. They can also be constructed in a pit if there is heavy wind or the surrounding ground contains a fire hazard. Cooking fires shall be a moderate size or the food burns. The hot coals can be used to start a warmth and comfort fire to heat the camping area when cooking is finished.

Examples of these fires should be built to use as training aids.

CONFIRMATION OF TEACHING POINT 4

QUESTIONS:

Q1. What are two advantages of a warmth and comfort fire?

Q2. What are some items that can be added to a fire to produce thick black smoke?

Q3. What type of ground surface should a cooking fire be on?

ANTICIPATED ANSWERS:

A1. They can help conserve body heat, help save needed calories, keep wild animals and insects away, and they are the most economical.

A2. Green branches, rubber, plastic or heavy oil.

A3. They should be on flat ground.

Teaching Point 5	**Explain, demonstrate and have the cadets practise lighting, maintaining and extinguishing fires.**
Time: 45 min	Method: Demonstration and Performance

LIGHTING A FIRE

TINDER

Tinder is any kind of material that a minimum amount of heat ignites. Good tinder needs only a spark to set it ablaze. Birch bark, dry grass, fine wood shavings, bird down, waxed paper and cotton fluff from clothing all make good tinder. Tinder must be dry. It is a good idea to carry tinder in a waterproof container.

METHODS FOR OBTAINING A SPARK

Matches. Matches are the easiest way to start a fire. They produce a flame instantly when struck against a striking pad. The biggest problem with matches is that in wind or wet conditions they may not be useful. They will not ignite if the striking pad becomes worn or wet. The matches should be packed in waterproof containers so that they cannot rub or rattle together and accidentally ignite. Non-safety, strike anywhere matches are the most effective in a survival situation.

Flint and steel. Flint and steel is the best method of lighting a fire if matches are unavailable. If the flint is struck vigorously with a piece of steel it produces hot sparks that ignites the fire. The flint should be stuck downward so the sparks hits the centre of the tinder. Even if the flint is wet it still produces a spark.

Magnifying glass. Magnifying glasses focus strong direct sunlight to produce enough heat to ignite a fire. The light from the sun should be directed onto the tinder. The obvious disadvantage to the magnifying glass is that if the sun is not out, it will not produce a spark.

Battery and steel wool. Strands of steel wool can be attached to the terminals of a car battery to produce enough spark to start a fire. When the two strands of steel wool are brought close together, a spark jumps between them.

Using a nine-volt battery demonstrate this method for obtaining a spark.

KINDLING

Kindling is the wood used to raise flames from the tinder so larger less combustible materials can be burned. The best kindling consists of small, dry twigs and small pieces of soft woods. Do not collect kindling straight from the earth because it is usually damp. It should be gathered from standing deadwood.

FUEL

Fuel is anything that burns in the fire. Dry wood from standing trees should be used to get the fire going. Once the fire is established, greener and damp wood can be used. Hard woods include hickory, beech and oak. These hard woods burn well, give off heat, and last a long time as hot coals. The fire can be maintained for a long period of time using hard woods. Soft woods burn very quickly and give off sparks. They can be used when lighting the fire. These soft woods include cedar, alder, hemlock, spruce, pine, chestnut and willow. After the fire is steadily burning, add fuel that is three to four times the size of the kindling.

MAINTAINING A FIRE

A fire should never be left unattended. It takes only seconds for a fire to begin burning out of control. Immediately after a fire has been started, it requires a modest amount of wood to build up heat. The fire requires very little wood to keep it burning once a good amount of heat is built up.

VENTILATION

Ventilation allows the needed oxygen to be supplied to the fire. The more oxygen introduced, the brighter the fire. The ideal amount of ventilation results in a steady burn while only using a moderate amount of fuel. The fire suffocates if there is too much fuel.

EXTINGUISHING A FIRE

Water is the easiest way to put out a fire. Water should be dumped on the fire until it results in no heat emanating from the centre. Ensure that all of the sparks are out prior to decamping by smothering it completely with wet earth or sand and filling the fire pit.

ACTIVITY

Time: 30 min	Method: Activity

OBJECTIVE

The objective of this activity is to allow the cadet to practically apply the principles learned by constructing, lighting, maintaining and extinguishing a fire.

RESOURCES

- Matches,
- Flint and steel,
- Battery and steel wool,
- Magnifying class,
- Tinder,
- Kindling,
- Fuel,
- Fire site,
- Rake,
- Shovel,

- Fire fighting equipment, and
- Water.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into small groups.
2. Have the cadets in their groups, return to their fire pit.
3. Provide cadets with a rake and shovel, and firefighting equipment.
4. Have each group prepare the tinder and kindling.
5. Have each group light the fire using a match.
6. Have each group maintain the fire for three minutes.
7. Have each group extinguish their fire.
8. Ensure that the fire is completely extinguished.

SAFETY

Ensure fire-fighting equipment is near each fire site.

CONFIRMATION OF TEACHING POINT 5

QUESTIONS:

Q1. What is fuel?

Q2. What does kindling do?

Q3. Name two of the four methods of obtaining a spark mentioned in this lesson.

ANTICIPATED ANSWERS:

A1. Fuel is anything that burns (wood, gasoline etc).

A2. Kindling is the wood used to raise the flames from the tinder so that larger less combustible materials can be burned.

A3. Matches, flint and steel, magnifying glass, battery and steel wool.

END OF LESSON CONFIRMATION

The cadets' participation in the activity will serve as confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Safety is a key concern when dealing with fire. Cadets must understand and apply principles of fire safety before they begin the steps in lighting. Fire is also the second step in the survival pattern and may be the difference between living and expiring while in a survival situation.

INSTRUCTOR NOTES / REMARKS

The directives outlined in CATO 11-08 *Environmental Protection and Stewardship* are to be adhered to during this training.

REFERENCES

C3-002 ISBN 0-00-653140-7 Wiseman, J. (1999). *The SAS survival handbook*. Hammersmith, London: HarperCollins Publishers.

C3-003 ISBN 1-896713-00-9 Tawrell, P. (1996). *Camping and wilderness survival: The ultimate outdoors book*. Green Valley, ON: Author.

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 7

EO M190.07 – ERECT, TEAR DOWN AND PACK TENTS

Total Time:	120 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Additional instructors are required for this lesson to ensure TP1 is covered in the time allotted.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

A demonstration and performance was chosen for TP 1 as it allows the instructor to explain and demonstrate erecting, tearing down and packing a modular tent while providing an opportunity for the cadets to practice these skills under supervision.

A demonstration was chosen for TPs 2–3 as it allows the instructor to demonstrate the skills while providing the cadets with knowledge on erecting, tearing down and packing tents.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have to erected, tore down and packed a two-section modular tent with walls.

IMPORTANCE

It is important for the cadets to be able to erect a modular tent because they are often used during survival exercises. A cadets' understanding of the erecting, tearing down and packing of tents allows them to better assist in the set-up of an aircrew survival exercise site.

Teaching Point 1	**Explain, demonstrate and have the cadets, as a member of a group, erect, tear down and pack a two-section modular tent with walls.**
Time: 60 min	Method: Demonstration and Performance

For this skill lesson, it is recommended that the instruction take the following format:

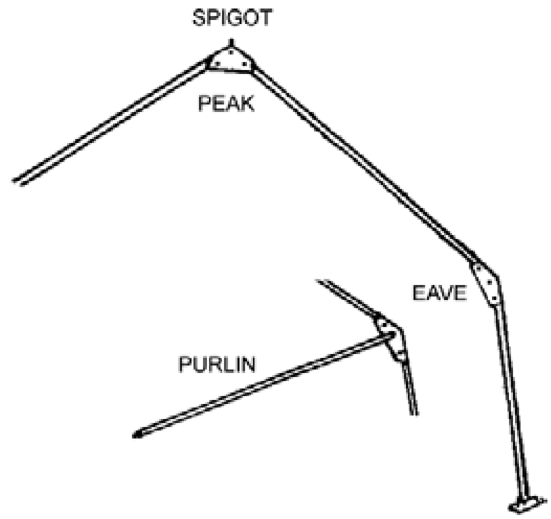
1. Divide the flight into two groups.
2. Explain and demonstrate each step in erecting, tearing down and packing a modular tent.
3. After demonstrating each step have the cadets perform the skill while monitoring their performance.

Note: Two instructors are required for this TP.

If the modular tent is going to remain erected for the duration of the exercise instruct tearing down and packing at the end of the exercise.

COMPONENTS OF A MODULAR TENT

A module of tent is comprised of a canvas section supported by tubular aluminum framework. It measures 2.5 m long by 5.5 m wide. The frame of a modular tent consists of two arch frames and three purlins (the horizontal beams along the length of the roof that support the canvas). The arch frame is hinged at the peak and the eaves. When folded the arch measures 2.75 m long. The purlins are 2.5 m long and connect two arches; one purlin at the peak and two more at each eave. They are locked into place without the use of tools. The framework is anchored with steel pegs which are inserted at the base of each arch and can be diagonally cross braced with cables or straps, between the eaves and base of the arches, to give an unobstructed inside space and an outside perimeter clear of guy wires. Guy wires are only used when the tent requires further reinforcement.



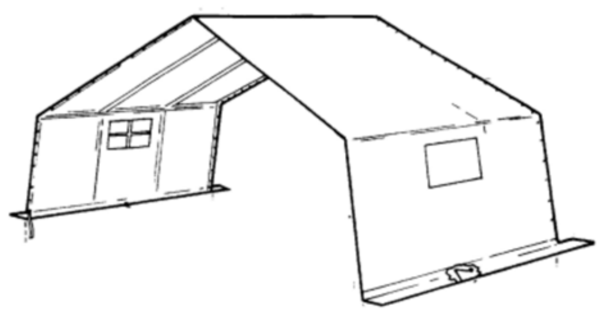
Note. Created by Director Cdts 3, 2007, Ottawa, ON: Department of National Defence.

Figure 1 Frame

TENT SECTIONS

The three tent sections are: centre sections, front walls and rear walls. The tent sections attach to one another by means of a series of cord loops and grommets known as “Dutch lacing”. The cord loops are on the opposite side of the grommets requiring all sections to be placed in the same direction. For example, all the cord loops on the right. Tent sections are made of olive green, core-spun, polyester-cotton, rip-stop woven material treated to be water-, rot- and flame-resistant. The sod cloth which extends 40 cm from the foot of each tent section is made from plastic-coated, waterproof material. The windows are screened and have blackout flaps and transparent vinyl panels which are attached with fastener tape (Velcro).

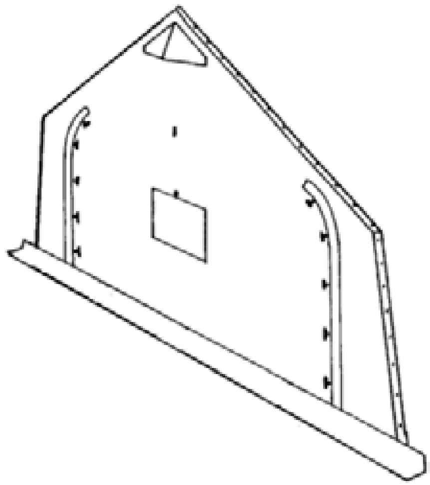
Centre section. This is the canvas roof and side wall covering of a module. It has a window in each side and a chimney opening in the roof.



Note. From Operational Support and Maintenance Manual for Tent, Main (p. 1-5), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.

Figure 2 Centre Section

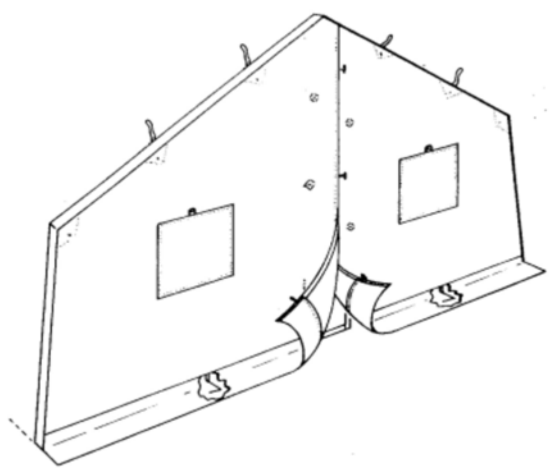
Front wall. Attaches with grommets and opens with two zippered personnel doors. The front wall includes one window and a closable air vent.



Note. From Operational Support and Maintenance Manual for Tent, Main (p. 1-5), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.

Figure 3 Front Wall

Rear wall. Attaches with cord loops and opens in the centre. The opening reaches the peak of the module and is fastened with toggles, allowing access for large equipment. The rear wall includes two windows.



Note. From Operational Support and Maintenance Manual for Tent, Main (p. 1-5), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.

Figure 4 Rear Wall

ACCESSORIES

Liners. The three common tent sections—centre section, front wall and rear wall—each have corresponding white fabric liners. These provide insulation as well as a light reflective surface, and are made from flame resistant material. The liners are suspended from inside the frame and are laced together similar to the tent sections.

Blackout hallway. Black fabric enclosure, 2.5 m long, attached inside the tent and laced to a grommet by the doorway, to prevent the entranceway from emitting light.

Lacing band. Provides the cord loops, to tie the two tent sections together when the module lacing sequence is disrupted because two grommet ends meet. It is 8.5 m long and 15 cm wide. A strap and a hooked shock cord are at each end to secure it to the frame and keep the band taut against the canvas.

Guy wires. Lines of cord that assist in securing the tent to the ground. Available for situations where the footings cannot be anchored in the ground or where the tent is subject to extreme windy conditions.

Bag tent. This is a flat canvas wrap specifically designed for containing tent sections. It includes a pocket to hold pertinent hardware.

Tools. A mallet, shovel and occasionally a stepladder. Tools are not included.

Explain tent maintenance and site selection to the cadets, but do not demonstrate or have the cadets perform.

TENT MAINTENANCE

The following precautionary measures, when followed, protect the tent components from corrosion, mildew, rot and unnecessary damage and work to prolong the life and usefulness of the tentage:

- Avoid folding or packing tent or liner sections when wet. Wet or damp tentage shall be unfolded and air dried within 48 hours.
- Protect tent and liner sections from petroleum and chemical stains. If soiling occurs, clean immediately with warm soapy water.
- Do not allow oil, mud or other foreign matter to gather or harden on frame components. Warm soapy water or cleaning solvents are recommended for cleaning. The components should not be lubricated.
- Do not leave collapsed tent sections and components in contact with the ground or exposed to the elements for more than 48 hours.
- All detected damage should be identified, reported and repaired at the earliest convenience.
- Dragging tentage on the ground, walking on tentage and general rough handling is prohibited.
- Effort shall be made to keep tentage equipment serviceable at all times and preventative maintenance practices must be employed during use.
- Erect and tear down tentage in accordance with the detailed procedures.

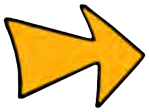
A site should be pre-determined when explaining these points. There is no requirement for the cadets to choose a site.

SITE SELECTION

The following considerations should be made when selecting a site for the modular tent:

- Access for vehicles is required for easy set-up and equipment transport.
- Firm level ground, high enough for natural drainage, is preferred. It is recommended to have a tough grass turf, free from projecting tree roots and rocks.
- Positioning the tent to avoid prevailing winds bearing directly in line with an end wall.

- A shady area free of underbrush is recommended in a hot climate. Doors should be accessible and trees that rub against the canvas in the wind should be removed or avoided.
- Cooking shall be conducted 100 m from tents used for sleeping personnel.



When selecting a tent site on snow-covered ground, choose an area free from crevices. Prod the surface to ensure that a flat base is selected. The snow shall be removed until a firm base is exposed. The tent shall, if possible, be positioned so that its side is located downwind to avoid drifting snow blocking the entranceway.

Explain, demonstrate and have the cadets perform each step in erecting, tearing down and packing.

ERECTING

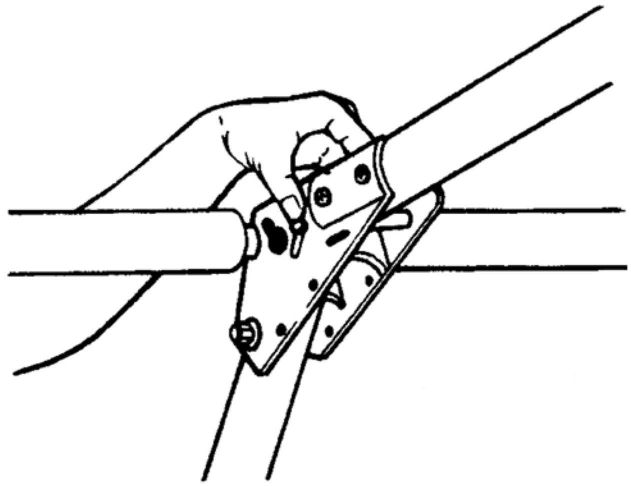
Lay out and Connect Frame

Expand all arch frames leaving the legs in a folded position and space them in module increments using a purlin as a measure. Connect the purlins to each arch at the peak and eaves.

Frame Locks

To operate the connecting, locking device on the peak bracket, first ensure the lock is released, by:

1. Placing the button head pin of the purlin into the bracket keyhole and push it upwards in the keyhole slot.
2. Moving the sliding bar up to allow the pivot lock to be swung over to hold the purlin in place.
3. Moving the sliding bar down to lock the pivot.
4. Operating the save bracket lock by lifting the sliding bar.
5. Releasing the arch frame leg from its erected state and moving down the lever lock, located inside the eave bracket.



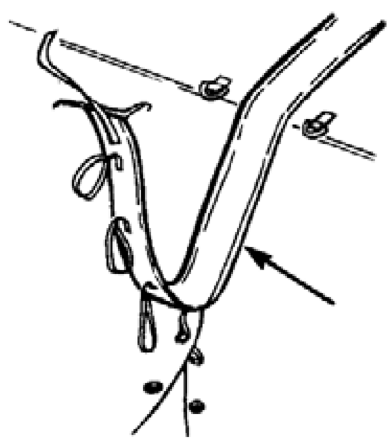
Note. From Operational Support and Maintenance Manual for Tent, Main (p. 2-5), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.

Figure 5 Frame Lock

Connect Tent Sections

Identify the tent sections and position them so the front-rear sequence of lacing corresponds to the front and rear wall location. Lace the centre sections together using the dutch lace as follows:

1. Sandwich the grommet side between the flaps on the lacing side.

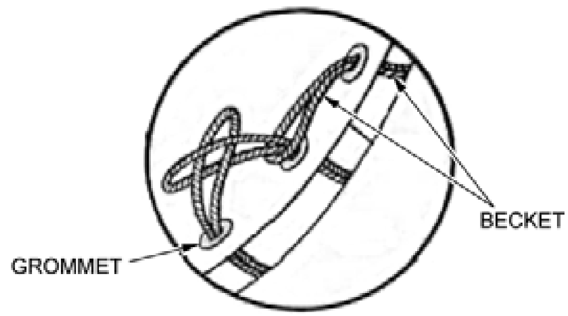


Note. From Operational Support and Maintenance Manual for Tent, Main (p. 2-8), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.

Figure 6 Canvas Lacing

2. Pass the cord loops through the corresponding grommet holes and then through the next loop working from the centre outwards.

3. Tie off the last loop.



Note. From Operational Support and Maintenance Manual for Tent, Main (p. 1-8), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.

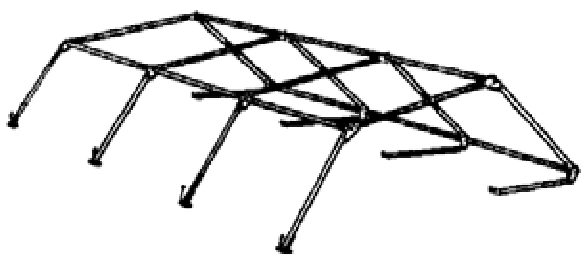
Figure 7 Canvas Lacing

Raise Side and Place Canvas

The following steps outline the procedure for raising the modular tent structure and placing the canvas:

1. Ensure the doors on the front and rear walls are closed. If the doors are left open they will be difficult to close after the modular tent is erected.

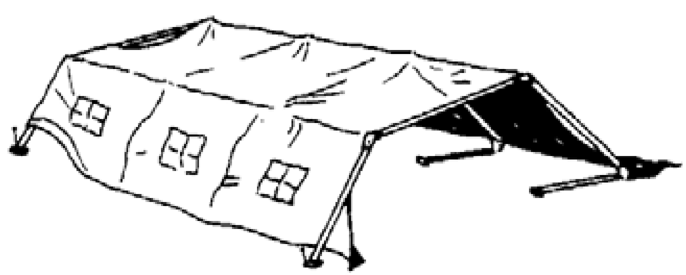
2. Raise one side of the frame with one person assigned to each arch frame. In windy conditions temporarily secure the upright section to the ground with the tent pegs.



Note. From Operational Support and Maintenance Manual for Tent, Main (p. 2-8), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.

Figure 8 Erect One Side

3. Place the previously folded canvas on the sloped side of the frame, positioning the master grommets (large holes at the peak of the canvas) over the frame spigots (large point at the peak of the frame), and then unfold the canvas onto the raised side.



Note. From Operational Support and Maintenance Manual for Tent, Main (p. 2-8), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.

