NUMERACY
// VOCATIONAL & PATHWAYS LEARNING

VPC 1&2

VCE: VM Units 1&2: From 2023

- ⇨ Literacy VM 1&2: Coursebook & Applied Vocational Booklet
- ⇨ Numeracy VM 1&2: Coursebook & Skills Development Portfolio
- ⇨ Personal Development VM 1&2: Coursebook & Applied Vocational Booklet
- ⇨ Work Related Skills VM 1&2: Coursebook & Applied Vocational Booklet

VPC Units 1&2: From 2023

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- ⇨ Personal Development VPC 1&2: Coursebook & Applied Vocational Booklet
- ⇨ Work Related Skills VPC 1&2: Coursebook & Applied Vocational Booklet

VCE: VM Units 3&4: From 2024

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- ⇨ Numeracy VM 3&4: Coursebook & Skills Development Portfolio
- ⇨ Personal Development VM 3&4: Coursebook & Applied Vocational Booklet
- ⇨ Work Related Skills VM 3&4: Coursebook & Applied Vocational Booklet

VPC Units 3&4: From 2024

- ⇨ Literacy VPC 3&4 : Coursebook & Applied Vocational Booklet
- ⇨ Work Related Skills VPC 3&4: Coursebook & Applied Vocational Booklet

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2023 into 2024 DELIVER Education: Order form for Semester 2 2023. All prices are (GST inc.)

2024 VM & VPC

VCE: Vocational Major

*Note: 3&4 due Nov & Dec '23	Printed Coursebook	Applied Vocational Booklet	Master license PDFs	e-version Master license PDFs	3&4 Interim masters
*Literacy VM: 3&4	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	- Available now
*Numeracy VM: 3&4	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	- Available now
*Personal Development VM: 3&4	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	Available in Oct
*Work Related Skills VM: 3&4	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	- Available now
Literacy VM: 1&2	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	
Numeracy VM: 1&2	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	
Personal Development VM: 1&2	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	
Work Related Skills VM: 1&2	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	

Vocational Pathways Certificate

*Note: 3&4 due Dec '23 & Jan '24	Printed Coursebook	Applied Vocational Booklet	Master license PDFs	e-version Master license PDFs	3&4 Interim masters
*Literacy VPC: 3&4	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	Available from Nov
*Work Related Skills VPC: 3&4	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	Available from Nov
Literacy VPC: 1&2	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	
Numeracy VPC: 1&2	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	
Personal Development VPC: 1&2	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	
Work Related Skills VPC: 1&2	___ @ $49.50	___ @ $27.50	___ @ $385	or ___ @ $495	

Vocational and Work Education Resources

	Printed Book	e-version Master license PDFs
Work Experience Journal	___ @ $22	or ___ @ $165
Work Placement Journal	___ @ $33	or ___ @ $220
PDS Planner: VPC 1&2	___ @ $33	or ___ @ $220
PDS Planner: VM 1&2	___ @ $33	or ___ @ $220
*PDS Planner: VM 3&4 (exp Jan '24)	___ @ $33	or ___ @ $220
Foundation Numeracy	___ @ $44	na
Senior Numeracy	___ @ $44	na

WACE: Career and Enterprise

Career and Enterprise	Printed Text Coursebook	e-version Master PDFs
CAE: General 11 2ed	___ @ $60	or ___ @ $660
CAE: General 12/ATAR 11 2ed	___ @ $62	or ___ @ $660
CAE: ATAR 12 2ed	___ @ $68	or ___ @ $770
CAE: Foundation 11	___ @ $55	or ___ @ $595
CAE: Foundation 12	___ @ $55	or ___ @ $595

VCE: Industry and Enterprise

New editions were released in 2022

I&E Unit 1: Workplace Participation 5ed - book	___ @ $38
I&E Unit 1: Workplace Participation - e-master	___ @ $550
I&E 1&2: Towards an Enterprising You 6ed - book	___ @ $55
I&E 3&4: Towards an Enterprising Australia 5ed - book	___ @ $68

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Numeracy Skills 1

Activities 1: Numeracy Skills		p.	Due date	Done	Comment
1A	**A world of numbers**	3			
1B	**Numbers as pictures**	4			
1C	**My world of numbers**	5			
1D	**Numbers at home**	6			
1E	**Numbers at work**	7			
1F	**Applied numeracy**	9			
1G	**My maths toolkit**				
1H	**Basic calculations**				
1I	**Check your digits**				
1J	**Calculating - Addition**	16			
1K	**Applied addition**	17			
1L	**Calculating - Subtraction**	20			
1M	**Applied subtraction**	21			
1N	**Testing time**	23			
AT1	**Count Up & Count Down:**	24-25			
PST	**Problem-Solving Cycle and Maths Toolkit**	26			

Comments:

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1.01 Introduction

Numeracy 101

Welcome to your studies of Vocational Numeracy so let's get started.

It's a world of numbers out there.

- ⇨ Numbers are used for your time and your travel.
- ⇨ Numbers are used for your work and for your income.
- ⇨ Numbers are used for your shopping and for your personal budget.
- ⇨ Numbers are used for your health and for your personal wellbeing.
- ⇨ Numbers are used for meal preparation and cooking.
- ⇨ Numbers are used for sporting, recreational and social activities.
- ⇨ Numbers are used for measuring, design, practical, technical and trade tasks.
- ⇨ Numbers are used to collect, gather, analyse data and numerical information.
- ⇨ Numbers govern how people work, play and live!

Numerical skills are required for all occupations. Workers in skilled trades need well-developed practical and technical numeracy.

Image: monkeybusinessimages/ iStock/Thinkstock

So you have to build your numerical skills to improve your personal, social, educational and working lives. Let's do it!

One of the key skills related to numeracy is being able to use appropriate numerical words, terms and descriptive phrases.

As a class, discuss examples from your experiences when these might be used.

Numerical Language

- Bigger than (More or greater than)
- Increasing (rising)
- Decreasing (falling)
- Half as much (halve)
- Twice as much (double)
- More expensive (dearer)
- Less expensive (cheaper)
- Longer (Further)
- Shorter (Closer)
- Smaller than (Less than or fewer)

Image: tifonimages/ Depositphotos.com

A world of numbers 1A

1. Match each of these **numbers** to the **correct** numerical **statement**.
2. Discuss as a class by talking about what these numbers **show about the world**.

- ❑ 2.7 people (in 2021)
- ❑ 14 hours 20 minutes
- ❑ 30%
- ❑ 37°C (approx.)
- ❑ 73%
- ❑ 81.7 years
- ❑ 87%
- ❑ 100°C
- ❑ $1,769.80
- ❑ $624,000
- ❑ $921,500
- ❑ $1.08m
- ❑ 25.6 million (approx.)
- ❑ 1.4 billion (approx.)
- ❑ 7.8 billion (approx.)

The population of Australia in 2022 is: _____	**The population of the World in 2022 is:** _____	**The population of India in 2022 is:** _____
Life expectancy for a person born in 2000 in Australia is: _____	**The average house price in Australia is:** _____	**The average weekly wage in Australia as at June 2022 is:** _____
The average sale price of a house in Melbourne as at June 2022 is: _____	**The average sale price of a house in regional Victoria as at June 2022 is:** _____	**The average sale price of a house in Australia as at June 2022 is:** _____
The proportion of workers under 25 in the retail trade industry is: _____	**The proportion of female workers in the education and training industry is:** _____	**The proportion of male workers in the construction industry is?** _____
The flight time from Melbourne to LA is: _____	**The temperature at which water boils is:** _____	**A healthy adult body temperature is:** _____

1.03 Introduction

1B Numbers as pictures

Sometimes numbers can be represented by pictures, graphs, pictograms and other visual images.

1. Each of these **images** refers to one of the numbers from **activity, 1A**. **Match** the **images** with the correct **number**.
2. Create an **image of your own** to **match** one of the other numbers.

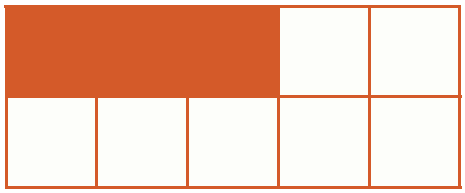
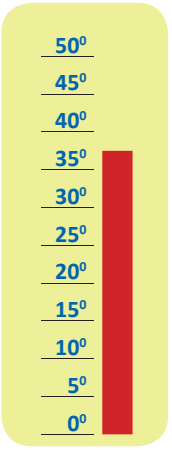


Image: selensergen/ iStock/Thinkstock



My world of numbers 1C

Consider these **situations** that involve **numeracy**.

1. For each one, explain how **numeracy** relates to that **situation**.
2. Describe a specific **numerical example** of that **situation** that relates to you.

Numbers in my life	Explanation	Example
e.g. My health and wellbeing	It is vital that I get enough sleep every night otherwise I get very grumpy.	I need to get 8-9 hours sleep per night which is about 60 hours per week.
e.g. My social life	I love to sing, dance and perform which requires me following timing cues.	I have to count the beats as 8, 16, 24 & 32 so I know when to start dancing my routines.
a. My time		
b. My shopping		
c. My money/ budget		
d. My health and wellbeing		
e. My meals		
f. My sport and recreation		
g. My social life		
h. My measuring		
i. My design (creative tasks)		
j. My practical/ technical tasks		
k. My work tasks		
l. My timetable		
m. My travel		

1.05 Numeracy Skills

Personal numeracy

Numbers play an important role in our **personal** and **home lives**. Families often have to do a lot of counting (addition) so as to:

- ⇨ plan how they live
- ⇨ manage their family
- ⇨ allocate the space in their homes
- ⇨ run a household budget
- ⇨ organise travel and transport
- ⇨ socialise with family members and friends
- ⇨ participate in sport, recreation and leisure,
- ⇨ as well as many other day-to-day tasks and activities that are part of their lives.

"32 squares in the block. I really should stop at 4! Really...!"

What do you do, that involves numeracy?

1D Numbers at home

For each of these numbers (and approximately so the same) give an **example** of how it relates to your **family** (**personal**) **life**. For example:

- ⇨ 2 = We have 2 pets, Rufus the dog and Smithy the cat
- ⇨ 8 = The number of 'screens' in our house: 2 TVs, 2 laptops, 3 phones & 1 iPad.
- ⇨ 10,000 (approx.) = The amount I need to save to buy a car.

1		50 (approx.)	
2		100 (approx.)	
3		1,000 (approx.)	
4		10,000 (approx.)	
5		100,000 (approx.)	
6		7:30am	
7		7:30pm	
8		45 minutes	
9		21°C	
10		10 metres	
20		>3km	

Work-related numeracy

Numbers play an important role in the everyday **working lives** of employees, business owners and customers. Workplace participants need to:

- ⇨ estimate and plan costs and meet budgets
- ⇨ manage staff rosters, opening hours and timetables
- ⇨ plan and organise stock, production and service schedules
- ⇨ collect sales revenue and fees from customers and clients
- ⇨ pay expenses and for inputs
- ⇨ pay wages and salaries
- ⇨ pay GST, income and company tax.

They also have to do many other day-to-day numerical work tasks and activities that are an essential part of working and the commercial world.

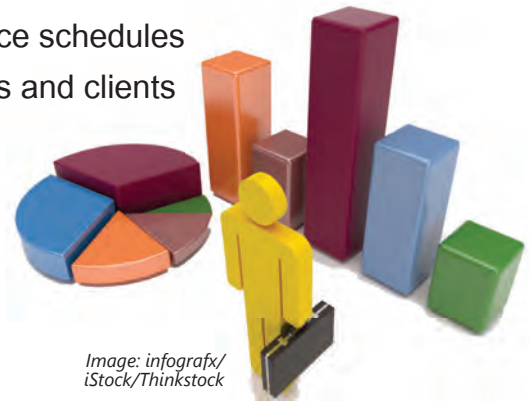


Image: infografx/ iStock/Thinkstock

Numbers at work 1E

For each of these numbers (and approximate) give an **example** of how it relates to your **vocational experiences** and/or the **world of work**. For example:

- ⇨ 4 = The number of hours of a casual shift at my work
- ⇨ 50 (approx.) = The number of workers employed at my workplace.
- ⇨ 10,000 (approx.) = The amount I needed to install a new phone system.

1		50 (approx.)	
2		100 (approx.)	
3		1,000 (approx.)	
4		10,000 (approx.)	
5		100,000 (approx.)	
6		8:30am	
7		5:30pm	
8		60 minutes	
9		1 metre	
10		22kg	
20		>3km	

1.07 Numeracy Skills

Working it out

There are many skills associated with numeracy and these go well beyond simply **adding**, **subtracting**, **multiplying** and **dividing**.

Just like any skill, people have varied levels of numerical capability. And just like any skill, numerical skills can be improved and developed.

Some of you will be at a developing stage of your numeracy. That's fine. The aim of this course is for you to build, improve and develop your skills.

Others of you might have more advanced numeracy skills. Through this course you will consolidate what you already know, and then develop and apply numerical concepts to broader situations.