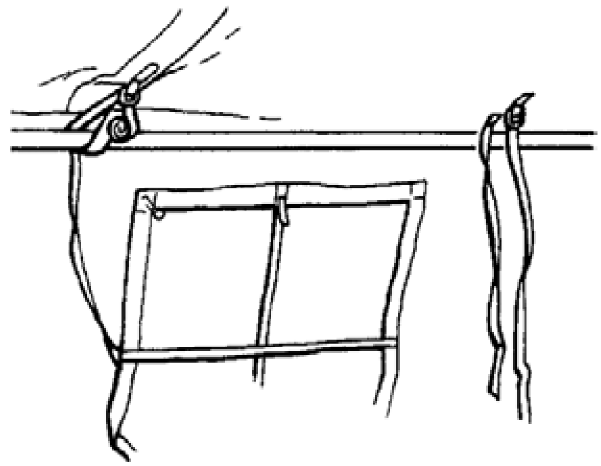
Figure 9 Place Canvas

4. Secure eave and foot straps on the raised side.

5. Attach the front and rear walls to the centre sections along the roof line only.

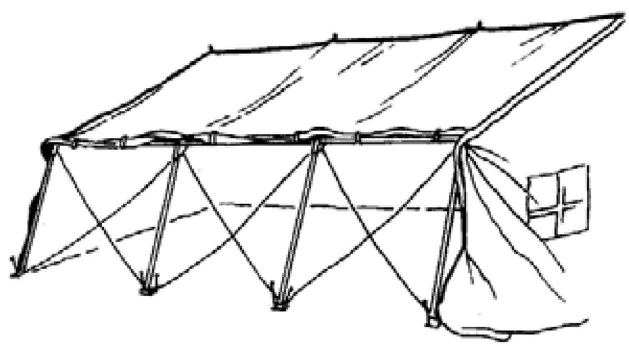
6. Raise the other side of the tent and align legs.

7. Attach save straps (straps on the underside of the canvas that attach to the purlins as illustrated in Figure 10) and bracing cables (support cables as illustrated in Figure 11) but do not tighten.



Note. *From Operational Support and Maintenance Manual for Tent, Main (p. 2-8), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.*

Figure 10 Save Straps



Note. *From Operational Support and Maintenance Manual for Tent, Main (p. 2-8), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.*

Figure 11 Bracing Cables

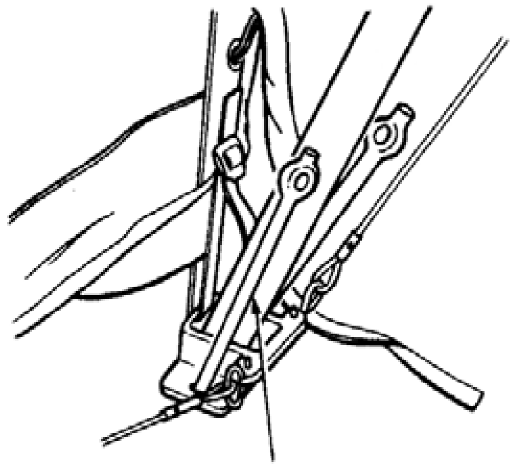
8. Complete lacing the end walls to the centre sections.

9. Raise the other side and adjust the positioning and alignment of the arch legs to achieve a smooth canvas fit.

ANCHOR

The following steps outline the procedure for anchoring the modular tent to the ground:

1. Secure the frame to the ground. Hammer in the steel pegs (two per foot), working from the outside of the tent, so that the pegs are angled inwards (to prevent frame lifting as illustrated in Figure 12).



Note. From Operational Support and Maintenance Manual for Tent, Main (p. 2-8), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.

Figure 12 Drive in Pegs

2. Tighten bracing cables or bracing straps to maximum tension.

3. Attach the foot strap, cinching to the maximum.

4. When using bracing cables, connect the vertical hold anchors with the corresponding D rings at the anchor points along the ground line of the canvas.

5. Drive the pegs into the ground under the sod cloth so that the side wall canvas is taut.

6. Connect the sod cloth flaps with the toggles and loops at the corners and along the sides. Place sod, snow or other suitable material on the sod cloths to prevent the wind from getting underneath them.

> A trench is sometimes required when the tent is pitched on poor draining ground such as a flat, clay or heavy soil surfaces or shallow soil over bed rock. Sandy soils or areas which slope off normally do not require drainage trenches. The trench should be 20 cm wide by 15 cm deep. Slope the trench so that it drains away from the tent. Dig outlet drains at the lowest points of the trench, ensuring that they do not interfere with pedestrian or vehicular movement.

> Only dig a trench if the situation requires.

TEARING DOWN

The reverse order for erecting is used to tear down a modular tent. The steps are:

1. Loosen cables and ground anchors and remove (if wind is not too strong), otherwise leave until the tent is lowered.

2. Remove material from the sod cloth.

3. Release all straps and lacing up to the eave purlins.

4. Lower the tent one side at a time.
5. Unlace tent walls and sections and remove from frame.
6. Dismantle frame (reverse procedure).

Ensure that arrangements are made to clean and dry the equipment, if required, at the earliest opportunity.

PACKING

Lay out the canvas with the outer surface facing the ground, for ease of cleaning. A diagram of the packing procedure is located at Attachment A. There are different methods for folding modular tent canvas; check with the local supply section when signing out the tentage.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in this activity will serve as the confirmation of this TP.

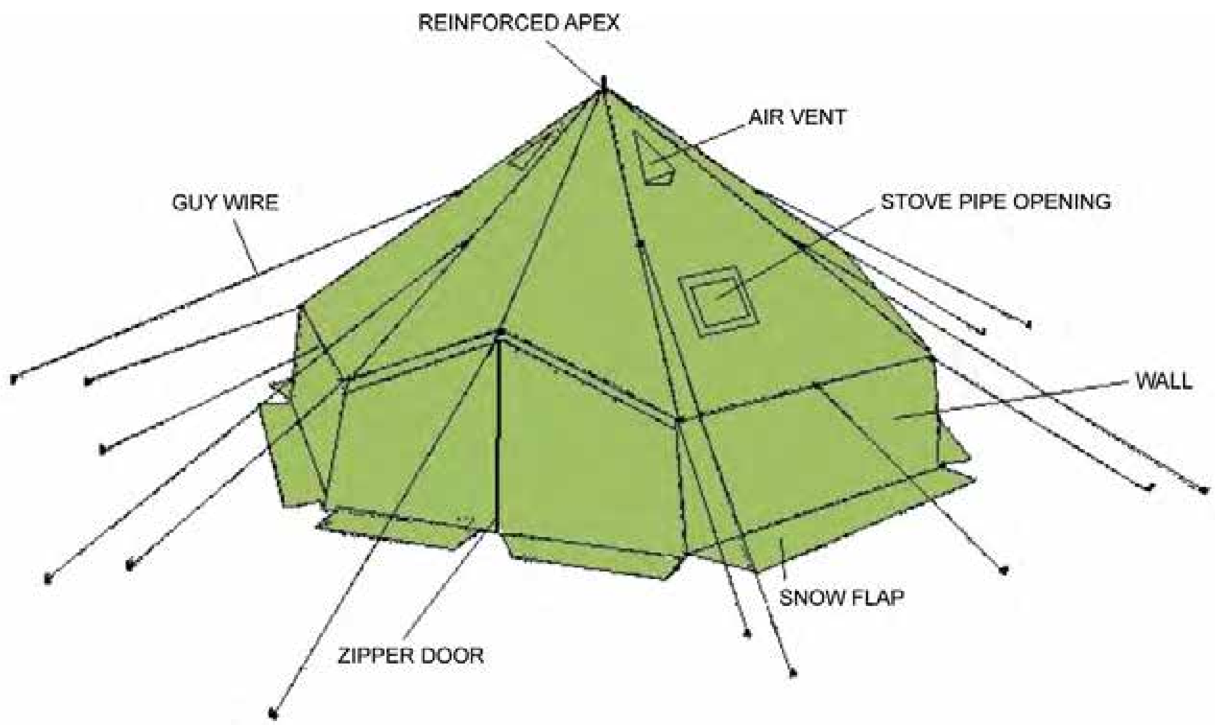
Teaching Point 2	**Explain and demonstrate erecting, tearing down and packing a 5- or 10-person Arctic tent.**
Time: 30 min	Method: Demonstration

These descriptions and instructions will be given as the tent is being erected, torn down and packed.

If the Arctic tent is going to remain erected for the duration of the exercise instruct tearing down and packing at the end of the exercise.

COMPONENTS OF A 5- OR 10-PERSON ARCTIC TENT

The 5- and 10-person Arctic tents are bell-shaped with a pentagonal base. Each wall section of the pentagon has a snow flap attached to the bottom portion of its panel. The tent consists of an inner and an outer portion. The inner portion is most commonly used for cadet training and consists of a zipper door, base tie-down points, air vents, stove pipe openings and a reinforced apex for pole insertion. The tent is supported by a single telescopic centre pole and 16 (10-person) or 10 (5-person) guy wires. The guy wires are pegged down with lightweight alloy or plastic pegs.

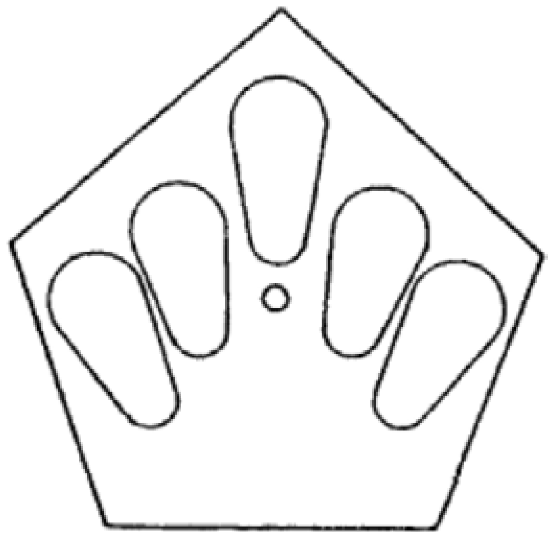


Note. Created by D Cdts 3, 2007, Ottawa, ON: Department of National Defence.

Figure 13 10-Person Arctic Tent Parts

Note. From Hero Army Surplus, Army Tents, by heroarmysurplus.com, 2007. Copyright 2007 by heroarmysurplus.com. Retrieved December 2, 2007, from http://heroarmysurplus.com/index.php/cPath/116?osCsid=jncvpsk59lech7i4chhja975q6

Figure 14 5-Person Arctic Tent

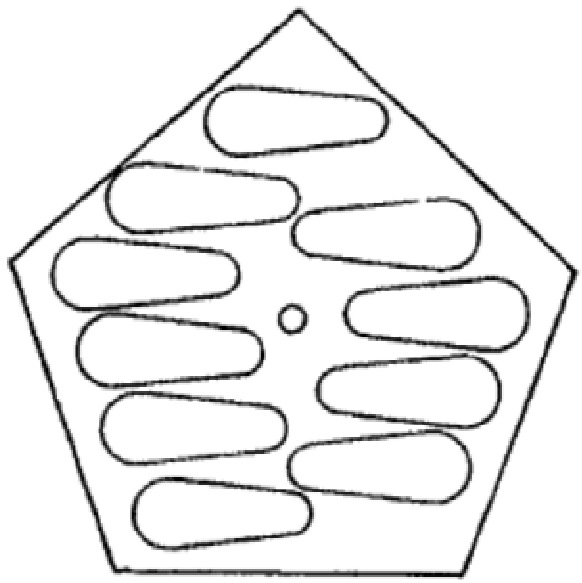


Note. From Arctic and Sub-Arctic Operations, Part 1 (p. 3-11), by DND Canada, 1974, Ottawa ON: Department of National Defence. Copyright 1974 by DND Canada.

Figure 15 5-Person Arctic Tent Sleeping Arrangement

Note. From Hero Army Surplus, Army Tents, by heroarmysurplus.com, 2007. Copyright 2007 by heroarmysurplus.com. Retrieved December 2, 2007, from http://heroarmysurplus.com/index.php/cPath/116?osCsid=jncvpsk59lech7i4chhja975q6

Figure 16 10-Person Arctic Tent



Note. From *Arctic and Sub-Arctic Operations, Part 1* (p. 3-12), by DND Canada, 1974, Ottawa ON: Department of National Defence. Copyright 1974 by DND Canada.

Figure 17 10-Person Arctic Tent Sleeping Arrangement

ARCTIC TENT INSPECTION

The tent must be inspected to ensure the following faults are not present:

- Reinforced ring on apex damaged or torn.
- Air vents are stuck closed or damaged.
- Panels have tears, holes, broken threads or seams.
- Guy wires or loops are either damaged or missing.
- Broken or frayed guy wires or guy wire loops.
- Stove pipe opening is damaged or missing.
- Zipper on the outer door is broken.
- Snow flaps with eyelets are torn away from the walls.
- Drying line keepers are torn away from the seams.
- Toggles are missing.
- Telescopic pole (10-person tent) sections have bends or splits or the pole keeper pin is missing.
- Tent pole (5-person tent) has bends or splits and do not fit together properly.
- Base plate has cracks and, in the case of the 5-person tent, the base plate keep pin is missing.
- Pegs have broken points or bends.

ERECTING

Explain and demonstrate the following. Have the cadets assist as required.

The only difference in erecting these two tents is the number of guy wires. On a 5-person Arctic tent there are 5 wires and on a 10-person Arctic tent there are 16. The following outlines the steps to take for erecting a 5- or 10-person Arctic tent:

1. Choose a site for the tent.
2. Spread the tent out on the ground with the outside facing up.
3. Ensure the zipper is closed on the front door.
4. Check if the liner is in place; usually it is not in place in a new tent.
5. If the liner is not in place, follow these steps:
   (a) Spread out the liner above the tent with the inside of the tent facing up.
   (b) Attach the top and bottom stove pipe toggles of the liner to the tent.
   (c) Attach the remaining toggles of the liner to the tent. Use the corners of the tent as check points to make sure a toggle was not missed.
   (d) Thread the lower drying line through the drying line keepers.
6. Peg the corners of the Arctic tent.
7. The tent pole will be folded in two. Straighten and lock it into position.
8. Take the pole and base plate under the canvas, going through the door and inserting it into the centre eye (reinforced apex) of the tent.
9. Secure the base of the pole onto the base plate and have the pole person hold the pole upright.
10. Drive the corner pegs into the ground before erecting the pole.
11. Have the pole person extend the pole until the skirt and snow flaps are level with the ground. Use the pegs as a guide; they should be pulled out during this step.
12. Lift the shackle and extend the pole. Be careful of the shackle pinching the pole person's fingers.
13. Lock the shackle into place to secure the height of the tent.
14. Pull on each of the lower guy wires and extend them in line with the seams of the tent.
15. Set each guy wire will have an adjuster on it; adjuster to the middle position.
16. Peg the guy wires to the ground using heavy duty pegs.
17. Adjust the guy wires to remove any sag in the lower portion of the tent. The tent should be even in height all the way around.
18. Repeat steps 14–16 with the upper guy wires. The tent guy wires should never cross with other tents.

19. Adjust and tighten all wires and prop up the door wire if necessary.
20. The two door eave wires can be propped up by placing the wire over an improvised pole, tree branch or other object higher than the door entrance. This keeps the doors from sagging and makes it easier to get in and out of the tent and gives the tent greater stability.

TEARING DOWN

Use the following steps to tear down an Arctic tent:

1. Have the pole person enter the tent and hold the pole.
2. Pull out the pegs one at a time and roll up the guy wires and tie them off.
3. Have the pole person lower and remove the pole.

PACKING

Use the following steps to pack an Arctic tent:

1. Lay out the tent with the tent door up and in the centre with zippers closed and remove any debris.
2. Ensure there are no double folds on the underside.
3. Hold the apex securely. The first long fold is made by folding the wings to the centre, with the pegs straight up and down.
4. Straighten and flatten out the Arctic tent.
5. Fold in snow flaps across the base.
6. Make the second long fold, repeating the action for the first long fold.
7. Straighten and flatten out the Arctic tent.
8. Make the third long fold, repeating the action for the first long fold.
9. Straighten and flatten out the Arctic tent.
10. Make the forth long fold by flipping the folds one on top of the other.
11. Make the first cross-fold; fold in the base to the top of the wall.
12. Make the second cross-fold by folding the apex into the base of the inserted pole section, allowing approximately 10 cm of loose fold at the base of the pole section to avoid wear and tear. The top of the pole should be offset.
13. Make the third cross-fold by placing the previous two folds one on top of the other.
14. Insert the tent, base plate and pegs into the bag.
15. Place the remaining two pole sections in the bag beside the tent.
16. Tie up the top of the tent bag.

CONFIRMATION OF TEACHING POINT 2

The cadets' observation of the demonstrations will serve as the confirmation of this TP.

Teaching Point 3	**Explain and demonstrate erecting, tearing down and packing a civilian-pattern tent.**
Time: 20 min	Method: Demonstration

These descriptions and instructions will be given as the tent is being erected, torn down and packed.

If the civilian-pattern tent is going to remain erected for the duration of the exercise instruct tearing down and packing at the end of the exercise.

SELECTING A CIVILIAN-PATTERN TENT

To select a suitable civilian-pattern tent, consider the number of people it needs to accommodate, seasons during which it is being used, weather conditions that may be encountered, the weight of the tent and required features.

Seasons and Conditions

Three-season tents. Designed to offer good ventilation in the spring, summer, and fall, and provide sturdy weather protection in everything but heavy snowfalls and very high winds. Many three-season tents have mesh inner bodies, which reduce condensation, and can often be used without the fly for a cool, bug-proof shelter on hot nights. Three-season tents are airier, less expensive, lighter, more compact and roomier than four-season tents. Their versatility makes them popular with backpackers, paddlers, and cyclists.

Note. From MEC Funhouse 4 Tent, by MEC.ca, 2007, Copyright 2007 by MEC.ca. Retrieved December 2, 2007, from http://www.mec.ca/Products/product_listing.jsp?FOLDER%3C%3Efolder_id=2534374302702837&bmUID=1196614958520

Figure 18 Three-Season Tent

Four-season tents. Built to protect in extreme weather. They usually come with many poles and have low, curved shapes to shield high winds and reduce snow build-up. Extra guy wires provide more staking options. Fabrics tend to be heavier, with thicker waterproof coatings that make them more weatherproof, but less ventilated, and more susceptible to interior condensation. This additional protection means greater weight and packed size, and may be inappropriate for anything other than ski touring, winter camping, or mountaineering.

Note. From MEC Mondarack Tent, by MEC.ca, 2007, Copyright 2007 by MEC.ca. Retrieved December 2, 2007, from http://www.mec.ca/Products/product_listing.jsp?FOLDER%3C%3Efolder_id=2534374302702837&bmUID=1196614958520

Figure 19 Four-Season Tent

WEIGHT

Tent weights are described as "minimum weight" and "packaged weight". The minimum weight includes the tent and frame, and the fewest pegs and guy wires necessary to properly set up the tent. Packaged weight includes the full tent, instructions, stuff sacks, repair swatches, all guy wires and pegs. Conditions permitting, weight can be saved by leaving some pegs and components at home, and improvising with materials available at the site.

FEATURES

Tent footprints. These are groundsheets that are custom-fit to the tent. Groundsheets protect tent floors from abrasions, increase waterproofness, and help insulate from the cool ground. Most tents have pre-made footprints, which are sold separately.

Vestibules. This is an excellent way to increase the liveability of a tent. They are useful for storing gear, to peel off wet clothing or put on boots. A pole-supported vestibule will be heavier, but generally larger and more storm-proof.

Explain and demonstrate the following. Use cadets to assist as necessary.

ERECTING

Setting up the Main Body

Use the following steps to set up the main body of a civilian-pattern dome tent:

1. Remove sharp objects that might puncture the tent floor. A footprint beneath the structure is not necessary for a waterproof tent, but it reduces long-term wear on the tent floor.
2. Assemble all poles carefully.

Shock-corded poles, (bungee cord) are meant to keep pole sections in the proper order, not as an automatic assembly mechanism for poles. Do not hold one section while whipping the rest of the pole back and forth, or toss the poles into the air; either procedure excessively stresses the pole joints and shock cord. Instead, fit poles together section by section, making sure that each piece slides completely into the next. Forcing an improperly assembled pole can damage the pole and / or the tent body and fly.

3. Lay the tent body flat. In windy conditions, peg all the floor corners before proceeding.
4. Lay the poles on top of the tent body so that each one crosses diagonally from one corner to the opposite corner; the two poles should cross in the centre to form an X.
5. Attach the pole clips to the canopy.
6. Fit the pole ends into the grommet tabs at the four corners of the tent.

Have one person lift the top of the tent to loft it up as the tension can cause the other poles to pop out. This is the stage when the greatest stress can be placed on the poles. There is often more than one grommet on each webbing tab to increase or decrease the tautness of the tent to compensate for fabric slackening or tightening caused by changes in humidity. When first erecting the tent, it is best to use the outermost (loosest) grommet on each tab.

7. Starting at a point over one of the doors, attach the clips on the tent to the poles.
8. Peg out the corners of the tent.

Most tents are colour-coded to help users erect them.

Attaching the Fly

1. Drape the fly over the tent so that the doors in the fly line up with the doors in the canopy.
2. Attach the Velcro wrap-ties to secure the fly onto the poles. They are usually on the underside of the fly on most tents. Attaching these wrap-ties is very important for strengthening the tent. The wrap-ties allow the poles to reinforce one another in a series of trusses; they also connect the corner guy wire attachment points directly to the poles for maximum stiffness when these guy wires are rigged.
3. Fit all of the grommet tabs on the fly over the appropriate pole ends.

Staking and Guying Out the Tent

Attach, peg out, and tension the four corner guy wires. Rather than thick, heavy poles for strength, most tents employ light, sturdy guy wires as part of their structure. This keeps the tents weight low. The design also makes it very important to securely rig the guy wires in any amount of wind. Not doing so could cause the tent to move in the wind (as with any tent, shelter from trees, rock, or snow walls will make for a quieter night under stormy conditions).

The pegs included with a tent are suitable for general use on relatively soft ground. On very hard-packed ground, use stakes that can withstand the force needed to secure them. On snow, sand, or other loose-packed surfaces, wider T-stakes or aluminum snow stakes will hold better; these stakes hold best buried horizontally. Improvise with other stakes (hiking staffs, ice axes, branches, rocks, trees), using the tents stake loops or cord as required.

Ventilating the Tent

Proper ventilation is the key to minimizing condensation in any tent. Some points to consider are:

- Keep fabric doors open as widely as the prevailing weather permits.
- If bugs are not a problem, leave mesh doors open.
- Open each door from the top down; warm, moist air rises and escapes through high openings.
- If the design of the tent allows, open it at either end or both sides to allow air to flow through.
- On very hot nights, when there will be no rain or dewfall, leave the flysheet off and use the inner tent to keep out bugs.

TEARING DOWN AND PACKING

The most important consideration in taking down a tent is not to stress the poles and fabrics, by following these steps:

1. Disconnect guy wires and release the tension from the tent.
2. Release all the poles. If the tent has pole sleeves, push the poles out of the sleeves instead of pulling them out.
3. Fold each pole in half first, and then fold down towards the outsides, two sections at a time. To minimize the stress on the bungee cord in the poles and to speed disassembly,
4. Remove all of the components from one another prior to storing. A wet tent should be dried prior to packing as the moisture damages the tent over time.
5. Fold and roll the tent rather than stuffing it into its sack. Rolling makes a smaller package, and causes fewer creases in the polyurethane coating. The tent and poles may be carried separately for easier packing or load sharing.

CARE AND MAINTENANCE

Protecting the Tent

Ultraviolet (UV) damage is the largest hazard for tents. Fabrics should not be exposed to sunlight for extended periods of time; this eventually results in colour fading and fabric failure. The uncoated fabrics of the tent canopy are most susceptible to damage from UV and should be covered by the more durable fly. If extended exposure is unavoidable, cover the tent with a tarp or a sheet of nylon.

Lighting the Tent

Using a candle lantern in a tent carries definite risks. Never leave a candle lantern burning unattended; always watch for fire hazards from overheating fabrics or spilling wax. Spilling wax can be dangerous, particularly to eyes and other sensitive areas. Use candle lanterns wisely and with extreme caution. Cooking in a tent is strongly discouraged because of fire hazards and carbon monoxide inhalation risks. Unlike campfire smoke and other fumes, carbon monoxide can render someone unconscious without warning.

Eating in the Tent

Mop up spills promptly with water. Many foods, particularly acidic ones like fruit or juices, can weaken synthetic fabrics over time. It is best to eat and store food away from a tent to avoid attracting animals.

Cleaning the Tent

Clean the tent by hand while it is set up, using a sponge, a mild non-detergent soap, and warm water. Rinse thoroughly. Do not dry clean, machine wash, or machine dry. Stubborn stains like tar can be left in place and dusted with talcum powder to prevent transfer to other areas of the tent in storage. After cleaning, a spray-on water repellent designed for synthetic fabrics may be applied to the flysheet if surface water repellent is weakened. This is apparent when water droplets no longer bead on the fabric. If the poles are exposed to salt or salt water, rinse them in fresh water and allow them to dry before storing (while aluminum does not rust, it can become brittle through unseen corrosion over time).

CONFIRMATION OF TEACHING POINT 3

The cadets' observation of this activity will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in erecting, tearing down and packing a modular tent will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

It is important for the cadets to be able to erect a modular tent because they are often used during survival exercises. A cadets' understanding of the erecting, tearing down and packing of tents allows them to better assist in the set-up of the camp during an aircrew survival exercise.

INSTRUCTOR NOTES / REMARKS

Every cadet, as a member of a group, should be given the opportunity to erect, tear down and pack a modular tent during the exercise.

The directives outlined in CATO 11-08 *Environmental Protection and Stewardship* are to be adhered to during this training.

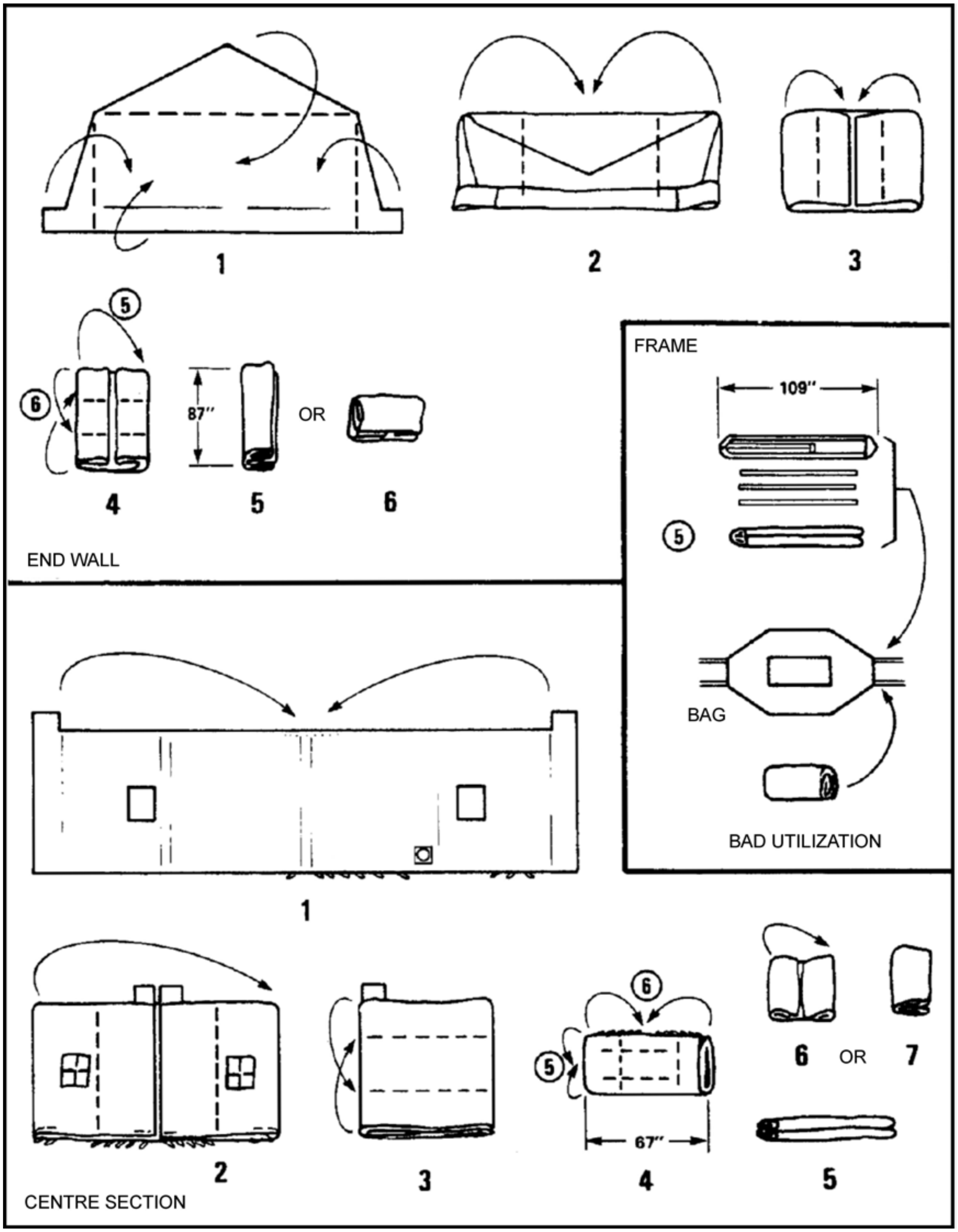
REFERENCES

A3-012 B-GG-302-002/FP-001 DAD (1982). *Basic Cold Weather training*. Ottawa, ON: Department of National Defence.

A3-059 C-87-110-000/MS-000 Canadian Forces. (1983). *Operational support and maintenance manual: Tent, main*. Ottawa, ON: Department of National Defence.

C3-003 ISBN 1-896713-00-9 Tawrell, P. (1996). *Camping and wilderness survival: The ultimate outdoors book*. Green Valley, ON: Author.

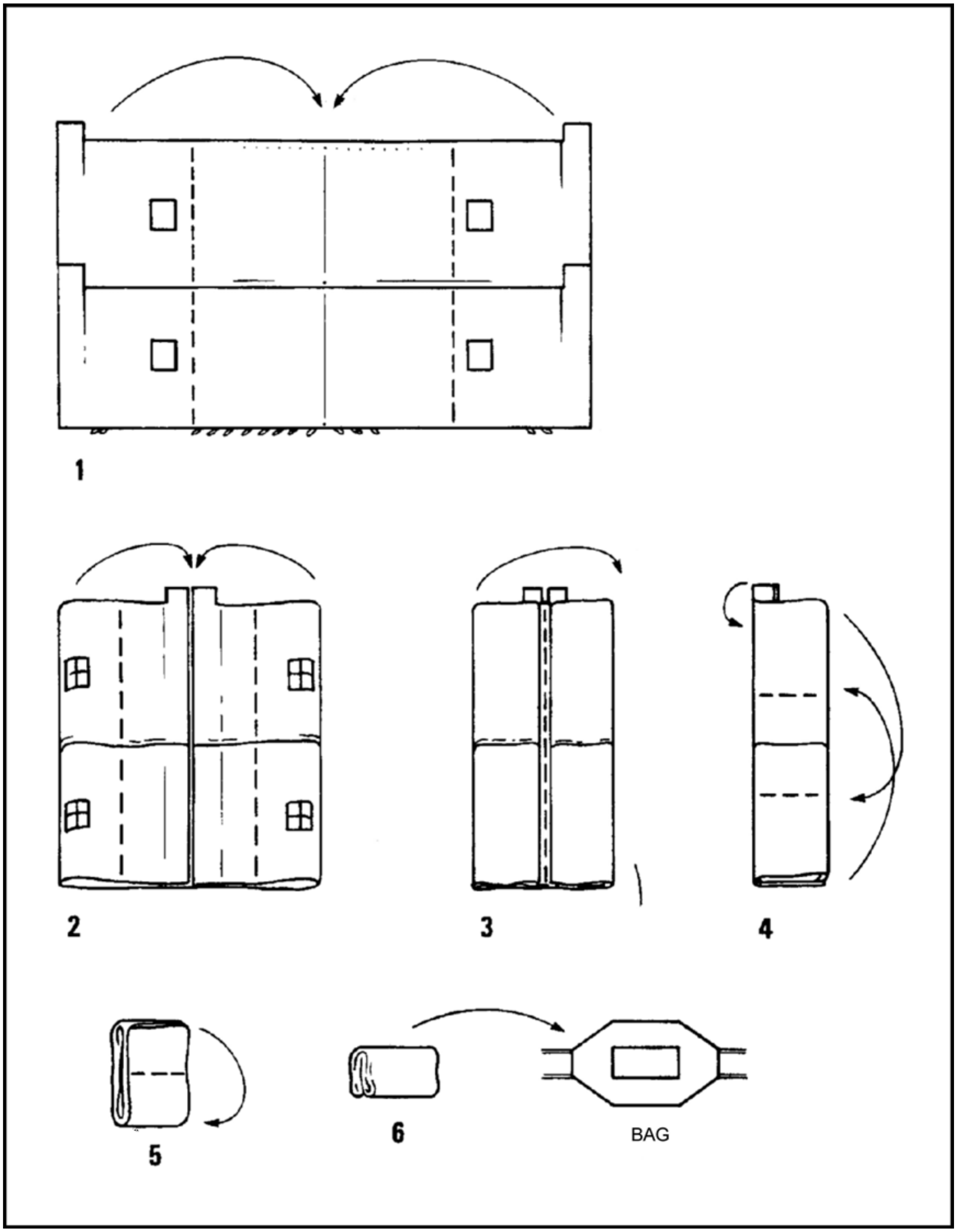
FOLDING A SINGLE TENT SECTION



Note. From Operational Support and Maintenance Manual for Tent, Main (p. 2-17), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.

Figure A-1 Folding a Single Tent Section

FOLDING LACED TENT SECTIONS



Note. From Operational Support and Maintenance Manual for Tent, Main (p. 2-18), by DND Canada, 1983, Ottawa ON: Department of National Defence. Copyright 1983 by DND Canada.

Figure A-2 Folding Laced Tent Sections

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 8

EO C190.01 – PARTICIPATE IN A PRESENTATION GIVEN BY A MEMBER OF A SURVIVAL ORGANIZATION / SEARCH AND RESCUE (SAR) COMMUNITY

Total Time: 60 min

THERE IS NO INSTRUCTIONAL GUIDE PROVIDED FOR THIS EO

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 9

EO C190.02 – TIE KNOTS AND LASHINGS

Total Time:	60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Photocopy the Knot-Tying and Lashing Instructions, located at Attachments A and B, for each cadet.

Cut lengths of braided rope for the cadets to tie the knots. The rope should be 10 mm in diameter and 3 m in length. Each cadet will require two lengths of rope.

Cut lengths of cord for the cadets to tie lashings. The cord should be 4-mm in diameter and 3 m in length. Each group of six cadets require eight pieces of cord.

Collect poles from natural resources. Poles should be approximately 6 cm in diameter and 2 m in length. Each cadet will require one pole.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for TP 1 to present background material on rope terminology.

A demonstration and performance was chosen for TPs 2 and 3 as it allows the instructor to explain and demonstrate tying knots and lashings while providing an opportunity for the cadets to practice and develop these skills under supervision.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

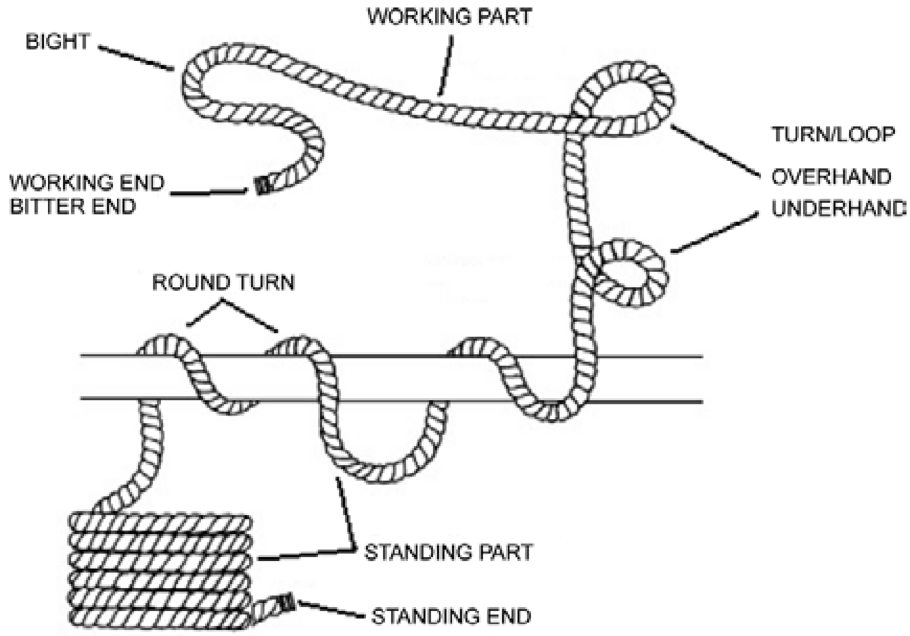
By the end of this lesson the cadet shall have tied knots and lashings.

IMPORTANCE

It is important for the cadets to know how to tie different knots and lashings in order to construct sturdy shelters, tents, snares and camp crafts.

Teaching Point 1 **Describe the parts of a rope.**

Time: 5 min Method: Interactive Lecture



Note. From Lost Knowledge Site, 2006, by Bryan Green. Retrieved March 6, 2009, from http://lostknowledgesite.com/BackToBasics/Knots/Knots.html

Figure 1 Parts of a Rope

PARTS OF A ROPE

The following definitions will assist cadets when tying each knot or lashing:

- The working end (bitter end) is the very end of the rope that is used for tying a knot.
- The working part (running part) is the short length of rope that is manipulated to make the knot.
- The standing part is the section of rope that usually "stands still" during the knot-tying process. Often it is the longer end that leads away from the loop, bight or knot.
- The standing end is the end of the rope opposite the end being used for tying a knot.
- The crossing turn or loop is a part of rope that crosses over itself. The working part can be over or under the standing part in a crossing turn.
- A bight is a loop in the rope that does not cross over itself.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS:

Q1. What part of the rope is called the working part?

Q2. What is a bight?

Q3. What is the standing end?

ANTICIPATED ANSWERS:

A1. The working part (running part) is the short length of rope that is manipulated to make the knot.

A2. A bight is a loop in the rope that does not cross over itself.

A3. The standing end is the end of the rope opposite the end being used for tying a knot.

Teaching Point 2	**Explain, demonstrate and have the cadets tie knots.**
Time: 25 min	Method: Demonstration and Performance

For this skill lesson, it is recommended that the instruction take the following format:

1. Explain and demonstrate the complete knot while cadets observe.
2. Explain and demonstrate each step required to complete the knot. Monitor cadets as they imitate each step.
3. Monitor the cadets' performance as they practice the complete knot.

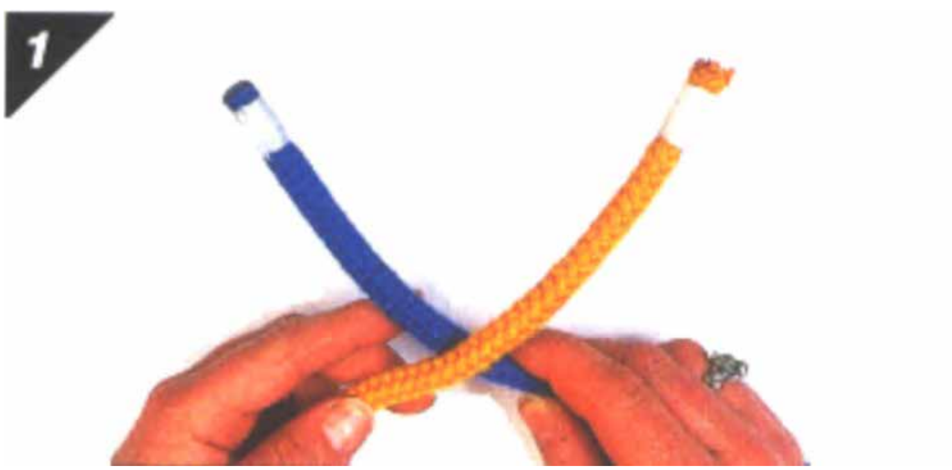
Note: Assistant instructors may be used to monitor the cadets performance.

KNOTS

Reef Knot. The reef knot is used for joining two ropes of equal diameter together. This knot can hold a moderate amount of weight and is ideal for first aid. It may be used when tying slings because the knot lies flat against the body.

Steps for Tying a Reef Knot

1. Place the left-hand working end on the top of the right-hand working end.



Note. From Pocket Guide to Knots and Splices (p. 98), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

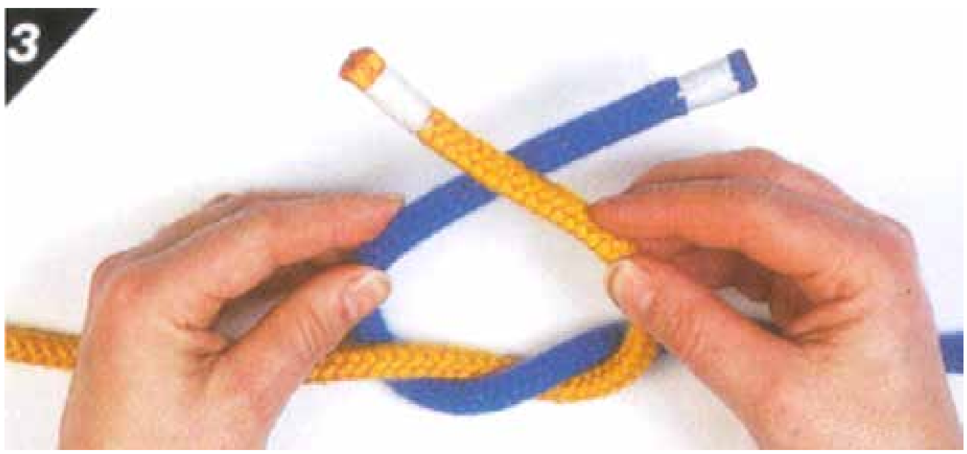
Figure 2 Step 1

2. Bring the left-hand working end under the right-hand working end.

Note. *From Pocket Guide to Knots and Splices (p. 98), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.*

Figure 3 Step 2

3. Place the working end that is now on the right, on top of the working end that is now on the left.



Note. *From Pocket Guide to Knots and Splices (p. 98), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.*

Figure 4 Step 3

4. Bring the working end that is on top under the other working end so it comes out at the same place it entered the knot.

Note. From Pocket Guide to Knots and Splices (p. 98), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 5 Step 4

5. Pull tight to complete the reef knot.

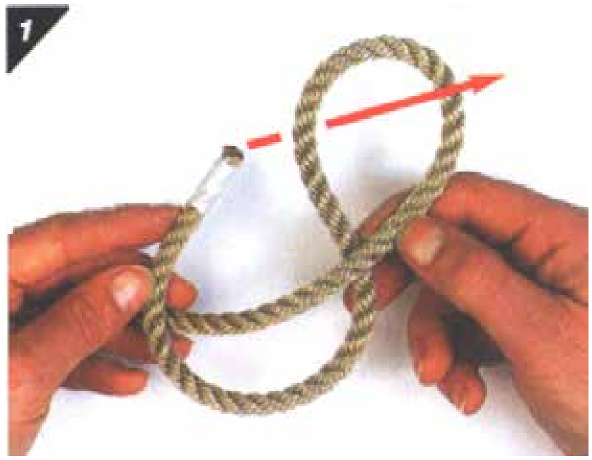
Note. From Pocket Guide to Knots and Splices (p. 98), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 6 Step 5

Figure-of-Eight Knot. The figure-of-eight knot is very simple and quick to tie. It makes an ideal stopper knot and is very easy to untie.