The aim is to assist all of you to improve your abilit to work with numbers. This will help make you r confident in your day-to-day lives. Hopefully, also make you more **employable** in the l

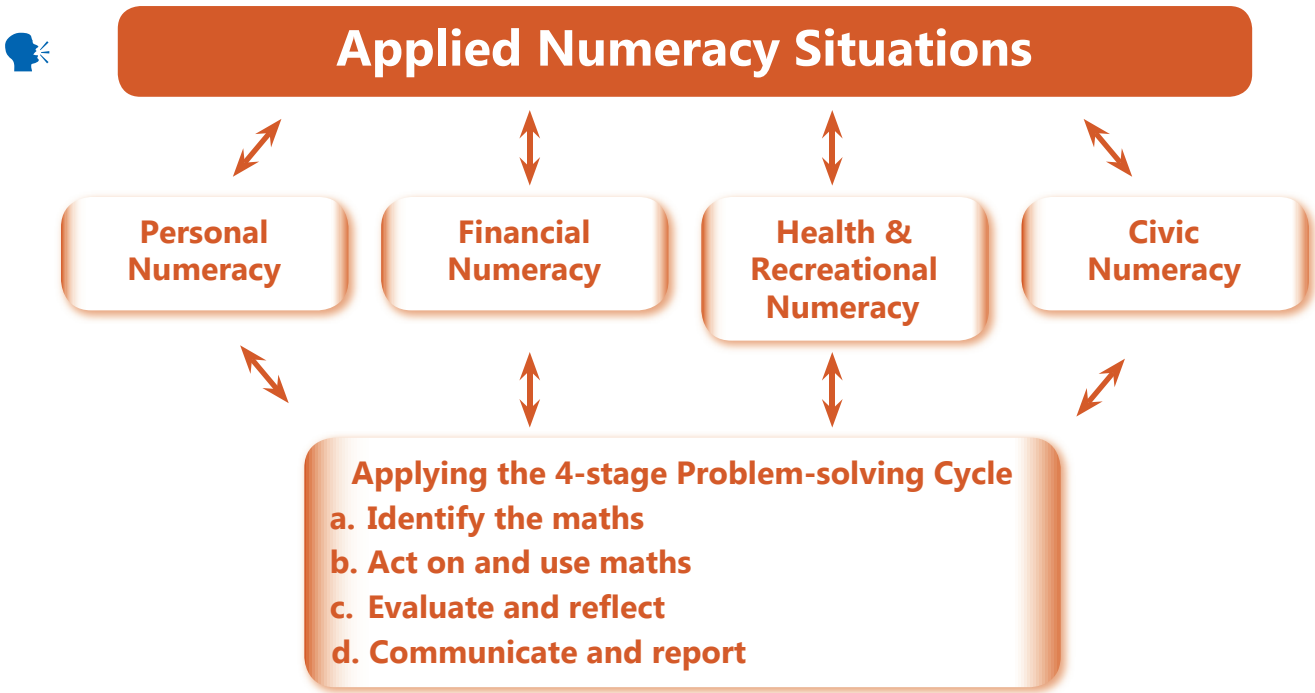
This course is focused on you develo of numeracy skills that will enable you t things out for yourself.

The main skills or topic areas (i below) are explored throughout varied modules over the c

And at all times you will need to appl **4-stage Problem-Solving Cycle** when you are developing and applying the required numeracy skills in these modules.

"I improved my numeracy skills in the classroom by learning how to apply them to the workplace. And when I did work placement this made me a better worker!"

Image: Jochen Sand/ Photodisc/Thinkstock



Applied numeracy 1F

Discuss these images of people from their **personal**, **social** and **working** lives.

1. For each image, briefly **describe** what the **people** are **doing**. **Add** 1 more **image** of your own.
2. For each image, discuss **which** of the 4 **types** of **applied numeracy situations** the people might be using.

Image: monkeybusinessimages/ Thinkstock

Image: Antonio Guillem/ iStock/Thinkstock

Image: Digital Vision/ Photodisc/Thinkstock

Extension: For each image identify a **2nd numeracy situation**. Briefly explain how these numeracy skills are **used together**.

1.09 Numeracy Skills

1 4 PS 2 3

Problem-solving cycle

You will need to apply the **4-stage Problem-Solving Cycle** at all stages throughout the year, for all activities and tasks you do. In the beginning stages, your teacher will guide you through the application of the problem-solving cycle. Then as you develop your numeracy skills, you will be expected to start to apply this cycle independently.

4-Stage Problem-Solving Cycle

1. Identify the maths

Find, identify and interpret the numerical information. Look for:

- ❑ numbers
- ❑ quantities
- ❑ shapes
- ❑ times
- ❑ problems
- ❑ words
- ❑ symbols
- ❑ sizes
- ❑ patterns
- ❑ data
- ❑ images
- ❑ measures
- ❑ directions
- ❑ sequences
- ❑ proportions
- ❑ amounts
- ❑ dimensions
- ❑ angles
- ❑ questions
- ❑ relationships.

2. Act on and use maths

...n the estimates or calculations ...r actions; and apply suitable ...chnologies. Such as:

- ❑ estimating
- ❑ measuring
- ❑ calculating
- ❑ comparing
- ❑ analysing
- ❑ solving
- ❑ making
- ❑ sketching & drawing
- ❑ designing
- ❑ rendering
- ❑ constructing
- ❑ building.

4. Communicate & report

Communicate the results and findings using a range of different methods and media. Consider:

- ❑ selecting
- ❑ explaining
- ❑ describing
- ❑ summarising
- ❑ graphing
- ❑ evaluating
- ❑ words
- ❑ numbers
- ❑ format
- ❑ method
- ❑ media
- ❑ technologies.

4 PS 2 3

3. Evaluate and reflect

Check and review to make sure that the right information is being used and that appropriate maths has been performed. Ask yourself:

- ❑ Did I perform the appropriate steps?
- ❑ Did I apply the correct tools?
- ❑ Does my answer seem correct?
- ❑ What did I do well?
- ❑ Is the result close to my estimate?
- ❑ What do I need to improve?
- ❑ How can I double-check?

Mathematics Toolkit: Analogue // Digital // Technological

Throughout the year you will develop skills in the use of many mathematics 'tools' and resources, as well as other tools and resources that relate more to your own vocational, health and recreational, financial, civic and personal circumstances.

- ❑ Measuring devices
- ❑ Calculators
- ❑ Timing devices
- ❑ Software
- ❑ Apps
- ❑ Spreadsheets
- ❑ Tables
- ❑ Graphing
- ❑ Mapping
- ❑ Counters
- ❑ Designing
- ❑ Making
- ❑ Inputs
- ❑ Scanners
- ❑ Outputs
- ❑ Planners
- ❑ Organisers
- ❑ Rosters
- ❑ Drawing
- ❑ Recordin
- ❑ Processing
- ❑ Data
- ❑ Statist
- ❑ Information
- ❑ Collecting
- ❑ Co
- ❑ Analysing

My maths toolkit 1G

At the start of this year, **what** **maths toolkit**?

Personal maths skills and tools	Work-related maths skills and tools
I can...	I can...
I can...	I can...
I am able to...	I am able to...
I am able to...	I am able to...
I can use...	I can use...
I can use...	I can use...
I can apply...	I can apply...
I...	I...

1.11 Calculating

Calculating

Calculating crosses over with, and is vital to, every other numeracy skill. So you need to develop a suite of basic numerical calculating skills that you can use in **personal** and **vocational** situations.

Numerical calculation is important for:

- personal activities such as doing the shopping, and planning and organising travel and transport,
- financial activities such as buying goods and services, and managing your budget,
- health and recreation activities including cooking using recipes, and following a fitness program,
- community and social (civic) activities including understanding data, and dealing with government information,
- work-related activities such as processing orders when working in a retail store.

Some of the basic functions that you are already likely to know include **addition**, **subtraction**, **multiplication** and **division**.

You might also be able to calculate **percentages** and **fractions**, as well as being able to **measure** temperature, distance and time.

1H Basic calculations

1. Set these out as appropriate **calculations** to apply the maths.
2. Check your answers as part of **evaluation** and **reflection**.

a. 16 minus 8	b. 16 divided by 4	c. 16 plus 16 add 16	d. 16 multiplied by 5
e. Spend $20 5 times a week.	f. Bake a dozen cupcakes each day for a week.	g. Travel for work is 30 minutes each way.	h. Do 50 push-ups on each day in January.

Basic calculations

Basic calculations are those 'sums' that you should generally be able to do in **your head**.

But for more complex problems, you might do those calculations **on paper**. Both these skills require you to **act on and use mathematics**.

In some cases you might need to use a **calculator** for your sums.

However, it is not good to just rely on using a calculator to do basic calculations. You really need to develop skills to do some calculations in **your head**, as well as **on paper**. Then you can **check** these by using a calculator.

Sometimes you have to think on your feet, so being able to do calculations in your head is important. For example, doing the shopping with only $50 for the entire spend!

Sometimes you have to do calculations on paper. For example, if you are working in a shop and the cash register breaks down and you have to add up orders manually.

And of course, you always need to be able to check if the answer the calculator gives you is correct. For example, putting an extra zero at the end of a big number can turn 1,000 into 10,000 very quickly. And that can have disastrous consequences!

It is important to remember that a calculator will only do calculations based on the numbers you enter.

People can make errors when entering data.

You need to be confident that the calculator's answer is correct. This is an important part of being able to **evaluate and reflect**.

So that's why you also have to be able to **predict** and **estimate** using your own in-built calculator - which is your brain!

Check your digits 1I

1. Macey has just done these 'sums' **using a calculator**. Do the answers **seem correct**?
2. Now, **check** the answers **using a calculator**. You might need to do some research.

a.	6 + 6 + 6 + 6 + 6 = 36		b.	5 cans of Pepsi Max = $2.50	
c.	75 - 55 - 25 = -5		d.	3 Big macs = $19.85	
e.	19 x 20 = 480		f.	50 litres of petrol = $75	
g.	10 + 50/5 = 12		g.	Paid $400 a fortnight = $20,800 per year	

1.13 Calculating - Addition

Addition

Addition is the adding of amounts or numbers to get a **total** or a **sum**. Essentially addition involves **counting**.

You might have performed addition problems by one or more of these methods.

To apply the problem-solving cycle, you should know how to use each method effectively. So let's do a recap of these.

Addition (plus or sum or adding) ...shown by a '+' sign

Addition can involve combining two numbers into a **sum**. e.g.

2 + 2 = 4

4 + 19 = 23

1/2 + 1/2 = 1

$75 + $24.95 = $99.95

Addition also involves combining more than two numbers. e.g.

1 + 2 + 1 = 4

17 + 20 + 13 = 50

1/4 + 1/4 + 1/4 = 3/4

12c + 87c + $1 = $1.99

9 + 11 + 55 + 25 = ?

NUM SUPER SKILLS

Physical counting

This involves counting the number of items based on pictures or images; or even counting physical items, objects and people.

For example:

- a teacher will do a **head count** when you are getting on a bus for an excursion
- you might count the number of fish fingers on each plate as part of a meal for four
- you might even count the number of feet while waiting to start your dance moves.

Addition using counting

4 3 5

e.g. Total = 4 + 3 + 5
Total = 12

Total 'sticks'?

Total number of people in this photo?

Image: Iryna Kurhan/ Hemera/Thinkstock

Number lines

Image: Elnur_/ Depositphotos.com

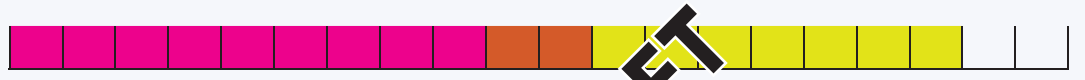
You can make use of a number line to add up a total amount. A number line allows you to **visually** mark out different amounts to 'see' a total.

When you are using **rulers** to measure distance, and **thermometers** to measure temperature, you are actually using a number line.

For example, a tailor or dressmaker may use a soft measuring tape to work out the total amount of fabric they may need. A measuring tape is an applied number line!

Addition: Using a number line

Calculate = 9 + 2 + 7



e.g. 9 + 2 + 7 = 18

Mathematical sums

You can use methods for setting out mathematical sums for addition, especially when the numbers become larger and more complex.

To do this, you set out the problem making sure that the numbers are **right aligned** (see below).

Right alignment ensures that you have numbers of the same **place value** (ones, tens, hundreds and so on) underneath each other.

Then you use an addition method to work out the sum. Your teacher will show you a preferred addition method, and some of you will have already mastered the common methods for doing this. But for now we'll use this method shown below.

Tip: Always perform any calculations in brackets first!

Addition: Using calculations

e.g. Calculate the total of: 17 + 42

```
  17
+ 42
----
  59
----
```

e.g. Calculate the total of: 9 + 46 + 154

```
 1 1
   9
  46
+ 154
-----
 209
-----
```

e.g. Calculate the total of: 23 + 8 + 316 + 115

```
  2
 23
  8
316
+ 115
-----
 462
-----
```

Tip: Do the 1st calculation to get an answer; then do the 2nd calculation to get your final answer!

1.15 Calculating - Addition

1J Calculating - Addition

Complete the following **addition calculations**. Make sure that you show appropriate **workings out**.

a. 9 + 6 =	b. 4 + 28 =	c. 16 + 87 =	d. 72 + 25 =
e. 4 + 19 + 29 =	f. 17 + 13 + 20 =	g. 17 + 13 + 20 =	h. 56 + 0 + 144 =
i. 8 + 7 + 4 + 3 =	j. 8 + 12 + 9 + 16 =	k. 15 + [illegible] + 25 + 35 =	l. 40 + 55 + 20 + 200 =
m. seven plus forty-six =	n. twelve add nin[illegible] =	[illegible] plus [illegible] 17 =	p. the sum of five, fifteen and fifty =
q. $25 + $24.95 =	r. $7 + $7.50 + 45 cents =	s. 3 hours plus 6 hours =	t. 2 hours + 45 mins =
u. 27 cm + 83 cm =	v. 2.5 km + 500 m =	w. 250 gm + 750 gm =	x. $0 + $1m =

Applied

Think of personal or work-related situations where you have to use addition.