Steps for Tying a Figure-of-Eight Knot

1. Make a crossing turn with the working end passing under the standing part of the rope and then bring the working end over the standing part.



Note. From Pocket Guide to Knots and Splices (p. 44), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 7 Step 1

2. Tuck the working end up through the loop from behind, forming a figure-of-eight.

Note. From Pocket Guide to Knots and Splices (p. 44), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 8 Step 2

3. Pull tight to complete the figure-of-eight knot.

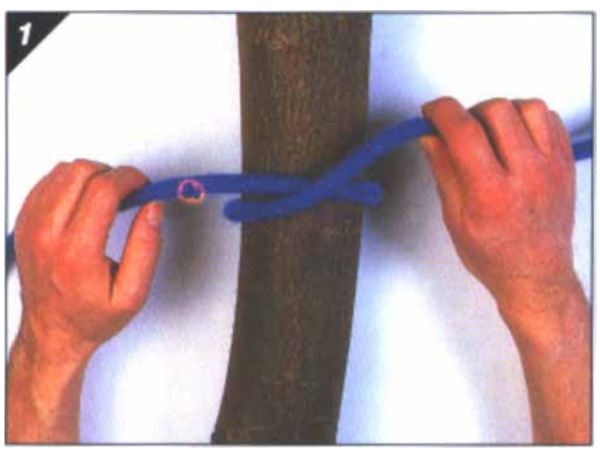
Note. *From Pocket Guide to Knots and Splices (p. 44), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.*

Figure 9 Step 3

Clove Hitch. The clove hitch consists of two half hitches or crossing turns each made in the same direction. It is used to finish and start lashings and should not be used in a situation where the hitch has variable tension as it can work loose.

Steps for Tying a Clove Hitch

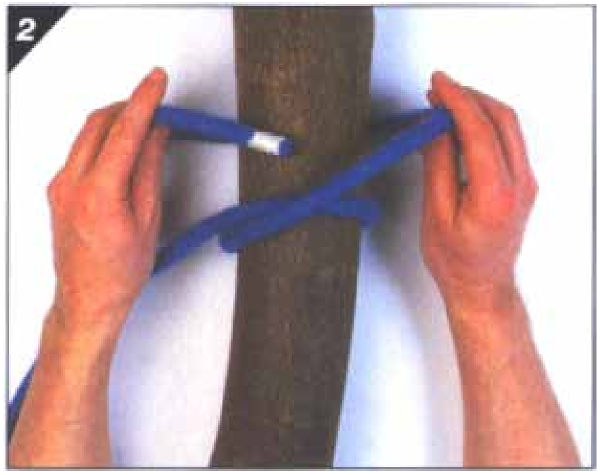
1. Make a turn around a pole / tree bringing the working end of the rope over and trapping the standing part of the rope. This makes the first half hitch.



Note. *From Pocket Guide to Knots and Splices (p. 106), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.*

Figure 10 Step 1

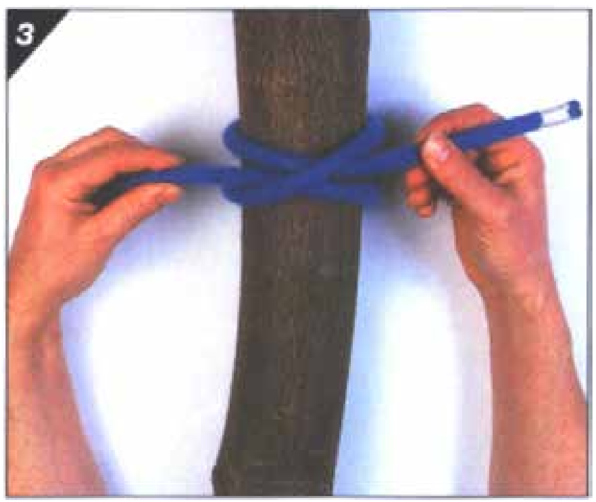
2. Bring the working end behind the pole / tree, above the first half hitch.



Note. From Pocket Guide to Knots and Splices (p. 106), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 11 Step 2

3. Put the working end under the turn just made. This gives the second half hitch and forms the clove hitch.



Note. From Pocket Guide to Knots and Splices (p. 106), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 12 Step 3

4. Pull tight to complete the clove hitch.

Note. From Pocket Guide to Knots and Splices (p. 106), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 13 Step 4

Bowline. The bowline is a very secure knot that will not slip, regardless of the load applied. Use this knot whenever a non-slip loop is required at the end of a line.

Steps to Tying a Bowline

1. A short distance back from the working end, make a crossing turn with the working part on top. Go on to form the size of the loop required.

Note. From Pocket Guide to Knots and Splices (p. 163), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 14 Step 1

2. Bring the working end up through the crossing turn. It goes under first, and then lies on top of the other part of the turn.

Note. From Pocket Guide to Knots and Splices (p. 163), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 15 Step 2

3. Bring the working end around behind the standing part and down through the crossing turn. A good way to remember this is: “the rabbit comes out of the hole, around the tree and back down the hole again”.

Note. From Pocket Guide to Knots and Splices (p. 163), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 16 Step 3

4. Pull tight by holding the working end and pulling on the standing part to complete the bowline.

Note. From Pocket Guide to Knots and Splices (p. 163), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 17 Step 4

Distribute Knot-Tying Instructions located at Attachment A to the cadets so they may practice the knots after the lesson.

CONFIRMATION OF TEACHING POINT 2

The cadets' participation in tying knots will serve as the confirmation of this TP.

Teaching Point 3	**Explain, demonstrate and have the cadets tie lashings.**
Time: 25 min	Method: Demonstration and Performance

For this skill lesson, it is recommended that the instruction take the following format:

1. Explain and demonstrate the complete lashing while cadets observe.
2. Explain and demonstrate each step required to complete the lashing. Monitor cadets as they imitate each step.
3. Monitor the cadets' performance as they practice the complete lashing.

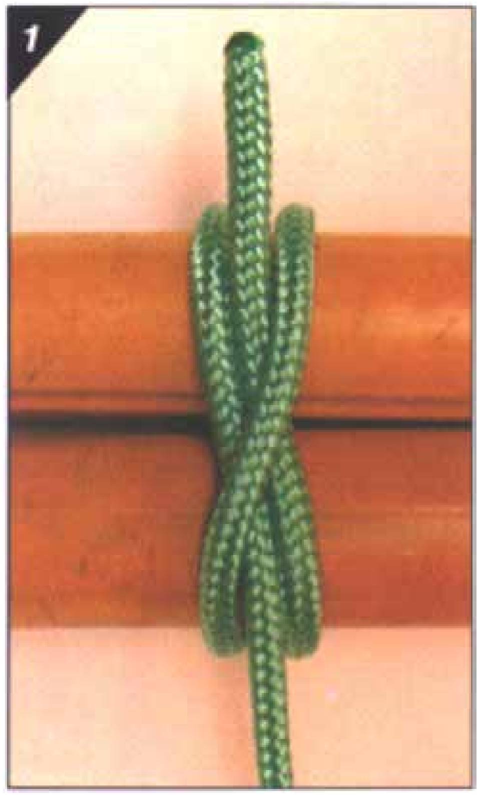
Note: Assistant instructors may be used to monitor the cadets performance.

LASHINGS

Round Lashing. Sometimes called a sheer lashing, the round lashing has two distinct uses. First, it creates an "A" frame or set of using a single lashing. Second, two or three round lashings can be used to bind together a couple of poles to make a longer spar. To make an "A" frame, two poles are put side by side; the lashing is made at one end. A slightly different approach is used to join two poles together to make a longer pole. The procedure is exactly the same, except the initial and final clove hitches are tied around both poles and there is no space left between the poles and no frapping is used. For extra strength to the spar, add extra lashings at the opposite end and middle of the adjoining poles.

Steps to Tying a Round Lashing

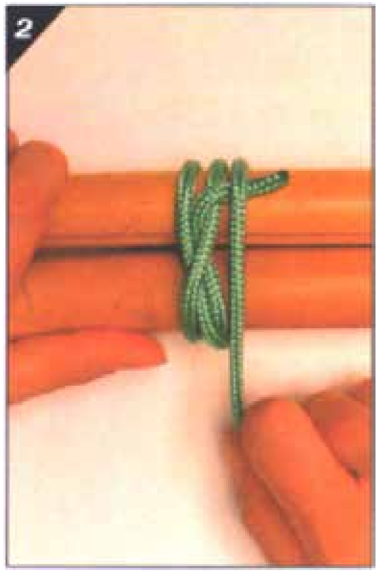
1. Start by making a clove hitch around both poles.



Note. From Pocket Guide to Knots and Splices (p. 184), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 18 Step 1

2. Wrap around both poles, trapping the end of the clove hitch.



Note. From *Pocket Guide to Knots and Splices* (p. 184), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

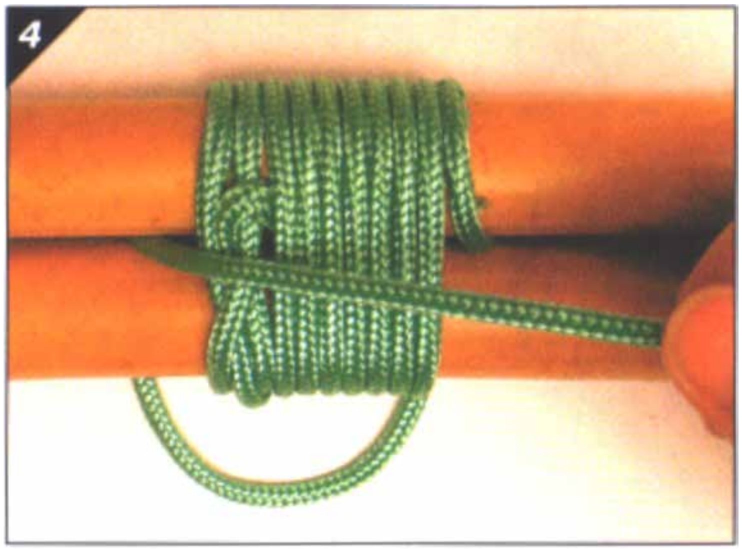
Figure 19 Step 2

3. Make eight to ten more turns round the pair of poles.

Note. From *Pocket Guide to Knots and Splices* (p. 184), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 20 Step 3

4. The lashing is finished with a clove hitch around both poles or a couple of frapping turns by bringing the end of the rope between the two poles.



Note. From Pocket Guide to Knots and Splices (p. 185), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

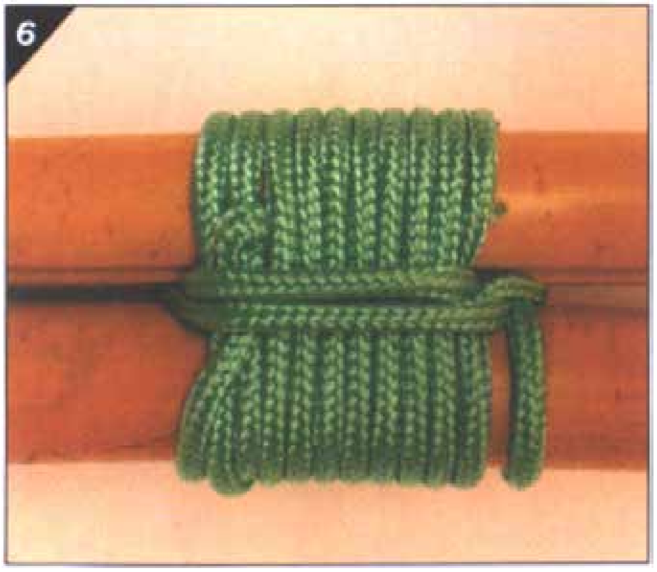
Figure 21 Step 4

5. Finish off with a clove hitch around one of the poles.

Note. From Pocket Guide to Knots and Splices (p. 185), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 22 Step 5

6. Pull tight to finish the round lashing with the poles parallel.



Note. From *Pocket Guide to Knots and Splices* (p. 185), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 23 Step 6

7. If being used for an "A" frame then open the poles.

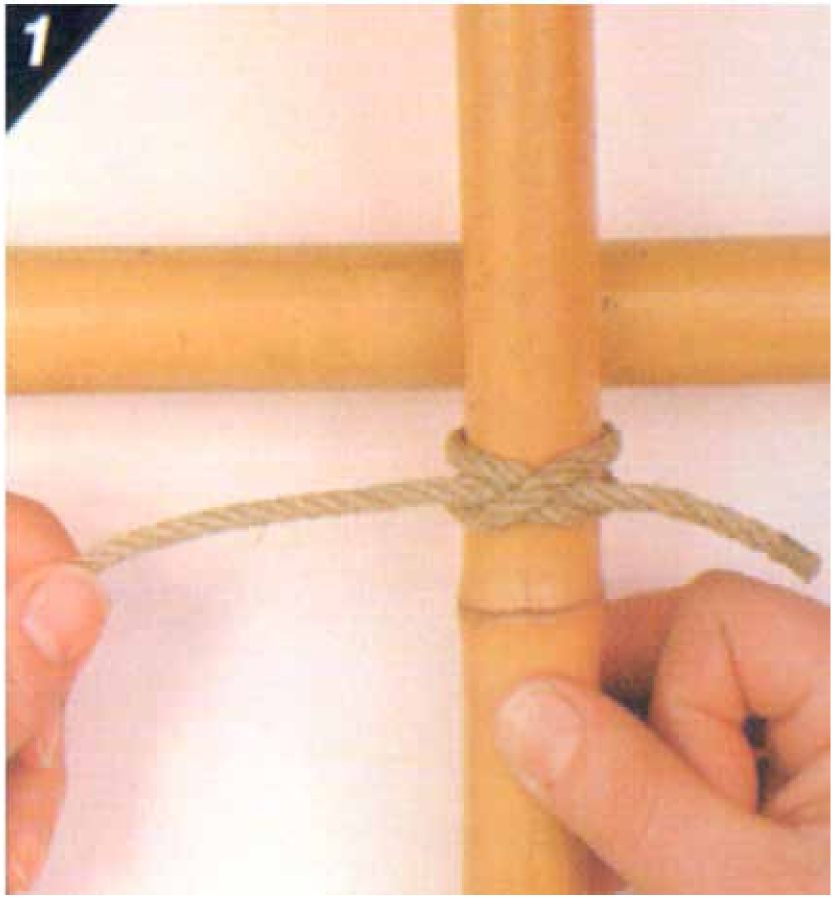
Note. From *Pocket Guide to Knots and Splices* (p. 185), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 24 Step 7

Square Lashing. A square lashing secures two poles together at 90 degrees and can be used in the construction of shelters and camp crafts. The cord used to make the lashing should be considerably smaller than the size of the poles. For the lashing to be effective, each turn must be pulled as tight as possible as it is made.

Steps to Tying a Square Lashing

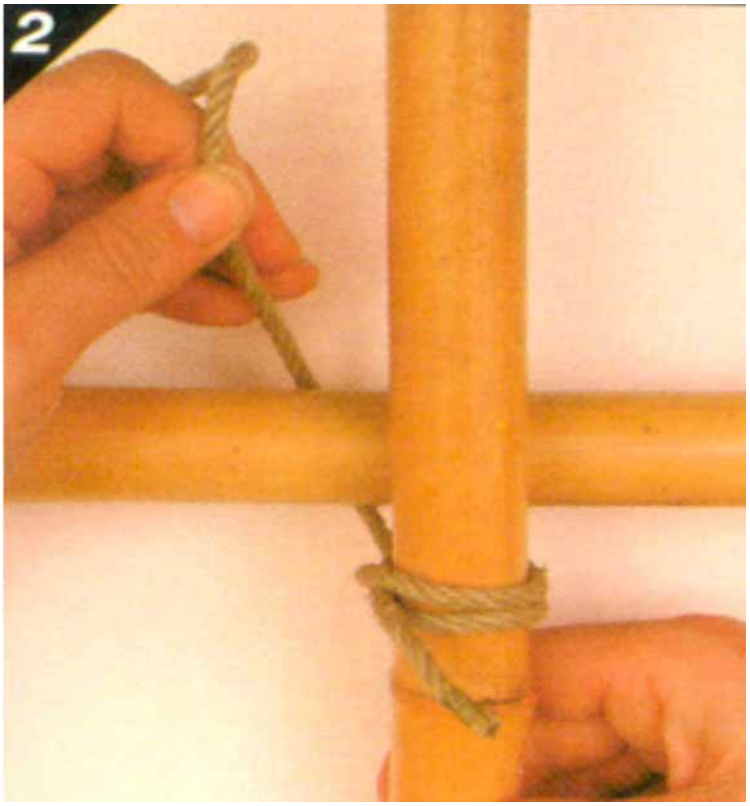
1. With the vertical pole on top of the horizontal pole, make a clove hitch on the vertical pole just below the horizontal pole.



Note. From Pocket Guide to Knots and Splices (p. 181), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 25 Step 1

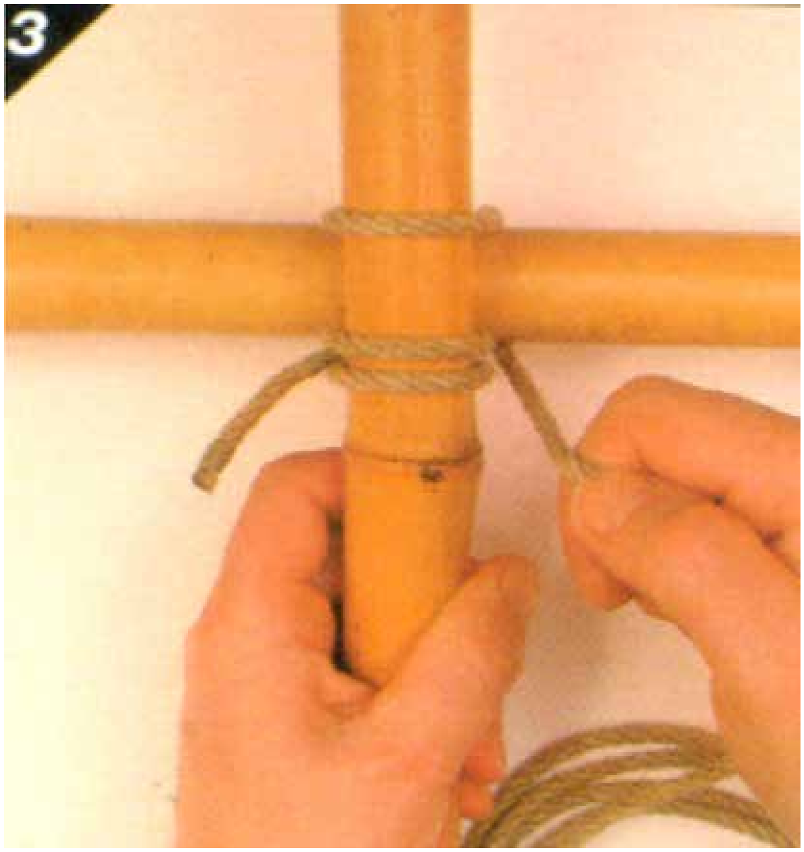
2. Bring all the cord around behind the horizontal pole.



Note. From Pocket Guide to Knots and Splices (p. 181), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 26 Step 2

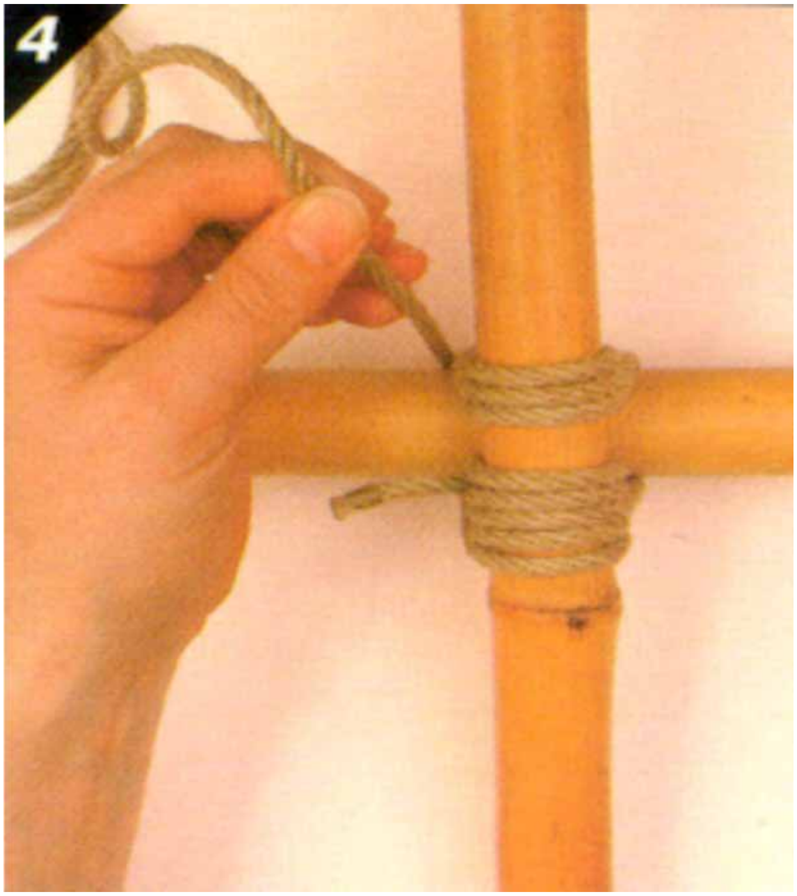
3. Bring the cord over the vertical pole and back behind the horizontal pole to the clove hitch. Pull tight.



Note. From Pocket Guide to Knots and Splices (p. 181), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 27 Step 3

4. Carry on making two or three more complete turns around the two poles, pulling tight after each turn.



Note. From Pocket Guide to Knots and Splices (p. 181), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 28 Step 4

5. After passing the clove hitch, bring the cord around the horizontal pole from behind and start to wrap around the junction between the two poles. These are frapping turns—pull them as tight as possible.

Note. From Pocket Guide to Knots and Splices (p. 181), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 29 Step 5

6. Make two frapping turns.

Note. From Pocket Guide to Knots and Splices (p. 181), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 30 Step 6

7. Finish off with a clove hitch around the horizontal pole.

Note. From Pocket Guide to Knots and Splices (p. 181), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 31 Step 7

8. Pull tight to complete the square lashing.

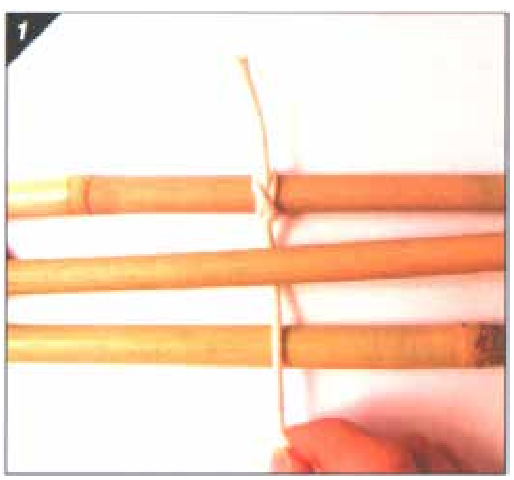
Note. From Pocket Guide to Knots and Splices (p. 181), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 32 Step 8

Figure-of-Eight Lashing. The figure-of-eight lashing is used to join three poles together to create a tripod. The tripod can be used for creating signal fires, shelters and camp crafts in a survival situation.

Steps to Lashing a Figure-of-Eight Lashing

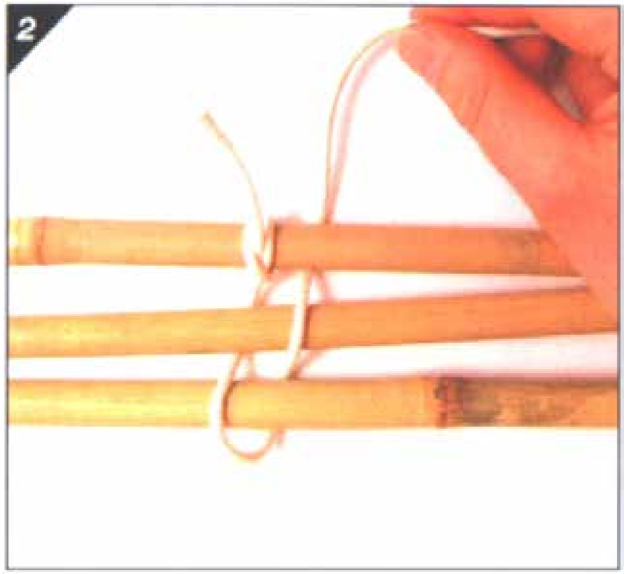
1. Start with a clove hitch around one of the poles, and lead the rope under and over the other two poles.



Note. From Pocket Guide to Knots and Splices (p. 187), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 33 Step 1

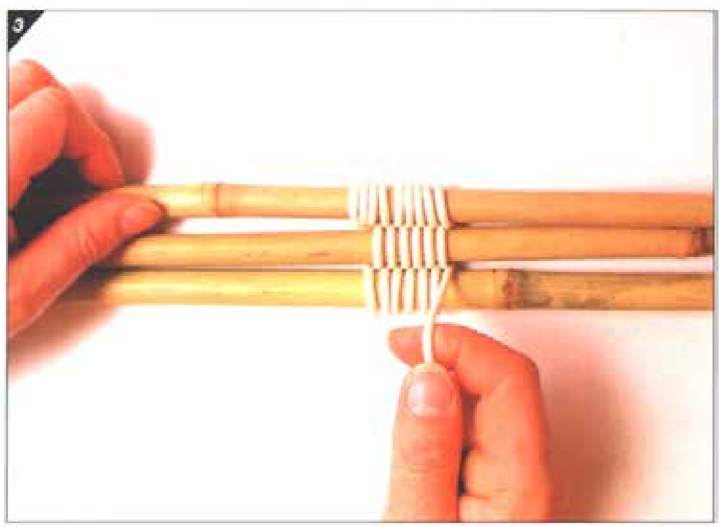
2. Go around the pole furthest away from the start and weave the rope back over and under.



Note. From Pocket Guide to Knots and Splices (p. 187), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 34 Step 2

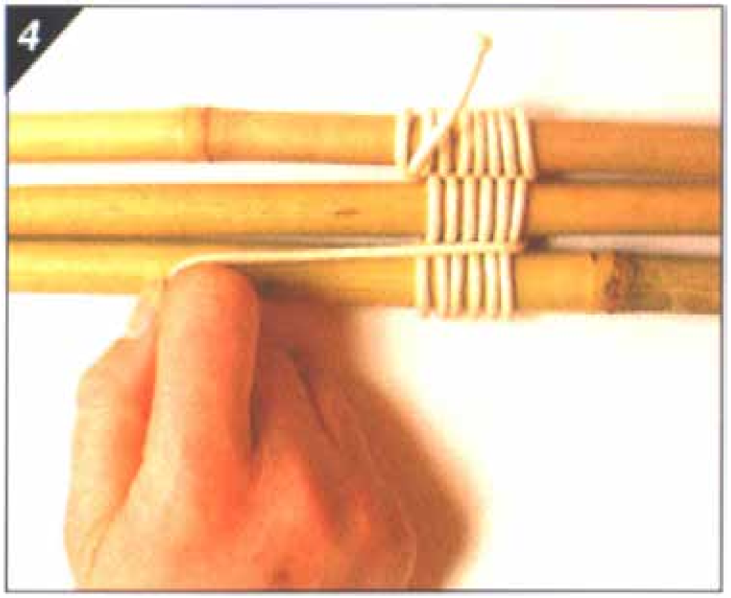
3. Continue to weave the rope in the figure-of-eight manner for seven or eight full passes before bringing the rope up between two of the poles.



Note. From Pocket Guide to Knots and Splices (p. 187), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 35 Step 3

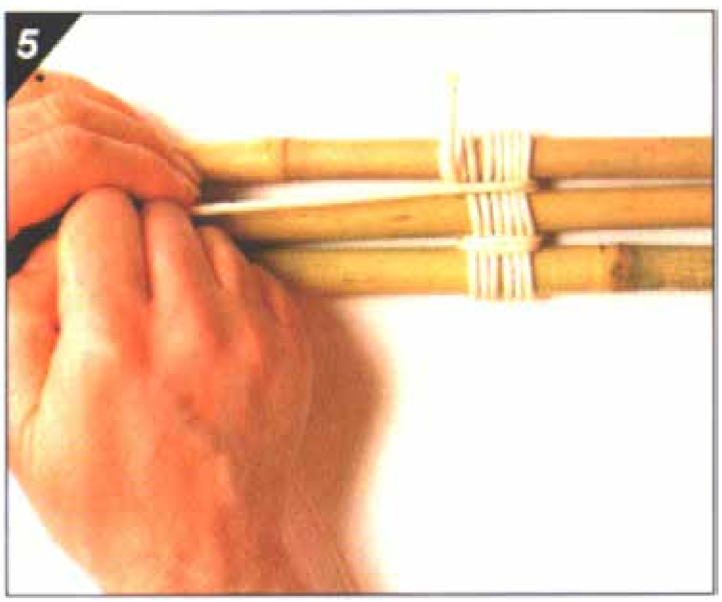
4. Pull the rope parallel to the poles and start to put in some frapping turns.



Note. From *Pocket Guide to Knots and Splices* (p. 188), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 36 Step 4

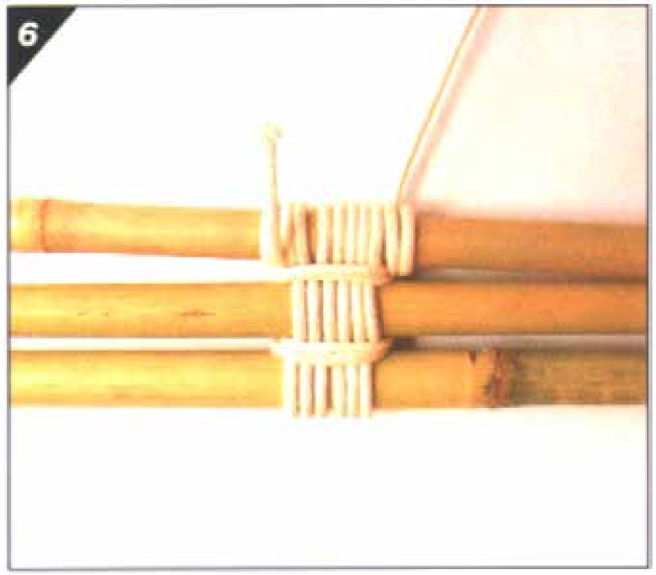
5. After making frapping turns between the first two poles move on to make frapping turns around the other pair of poles.



Note. From *Pocket Guide to Knots and Splices* (p. 188), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 37 Step 5

6. Finish off with a clove hitch around the pole from which you first started.



Note. From Pocket Guide to Knots and Splices (p. 188), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 38 Step 6

7. Open to create tripod.

Note. From Pocket Guide to Knots and Splices (p. 188), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure 39 Step 7

Distribute Lashing Instructions located at Attachment B to the cadets, so they may practice the knots after the lesson.

CONFIRMATION OF TEACHING POINT 3

The cadets' participation in tying lashings will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in the knot-tying activities will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

It is important for the cadets to select the appropriate knot and lashing when constructing shelters, signal fires or camp crafts for safety and quality.

INSTRUCTOR NOTES / REMARKS

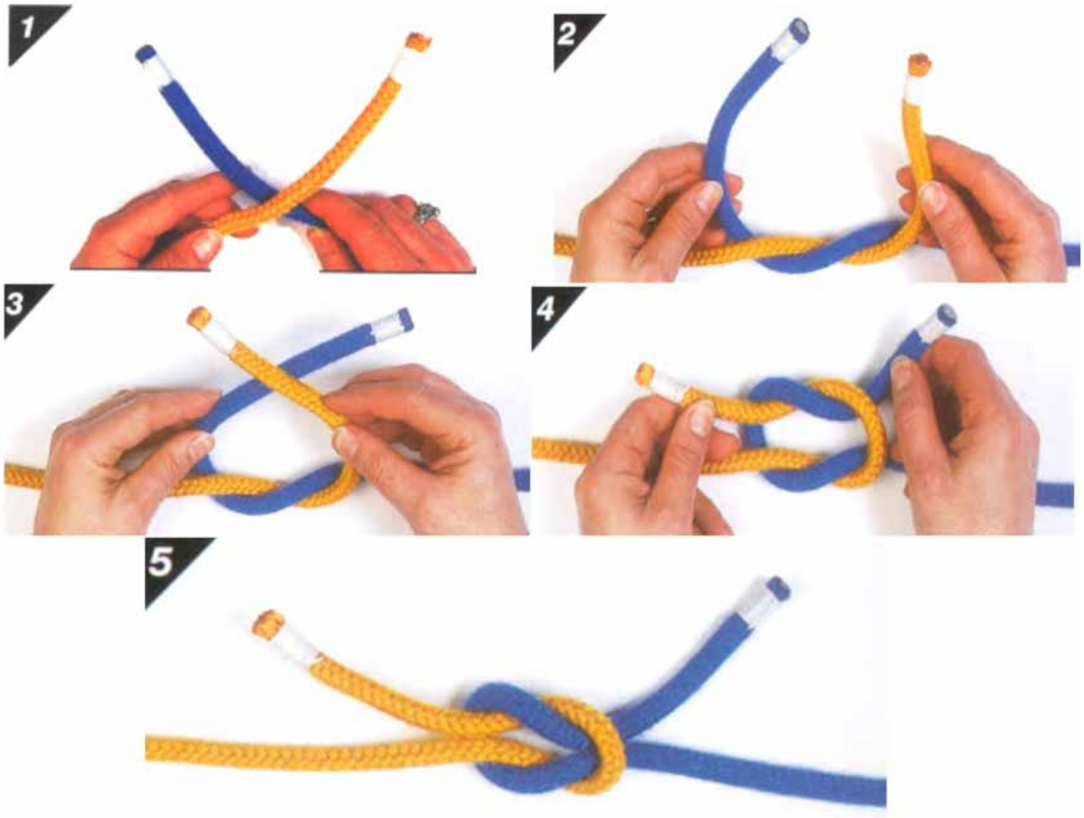
The cadet will require two 3 m lengths of 10 mm diameter braided rope to perform the required knots and lashings.

REFERENCES

C3-026 ISBN 1-55267-218-2 Pawson, D. (2001). *Pocket guide to knots and splices*. London, England: PRC Publishing.

KNOT-TYING INSTRUCTIONS

REEF KNOT



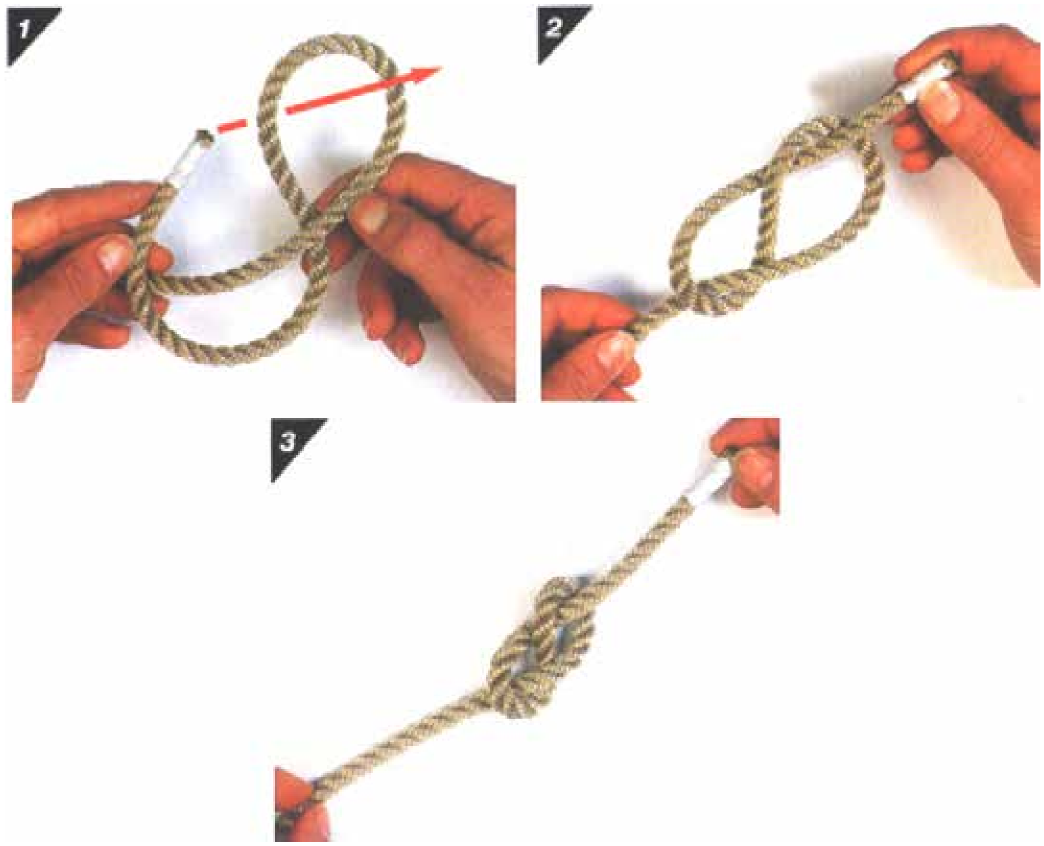
Note. From Pocket Guide to Knots and Splices (p. 98), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure A-1 Steps 1–5

1. Place the left-hand working end on the top of the right-hand working end.
2. Bring the left-hand working end under the right-hand working end.
3. Place the working end that is now on the right on top of the working end that is now on the left.
4. Bring the working end that is on top under the other working end so that working end that is moving comes out at the same place it entered the knot.
5. Pull tight to complete the reef knot

KNOT-TYING INSTRUCTIONS

FIGURE-OF-EIGHT KNOT



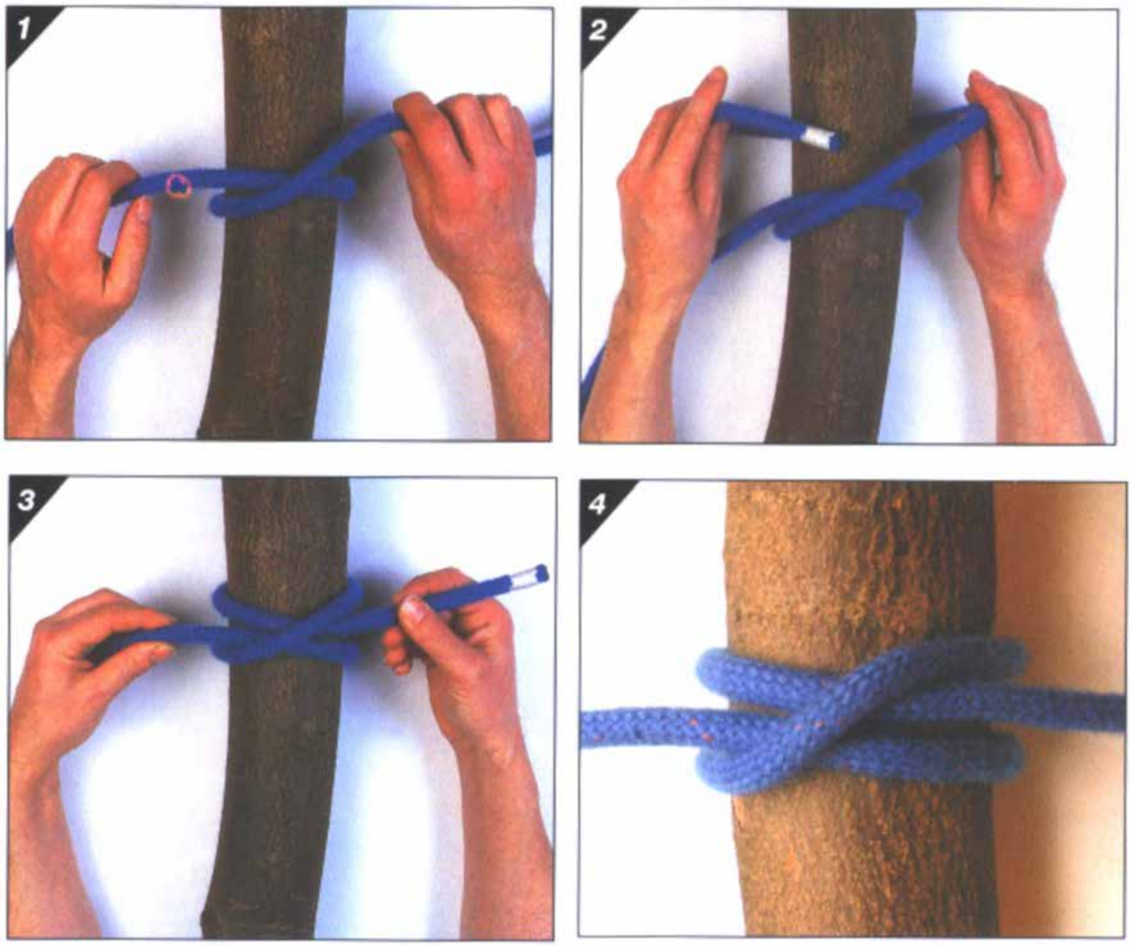
Note. From Pocket Guide to Knots and Splices (p. 44), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure A-2 Steps 1–3

1. Make a crossing turn with the working end passing under the standing part of the rope and then bring the working end over the standing part.
2. Now tuck the working end up through the loop from behind, forming a figure-of-eight.
3. Pull tight to complete the figure-of-eight knot.