When do you need to perform addition? Why?

What methods do you use? What tools and techniques do you use?

How would you rate your addition skills? Why so?

Applied addition

People need to use addition in many personal and vocational situations. Some common situations are listed here. Can you think of some more?

Personal

- Calculating how much food to cook and serve for family meals.
- Adding up the grocery shopping.
- Working out the time it might take to travel between destinations.
- Measuring and calculating the timber needed to make a garden border.
- Counting the number of steps as part of a personal fitness routine.
- Planning a personal diary to balance school, personal and work commitments.

Work-related

- Calculating the total of a customer's bill in a café.
- Adding up total sales for the day.
- Calculating the business costs for a week.
- Adding up wages as a part of a timesheet.
- Planning the time schedule for a courier delivery run.
- Working out how much time is needed to do a specific work task, such as a house painting job.

"I have calculated that to feed 20 people at our BBQ we will need, 40 sausages, 3 loaves of bread, a bottle of sauce and 2 kg of onions. Anything else I might have missed?"

Image: Goodluz/ iStock/Thinkstock

Applied addition 1K

Choose an **occupation** that you are interested in. Describe **situations** when a **worker** needs to use **addition** for their job roles. What '**tools**' do they use for this?

Occupation:			

1.17 Calculating - Subtraction

Subtraction

Subtraction is taking away amounts or numbers to get a total or a sum.

Once again, it involves counting.

In common calculations, subtraction should result in an answer that is smaller than the original. e.g. 25 take away 10 equals 15.

Subtraction problems can also be solved using a number line or by setting out mathematical sums.

Your teacher will go through the examples below, as well as others, with you.

The answer determined by subtraction gives us the difference between the original amount and the new amount. e.g. The difference between 25 and 10 is 15.

Subtraction using physical counting can also result in finding out the difference between an original amount and a new amount. This is often important in work and business situations.

For example, at the start of the day trading we had 100 hotdogs, and at the end we counted that we have 16 left.

The difference is 86 (100 - 16 = 84).

Therefore we must have sold 84 hotdogs (or eaten some, or dropped some on the ground!)

Tip: Always perform any calculations in brackets first!

Subtraction (take away or minus) ...shown by a '-' sign

Subtraction involves taking a number away from another, i.e. finding the difference between two numbers.

4 - 3 = 1

41 - 28 = 13

1 - 1/2 = 1/2

$50 - $27 = $23

Subtraction can also involve taking away more than two numbers. e.g.

3 - 2 - 1 = 0

1 - 1/4 - 1/4 = 1/2

$10 - $5 - $6 = -$1

100 - 50 - 25 - 10 = ?

Tip: When subtracting more than one number you can take the first number away to get an answer, then take the 2nd number away from that answer, and so on. (See p.19)

NUM SUPER SKILLS

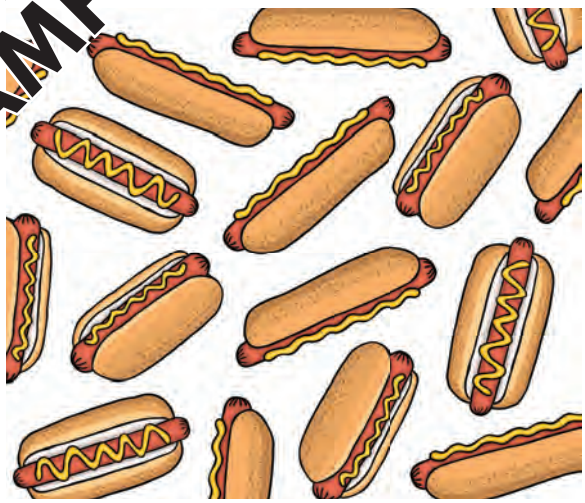


Image: SynchR/ Depositphotos.com

Subtraction: Using a number line

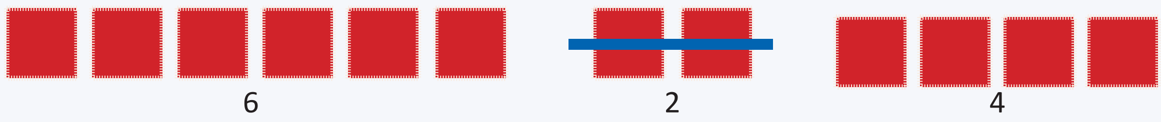
Calculate: 20 minus 13

e.g. 20 - 13 = 7

Physical counting

Just as with addition, this involves counting the number of items based on pictures or images; or even counting physical items, objects and people. But this time the focus is on taking away.

Subtraction: Using counting



e.g. Total = 6 minus 2
Total = 4

Total sticks, 'gone'?

Subtraction: Using calculations

e.g. Calculate the total of: 49 - 17

```
   49
 - 17
   32
```

e.g. Calculate the total of: 144 - 68

```
  0 1 3 1
  1 4 4
 -  6 8
    7 6
```

e.g. Calculate the total of: 95 - 43 - 11

```
   95
 - 43
   52
 - 11
   41
```

Tip: Do the 1st calculation to get an answer; then do the 2nd calculation to get your final answer!

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1.19 Calculating - Subtraction

1L Calculating - Subtraction

Complete the following **subtraction** calculations. Make sure that you show appropriate workings out.

a. 9 - 3 =	b. 24 - 8 =	c. 86 - 17 =	d. 105 - 25 =
e. 50 - 20 - 10 =	f. 87 - 12 - 20 =	g. 100 - 45 - 36 =	h. 156 - 0 - 144 =
i. 8 - 2 - 5 - 1 =	j. 28 - 12 - 9 - 6 =	k. 75 [illegible] 0 - 25 - 35 =	l. 140 - 50 - 40 - 60 =
m. forty minus six =	n. ninety take away thirty =	[illegible] hundred minus 44 [illegible] away 17 =	p. 25 less 10 =
q. $25 - $19 =	r. $10 - $7.50 =	s. 2 and 1/2 hours minus 1/2 hour =	t. 3 and 1/2 hours - 30 minutes =
u. 85cm - 60cm =	v. 2.5km less 500m =	w. 600g - 150g =	x. $1m minus $0 =

Applied

Think of personal or work-related situations where you have to use subtraction.

When do you need to perform subtraction? Why?

What methods do you use? What tools and techniques do you use?

How would you rate your subtraction skills? Why so?

Applied subtraction

People also need to use subtraction in many personal and vocational situations. Discuss those below and once again, can you think of some more?

Personal

- Keeping track of spending in a bank account for a personal budget.
- Taking away the essential bills before working out how much is left over to spend in a household budget.
- Subtracting the travel time when working out how much time you have left when going out for the evening.
- Subtracting how much timber to saw off when making a garden border.
- Subtracting the time taken for school, personal and work commitments as part of a daily schedule.

Work-related

- Making change for a customer paying for a purchase.
- Taking away lunch breaks from actual wo time as part of a timesheet or staff ros
- Calculating how much stock is left of a day's trading.
- Working out a business's pr expenses) for the week.
- Working out how much a work day after answering emails i morning.

"I've blown my budget again. I'm good at the adding part; but not so good at the subtracting part!"

Image: unknown/ iStock/Thinkstock

Applied subtraction 1M

Choose an **occupation** that you are interested in. Describe situations when a **worker** needs to use **subtraction** for their job roles. What '**tools**' do they use for this?

Occupation:			

1.21 Putting It Together

Addition and subtraction

Sometimes you might have to perform calculations that involve both addition and subtraction. This will require more than a one-step calculation process and is a more advanced numeracy skill.

The idea is to deal with two numbers at a time, get an answer and then deal with the next number; and so on.

For example: Addition and subtraction

- ⇨ You have $500 in the bank.
- ⇨ You are paid $100 in wages.
- ⇨ You spend $200 on a new pair of Docs.
- ⇨ You also spend $50 on a present for your mother's Birthday.

How much is left in your bank account?

So let's look at this as a calculation. You can just work left to right.

e.g. $500 + $100 - $200 - $50

= $500 + $100 - $200 - $50

= $600 - $200 - $50

= $400 - $50

= $350

Applied numeracies

People might need to do addition and subtraction types of calculations when they are:

- ⇨ keeping track of time
- ⇨ planning a travel itinerary
- ⇨ managing their bank account
- ⇨ planning a household budget
- ⇨ planning a menu or a function
- ⇨ estimating and measuring materials
- ⇨ working out total people in attendance
- ⇨ making sure they have enough stock for their business.

People also naturally apply addition and subtraction to many other personal and work-related activities.

🗣 Your teacher will discuss these examples with you, but think of some others.

Image: BrianAJackson/ Depsoitphotos.com

Testing time 1N

1. Do the following **calculations** in **your head** or on **paper**. Your teacher will set a time limit.
2. Now do the **same calculations** using a **calculator**. Time this.
3. Estimate how many calculations you have done correctly.
   Your teacher will give the answers after the class has done both tasks.

a.	37 + 92	=	37 + 92	=
b.	56 - 29	=	56 - 29	=
c.	42 + 25 + 60	=	42 + 25 + 60	=
d.	75 - 25 - 25	=	75 - 25 - 25	=
e.	10 + 15 -12	=	10 + 15 -12	=
f.	27 - 12 + 50	=	27 - 12 + 50	=
g.	88 - 9 - 29	=	88 - 9 - 29	=
h.	75 + 25 + 50 - 40	=	75 + 25 + 50 - 40	=
i.	152 + 87	=	152 + 87	=
j.	136 - 37	=	136 - 37	=
k.	$25 + $20 + $15	=	$25 + $20 + $15	=
l.	$150 + $27.50	=	$150 + $27.50	=
m	$100 - $47	=	$100 - $47	=
n.	$200 - $50 + $100	=	$200 - $50 + $100	=
o.	60 minutes + 3 hrs	=	60 minutes + 3 hrs	=
Estimated correct		/15		/15
Total correct:		/15		/15

4. As a class discuss how you went. What were the **patterns** around your own areas of **strength** and **weakness**? What about for the class as a whole?

1.23 Assessment Task

AT1 Count Up & Count Down Personal Numeracy

Overview

For this task you are required to identify items from your personal, home or social lives and document these.

You are required to count up exactly to 50 by identifying these items in your life. The best way to understand this is with an example.

e.g. 4 fingers + 2 pets + 3 siblings + 5 apples + 9 screens, etc..

Once you get to 50 you are required to count down, using different items until you arrive at zero.

Rules

- ⇨ You cannot use the same number more than once when counting-up.
- ⇨ You cannot use the same number more than once when counting-down.
- ⇨ You must select different types of items. (e.g. only one body part, only one fruit, only one electrical product and so on, across both the counting-up of items and the counting-down of items).
- ⇨ You must document the items using images, video, etc..

1 4 PS 2 3

Problem-solving cycle

To successfully complete this activity you must apply each of the 4 stages of the problem-solving cycle where appropriate.

Steps 1&2 mainly involve stages: **A: Identify the maths** ; **B: Act on and use maths** with some **C: Evaluation** .

Step 3 mainly involves stages: **C: Evaluate and reflect** and **D: Communicate and report** ; with some **B: Act on and use maths** .

Report

You must prepare a report that:

- ❑ shows the calculations
- ❑ documents the items using images, video or some other method
- ❑ explains why some of these items are an important part of your life
- ❑ describes how you applied each of the 4 stages of the problem-solving cycle.

Your teacher might also instruct you to present your report to the class using multimedia, a poster or some other method.

Note: Your teacher might add other information including due dates. Record this and other task information.

Note: In the final column, your teacher might also include an achievement level to indicate your level of performance for each part of the task.

Name(s):

Key dates:

Unit 1

Applied generally

Tasks - AT1: Count Up & Count Down	Must Do?	Due by	Done	Level
Step 1: Counting up				
Negotiate the task details with your teacher.	✓			
i. Identify suitable items.	✓			
ii. Complete the counting-up calculations.	✓			
iii. Document the items.	✓			
Step 2: Counting down				
i. Identify suitable items.	✓			
ii. Complete the counting-up calculations.	✓			
iii. Document the items.	✓			
Step 3: Task completion and reporting				
⇨ Prepare a draft of your report.	✓			
⇨ Use appropriate numerical language.	✓			
1 4 PS 2 3 **Describe applied use of the problem-solving cycle.**	✓			
Develop and apply mathematical tools and techniques.	✓			
⇨ **Prepare and submit your final report & documentation.**	✓			
Present a report to the class (if required).				

Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report

Additional information:

Signed: _____ Date: _____

1.25 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task: **Names/Dates:**

AT1 -

1. Identify the maths					
Identify problem(s)	Done: ○ Level:	Recognise maths	Done: ○ Level:	Select information	Done: ○ Level:
Interpret information	Done: ○ Level:	Choose processes	Done: ○ Level:		Done: ○ Level:
2. Act on and use maths					
Perform estimations	Done: ○ Level:	Decide techniques	Done: Level:	Choose maths tools	Done: Level:
Select technologies	Done: ○ Level:	Perform calculations	Done: ○ Level:		Done: ○ Level:
3. Evaluate and reflect					
Check Estimations	Done: ○ Level:	Compare results	Done: Level:	Check processes	Done: Level:
Review actions	Done: ○ Level:	Check logical reasoning	Done: ○ Level:	Assess conclusions	Done: ○ Level:
Communicate and report					
Written processes	Done: ○ Level:	Written results	Done: Level:	Oral processes	Done: Level:
Oral results	Done: ○ Level:	Digital processes	Done: ○ Level:	Digital results	Done: ○ Level:

Mathematical Toolkit					
Analogue tools - What & how?		Digital Devices - What & how?		Software & Apps - What & how?	
Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy

Time and Place 2

Activities 2: Time and Place		p.	Due date	Done	Comment
2A	**What about time**	29			
2B	**It's time**	31			
2C	**Telling the time**	33			
2D	**24-hour time**	34			
2E	**My daily time**	35			
2F	**Converting time**	36			
2G	**Estimating and converting**	37			
2H	**What about place**				
2I	**Preferred directions**	40			
2J	**Different ways**	41			
2K	**Maps: Pathways**	42			
2L	**Maps: Landmarks & scale**	43			
2M	**Whereabouts?**	44-45			
AT2	**Map it Out**	46-47			
PST	**Problem-Solving Cycle and Maths Toolkit**	48			

Comments:

2.01 Personal Numeracy

Personal numeracy

In Unit 1 you will be assessed on your understanding and application of both **Location** and **Systematics** in relation to Personal Numeracy. As part of your learning activities, you are expected to naturally apply the **4-stage Problem-Solving cycle**, as well developing and applying your **Mathematics Toolkit**.

Location

Location involves having an understanding of **space**, **direction** and **location**. In our lives we need to find things (locate), organise things (arrange or plan) and move from one place to another (travel).

Location involves **directions**, travel **routes**, travel **times**, **maps** and even our own **personal space**. Time plays an important part in these tasks so we'll start with a recap.

Location is also very important for vocational situations including getting to work **on time**, organising a safe and efficient **workspace**, deciding how best to service **customers** and **clients** and also organising for **deliveries** and orders.

Systematics

Systematics involves how we can make best use of **technology**, including **devices** and **apps** to help us **plan** and **organise** our personal lives, our educational lives, our social and recreational lives, our work lives and other activities in our life.

Systematics deals with **data** and **information**. Think of your school timetable, a work roster, and a public transport timetable. Lots of important data and information in those.

Data and information involves **inputs** and **outputs**. When using a SatNav you input information - your location and destination - and you get outputs - a travel route and estimated time.

What About Time

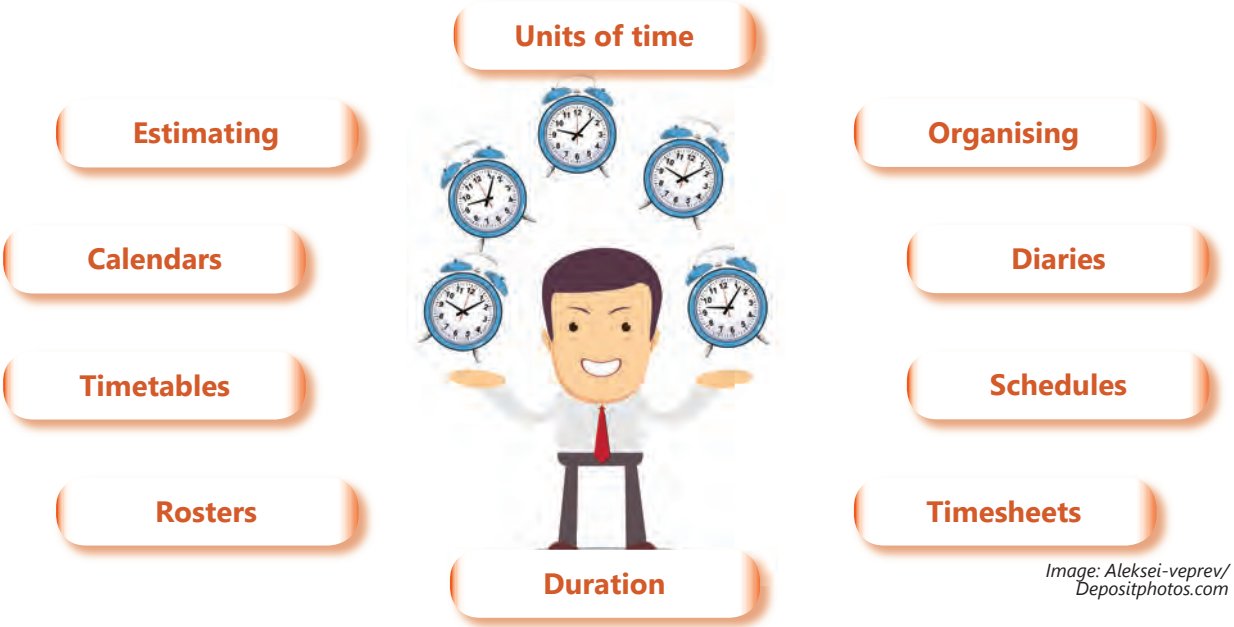


Image: Aleksei-veprev/ Depositphotos.com

What about time 2A

1. Match each of the time **terms**, with the correct **explanation**.
2. For each one, briefly **explain** when this is **important** for **you**.

Term	Explanation	My example
	Seconds, minutes, hours, days, months, years and so on.	
	An organised collection of data that sets out specified times and durations for people, schools transport, and other settings.	
	These are hard copy, digital or app-based tools for recording dates, times, appointments, etc..	
	This means how long something goes for, or the elapsed time.	
	This is a system of days and units used to standardise time.	
	This is the ability to accurately work out how much time a task might take, or how you might need to plan and organise your time.	
	This work schedule shows when, and for how long, employees work.	
	The general term used for a person's varied personal, social, education and work tasks, times and commitments.	
	This is a summary of weekly hours worked and relevant pay rates.	
	This is the ability to accurately plan and arrange your time and your tasks in order to get things done.	

- ❑ calendars
- ❑ diaries
- ❑ duration
- ❑ estimating
- ❑ organising
- ❑ schedule
- ❑ rosters
- ❑ timetables
- ❑ timesheets
- ❑ units of time

2.03 It's Time

Time

How well do you relate to time?

Image: cindygoff/ Depositphotos.com

At this stage of the unit it is important to develop some essential numerical skills related to time.

Time is simply a method of counting.

Time breaks **duration** down into equal amounts.

Our contemporary 'Western' time system uses **units of time** such as seconds, minutes, hours, days, months, years, etc.. This system is based on the Gregorian calendar of 1582.

A **day** has a duration of 24 hours. This is the approximate time it takes the earth to rotate on its axis.

The 24-hour day is thought to originate from an ancient Egyptian method of base 12 counting, and reflects the use of a sundial.

An **hour** is broken into 60 **minutes**, each of which is broken into 60 **seconds**. So there are 86,4[illegible] seconds in a day (60 x 60 x 24). That's a lot of [illegible]s to use wisely.

A **year** is 365 days.

This is the approximate time it takes the Earth to orbit The Sun!

This orbit actually takes about 6 extra hours per year, hence we have a **leap year** every four years to 'add' this extra day (4 x 6 hours)!

Time is the only **resource** that we all have the same amount of.

We each have 24 hours a day, 7 days a week, 52.18 weeks a year and about 82 years a lifetime (on average).

So how do you use your time?

Sing it loud, sing it proud

Hit songs with time in the title! Who sung these and when?	**Hit songs about time**! Who sung these and when?
⇨ Time After Time	⇨ Treaty
⇨ The Times They Are A-Changin'	⇨ Cats in the Cradle
⇨ Sign of the Times	⇨ 9 to 5
⇨ (I've Had) the Time of My Life	⇨ Nothing Compares to U
⇨ If I Could Turn Back Time	⇨ Leavin' on a Jet Plane
⇨ Time is on My Side	⇨ Yesterday
⇨ Time Warp	⇨ Tomorrow
⇨ Summertime	⇨ Forever Young
⇨ Time	⇨ What You Waiting For

Do you have any fave' contemporary performers who sing about time?

It's time 2B

1 4 PS 2 3

1. Match each of these **terms** to the correct **statement** related to **time**.
2. Discuss by talking about how these concepts relate to **your own lives**.

❑ 24-hour time	❑ calendar	❑ ETA	❑ seconds
❑ am	❑ days	❑ hours	❑ time zones
❑ analogue	❑ digital	❑ minutes	❑ wage
❑ appointment	❑ duration	❑ pm	❑ week

There's just over 52 of these in a year.
_____

There's 60 of these in a minute.
_____

There's 60 of these in an hour.
_____

There's 24 of these in a day.
_____

There's usually 365 of these in a year.
_____

This is the 'number' type of time.
_____

These letters mean before midday.
_____

These letters mean midday.
_____

This is the 'clock-face' type of time.
_____

This is the 'continuous number' showing of time.
_____

This is the amount paid to workers for hours worked.
_____

This term describes when something is expected to arrive.
_____

This is a system of days and dates used to standardise time.
_____

This word describes how long something goes for.
_____

You need this to book another person's time.
_____

This sets out relative time based on where you are in the world.
_____

2.05 It's Time

'Telling' the time

Time can be commonly shown in **analogue** terms using hands and numbers on a 12-hour clockface or a manual watch, or in **digital** terms using numbers.

Some people prefer to use **24-hour time**. Time is also the 4th dimension!

Analogue time

Analogue time generally refers to the traditional method of 'telling' time as shown on a clock or on a watch.

Analogue time uses a **12-hour clockface** with an hour hand, a minute hand and sometimes even a second hand.

Many people use analogue timepieces in their professions, including doctors and nurses who may have to count seconds. Some people such as pilots and divers prefer analogue timepieces for their **precision**.

Digital time

Digital time is now the most common way of telling time. People use **digital devices** such as their mobile phones, digital clocks, digital watches and other time devices to read time in a numerical format.

Digital devices normally also indicate am or pm.

24-hour time

24-hour time treats the day as one 24-hour period and counts the hours from 0 to 24 (or 23:59:59).

The day starts at 0:00 hours (which is midnight) and goes through to 24:00. (Note: 24:00 is also regarded as midnight).

12:00 hours is midday. 13:00 hours is 1pm and so on. Each pm hour adds 1 to the number 12.

Sometimes 24-hour time is communicated as "14 hundred hours" (i.e. 2pm in Army time!).

Many industries use a 24-hour clock to communicate and record **work time** for activities associated with **rosters**, work shifts, **transport**, automated tasks and many other work-related activities.

AM and PM

a.m. refers to the time between 12:00pm (midnight) and 12 (noon). am stands for ante meridiem (before midday).

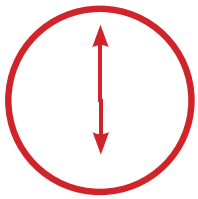
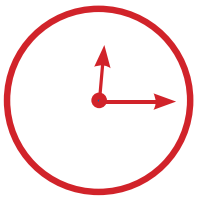
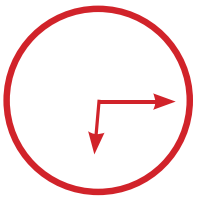
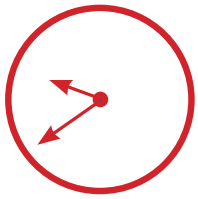
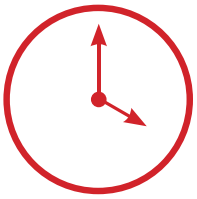
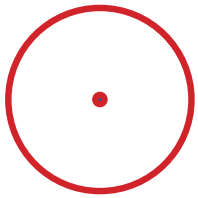
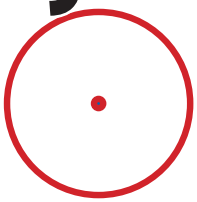
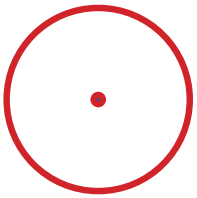
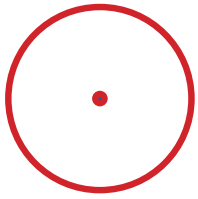
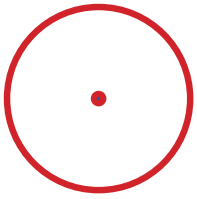
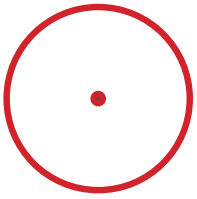
p.m. refers to the time between 12:00 noon and 12 midnight. pm stands for post meridiem (past midday).

You can write 'a.m'. and 'p.m.' as just **am** and **pm** without the full stops.

So there you have it. A basic refresher of time. So time to put your knowledge to the test with a few activities to apply your skills.

1. Interpret these **analogue** clockfaces to estimate the **time**. (You might want to show key numbers on the clockface to help you).
2. Show the **correct time** on the **blank** clockfaces.

   Tip: Remember that the hour hand does move continuously between numbers (but slightly) as the minute hand goes around an hour.