KNOT-TYING INSTRUCTIONS

CLOVE HITCH



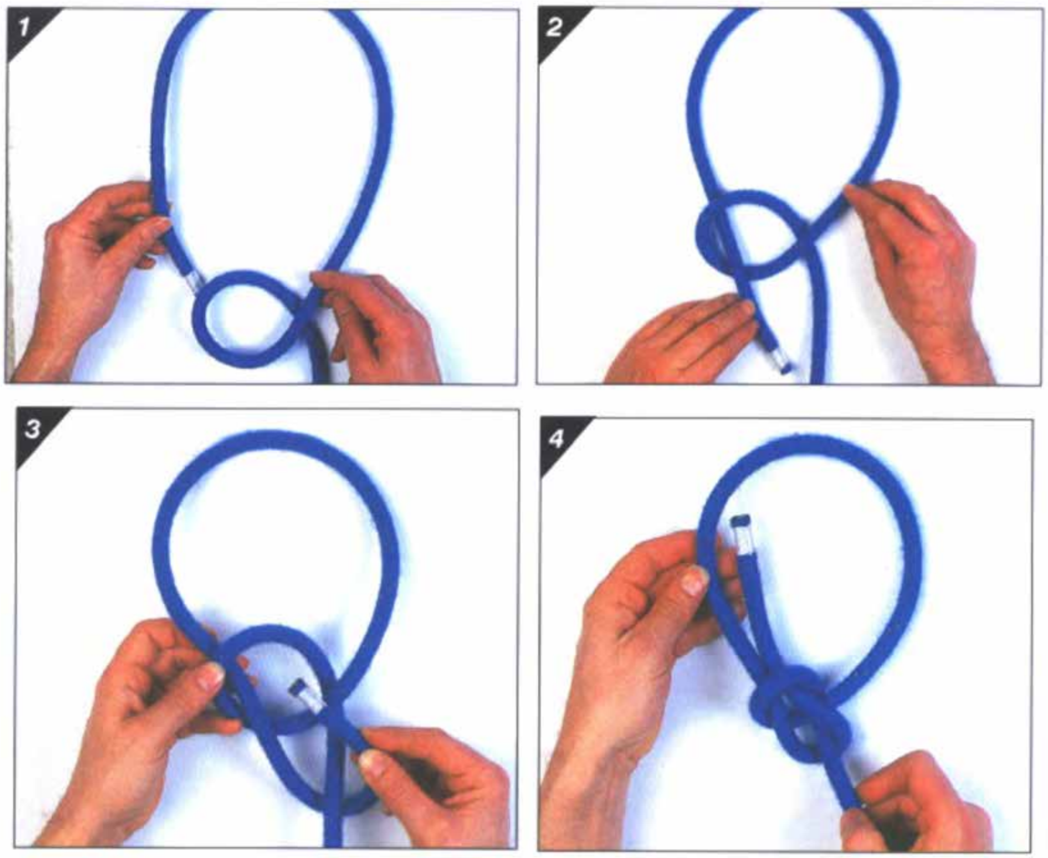
Note. From Pocket Guide to Knots and Splices (p. 106), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure A-3 Steps 1–4

1. Make a turn around the pole / tree bringing the working end of the rope over and trapping the standing part of the rope. This makes the first half hitch.
2. Bring the working end round behind the pole / tree, above the first half hitch.
3. Put the working end under the turn just made. This gives the second half hitch and forms the clove hitch.
4. Pull tight to complete the clove hitch.

KNOT-TYING INSTRUCTIONS

BOWLINE



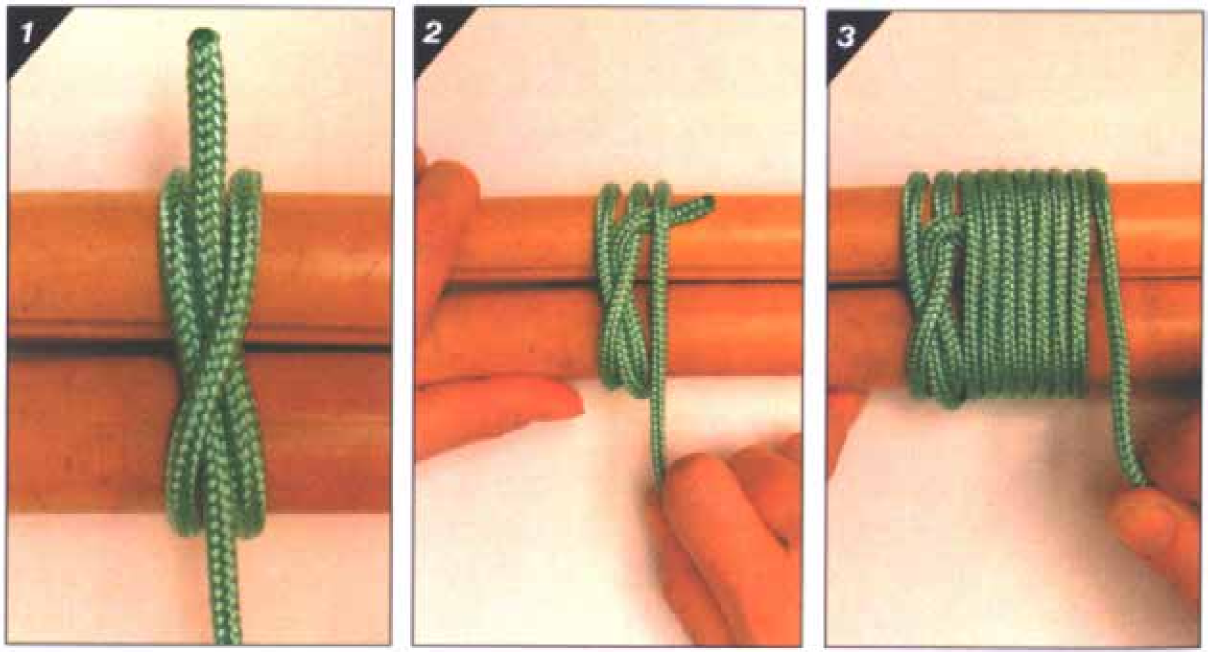
Note. From Pocket Guide to Knots and Splices (p. 163), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure A-4 Steps 1–4

1. A short distance back from the working end, make a crossing turn with the working part on top. Go on to form the size of the loop you require.
2. Bring the working end up through the crossing turn. It will go under first, and then lie on top of the other part of the turn.
3. Bring the working end around behind the standing part and down through the crossing turn. A good way to remember this is: “the rabbit comes out of the hole, around the tree and back down the hole again”.
4. Pull tight by holding the working end and pulling on the standing part to complete the bowline.

LASHING INSTRUCTIONS

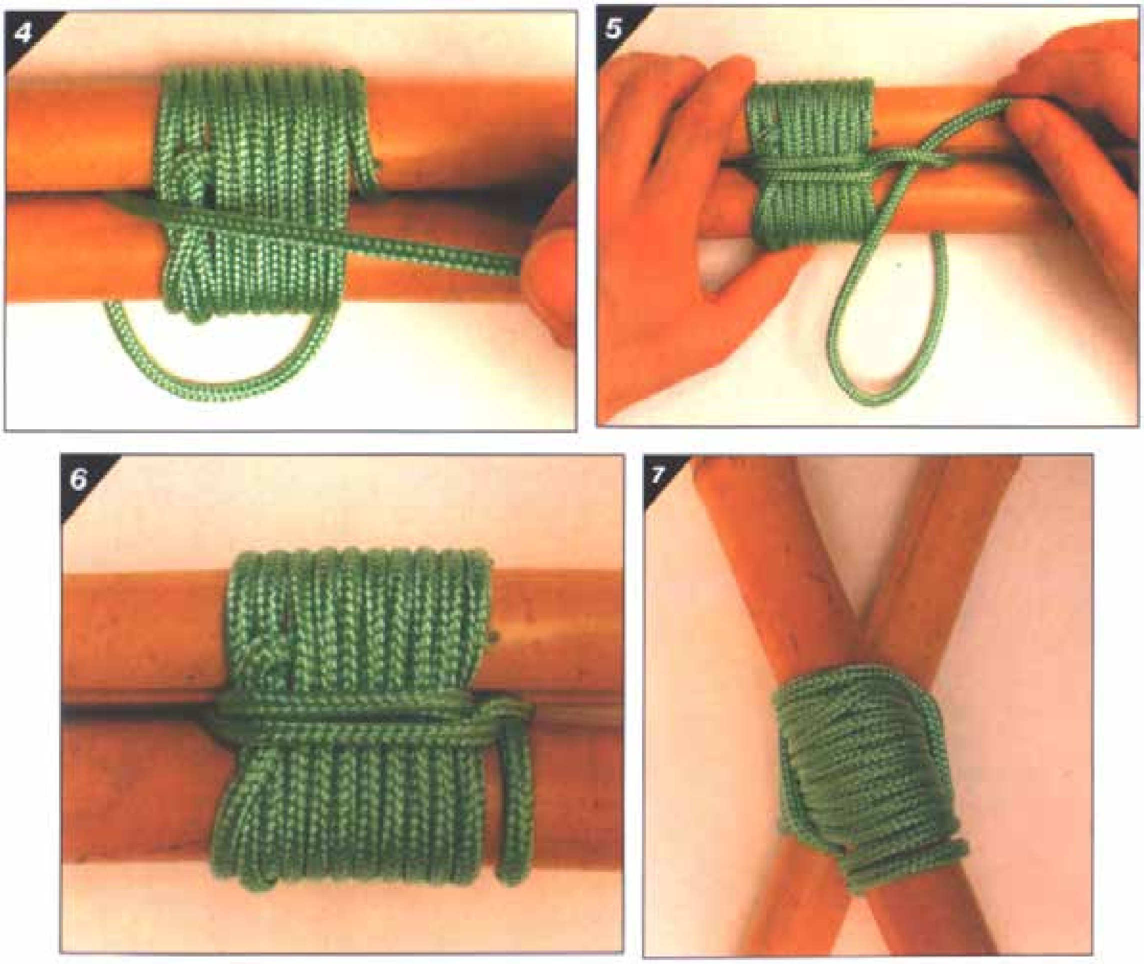
ROUND LASHING



Note. From Pocket Guide to Knots and Splices (p. 184), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure B-1 Steps 1–3

1. Start by making a clove hitch around both poles.
2. Wrap around both poles, trapping the end of the clove hitch.
3. Carry on making eight to ten more turns round the pair of poles.



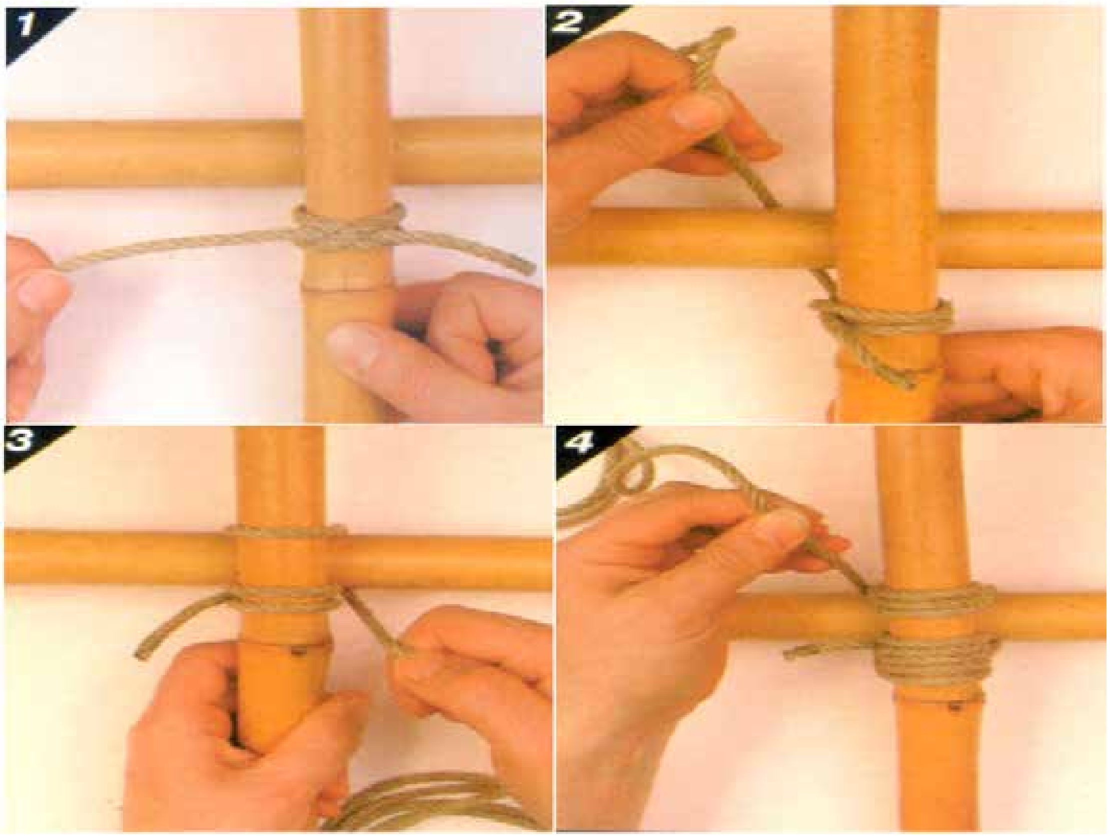
Note. From Pocket Guide to Knots and Splices (p. 185), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure B-2 Steps 4–7

4. The lashing could now be finished with a clove hitch around both poles or put in a couple of frapping turns by bringing the end of the rope between the two poles.
5. Finish off with a clove hitch around one of the poles.
6. Pull tight to finish the round lashing with the poles parallel.
7. If being used for an "A" frame then open the poles.

LASHING INSTRUCTIONS

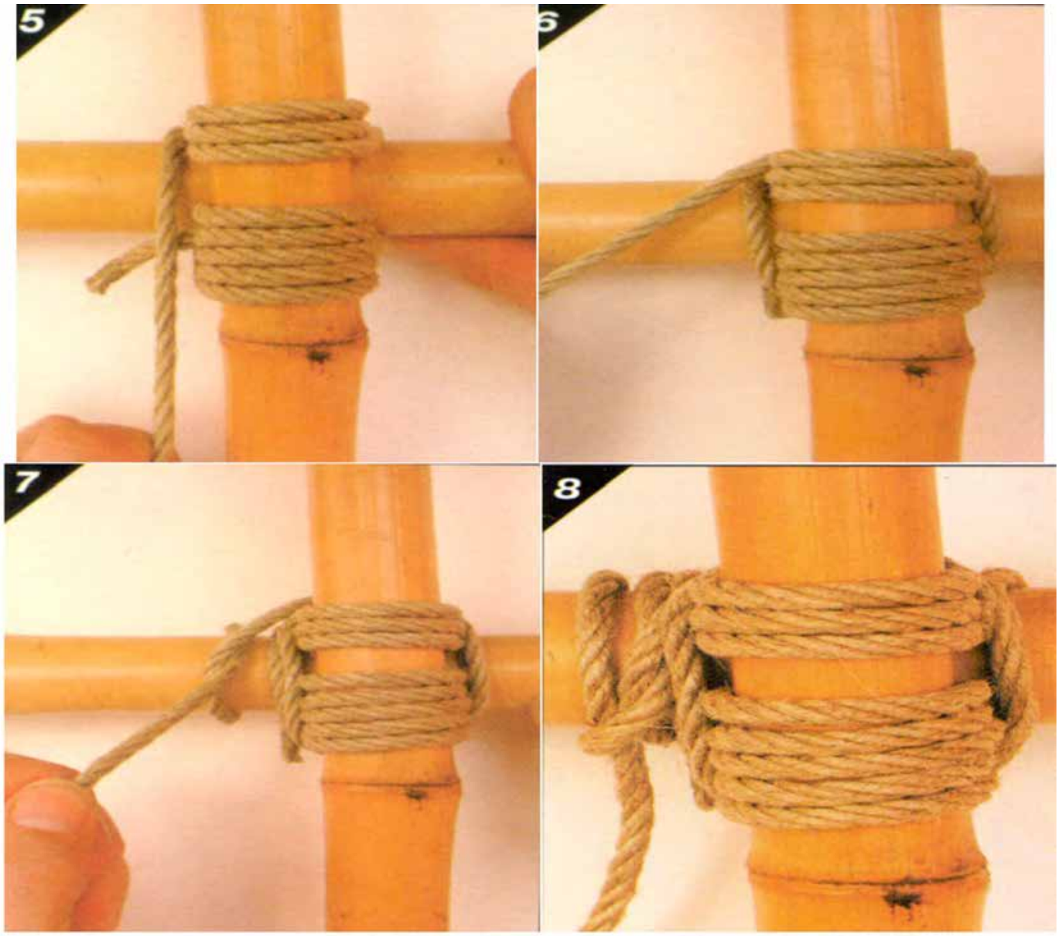
SQUARE LASHING



Note. From Pocket Guide to Knots and Splices (p. 181), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure B-3 Steps 1–4

1. With the vertical pole on top of the horizontal pole, make a clove hitch on the vertical pole just below the horizontal pole.
2. Bring all the cord around behind the horizontal pole.
3. Bring the cord over the vertical pole and back behind the horizontal pole to the clove hitch. Pull tight.
4. Carry on making two or three more complete turns around the two poles, pulling tight after each turn.



Note. From Pocket Guide to Knots and Splices (p. 181), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure B-4 Steps 5-8

5. After passing the clove hitch, bring the cord around the horizontal pole from behind and start to wrap around the junction between the two poles. These are frapping turns—pull them as tight as possible.

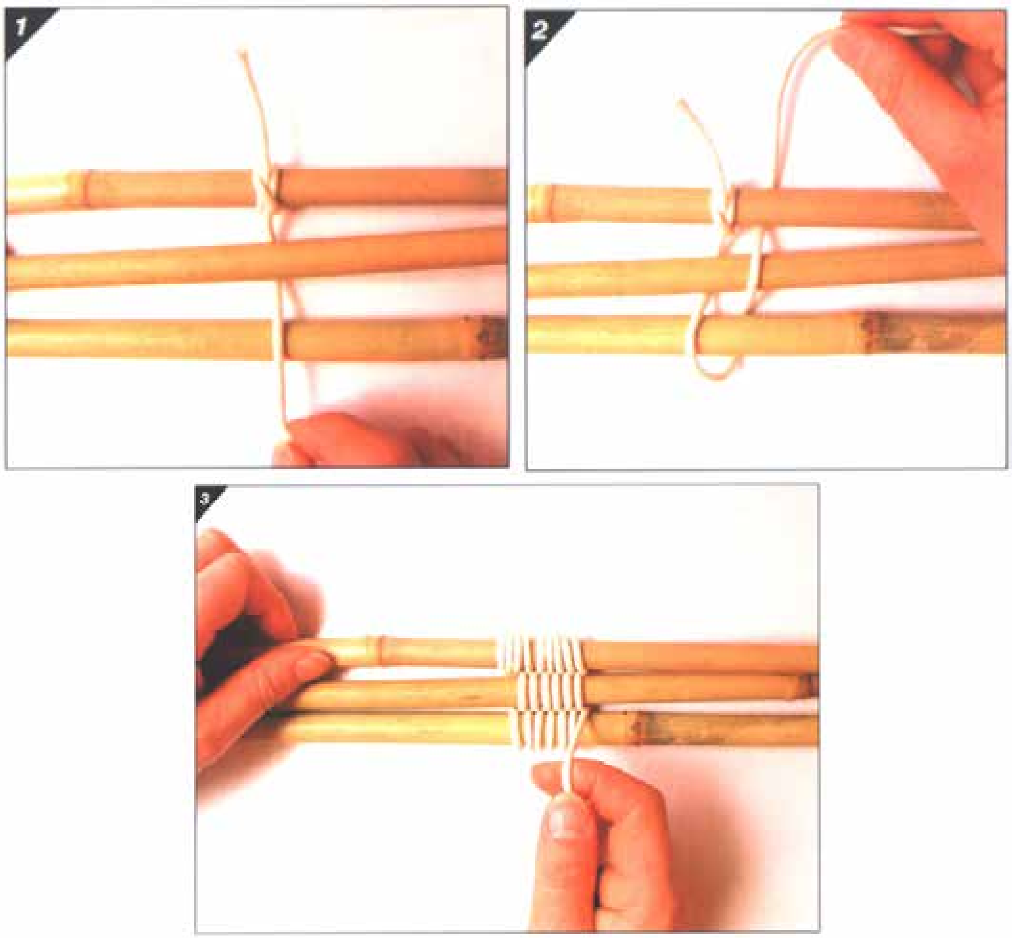
6. Make two frapping turns.

7. Finish off with a clove hitch around the horizontal pole.

8. Pull tight to complete the square lashing.

LASHING INSTRUCTIONS

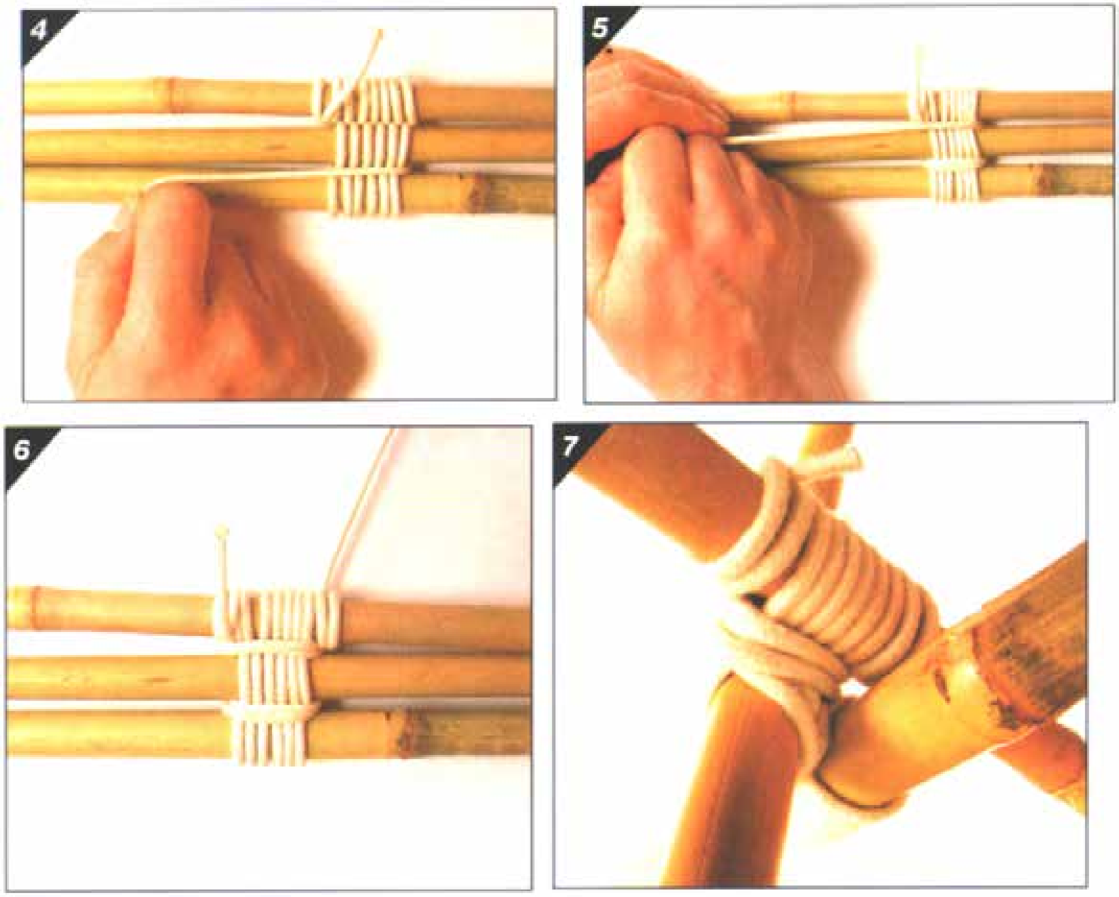
FIGURE-OF-EIGHT LASHING



Note. From Pocket Guide to Knots and Splices (p. 187), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure B-5 Steps 1–3

1. Start with a clove hitch around one of the poles, and lead the rope under and over the other two poles.
2. Go around the pole furthest away from the start and weave the rope back over and under.
3. Continue to weave the rope in the figure-of-eight manner for seven or eight full passes before bringing the rope up between two of the poles.