		
		
 7:30	 10:15	 Half past nine
 A quarter to four	 Noon	 The current time

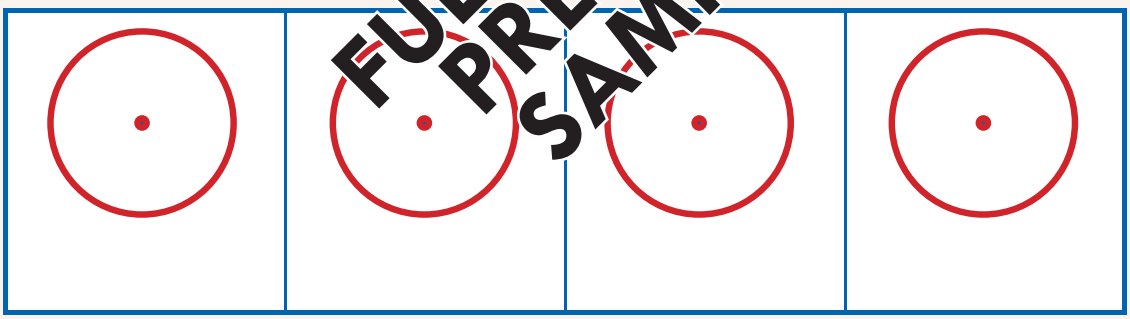
2.07 It's Time

2D 24-hour time

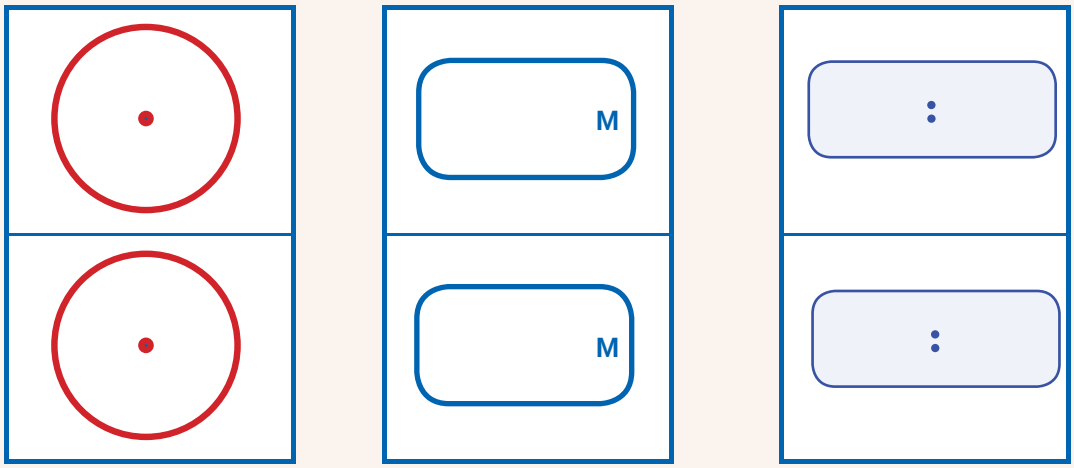
1. Use the signifiers of **am** and **pm** to interpret these **24-hour digital displays** as 12-hour time.

13:00	15:30	21:45	23:17
07:00	03:45	11:30	20:15
19:00	00:00	12:00	24:00

2. Choose **4** of the **24-hour** examples above and **show** the correct **time** on a **12-hour clockface.** Make sure to also include **am** or **pm**.



3. What **time** do you usually **get up** and **go to bed**? Show these times on a 12-hour **clockface**, as **digital** time, and as **24-hour** time.



My daily time 2E

1 4 PS 2 3

1. So how does **time impact on your life**?

   Consider your personal life, your school life, your working life, your social life, your family life and your recreational life.

2. For each of these different aspects of your life, identify **3 examples** when **time impacts** on, or **influences**, what **you do**.

   e.g. School: - On a school day I have to get up at 7am.
   - The school day goes from 8:45am to 3:30pm.
   - On my VET day I have to be at TAFE by 8:30am.

My personal life	My school life	My working life
i.	i.	i.
ii.	ii.	ii.
iii.	iii.	iii.
My social life	**My family life**	**My recreational life**
i.	i.	i.
ii.	ii.	ii.
iii.	iii.	iii.

Discussion

As a class develop a list of **strategies** and **tools** and **apps** that you could use to help you **organise**, **plan** and **use your time better.**

2.09 Converting & Estimating Time

Converting time

At times we have to convert **hours** into **minutes**, or minutes into hours, or even **minutes** into **seconds**; as well as other conversions using units of time. This is a very important skill when it comes to estimating, organising and planning for how long tasks might take, or for estimating, calculating and planning the duration of **travel** journeys.

The major units for recording time are hours, minutes and seconds. But the breakdown for counting time is different from our usual decimal counting method.

With hours, minutes (and seconds) we need to remember that there are 60 seconds in a minute and 60 minutes in an hour. So:

- ⇨ 1 full hour is 60 minutes
- ⇨ 1 half of an hour is 30 minutes
- ⇨ 1 quarter of an hour is 15 minutes
- ⇨ 3 quarters of an hour is 45 minutes
- ⇨ 1 full minute is 60 seconds
- ⇨ 1 half of a minute is 30 seconds (and so on...)

Image: jordygraph/ Depositphotos.com

2F Converting time

Complete the following **time** conversions:

a. What is 1 hour in minutes?	b. What is [illegible] hours in minutes?	c. What is 1 hour 15 minutes in minutes?	d. What is 4 and 1/2 hours in minutes?
e. What is 4 hours in minutes?	f. What is 20 hours in minutes?	g. What is 2 1/4 hours in minutes?	h. What is 1 day in minutes?
i. What is 120 minutes in hours?	j. What is 180 minutes in hours?	k. What is 330 minutes in hours?	l. What is 495 minutes in hours?
m. What is 600 minutes in hours?	n. What is 960 minutes in hours?	o. What is 990 minutes in hours?	p. What is 15 minutes in hours?

Estimating duration

Sometimes you have to estimate time to better **plan** and **organise** your life.

This is a skill that requires you to estimate how long a task will take, or how long travel times might be, or even how much time you spend on particular tasks.

Estimating time is about using numerical skills to estimate, or even calculate, the **duration** for tasks. This is very important for cooking. You don't want to burn the roast!

A simple explanation of duration is how much time something takes to do. e.g. A train journey from Melbourne to Geelong might equal 63 minutes.

It is also important to develop skills in estimating and calculating total time, or accumulated time, over a number of hours, days or weeks. e.g. Maindi spends 2,912 hours per year checking her 'socials'. What about you?

Estimating and converting 2G

1 4 PS 2 3

1. Make **estimates** of the **duration** for these tasks
2. Then **convert** your **estimates** into the most appropriate **units** of **time**.
3. Write or record your final answer, as your teacher will have students share their results with the class.

a. How long it takes you to get to school?	b. How long you spend getting to school for the entire week?
c. How much time you will spend today on social media?	d. How long you will spend on social media this week?
e. How much time you will use to exercise today?	f. How much time you will spend exercising this week?
g. How long will it take you to make a toasted sandwich?	h. How long would it take you to make a toasted sandwich lunch for the whole class?
i. How long will it take you to get to the nearest beach?	j. How long will it take you to travel to the Gold Coast?

NUMERACY 5

2.11 Personal Numeracy - Location

Location

Location refers to where something or someone is.

We need to understand location relative to where we are, and to where others are.

Having this **spatial understanding** will enable us to better navigate the world.

Spatial understanding is very important for work-related situations as well. Some jobs rely heavily on location and getting around, such as train, bus and tram drivers, delivery and courier drivers, paramedics, pilots, sportspeople and many other job roles.

Understanding location often involves using **directional** words that are relevant to our position.

It's a big country you know.
So how do we know where to go?

Image: hobbitt_art/Depositphotos.com

These can include words such as "left" or "right", "up" or "down", "over there", "behind", "in front", "beside", "here", or even "up the street or around the corner"!

We can say that these types of descriptions describe the **relative position**.

We also use **descriptors** that give an indication of how far, such as "pretty soon", "3-blocks", "half-a-kilometre", "in 5 minutes" or simply even, "go just up the street and you'll find it"!

And of course, we can also rely on our **digital helpers** to do the hard work for us. Where am I going? Let's just tap the location into my phone and bingo - I'm off.

So what about you? What do you use to help you understand location and get around?

What About Place

- Location
- Directions
- Distance
- Estimating
- Planning
- Hard copy maps
- Digital maps
- Navigation
- Landmarks
- Travel & transport

Image: tashatuvango/ Depositphotos.com

What about place 2H

1. Match each of the **location** terms below, with the correct **explanation**.
2. Briefly explain how **you** have used this, or could (or should) use this.

Term	Explanation	My example
	Simply - where something is.	
	Making a quick or rough approximation of travel distance, or travel time, or both.	
	Places of interest, importance or prominence that can be looked for to help in navigation.	
	Way and means, including vehicles, of getting from one place to another.	
	GPS, SatNavs and other positioning devices.	
	How far (or how long) a journey is, usually measured in length and/or time.	
	Using techniques and 'tools' to formulate expected travel routes, times and an itinerary.	
	The act of 'getting around', working out a travel route, using journey markers, taking directions, etc..	
	Instructions on where to go; sometimes using location or compass pointers.	
	Paper and physical maps such as street directories.	

- ❑ digital maps
- ❑ directions
- ❑ distance
- ❑ estimating
- ❑ hard copy maps
- ❑ landmarks
- ❑ location
- ❑ navigation
- ❑ planning
- ❑ travel and transport

2.13 Getting Around

Directions

A very important set of numerical skills includes the ability to be able to give and follow directions to find your way (**navigate**) around. Giving and following directions is applied use of the problem-cycle in action. Directions may be in these forms.

- **Oral:** Verbally, such as asking someone the way to the nearest train station.
- **Written:** By following a sequence of directions from a starting point to a destination.
- **Visual:** Using a print or digital map to find your way around a location, such as using a store layout map when in IKEA.
- **Digital:** Using GPS in a car, or a maps feature, or an app on your phone to find key landmarks while on holiday in an unfamiliar city.
- **Physical:** Showing, pointing or leading someone so as to 'act out' appropriate directions.

When we both give and receive instructions we usually use a combination of these methods. However, people have different communication styles; and also different preferred learning styles for understanding information.

Some people like to be shown, some like to be told, some like to follow a map while others simply just like 'being lost' and stumbling upon something new!

So what type of method for 'directions' do you prefer to use when you are trying to get around?

2I Preferred directions

Comment on each of the methods (for or against) to describe your **preferences** for **giving** and **receiving directions**. Describe an example for each method.

Method	Explanation for me	Example
e.g. Digital	I like to use a map on my phone because I can set my location and see the directions on my screen.	When I travelled to my appointment for work experience in the city I put the address in my phone and followed its directions very easily.
Oral		
Written		
Visual		
Digital		
Physical		

There to here and back again

Sometimes we know how to **navigate** around familiar places because we have done it before. For example, you know how to get from your home to school, and back again. Even if you use different travel methods and routes.

But think back to the first time you had to navigate your journey. How did you work out your travel route? A map? An app? Did someone show you? Did someone take you?

So, now that you are experienced, how would you 'show' someone how to get from there to here, and back again?

Different ways 2J

1 4 PS 2 3

1. Create a **map** that shows your usual **journey** from your **home** to **school**.
2. What types of **information** and **landmarks** should you **show** on your **map**?
3. On your **map**, show a **different** travel **journey** that you can use **to get home**.
4. Why might **people** travel **one route** to get to a destination, and then a travel **different route** to **get back** again? Discuss examples as a class.

Start to plan your map and journeys below.
Then create your final map using large paper, or multimedia.

2.15 Getting Around

Using maps

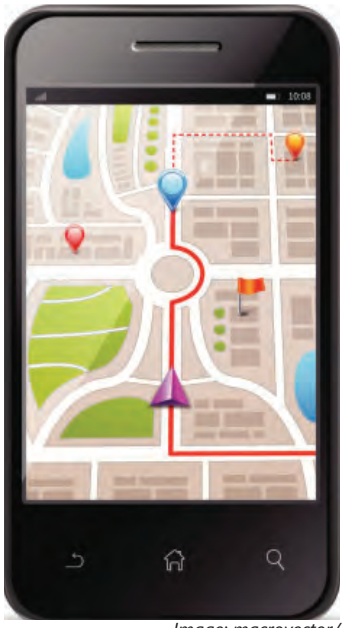


Image: macrovector/ iStock/Thinkstock

Whether you are using maps to get around or you are drawing a map to help others, you have to make the map functional so that it can be effective.

This means that the map must **guide** the person about how to get from their origin to their destination.

The map should also be **efficient**.

This means that the map needs to enable the person to quickly and easily work out how to get from their **origin** to their **destination**.

Three key mapping features that make a map more usable (i.e. both more effective and more efficient) are **pathways**, **landmarks** and **scale**.

Pathways

When using or making a map, you are likely to trace a travel route (or a pathway). A pathway is the **route** that includes the ways to get from 'point A' to 'point B'.

A person might mark the route on the map that they are going to follow. Or they may trace it with their finger to commit this information to memory.

GPS, street directories and map pathway routes might include roads, streets, highways, freeways and other paths of travel.