Note. From Pocket Guide to Knots and Splices (p. 181), by D. Pawson, 2001, London, England: Prospero Books Inc. Copyright 2001 by PRC Publishing Ltd.

Figure B-6 Steps 4-7

4. Pull the rope parallel to the poles and start to put in some frapping turns.

5. After making frapping turns between the first two poles move on to make frapping turns around the other pair of poles.

6. Finish off with a clove hitch around the pole from which you first started.

7. Open to create tripod.

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 10

EO C190.03 – CONSTRUCT A HOOTCHIE-STYLE SHELTER

Total Time:	90 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Prepare all materials required for the construction of a hootchie-style shelter for each group of cadets.

Prepare an example hootchie-style shelter.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

A demonstration and performance was chosen for TP 1 as it allows the instructor to explain and demonstrate setting up a hootchie-style shelter while providing an opportunity for the cadets to observe and ask questions.

A practical activity was chosen for TP 2 as it is an interactive way for the cadets to experience setting up shelters in a safe and controlled environment.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have constructed a hootchie-style shelter.

IMPORTANCE

In a survival situation, it is very important to be able to construct an effective shelter. A shelter protects a person from weather, animals and insects. They can also provide warmth, shade and comfort. The hootchie-style shelter is effective for squadron aircrew survival exercises.

Teaching Point 1 | **Explain and demonstrate the procedure for constructing a hootchie-style shelter.**

Time: 25 min | Method: Demonstration

OBTAIN THE APPROPRIATE SUPPLIES

In order to effectively build a hootchie-style shelter, the following supplies will be needed:

- Two military-style groundsheets that properly zip together (these are also called half shelters or utility sheets).
- Three metres of twine or thin rope.
- Several pegs or small twigs.
- Spade or small shovel.
- Knife or scissors.

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 1 Two Military Groundsheets

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 2 Appropriate Supplies

SELECTING A SITE

1. Apply the site selection principles when constructing the hootchie.
2. Ensure that the two trees are spread approximately ten feet apart (or the length of the groundsheets allowing for approximately two feet for the entrance).

CHECKING MATERIAL

1. Inspect the material for fatigue and wear (should not have holes as it would allow rain and other objects into the completed shelter).
2. Ensure that the zippers on the groundsheets are not damaged.
3. Inspect the grommets on each groundsheet to ensure they are in good repair so that they can be utilized for holding pegs down.

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 3 Grommet

4. The twine used should be strong enough to hold the two groundsheets up and allow enough give for the fatigue that is experienced when cadets enter and leave the shelter.

ZIPPING THE GROUNDSHEETS

1. The two groundsheets are zipped together to form a sufficient bond.

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 4 Zipping Groundsheets

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 5 Two Groundsheets Zipped Together

TYING THE SHELTER TO TREES

1. Using a clove hitch, tie each end of the zipped groundsheet to the two trees with the twine provided, cutting the excess twine for future use.

2. Ensure that the shelter is tied at the waist of the tallest occupant. This height allows enough head room when the shelter is complete.

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 6 Tying Shelter to a Tree

3. The two groundsheets should be pulled tight as possible between the two trees to prevent rain from collecting and stops the shelter from sagging after extended use.

4. When tying the shelter, ensure that the flap at the peak of the shelter covers the zipper and that there is enough room on one end for an entrance and exit.

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 7 Shelter Tied to Two Trees

PEGGING

1. Using an appropriate length string, pull the string through the grommets that run along the bottom of the groundsheets.
2. Tie the string together to form a loop. Using these loops, tightly pull each corner of the groundsheets out from the centre and peg them using small twigs.
3. Leave the edge of the groundsheet about 5 cm above the ground for ventilation.

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 8 Pulling Pegs Tight

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 9 Shelter 5 cm Above the Ground

4. After the corners are pegged, peg the remaining grommets in between the two corners on each side.

When each side of the shelter is pegged, it should be flush, tight surface with no wrinkles. This tight surface allows for efficient run-off of rain.

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 10 Flush, Tight Surface

Ensure that the flaps for the doors are tied together prior to pegging. If the doors are not tied they may not tie together properly when the shelter is tightly pegged.

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 11 Doors Tied Together

DIGGING TRENCHES

1. Dig small trenches 10 cm away from the sides of the shelter to allow for effective drainage of rainwater.
2. Trenches should be approximately 10 cm in width and 5–10 cm deep.
3. When the shelter is complete, dry grass or hay can be used as bedding.

Note. Created by Director of Cadets 3, 2006, Ottawa, ON: Department of National Defence.

Figure 12 Completed Hootchie-style Shelter

Teaching Point 2	**Have the cadets construct a hootchie-style shelter.**
Time: 60 min	Method: Practical Activity

ACTIVITY

OBJECTIVE

The objective of this activity is to have the cadets construct a hootchie-style shelter.

RESOURCES

- Two groundsheets,
- Three metres of twine or thin rope,
- Several pegs or small twigs,
- Spade or small shovel,
- Knife or scissors, and
- Flagging tape.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

- Divide the cadets into groups of two. Each group member should be of the same gender.
- Direct cadets to find a suitable site to build a hootchie-style shelter.
- Issue required resources to each group of cadets.
- Direct each group to construct a hootchie-style shelter.

SAFETY

Nil.

END OF LESSON CONFIRMATION

The cadets’ participation in the activity will serve as confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

In a survival situation, it is very important to be able to construct an effective shelter. A shelter protects a person from weather, animals and insects. They can also provide warmth, shade and comfort. The hootchie-style shelter is effective for squadron aircrew survival exercises.

INSTRUCTOR NOTES / REMARKS

The directives outlined in CATO 11-08 *Environmental Protection and Stewardship* are to be adhered to during this training.

REFERENCES

C3-002 ISBN 0-00-653140-7 Wiseman, J. (1999). *The SAS survival handbook*. Hammersmith, London: HarperCollins Publishers.

C3-003 ISBN 1-896713-00-9 Tawrell, P. (1996). *Camping and Wilderness Survival: The ultimate outdoors book*. Green Valley, ON: Author.

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 11

EO C190.04 – COLLECT DRINKING WATER IN THE FIELD

Total Time:	60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Prepare a suitable instructional area.

Prepare examples of water collection devices.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for TP 1 to orient the cadet to conserving water and generate an interest in the subject.

A demonstration and performance was chosen for TP 2 as it allows the instructor to explain and demonstrate collecting drinking water and provides an opportunity for the cadet to practice the skill under supervision.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have collected drinking water in the field.

IMPORTANCE

Cadets will obtain the skills to collect water in a survival situation. Water is vital to human survival. Without sufficient drinking water the body with shut down and eventually die. Having sufficient drinking water combats thirst, which is an enemy of survival.

Teaching Point 1 **Describe the importance of water conservation and retaining fluids.**

Time: 15 min Method: Interactive Lecture

OVERVIEW

The human body consists of 75% water. It is required to keep kidneys functioning so they may eliminate wastes, control body temperature, and regulate the nervous system.

Water is essential to life. All living things contain water and depend on it. The average person can survive for approximately three weeks without food but only three days without water. Do not wait until water supplies have completely diminished to find a water source. When faced with a survival situation, conserve water and find a source as soon as possible. The source should be fresh, running water though. However, boiling or the use of chemical purifiers can sterilize water.

When water is lost from the body it must be replaced to maintain health and efficiency. The human body loses two to three litres of water per day, which must be replaced to maintain the water balance. This water replacement occurs by consuming actual water or water that is contained in food.

DEHYDRATION

The human body has no means of storing water like it can with food fats. When the body is deprived of water it becomes dehydrated, which can affect it in very negative ways.

Effects of Water loss:

Loss of 1–5% Body Water	Loss of 6–10% Body Water	Loss of 11–12% Body Water
Thirst	Headache	Delirium
Discomfort	Dizziness	Swollen tongue
Lethargy	Dry mouth	Twitching
Impatience	Tingling in limbs	Deafness
Lack of appetite	Blue shade to skin	Darkening vision
Flushed skin	Slurred speech	Lack of feeling in the skin
Increased pulse	Difficulty breathing	Skin starts to shrivel
Nausea	Inability to walk	Inability to swallow
Weakness	Blurred vision	Death

RETAINING FLUIDS

The following precautions can be taken to keep fluid loss to a minimum:

- Avoid exertion.
- Do not smoke.
- Keep cool, stay in the shade.
- Do not lay on the hot ground or heated surfaces.
- Eat as little as possible – If there is little fluid in your body, water is taken from the vital organs to digest the food.
- Avoid speech.
- Breathe through the nose, not the mouth.

CONFIRMATION OF TEACHING POINT 1

QUESTION:

Q1. What percentage of the human body is water?

Q2. How much water does the human body lose each day?

Q3. What are three ways to prevent water loss?

ANTICIPATED ANSWERS:

A1. Seventy-five per cent.

A2. Two to three litres.

A3. Avoid exertion, do not smoke, keep cool, stay in the shade, do not lay on the hot ground or heated surfaces, eat as little as possible, avoid speech, and breathe through the nose, not the mouth.

Teaching Point 2	**Explain, demonstrate and have the cadets collect drinking water.**
Time: 40 min	Method: Demonstration and Performance

For this skill lesson, it is recommended that the instruction take the following format:

1. Explain and demonstrate the complete skill while cadets observe.
2. Explain and demonstrate each step required to complete the skill. Monitor cadets as they imitate each step.
3. Monitor the cadets' performance as they practice the complete skill.

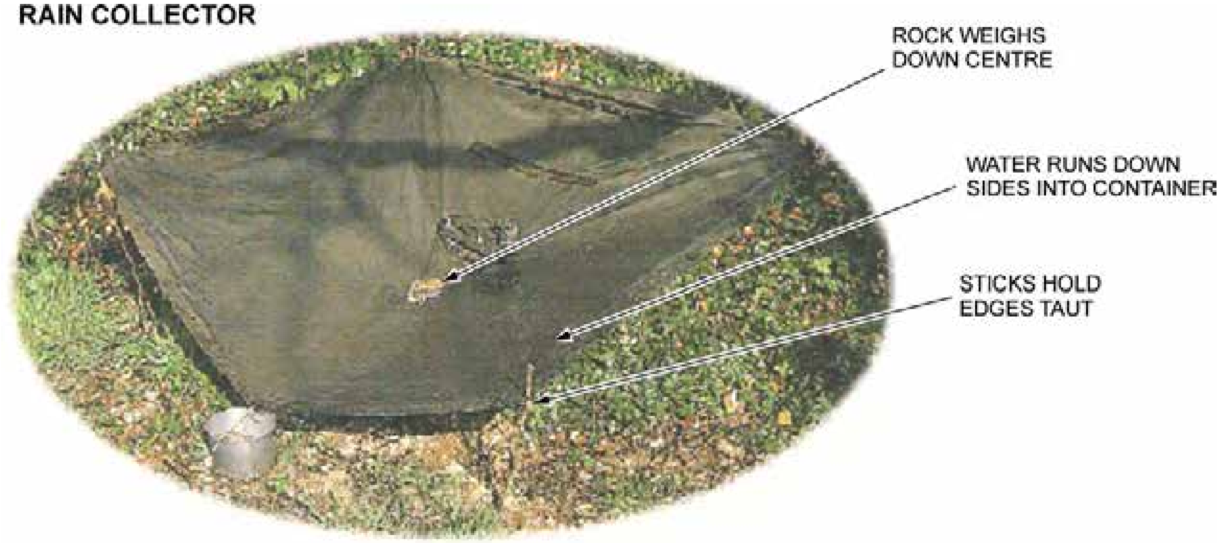
Note: Assistant instructors may be required to monitor the cadets' performance.

COLLECTING WATER

Rain Water

Set out a container to collect any rain that may fall. The flow from the roof of a shelter can be collected using improvised guttering to channel the rain into containers. Rainwater requires less purification than a standing body of water. Collecting rainwater is also easier than other collection methods.

Stretch a plastic bag / poncho tightly over a wide area, preferably on a slope. Peg down its corners with sticks and collect the rain in a container. A rock may be used to weigh down the centre and better direct the water into the container. When waterproof sheets are unavailable, use birch bark sheet and shape it to channel the water into a container.



Note. From The Complete Wilderness Survival Manual by Hugh McManners, 1994, Toronto, ON: McMillan Canada.

Figure 1 Rain Collector

DEW

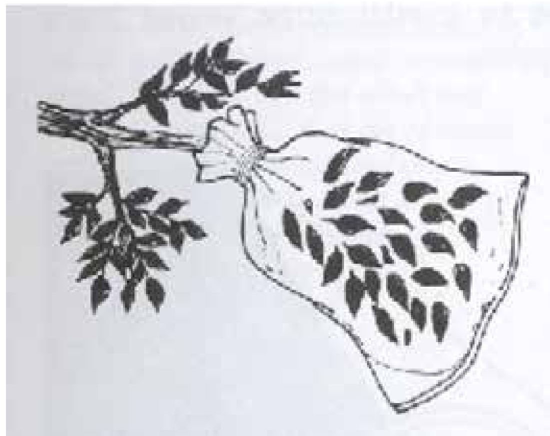
As the air cools down at night, the water vapour in the air condenses as dew on low-lying ground, and vegetation. This water evaporates rapidly as the sun rises. Many plants, insects and animals depend upon dew to survive. Humans can also make use of this natural water supply. Dew can be collected by soaking a cloth in long wet grass. The best time for collection is at dawn. When the cloth is soaked, wring the water out into a container. If a cloth is unavailable, a spare t-shirt or other piece of clothing may be used.

Note. From The Complete Wilderness Survival Manual by Hugh McManners, 1994, Toronto, ON: McMillan Canada.

Figure 2 Dew Collection

Water from Vegetation

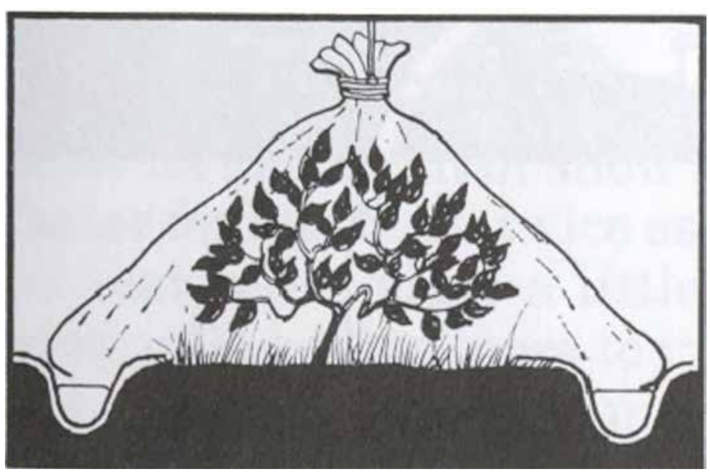
Tie a plastic bag over a healthy, bushy green branch. The water vapour given off by the foliage heats up inside the plastic and condenses to form water inside of the bag. On trees, keep the mouth of the bag at the top with a corner hanging low to collect condensed evaporation.



Note. From The SAS Survival Handbook, by John Wiseman, 1999, London, England: HarperCollins Publishers.

Figure 3 Collecting Condensation

An entire plant can also be used as a water source. Placing a plastic bag over any vegetation collects moisture by evaporation. The moisture condenses on the plastic as it cools. Suspend the bag to an overhead tree branch, or place a wide stick on the inside to prop up the plastic bag. Arrange points for the water to collect.



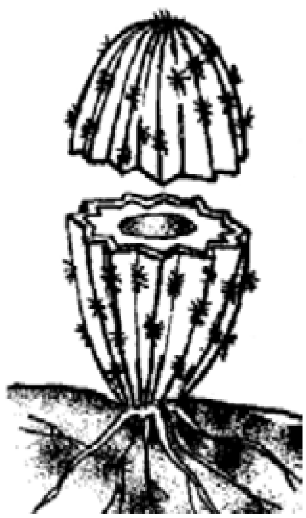
Note. From The SAS Survival Handbook, by John Wiseman, 1999, London, England: HarperCollins Publishers.

Figure 4 Collecting condensation from plants

There are many different types of vegetation that store water in either their leaves or roots. Some types of vegetation capture rainwater to trap insects for food. Others secrete special fluids that can be tapped and drank by humans in emergencies. Some examples include: pitcher plants, cacti, tree roots and vines.

Note. From The Complete Wilderness Survival Manual by Hugh McManners, 1994, Toronto, ON: McMillan Canada.

Figure 5 Pitcher Plant



Note. From Camping and Wilderness Survival: The Ultimate Outdoors book by Paul Tawrell, 1996, Green Valley, ON: Author

Figure 6 Cactus

Solar Still

Water can be extracted from soil using a solar still. As long as there is a difference in temperature in between two surfaces, air between those surfaces heats up and becomes saturated. The air condenses as droplets on the cooler surface.

To construct a solar still dig a hole about three feet wide and two feet deep. Place a collecting can at the bottom of the hole. Spread a plastic sheet across the hole and hold it in place with rocks. Weigh down the centre of the sheet over the container with a fist-sized rock. As the temperature of the air and soil rise, water vapour condenses on the underside of the cooler sheet and runs into the container. Dig another hole when the moisture in the hole / still has been used up.

Note. From The Complete Wilderness Survival Manual by Hugh McManners, 1994, Toronto, ON: McMillan Canada.

Figure 7 Solar Still

Digging for Ground Water

Water often seeps into a hole dug in a location where the water table is high. Dig a hole about one foot deep. Water seeps from the ground into the hole. The water is dirty the first few times the hole fills, but clear water eventually rises and can be purified and drunk. Keep scooping away the muddy water until clear water rises. Note the surroundings before a water hole has been dug. Never dig where the mud has a potent smell or a green slime on the surface. This water is probably contaminated. Do not collect water where there are dead animals and always purify the water before drinking.

ACTIVITY

Time: 20 min

OBJECTIVE

The objective of this activity is to have the cadets make a water collection device.

RESOURCES

- Plastic bags / sheets of plastic (one per group).
- Shovels (one per group).
- Pegs (one per group), and
- Cup or bowl (one per group).

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

- Divide the cadets into groups of three or four.
- Assign each group a water collection device to set up.
- Cadets are to construct the water collection device as per instructions given during the lesson.

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. What are some surface characteristics to look for when searching for a water source?

Q2. How can insects help find a water source?

Q3. What is a method of collecting water?

ANTICIPATED ANSWERS:

A1. Follow dry riverbeds. The structure and composition of the rocks may result in a stream emerging. The riverbed may be followed to its source. There may be a trickle of water that remains or humid soil is present where a pit can be dug to the water table. Watch for damp spots on the ground. A high water table can cause this. Old human habitations can be a good place to find water. Old mines and dumps are good examples. Water may be collected from dew accumulation.

A2. Insects live within flying distance of water. Their flight path may be followed to a water source.

A3. Rain collection, dew collection, water from vegetation, solar still, and water from the ground.

END OF LESSON CONFIRMATION

The cadets' participation in the activity will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Cadets have learned the effects of water on the human body, how to find water and how to collect it. Water is vital to human survival; without sufficient drinking water the body shuts down and eventually dies. Having sufficient drinking water combats thirst, which can be an enemy of survival.

INSTRUCTOR NOTES / REMARKS

The directives outlined in CATO 11-08 *Environmental Protection and Stewardship* are to be adhered to during this training.

This lesson should be scheduled at the start of the morning with the cadets setting up their water-collection devices. Follow up should take place the next to indicate the cadets' water-collecting devices worked.

REFERENCES

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 12

EO C190.05 – IDENTIFY ENVIRONMENTAL INJURIES

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for this lesson to orient the cadets to environmental injuries and generate awareness of the subject.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have identified environmental injuries.

IMPORTANCE

Being able to recognize environmental injuries gives cadets the confidence to help in an emergency that could occur any time while in a survival situation. Knowing the symptoms and basic treatments for environmental injuries will aid cadets in possibly preventing and detecting an injury earlier.

Teaching Point 1 **Explain how to recognize hiking injuries.**

Time: 5 min Method: Interactive Lecture

BLISTERS

Blisters are sign that boots do not fit properly or are not broken in. Blisters are also a sign that the feet are too tender for the distance being covered in the hike. The first sign of a blister is hot spots. Upon noticing a blister, relieve the pressure on the area by loosening the boots, removing a pair of socks, or even cutting a hole in the socks around the offending area.