Many GPS and e-devices will come up with a pathway route when you enter in your destination. These devices might also communicate the route aloud. In fact many people follow these **verbal instructions** when travelling.

Pathways are also important as escape routes for emergency **evacuation** procedures. Have you noticed any of these, usually as green arrows, around your school?

Pathways might also include public transport routes, bike paths, pedestrian traffic areas, waterways, terminals and exchanges (e.g. airports) and so on.

2K Maps: Pathways

What is a map '**pathway**'?	Why is a map **pathway important**?

Features and landmarks

Image: tovovan/ iStock/Thinkstock

Most maps will include common or key features or landmarks.

These **landmark** features might include places of interest, government buildings and services, emergency facilities, green areas, schools, signs and other distinguishing and useful features.

Landmarks might be located in the correct spot on the map, but may not be drawn to scale.

These map **features** help people by getting them to look out for key landmarks that they might notice on their journey. For example:

- ⇨ "If you reach the canteen then you've gone too far."
- ⇨ "Turn left at the traffic lights."
- ⇨ "When you come to the double-storey house k[illegible] going, because mine is three doors down."

So, if you can find features and landmarks wh[illegible] getting around - then problem-solved!

Scale

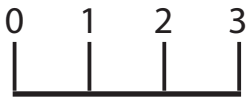
Most maps are usually drawn to scale. This means that the distance shown on the map corresponds with a distance in real life.

Scale allows the user of a map to make a visual estimate of travel distance and time. Therefore it helps us to get our spatial bearings. However, not all maps are drawn to scale, nor do they need to be.

So when you are using a map see if it is **to scale**, or **close to scale**.

Also, if you are constructing a map, then try to make it close to scale so that people can **estimate** approximate distance and time. Your teacher will help you with this.

Scale = 1:100
1 cm = 1 m



Maps: Landmarks & scale 2L

What are map '**landmarks**'? How are map landmarks **useful**?	What is a map **scale**? How does a scale **help** a map **user**?

2.17 Putting it Together

2M Whereabouts?

1 4 PS 2 3

Use the **map** below to identify the **location** of the **features** and **landmarks** and other **information** in the table on p.45.

- ⇨ The map is not exactly to scale, but it is pretty close.
- ⇨ Of course, the size of people, vehicles and other features may not be that large - especially the duck - ducks don't come that big!
- ⇨ You could do this working in pairs, but each of you should fill in your own table. If you need more space, enlarge the table, or use your workbooks.

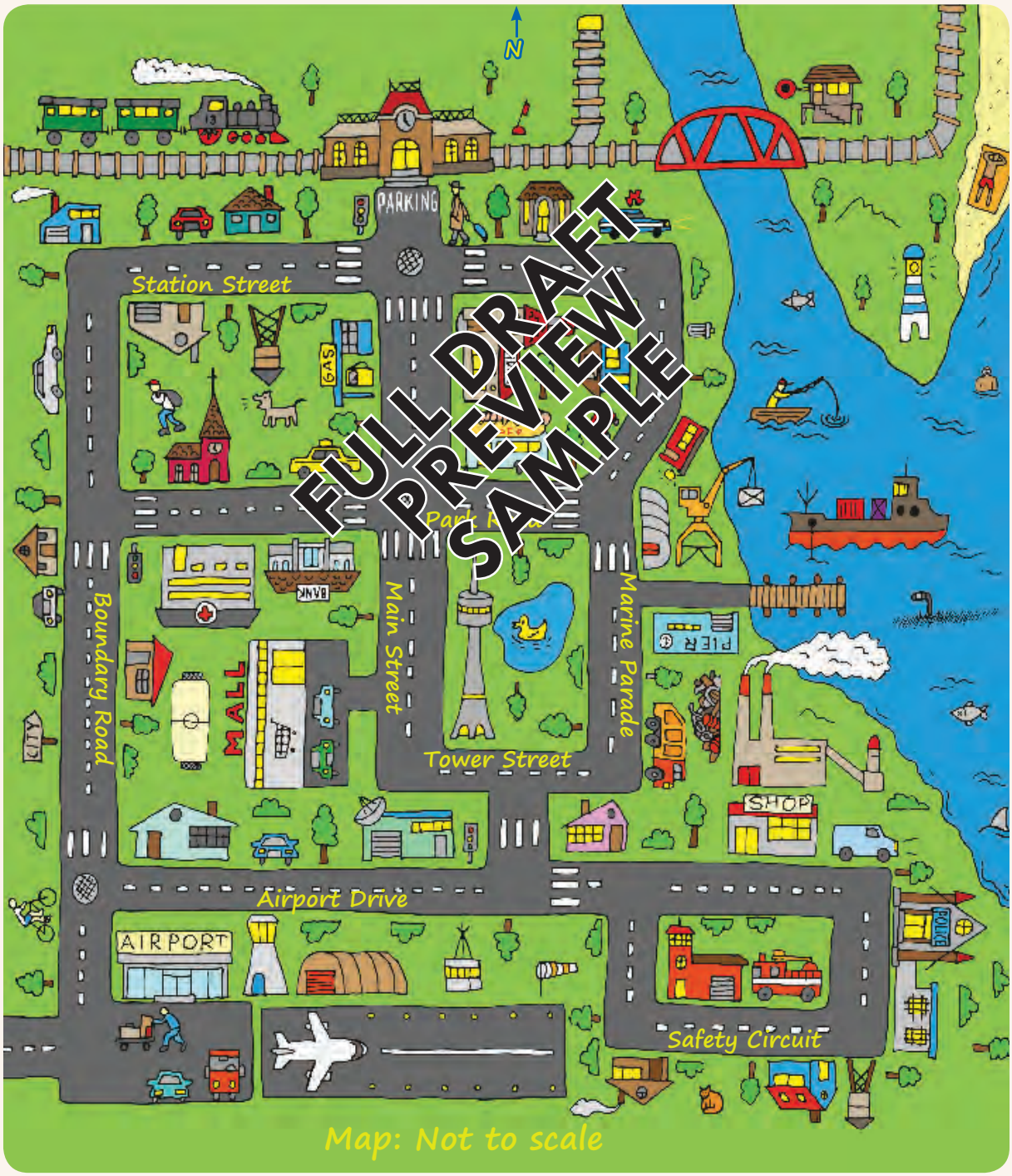


Image: WINS86/Depositphotos.com

On which 'roadway' is the train station?	On which 'roadway' is the fire station?	On which 'roadway' is the pier?
On which 'roadway' is the airport?	On which 'roadway' is the shopping mall?	On which 'roadway' is the hospital?
On which 'roadway' is the petrol (gas) station?	On which 'roadway' is the garbage tip?	On which 'roadway' is the city edge?
On which 'roadway' is the church?	On which 'roadway' is the police station?	On which 'roadway' is the viewing tower?
What is the nearest intersection to the hotdog van?	What is the nearest intersection to the church?	What is the nearest intersection to the duck pond park?
What is the nearest intersection to the railway bridge?	What is the nearest intersection to the bank?	What is the nearest intersection to the taxi rank?
Which 'roadways' run north-south?	Which 'roadways' run east-west?	On which side of town is the water?
On which side of town is the boundary?	At which end of town could you enter and leave via roadway?	The train only runs in one direction. From which direction does it enter town?
What is the direction of the police station relative to the hospital?	What is the direction of the airport relative to the train station?	What is the direction of the shipping port relative to the airport?

Give directions for someone walking from the mall to the police station.	Give directions for someone driving from the airport to the hotel.
Assume Boundary Road is 1km long. How long might it take to walk, cycle and drive?	Assume Park Road is 0.5km long. How long might it take to walk from the hospital to the tip?
Where is the no-though road? Why?	Is there any vehicle access allowed between Tower Street and Airport Drive? Explain?
Where's the beach? How could you get to it?	Where should you avoid swimming? Why?

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2.19 Assessment Task

AT2 Map it Out
Personal Numeracy: Location

Overview

You are going to **create a map** that directs a friend from your school to your home.
Note: Your teacher might change the 'location' and/or the 'destination'.

You should construct your final map using multimedia or your hand-design skills.

1 4 PS 2 3

At all stages of this task you will need to apply the 4-Stage Problem-Solving Cycle:
1 Identify the maths 2. Act on and use the maths 3. Evaluate and reflect 4. Communicate and report.

You will also have to use, develop and apply tools and techniques from your **Maths Toolkit**.

a. Find out the **travel mode** the person is using.
i.e. Are they walking, riding, using public transport, etc.?

b. Find out if the person has any **access or mobility** issues or needs.
i.e. Consider distance, wheelchair accessibility, stairs, etc. when designing your map and planning a suitable pathways route.

c. Estimate the **distance** and **time** travelled.
Determine if the distance is too far for the travel mode.
If required, recommend other methods of transport that might be needed.

d. Decide the **size** and **scale** of your map.
Your map doesn't have to be exact.
But if you are good at design you might make the map close to scale.

e. Trace a **pathways route** on your map.
Consider labelling key routes, roads, pathways, etc.. You should also include some estimates of distances and/or times.

f. Show some key **landmarks** on your map.
These will help the person navigate the route more easily.

g. Add **instructions** such as turn left, travel north, etc..
Choose suitable language that suits you and the user. (i.e. How many people know which way is north when they are walking down the road?)

h. When finished, **compare** your map to an **analogue** or a **digital** map.
How did you go? What was good about your map and not so good?
How could you improve your mapping skills for the future?

Note: In the final column, your teacher might also include an achievement level to indicate your level of performance for each part of the task.

Name(s):

Key dates:

Personal Numeracy
Location Module 1

Tasks - AT2: Map it Out	Must Do?	Due by	Done	Level
Task planning				
Negotiate the task details with my teacher.	✓			
⇨ Decide on the location and the destination.	✓			
a. Find out travel mode.	✓			
b. Identify access or mobility issues.	✓			
c. Estimate distance and time	✓			
Step 2: Create my map.				
d. Size and scale.	✓			
e. Pathways route.	✓			
f. Landmarks.	✓			
g. Instructions.	✓			
Step 3: Task completion and Reporting				
h. i. Compare my map to existing maps.	✓			
h. ii. Evaluate quality of my map.	✓			
⇨ Use appropriate numerical language.	✓			
1 4 PS 2 3 **Describe applied use of the problem-solving cycle.**	✓			
Develop and apply mathematical tools and techniques.	✓			
⇨ **Prepare and submit my final map & documentation.**	✓			
Present a report to the class (if required).				

Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report

Additional information:

Signed: _____ Date: _____

2.21 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task: **Names/Dates:**

AT2 -

1. Identify the maths					
Identify problem(s)	Done: ○ Level:	Recognise maths	Done: ○ Level:	Select information	Done: ○ Level:
Interpret information	Done: ○ Level:	Choose processes	Done: ○ Level:		Done: ○ Level:
2. Act on and use maths					
Perform estimations	Done: ○ Level:	Decide techniques	Done: Level:	Choose maths tools	Done: Level:
Select technologies	Done: ○ Level:	Perform calculations	Done: ○ Level:		Done: ○ Level:
3. Evaluate and reflect					
Check Estimations	Done: ○ Level:	Compare results	Done: Level:	Check processes	Done: Level:
Review actions	Done: ○ Level:	Check logical reasoning	Done: ○ Level:	Assess conclusions	Done: ○ Level:
Communicate and report					
Written processes	Done: ○ Level:	Written results	Done: Level:	Oral processes	Done: Level:
Oral results	Done: ○ Level:	Digital processes	Done: ○ Level:	Digital results	Done: ○ Level:

Mathematical Toolkit					
Analogue tools - What & how?		Digital Devices - What & how?		Software & Apps - What & how?	
Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy

Location and Planning 3

Activities 3: Location and Planning		p.	Due date	Done	Comment
3A	**Location & planning**	51			
3B	**Compass directions**	52			
3C	**Language of location**	54-55			
3D	**Personal space**	56-57			
3E	**Tour guiding**	58-59			
3F	**Distance and time**	61			
3G	**Apps v maps**	62			
3H	**Travel**	[illegible]			
3I	**Distance and time II**	6[illegible]65			
3J	**Calendars & diaries**	67			
3K	**To-do list**	68			
3L	**Timetables**	69			
3M	**Rosters**	71			
AT3	**'Appy Birthday**	72-73			
PST	**Problem-Solving Cycle and Maths Toolkit**	74			

Comments:

3.01 Location and Planning

Personal Numeracy

In this section, you will continue to develop your skills related to **location**, and apply these skills to **personal** and **vocational** situations.

You will also investigate the use of **systematics** to help you **plan**, **organise** and **schedule** various activities that people are expected to do in their lives.

Once again you are expected to naturally apply the **4-stage Problem-Solving Cycle** when completing Personal Numeracy activities, and add more tools and techniques by further developing and applying your **Mathematics Toolkit**.

Here are some key numerical skills that you will develop and apply. Your teacher might also focus on others.

- ⇨ Knowing and understanding deadlines.
- ⇨ Estimating, planning, and organising personal time.
- ⇨ Organising and balancing personal commitments and responsibilities.
- ⇨ Using calendars, dairies and to-do lists.
- ⇨ Understanding schedules, rosters and timetables.
- ⇨ Investigating places, maps and distances.
- ⇨ Reading, using and making maps.
- ⇨ Planning a travel route.
- ⇨ Finding landmarks, and interpreting symbols and scales.
- ⇨ Giving and following directions.
- ⇨ Estimating, planning, and organising travel time.
- ⇨ Estimating distance and travel times.
- ⇨ Comparing travel options, times and costs.