SHIN SPLINTS

Shin splints are characterized as pain in the front of the lower leg. Shin splints primarily come from excess toe flexion (bending). Shin splints are usually caused by walking without extending the ankle on each step and not using the toes to press down on the ground. Do not wear clogs of any kind because the ankle needs to stay flexed to keep the clog on the foot.

MUSCLE CRAMPS

Muscle cramps are often associated with dehydration. Muscle cramps commonly occur in people who overwork their muscles to the point of exhaustion. Some possible causes of muscle cramps include:

- lack of water,
- lack of calcium,
- lack of potassium, and
- lack of sodium.

SPRAINS

A sprain occurs when the ligaments of a joint are torn by a sudden twist or wrench. Symptoms of a sprain can include the joint being very painful when moved, and considerable swelling. First aid for a sprain includes wrapping the joint in a heavy bandage and resting the limb in a comfortable elevated position.

Inform the cadets that if they experience any of the mentioned symptoms they should tell someone immediately and go to the nearest first aid station.

CONFIRMATION OF TEACHING POINT 1

QUESTION:

Q1. What are blisters a sign of?

Q2. What is the primary cause of shin splints?

Q3. What are the common causes of muscle cramps?

ANTICIPATED ANSWERS:

A1. Blisters are a way of telling the body the boots do not fit, they are not broken in or the feet are too tender for the miles covered hiking.

A2. Shin splints primarily come from excess toe flexion.

A3. Lack of water, lack of calcium, lack of potassium, and lack of sodium.

Teaching Point 2	**Explain how to recognize frostbite injuries.**
Time: 5 min	Method: Interactive Lecture

FROSTBITE

There are several types of frostbite. Each of the types is increasingly worse than the previous. The types of frostbite include:

- **Incipient frostbite or frostnip**. This type of frostbite is the initial pain from the cold. It is followed by numbness and after rewarming, a tingling feeling. No permanent damage occurs with this type of frostbite.
- **Superficial frostbite**. This type of frostbite affects only the skin and tissue that is near the surface. The affected area is white and frozen to the touch, but the tissue beneath it is soft and resilient. In worse cases, blisters form after 24 to 36 hours and the pain of the injury may last several weeks.
- **Deep frostbite**. This frostbite is more serious and involves deeper tissue, possibly as deep as the bone. Before rewarming, the injured area is hard. Blisters usually form in three to seven days and are larger than in superficial frostbite. There will be a significant amount of swelling, which can last several weeks.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

1. What is incipient frostbite or frostnip?
2. What is superficial frostbite?
3. What is deep frostbite?

ANTICIPATED ANSWERS:

1. It is the initial pain from the cold.
2. It only affects the skin and tissue that is near the surface.
3. It is more serious and involves deeper tissue, possibly as deep as the bone.

Teaching Point 3	**Explain how to recognize the signs and symptoms of hypothermia.**
Time: 5 min	Method: Interactive Lecture

HYPOTHERMIA

Hypothermia means too little heat. In medical terms it means a lowering of the body's core temperature, resulting in the breakdown of bodily functions.

Some factors that contribute to hypothermia include:

- lack of proper nutrition or hydration,
- inadequate clothing,
- getting wet, and
- exhaustion.

Some ways to prevent hypothermia include:

- wearing a sufficient thickness of insulation,
- having protection from the wind,
- keeping dry (inside and out),
- maintaining proper nutrition and hydration, and
- pacing to prevent fatigue.

Signs to watch for in others include:

- complaints of feeling cold,
- stumbling,
- falling,
- slurred speech,
- violent shivering,
- poor judgement,
- irrational behaviour, and
- in extreme cases loss of urinary control and fruity acetone breath.

Signs for individuals to watch for in themselves include:

- feeling of deep cold,
- shivering,
- stumbling,
- falling, and
- poor coordination.

CONFIRMATION OF TEACHING POINT 3

QUESTIONS:

Q1. What are some factors that contribute to hypothermia?

Q2. What are the signs of hypothermia to watch for in others?

Q3. What are the signs of hypothermia to watch for in yourself?

ANTICIPATED ANSWERS:

A1. Lack of proper nutrition or hydration, inadequate clothing, getting wet and exhaustion.

A2. Complaints of feeling cold, stumbling, falling, slurred speech, violent shivering, bad judgement, irrational behaviour, people with profound hypothermia may lose urinary control and have fruity acetone breath.

A3. Feeling of deep cold, shivering, stumbling, falling and poor coordination.

Teaching Point 4	**Explain how to recognize heat related injuries.**
Time: 10 min	Method: Interactive Lecture

HEAT CRAMPS

Heat cramps are usually the first warning of heat exhaustion. They occur in the muscles that are doing the most work such as the arms, legs and abdomen. Heat cramps are usually due to a lack of body salt.

Symptoms of heat cramps include:

- shallow breathing,
- vomiting, and
- dizziness.

Treatment for heat cramps includes:

- moving to shade,
- resting, and
- drinking water with a small amount of salt dissolved in it.

HEAT EXHAUSTION

Heat exhaustion is produced by exposure to high temperature and humidity. It is also produced through the loss of body fluids through excessive sweating. It can occur without direct exposure to the sun.

Symptoms of heat exhaustion include:

- pale face,
- cold and sweating skin,
- weak pulse accompanied by dizziness,
- weakness,
- cramps, and
- deliriousness or unconsciousness.

Treatment for heat exhaustion includes:

- moving to shade,
- resting, and
- drinking water with a small amount of salt dissolved in it.

HEATSTROKE

Heatstroke is the most serious result of overexertion or overexposure to the sun.

Symptoms of heatstroke include:

- hot dry skin,
- flushed face and feverish,
- sweating stops,
- rising temperature,
- fast, strong pulse,
- severe headache,
- vomiting, and
- unconsciousness.

Treatments for heatstroke include:

- laying in the shade with head and shoulders slightly raised;
- removing layers of outer clothing;
- cooling body by wetting clothing with tepid (warm) water and fanning; and
- sprinkling water over the individual (do not fully immerse the individual in water).

SUNBURN

A sunburn with blistering is dangerous, especially with pale and sensitive skin.

Treatment for sunburn includes:

- avoiding further exposure to the sun by keeping in the shade or covering skin with clothes;
- taking painkillers if available; and
- covering all blisters with dressings (do not burst the blisters).

SORE EYES

Sore eyes may occur due to glare or excessive exposure to the sun or dust particles.

Treatment for sore eyes includes:

- resting in the shade;
- covering eyes after washing out the foreign debris;
- bathing eyes in warm water;
- using a mask to cover the eyes; and
- darkening below eyes with charcoal to avoid recurrence.

DEHYDRATION

Dehydration becomes more noticeable as more body fluid is lost. Water makes up 75% of the body’s weight. Survival is unlikely if more than one fifth of the body’s water is lost.

For fluid loss between 1-5% of body weight, symptoms include:

- thirst,
- vague discomfort,
- lack of appetite,
- flushed skin,
- impatience,
- sleepiness, and
- nausea.

For fluid loss between 6-10% of body weight, symptoms include:

- dizziness,
- headache,
- laboured breathing,
- no salivation,
- indistinct speech, and
- unable to walk.

For fluid loss between 11-20% of body weight, symptoms include:

- delirium,
- swollen tongue,
- inability to swallow,
- dim vision,
- numb, and
- shrivelled skin.

In the latter stages of dehydration, there is significant muscular weakness and impaired mental capacity.

Inform the cadets that if they experience any of the symptoms listed in this class to tell someone immediately and go to the nearest first aid station.

CONFIRMATION OF TEACHING POINT 4

QUESTIONS:

Q1. What are the symptoms of heat stroke?

Q2. Survival is unlikely if how much of the body's water is lost?

Q3. What is the treatment for heat exhaustion?

ANTICIPATED ANSWERS:

A1. Hot dry skin, flushed face and feverish – but sweating stops, temperature rises, pulse becomes fast and strong, severe headache, often with vomiting and unconsciousness may follow.

A2. One-fifth.

A3. Moving to shade, resting and drinking water with a little salt dissolved in it.

END OF LESSON CONFIRMATION

QUESTIONS:

Q1. What are blisters a sign of?

Q2. What are the three types of frostbite?

Q3. What are the signs of hypothermia to watch for in yourself?

ANTICIPATED ANSWERS:

A1. Blisters are a way of telling the body that one's boots do not fit, they are not broken in or one's feet are too tender for the miles they are covering in their hike.

A2. Incipient or frostnip, superficial frostbite and deep frostbite.

A3. Feeling of deep cold, shivering, stumbling, falling and poor coordination.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Environmental injuries can be very serious and life threatening. Understanding the symptoms and basic treatments for these injuries provides individuals with the knowledge to possibly prevent and detect an injury earlier.

INSTRUCTOR NOTES / REMARKS

The directives outlined in CATO 11-08 *Environmental Protection and Stewardship* are to be adhered to during this training.

REFERENCES

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ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 13

EO C190.06 – DEMONSTRATE RESPECT FOR THE ENVIRONMENT ON AN AIRCREW SURVIVAL EXERCISE

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Ensure the following materials are ready prior to the class:

- an example of biodegradable soap or shampoo; and
- a stove fuel cartridge.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for this lesson to present information on respecting the environment during an aircrew survival exercise.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have demonstrated respect for the environment on an aircrew survival exercise.

IMPORTANCE

Cadet squadrons are at aircrew survival training sites only a few days each year while these areas are always home to wildlife and vegetation. By following certain procedures, the wilderness can be preserved while serving aircrew survival exercises.

Teaching Point 1 | **Discuss the importance of low impact camping.**

Time: 5 min | Method: Interactive Lecture

Try to select a location where both good and poor examples of low impact camping are present.

LOW IMPACT CAMPING CONCERNS

The goal of low impact camping is to leave the training area in the condition it was before being used. There should be little indication that the area had been used at all.

POSSIBLE OUTCOMES OF ENVIRONMENTAL OVERUSE

With camping and hiking becoming increasingly popular, it is important to treat the environment with respect. The overuse of environmental resources could cause:

- an excess build up of garbage,
- barren, stripped land,
- exposed tree roots,
- destroyed plants, or absence of vegetation, and
- scarred trees where branches have been torn away.

These outcomes affect the environment negatively. For example, the amount of garbage in a wilderness area can pollute the ground, the water, and the wildlife that live there.

ENVIRONMENTAL PRECAUTIONS

Through people taking responsible actions and following proper precautions, a site can be left in its natural condition for continuous use. This environmental consciousness helps wildlife and plants to recover from the impact of field training. A number of precautions may be taken, to include:

- packing out all garbage, including used stove cartridges and other non-burnable trash;
- staying on trails whenever possible. Do not create new paths by cutting down vegetation;
- avoiding crushing plants underfoot by walking on rocks and compacted earth;
- no harassing or feeding animals;
- where campfires are allowed, gathering fallen branches instead of cutting down trees for firewood; and
- using designated fire pits for campfires.

CONFIRMATION OF TEACHING POINT 1

QUESTION:

Q1. When creating a fire, where should the firewood be collected?

Q2. Why should you stay on trails whenever possible?

Q3. If you come across various forms of wildlife, what precautions should be taken?

ANTICIPATED ANSWERS:

A1. Gather fallen branches instead of cutting down trees for firewood.

A2. So vegetation is left alone and not trampled.

A3. Do not harass the animals or feed them.

Teaching Point 2	**Discuss factors while cooking.**
Time: 5 min	Method: Interactive Lecture

IMPORTANT FACTORS WHILE COOKING IN THE FIELD

There are a number of factors that should be considered while cooking in the field, to include:

- drain food away on the ground in the cooking area;
- evenly distribute waste water from cooking across the ground away from the cooking area and bivouac site;
- dump waste water away from ground water;
- pack up garbage immediately; and
- pack wet waste in a sealed container or a plastic bag and separate from dry garbage.

RECYCLING IN THE FIELD

It is very important to divide up garbage for recycling. There are different recycling groups for cardboard, paper, metal, glass, plastic and rigid foam.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. What factors should be taken into account when disposing of waste water from cooking?

Q2. What is important to keep in mind when disposing of wet waste?

Q3. What are the different types of recyclable materials?

ANTICIPATED ANSWERS:

A1. It should be evenly distributed across the ground away from the cooking area and bivouac site.

A2. Wet waste should be sealed in a container or plastic bag.

A3. Cardboard, paper, metal, plastic, rigid foam, and glass.

Teaching Point 3 | **Discuss factors while washing.**

Time: 10 min | Method: Interactive Lecture

IMPORTANT ENVIRONMENTAL FACTORS WHILE WASHING

It is important to maintain proper hygiene while in the field. If soap is going to be used while bathing in the field, certain precautions should be taken, to include:

- selecting a site on high and dry ground that is at least 100m away from a ground water source;
- using as little soap as possible, sponge bathe from a basin of water;
- ensuring that the grey water is disposed of properly into a grey water container; and
- using biodegradable soaps and shampoos should be used.

Prior to swimming in a large body of water, ensure that any oils (eg, sunscreen, grease, fuel residue, bug repellent, body oils.) are removed to ensure that no water is contaminated.

Show an example of biodegradable soap and shampoos to the cadets.

CONFIRMATION OF TEACHING POINT 3

QUESTIONS:

Q1. If using soap, where should one bathe?

Q2. If using soap to bathe, what form of soap should be used?

Q3. What should be washed off before going swimming?

ANTICIPATED ANSWERS:

A1. Ensure the site is on high and dry ground, and at least 100m away from a ground water source.

A2. Biodegradable soap.

A3. Different types of oils (eg, sunscreen, grease, fuel residue and body oils).

Teaching Point 4 | **Discuss waste disposal methods.**

Time: 5 min | Method: Interactive Lecture

PROPER DISPOSAL OF HUMAN WASTE

There are a number of factors that should be considered with respect to waste disposal in the field. Wherever possible, use an established toilet, outhouse or portable toilet. If toilets, outhouses, or portable toilets cannot be used, then a latrine should be dug for communal use. A hole about 60 cm x 60 cm, 30 to 60 cm deep works for about 20 people for up to two days. When the hole is full to about 15 cm from the top, cover it with the remaining dirt and natural cover.

Ensure to check local regulations concerning latrine construction prior to demonstrating this to the class. Some areas do not allow latrine construction.

CONFIRMATION OF TEACHING POINT 4

QUESTIONS:

Q1. If a latrine is constructed (regular measurements), how long will it be suitable?

Q2. Name three types of facilities that should be used for proper waste disposal?

ANTICIPATED ANSWERS:

A1. Up to two days.

A2. An established toilet, outhouse or portable toilet.

END OF LESSON CONFIRMATION

QUESTIONS:

Q1. When creating a fire, where should you collect the firewood?

Q2. What is important to keep in mind when disposing of wet waste?

Q3. What form of soap should be used?

ANTICIPATED ANSWERS:

A1. Gather branches instead of cutting down trees for firewood.

A2. Pack wet waste in a sealed container or a plastic bag and separate from dry garbage.

A3. Biodegradable soap.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

There are a number of things to remember to respect the environment during an aircrew survival exercise. Following proper methods for cooking, washing, and waste disposal are important to preserving the environment. If these methods are followed during exercises, the training area can be maintained and used for many years.

INSTRUCTOR NOTES / REMARKS

The directives outlined in CATO 11-08 *Environmental Protection and Stewardship* are to be adhered to during this training.

REFERENCES

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C3-008 ISBN 0-02861-100-4 Mouland, M. (1999). *Complete idiot's guide to camping and hiking*. Toronto, Canada: Alpha Books.

ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 14

EO C190.07 – IDENTIFY HABITATS OF ANIMALS AND INSECTS

Total Time:	30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Recce the area to locate habitats of animals and insects. It is recommended the route be flagged with flagging tape or visibly marked for the cadets before the lesson.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An in-class activity was chosen for this lesson as it is an interactive way to present the content.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have identified habitats of animals and insects.

IMPORTANCE

It is important for cadets to be able to identify animals and insects for food in a survival situation. After a few days the body needs nourishment which may be provided by the animals and insects in the surrounding area.

Teaching Point 1 **Conduct an activity to have the cadets identify habitats.**

Time: 25 min Method: In-Class Activity

EDIBLE INSECTS

Insect Gatherings

Many insects are inactive during the heat of the day, although most emerge to collect moisture when it rains. Look for them in nooks and crannies of trees and behind the bark, in the tissue and seed pods of plants, in any moist shady spots and on the beds of pools of water and streams. The larvae and grubs of many insects are edible and easily found in rotten logs, underground, or under the bark of dead trees. Ants' and termites' nests are often immediately recognizable mounds. Snails can be found in fresh water, salt water and from deserts to alpine meadows. Slugs are simply snails without shells.

Insects provide ample amounts of protein, fats, carbohydrates, calcium and iron. Insects can be found throughout the world and they are easy to procure. Worms contain the highest class of protein with a large proportion of essential amino acids and are easily collected. Although a fair number of insects can be eaten raw, it is best to cook them to avoid ingesting unwanted parasites. Collect only living specimens. Avoid any that look sick or dead, have a bad smell or produce skin irritation or a rash when handled.

> As a general rule, avoid insects that carry disease (eg, flies, mosquitoes, and ticks), poisonous insects (eg, centipedes and spiders), and insects that have fine hair, bright colours, and eight or more legs.

NUTRITION BREAKDOWN

Insect (per 100 g)	Protein (g)	Fats (g)	Carbohydrates (g)	Calcium (mg)	Iron (mg)
Crickets	12.9	5.5	5.1	75.8	9.5
Small grasshoppers	20.6	6.1	3.9	35.2	5.0
Giant water beetles	19.8	8.3	2.1	43.5	13.6
Red ants	13.9	3.5	2.9	47.8	5.7
Silkworm pupae	9.6	5.6	2.3	41.7	1.8
Termites	14.2	n / a	n / a	0.050	35.5
Weevils	6.7	n / a	n / a	0.186	13.1

Note. From Wilderness Survival. (p. 161), by G. Davenport, 2006, Mechanicsburg, PA: Stackpole Books. Copyright 2006 by

Figure 1 Nutritional Value

> Insects that can be eaten are bees and wasps, hornets, beetle grubs, locusts, aquatic insects, snails, slugs and worms.

ANIMALS

Many animals make their homes in burrows, usually on high ground away from water. Some, such as rabbits and ground squirrels, use little effort to conceal them, although one or two exits are hidden for use in an emergency. Rabbits' emergency holes are easily dug out; a piece of bramble or barbed wire can be pushed down the hole to hook the rabbit out.

Signs of feeding include:

- the way in which bark has been stripped from trees;
- the gnawed shells of nuts;
- partially eaten fruits;
- bitten off shoots;
- the remains of prey; and
- animals of carnivores or the destruction of nests.

Discarded fruits or nuts are often found when food is plentiful—an animal finds one piece not to its liking and drops it to try another. They not only reveal an animal's presence but suggest bait for traps.

A skilled eye can often identify the species of animal by the pattern left by tooth or beak marks on a nut, or the way in which a pine cone has been stripped to get at its seeds.

DROPPINGS

Droppings give one of the best indications of whether an animal is an herbivore or a carnivore. The size of the animal can be judged from their mass and quantity; dryness is an indication of how long since the droppings were passed. Old droppings are hard and odourless. Fresh are wet and still smelling. Flies draw attention to droppings.

Many mammal droppings have a strong scent. Animals that live on vegetation, such as cattle, deer and rabbits, produce roundish and strawy droppings. The droppings from a meat eater, like cats, are long and tapered. Break open a dropping to see if there are any clues to what the animals have been eating, then bait accordingly.

ROOTINGS

Some animals root up the ground in search of insects and tubers. If the earth is still crumbly and fresh, an animal is likely to have been active on the spot recently. Small scratches may be where a squirrel or other rodents have been digging for shoots.

Scents and Smells

Listen to the noises and register the smells. They are certain to include indications of the wildlife present and where one kind of animals exists there may be others.

TRACKS

Animal tracks consist of bent blades of grass, gnawed bone, broken seeds, the dragged body or tail, and the footprint of the animal.

All prints of an animal are not the same as they depend upon:

- the age of the animal,
- the movement of the animal—walking, running, bounding,
- the material it is walking on—sand, mud, clay, grass, or snow,

- the season—some animals have extra fur on their paws in the winter, and
- the age of the tracks.

When a track is observed:

- Choose a well defined area of the track.
- Study the track to determine the direction of travel, the forefoot and hind foot pattern.
- Determine if there are any body rub points as a dragged tail, dragged foot, or dragged fur of the animal.
- Determine if the animal is running, hopping, walking, trotting, or just meandering.

ACTIVITY

Time: 15 min

OBJECTIVE

The objective of this activity is to have the cadets identify habitats of animals and insects.

RESOURCES

Nil.

ACTIVITY LAYOUT

Nil.

ACTIVITY INSTRUCTIONS

1. Guide the cadets around various points on the trail / route, pointing out any signs of animal habitats.
2. Divide the cadets into groups of three and have them look for habitats of animals.
3. After 10 minutes, have the cadets return back to the instruction area.
4. Have the cadets discuss what animal(s) may live in the habitats they have found.

SAFETY

Nil.

END OF LESSON CONFIRMATION

The cadets' participation in the activities will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Being able to identify animals and insects becomes a very important skill in a survival situation. After a few days, the body needs nourishment which can be animals and insects found in the surrounding areas.

INSTRUCTOR NOTES / REMARKS

The directives outlined in CATO 11-08 *Environmental Protection and Stewardship* are to be adhered to during this training.

REFERENCES

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C3-003 ISBN 1-896713-00-9 Tawrell, P. (1996). *Camping and wilderness survival: The ultimate outdoors book*. Green Valley, ON: Author.

C3-150 ISBN 978-0-8117-3292-5 Davenport, G. (2006). *Wilderness survival*. Mechanicsburg, PA: Stackpole Books.

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