Image: Dynamic Graphics/ Thinkstock.com

Location & planning 3A

1. Describe an **example** of how each of these **location and planning terms** can help you in your life.
2. Identify the types of **information/apps/tools** and other things that you make use of, to help you with each of these location and planning terms.

Term	Explanation	Information/apps/tools
routes		
maps		
directions		
timetables		
deadlines		
timelines		
diaries		
distance		
private transport		
public transport		
travel time		
travel cost		

3.03 Describing Location

The language of directions

When giving and following oral directions we often use, and listen for, certain language to describe 'where' and 'how' related to location and directions. We also often combine oral directions with physical gestures such as pointing.

Compass directions use terms such as north, south, east and west, or north east, south west and so on. But most of us usually don't use this more formal way of speaking. And many times we don't even know which direction is which, unless we have a map, or have prior knowledge of an area. But when we hear about the direction of the wind on the weather report, compass directions can tell us a lot!

As you know, we can make use of **directional** words that are relevant to our position such as "left" or "right", "up" or "down", "over there", "behind", "in front", "beside", "here", or even "around the corner". We can say that these types of descriptions describe **relative position**.

We also use **descriptors** that give an indication of how far, such as "pretty soon", "2-blocks", "200m", "in 3 minutes" or simply even, "just go down the corner and you'll see it."

So what type of language do you prefer to use to describe location and how to find your way around?

3B Compass directions

1. Label the **compass points** with the appropriate **directions**.

2. Using a **compass**, place this **page** flat on the **desk in front of you**. Use the compass to draw an **arrow showing north** on this page. In which direction is your home?
3. The **school** will be the **opposite direction** to your home. What direction is that?
4. In which **direction** is the **city**? From which **direction** is the wind **blowing**?

Location

It is important that you develop a vocabulary of location to enable you to accurately describe the **relative position** of people, features and objects with one another.

Correct terminology assists when **following** and **giving directions**, when helping people deal with spatial issues; in sport and recreation, as well as in work-related situations such as helping co-workers to use equipment, or to position themselves around work stations, or when guiding a customer to find different items in a store.

At times it is important to consider your own **perspective**. If you are facing someone then your left is right for them. To overcome this people sometimes face the same way when giving directions. Do you?

Image: Oksana_L/ Depositphotos.com

3.05 Describing Location

3C Language of location

1. For each of these **situations** use appropriate language to **describe** the **relative position** of the people, objects and equipment shown. e.g. Left, right, behind, next to, and so on! You choose the language that suits.

Image: Thomas Northcut/ DigitalVision/Thinkstock

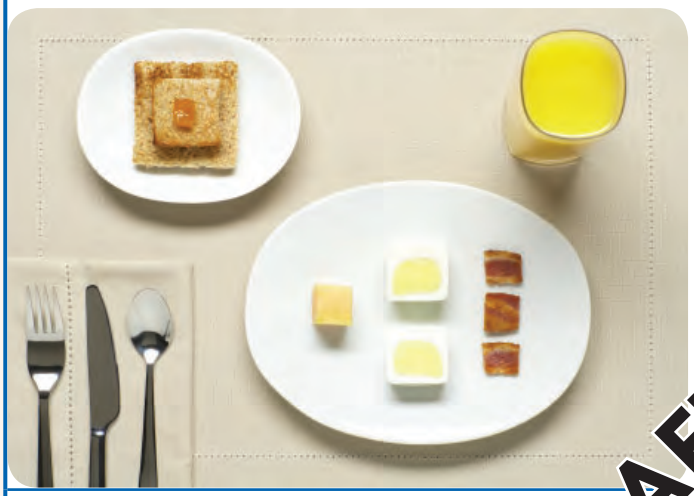


Image: Artisticco LLC/ Thinkstock

Image: Pavlo61/ iStock/Thinkstock

2. Use the **language of location** to describe where these tools are placed.

Some tools are in an **absolute position**, (e.g. 'top right'). Whereas others will need to be described **relative to another** tool or tools (e.g. 'opposite').

Image: ratch001/ Thinkstock

Location	Description
top left	
top right	
bottom left	
bottom right	
top	
bottom	
centre	
left	

Location	Description
right	
above	
below	
over	
under	
beside	
opposite	

3.07 Describing Location

3D Personal space

1 4 PS 2 3

1. Personal Space

All people have a personal space **zone** that guides how close they want to get to other people (**proximity**). We all have to respect other people's personal space. It is important that you have an understanding of personal space '**comfort zones**' and how these might change depending on the closeness of your **relationships** with others.

a. Describe what is **happening** in each of these situations.

b. Why do **personal space** comfort zones **change** in different situations?

Images: mentalmind/ Depositphotos.com

1 4 PS 2 3

2. Work Space

When we work, some of the rules of personal space get changed. This is because different workplaces need to set up **floor layouts** and **work stations** to best suit the **tasks** that a worker is expected to do for customers and clients.

Image: mentalmind/ Depositphotos.com

1. Choose an **occupation** and describe how that worker's **work station** or **work site** is set up. Create a **sketch** or an **image**.
2. Are the **personal space** zones for that person **different** as a **worker**?
3. How would that worker make sure that they **respect other** people's **personal space** zones?
4. What types of **job tasks** require **workers** to '**breach**' personal space **comfort zones**?

1 4 PS 2 3

Discussion

What happened to the acceptable zones of personal space as part of social distancing requirements during the COVID-19 pandemic? How did this impact on you? Have 'spatial' zones returned to normal?

How do you do on public transport? Do you find your personal space invaded? What positive actions can use to deal with this?

3.09 Directions in Action

Directions in action

As you have experienced, we normally use more than one method for giving directions.

One of the most common combinations is through using visual directions such as a map, combined with oral instructions and perhaps even supported by some physical pointers.

As a class discuss this example. Your teacher will also read it aloud for the class.

Roberto is walking along the main shopping street in his town. A backpacker comes along, and in broken English asks Roberto how to get to the train station. The backpacker has a map of the local area on his phone, but can't seem to work out which way to walk.

Roberto looks at the phone and takes it from the backpacker and turns the phone upside down. Roberto then points in the direction the phone is now oriented and says, "train that way".

Roberto draws the attention of the backpacker to this phone and traces the route on the map while at the same time saying the words out loud.

"Straight - 5 minutes, turn left - 3 minutes across the bridge (Roberto makes an arc with his arm), turn right - 5 minutes; and there!"

At which Roberto points down hard with his finger to the station on the phone map.

"Got it?"

The backpacker nods and offers...

"Thanks, gidday beaudy mate," and marches off in the correct direction.

Roberto smiles but is a little perplexed. He hasn't heard anyone say "gidday beaudy mate" before and wonders what the rest of the world must think of Australians!

Image: toxawww/ Depositphotos.com

3E Tour guiding

1 4 PS 2 3

1. Which **methods** for giving **directions** did Roberto use? Give examples.

2. How **effective** were the **directions** given by Roberto? Why so?

3. Explain whether **you** would use the **same methods** for giving **directions** that Roberto used, or whether you would use **different** methods.

4. What **digital devices** and **apps** exist that can help people and tourists get around in unfamiliar or foreign places? How would you **used** any of these?

Extension

Choose a place in your suburb or town where you might get asked directions to a local landmark, such as a train or bus station or some other important landmark.

In your workbooks, give directions from where you are located to help a tourist get to this landmark.

What methods would you use? Explain why.

Note: You could role-play this for the class using a partner and relevant tools such as a map and/or phone.

3.11 Distance and Time

Distance

Image: goglik83/ Depositphotos.com

As you already know, distance is a '**how far**' sort of measure.

"How far is it to the Melbourne CBD?"

For some of you, not very far, especially if you live locally in one of the city's nearby inner suburbs!

What about people in Melbourne's expanding outer west? And those living east, west, south, outer east, or north, or north east or south east? What about those in Bendigo, Wangaratta, Benalla, Yarram or Bairnsdale? How about those in Mallacoota, Mildura, Wodonga or Swan Hill? And let's not forget about those of you in another state.

So what do you reckon? How far - from where you're sitting right now - to the city? How will you know?

Time

When we are travelling, knowing the distance of the total journey from our **origin** to **destination** is only one part of the equation.

The second and more important number that we need to work out, is the **time** it might take to travel that distance.

In fact, sometimes we don't even need to worry about the distance. If you are catching a train to the city for a job interview you don't really worry about how far you have to travel. What you are more likely to be concerned with is how long it takes you to complete the journey.

If you are travelling by public transport you will check **timetables** (using **systematics**).

If you are travelling by car you will rely on someone else's expertise to advise you, because they are likely to be able to estimate travel time based on their own **knowledge** and **experience** of travelling at this time of the day.

However, if you are getting there under your own power, such as by cycling, then you will need to know the distance.

You will factor in how **fast** you usually cycle - let's say an average of 20km per hour.

Then there's the **distance** - let's say 20km. So that's 20km/ 20kmh which actually equals 1 hour! (Your teacher will show you how to do this calculation).

You will need to add more time for traffic conditions, traffic lights, getting lost in the city, parking and locking your bike, freshening up, changing clothes, finding the building, getting to the right place in the building and so on.

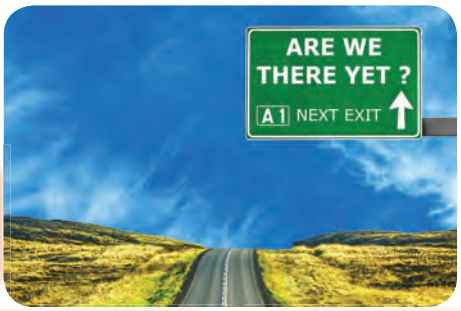
So what time is the appointment? Better give it another 30 minutes to do those other things. Also better hope it doesn't rain; and you don't want a puncture.

So that are a lot of things to consider!

Travelling: How long?

Distance of journey from origin to destination.

Day of week e.g. work day vs weekend.



Time of day e.g. peak hour vs off peak.

Mode of transport e.g. public vs private transport.

Familiarity with journey.

Weather conditions.

Image: Alexis84/ Depositphotos.com

Distance and time 3F

1. Calculate the **distance travelled** for these different transport modes. Which type of **transport** might these be?

a. 60kmh for 1 hour	b. 900kmh for 10 hours	c. 10[illegible]mh for 30 min	d. 5kmh for 2.5 hours

2. Estimate the **distance** to each of these destinations.

3. How much **time** do you think it will take you to **travel** to these **destinations** using the **types of transport** listed?

1 4 PS 2 3

Journey	Estimated distance	Journey time: by [illegible]	Journey time: by public transport	Journey time: by your choice
a. Your school to your home.				
b. Your home to the nearest train station.				
c. Your home to the CBD.				
d. Your home to the airport.				
e. Your home to your workplace (or a place you'd like to work).				

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4. Research these **distances** and **times** using **maps, GPS** or other resources. Set up another table in your workbooks. How well did you estimate?

3.13 Distance and Time

Issue to consider

One of the main reasons for using maps is to estimate travel distance and time so that you can **organise** yourself and others better.

As you know, a **scale** shows the distance ratio that a map represents to real life.

Most properly prepared printed maps, such as street directories will use an accurate scale.

Digital maps use Global Positioning System (**GPS**) satellite data to calculate distance.

However, not all maps are drawn to scale, especially site maps and retail maps.

And when using maps to plan your travel you have to take into account travel time issues such as peak traffic flows, congestion, local knowledge and other issues.

One advantage of digital mapping devices is that they can give you a travel time estimate.

This is especially good for longer trips and driving through regional areas. And you can usually choose alternate routes to see different variations.

However, digital maps can be quite inaccurate for shorter city trips which might have more hold-ups, especially around peak times, such as to and from work and school. And the alternative routes often just give you more of the same issues, because the 'computer' does not know about local issues and shortcuts.

tashatuvango/
Depositphotos.com

3G Apps v maps

In the contemporary digital world, many people use **apps** to tell them where to go. They don't bother looking up a **map** at all, they just listen to what the app tells them, or follow the pointer on their screens. But maps can be very useful, and are a great way of embedding knowledge about location and travel.

When it comes to **travel** and **transport** which do you prefer, **apps** or **maps**? And what **types** of apps, or maps, do you prefer?

Travel speeds

A **travel speed** represents the **ratio** between one quantity (distance) and a second quantity (time).

This **relationship** can be expressed as a **rate**, such as kilometres per hour (km/h or kmh), or metres per second (m/s or mps).

This sounds complex but it is really quite straightforward. We apply this numerical skill all the time when driving!

An international passenger jet travels at about 700-900 km per hour. That's pretty fast over a sustained distance.

In his heyday, Usain Bolt could sprint at just under 10 metres per second for a short distance - up to about 200m. For a human, that's really bolting along!

Back in 2011, Kurt Fearnley wheeled the Boston Marathon in just under 79 minutes at an average speed of about 32kmh. That really is moving!

So how fast can you move?

Image: PinkBadger/Depositphotos.com

M… commuters cycle to work which can …uch faster than peak hour driving!

Travel 3H

Match these **travel speeds** … **of travel.**

- ❑ 2-3 kmh
- ❑ 4-5 kmh
- ❑ 6-7 kmh
- ❑ 6-9 kmh
- ❑ 7-10 kmh
- ❑ …-12 kmh
- ❑ 10 kmh
- ❑ 13+ kmh
- ❑ 15-25 kmh
- ❑ 25+ kmh
- ❑ 15-30 kmh
- ❑ 25-50 kmh
- ❑ 40-60 kmh
- ❑ 80-100 kmh
- ❑ 25-45 kmh
- ❑ 15-35 kmh
- ❑ 20-40 kmh
- ❑ 900kmh

bus - metro	**cycling - easy**	**cycling - moderate**
cycling - hard	**driving - peak**	**driving - metro**
driving - outer	**driving - freeway**	**jog - easy**
jog - fast	**international flight**	**running**
skating	**train - metro**	**tram**
walk - strolling	**walk - normal**	**walk - brisk**

3.15 Distance and Time

3I Distance and time II

1. Calculate the following **travel times**.

Distance: 60km at 60kmh	Distance: 30km at 60kmh	Distance: 25km at 100kmh
Distance: 12km at 6kmh	Distance: 7km at 21kmh	Distance: 10km at 2kmh

1 4 PS 2 3

2. Estimate **how long** it would take you to **travel these distances**, using these **different travel modes**. What would be the **average speed** of each?

	Walk/roll	Jog	Skate	Cycle
1km				
3km				
5km				
10km				
20km				
50km				
100km				

	Public transport Choice 1	Public transport: Choice 2	Car	Other
1km				
3km				
5km				
10km				
20km				
50km				
100km				

1
4 PS 2
3

Applied

As part of your vocational studies you are likely to undertake **work experience** and/or **work placements**. Let's just call these work placements from now on.

Complete these tasks for your **current work placement** you are undertaking, or for a **potential work placement** that matches your vocational goals.

a. Create a **map** that shows the **journey** from your **home** to your **work placement**.

b. What types of **information** and **landmarks** should you **show** on your **map**?

c. What **travel modes** does this journey involve?

d. How much **time** should this **journey take**? How do you know this, i.e. timetables, apps, etc.?

e. How **effective** or **convenient** is this travel **journey**?

Assume your **normal transport mode** is **unavailable**.

f. Create a new **map** that shows the **journey** from your **home** to your **work placement.**

g. What types of **information** and **landmarks** should you **show** on your **new map**?

h. What **travel modes** does this **new journey** involve?

i. How much **time** should this **new journey take**? How do you know this, i.e. timetables, apps, etc.?

j. How **effective** or **convenient** is this **new travel journey**?

Old-school vs new -school

k. Use **digital technology** to re-plan your **first journey**. **Compare** the **results** to the first map you created.

l. What were the **similarities** and **differences** between the analogue and the digital journeys?

m. Which format, **your map** or the **digital map**, suggested a better journey? Why?

n. Use **digital technology** to re-plan your **new journey**. **Compare** the **results** to the second map you created.

o. What were the **similarities** and **differences** between the analogue and the digital journeys for the second journey?

p. Which format, **your map** or the **digital map**, suggested a **better** second journey? Why?

Recommendations

q. So, which was **better**? **Your** own hand and brain-created **analogue maps** - or the **digital maps**. Why so?

r. What **skills** did you **develop** applying each **method**?

3.17 Planning and Organising

Planning and organising

Planning is about knowing what to do and when to do it. Organising is about actually doing these tasks. All the plans in the world will come to nothing unless people organise themselves appropriately.

Organising involves setting **short-term** or day-to-day **goals** using tools such as calendars, daily planners and to-do lists. Organising means understanding task **deadlines**, knowing how long tasks will take (**duration**) and scheduling which tasks to do first (**prioritising**).

Organising is about using **resources** to achieve goals and objectives. This means weighing up alternatives and making sacrifices.

Personal organising involves using your time to meet all of your different personal, family, social, recreational, educational and work **commitments** and **responsibilities**.

Planning and organising also involves interpreting and using **timetables**, **schedules**, and **rosters**.

By planning and organising you can achieve a bet[illegible] balance between personal, work-related and other commitments. This helps you [illegible]

- ⇨ set and achieve short-term, mid-term and [illegible]erm **goals**
- ⇨ use your time more **efficiently** and ge[illegible]
- ⇨ improve your **punctuality** and reli[illegible]
- ⇨ better manage **transport** and t[illegible]vel r[illegible]
- ⇨ meet **deadlines** and comp[illegible]te tasks [illegible]ctively
- ⇨ achieve a better work[illegible] and
- ⇨ improve your own **personal wel[illegible]**.

Image: VCTStyle/ Thinkstock

Planning and organising tools

There is a range of planning tools that you can use to plan and organise your time. These come in both analogue (hard copy) and digital forms.

Some common examples of planning and organising tools include **calendars, to-do lists**, **rosters** and **timetables**.

Planning and Organising Tools

- **i. Calendars & diaries**
- **ii. To-do lists**
- **iii. Schedules & rosters**
- **iv. Timetables**

i. Calendars & diaries

Image: Faithie/Depositphotos.com

A calendar is the most common and basic method of recording and measuring dates and times. Calendars are normally organised as a universally accepted 'year of dates' broken into months.

Each month shows its specific days and dates. Some people also follow religious calendars. We use the internationally recognised Gregorian Calendar, with weeks starting on a Monday.

Some people prefer **hard copy calendars** on a wall, their fridge or in a workplace. Others prefer desktop diaries.

Many people now use **e-dairies** and **apps** to manage their personal commitments and responsibilities. They rely on their computers, phones and other devices to plan and track dates, and to record important personal commitments and responsibilities, by setting reminder notifications and alarms.

Many work email programs and apps allow people to use calendars to record dates and times of meetings, appointments, tasks, deadlines; and these tools send people advance notifications of their commitments.

It is important to realise that although digital planning devices are good, you don't need to use an app to plan and organise your time; you can use paper or your 'brain'.

However, e-diary and **app reminders** are a good way to keep you on track.

Calendars & diaries 3J

1. When do you use a **calendar**? Why? And what **types**?

2. When do you use a **diary**? Why? And what **types**?

3.19 Planning and Organising

ii. To-do list

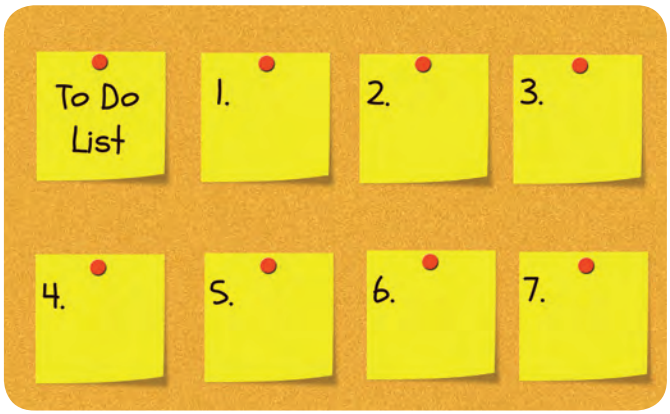
A to-do list is one of the most useful tools you can use at the first stage of any planning and organising process.

A to-do list involves the following steps.

1. Identify the key tasks (or steps) you need to do to achieve the overall goal.
2. Number these key tasks in order.
3. Estimate how long it is likely to take to do each task.

You can use a diary or notebook, Post-It Notes, or the 'note' function on an e-device.

Image: mybaitshop/Depositphotos.com



3K To-do list

1 4 PS 2 3

Construct a to-do list for the following overall task:

Organise the details for a [illegible] volunteer placement.

1. Identify the key **smaller tasks** or **steps**, put these steps in **order**, then **estimate how long** it is likely to take you to do each task or step.
2. In your workbooks write a [illegible] as a **complete to-do list**!
3. Use Post-It Notes to create **another to-do list** for a task related to your school program, such as an assignment or a responsibility you have to meet.

iii. Timetables

A timetable is a **schedule** that sets out various times and durations for a particular activity. The most common timetables that you use include:

- your school subject timetable
- your VET timetable
- public transport timetables
- work timetables (rosters)
- services appointment timetables such as for a doctor or dentist, hairdresser or barber, and many others
- government services timetables such as Centrelink;
- and any other activity that uses set times and time durations.

Image: anze.bizjan/Depositphotos.com

Airline timetables are non-negotiable. The plane won't wait for you!

One person's timetable is designed to fit in with all the other timetables that are part of the same activity, network or system.

This means that timetables must be designed to meet very rigid time schedules.

For example, your school timetabler has to take the needs of students, teachers, classrooms, facilities (such as labs, tools) and many other variables to construct a suitable timetable. Of course, you have to follow that timetable.

And then on your VET or work day you may have to deal with your TAFE timetable, your employer's work roster, bus timetables, your personal or family commitments (such as looking after younger siblings or doing domestic chores) and perhaps even your own personal casual work roster. So it can get quite complex!

Timetables 3L

What types of **timetables** do **you use** and access? Do you access these in **analogue** or **digital** forms? Describe some **examples**.

3.21 Planning and Organising

iv. Schedules & Rosters

Two important time management tools for personal, educational and vocational situations are schedules and rosters.

A **schedule** is the general term used to describe planning, organising and doing all the tasks, and meeting all the responsibilities and time commitments, of an individual, a team or some other entity. e.g. “You free for a coffee today.” “Let me check my schedule.”

Rosters

A roster is a planning and organising tool that sets out the labour needs of an organisation.

Rosters are used to make sure the appropriate number of staff is available to effectively do the work roles and responsibilities needed.

Rosters set out and communicate employees’ scheduled work hours. This includes workers with specific skills to do particular job roles, as well as supervisory and management staff.

- ⇨ Rosters need to be planned well in advance.
- ⇨ Rosters are often drawn up using 24-hour [illegible]
- ⇨ Rosters need to be communicated to [illegible] involved.
- ⇨ Rosters should ensure that an appr[illegible]ce [illegible] skills, training and authority is covered by the workers.

Gra[illegible]le Ne[illegible]gen[illegible] Weekly Roster M[illegible]nday [illegible]ay 19 - [illegible]day May 25, 2023						
Times	**8-10am**	**10am-12pm**	**[illegible]pm**	**2-4pm**	**4-6pm**	**6-8pm**
Monday 20/5	Edwina F.	Edwina F.	Edwina F.	Edwina F.		
	Reg. G.	Reg G.				
Tuesday 21/5		Edwina F.	Edwina F.	Edwina F.	Edwina F.	
	Reg. G.	Reg G.				
Wednesday 22/5		Adut N.	Adut N.	Adut N.	Adut N.	
	Edwina F.	Edwina F.	Edwina F.	Edwina F.		
Thursday 23/5			Edwina F.	Edwina F.	Edwina F.	
	Reg. G.	Reg G.				
Friday 24/5		Adut N.	Adut N.	Adut N.	Adut N.	Adut N.
	Edwina F.	Edwina F.	Edwina F.	Jo P.	Jo P.	
Saturday 25/5	Jo P.	Jo P.	Jo P.	Aloysius Z.	Aloysius Z.	Aloysius Z.
	Reg. G.	Reg G.	Frankie F.	Frankie F.	Frankie F.	
Sunday 19/5	Jo P.	Jo P.	Jo P.			
		Edwina F.	Edwina F.	Edwina F.	Edwina F.	

Rosters 3M

1 4 PS 2 3

Jack Fromage works at Hungry Macs. The boss has just texted Jack with the roster for next week. But it's a long string of information!

> Monday: 11am to 7pm; Tuesday: Day off; Wednesday: 7am to 5pm; Thursday: Day off; Friday: 12pm to 9pm; Saturday: 10am to 2pm then 6pm to 10pm; Sunday: 12pm to 4pm.

Jack is going to enter the roster in his e-calender. He'll also print this out and put it on his fridge as a reminder.

1. Set out **Jack's roster** for the upcoming week. How many **hours** will **Jack work** for the week?

Name:			**Dates:**				
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
7:00							
8:00							
9:00							
10:00							
11:00							
12:00							
13:00							
14:00							
15:00							
16:00							
17:00							
18:00							
19:00							
20:00							
21:00							
22:00							

2. Use the roster on p.70 for Gramble Newsagency to tally the **weekly hours** for **each worker**. How many **hours** do staff work in **total**? When is the **newsagency less busy**? How do you know? Which **shift** would **your prefer**? Why so?

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3.23 Assessment Task

AT3 'Appy Birthday
Personal Numeracy: Location & Systematics

Overview

You are going to plan and organise a surprise birthday party for a good friend for next Friday.

- ☺ What would you do?
- ☺ What food, drink, entertainment and other party favours will you need to organise?
- ☺ Who will you invite - and to where - and at what time?
- ☺ You will need to use both digital and analogue tools and apps for different steps.

Your teacher might get you to work in pairs. You will present a final report to your teacher and perhaps an oral report to the class.

1 4 PS 2 3

At all stages of this task you will need to apply the 4-Stage Problem-Solving Cycle:
1 Identify the maths 2. Act on and use the math 3. Evaluate and reflect 4. Communicate and report.

You also have to develop and apply tools and techniques from your **Maths Toolkit**.

Steps

1. Create a **to-do list** of the key tasks required for the surprise party and place these in the **correct order**. Analogue or digital?
2. Prepare a **timeline** to help plan and organise the surprise party. Analogue or digital?
3. Choose appropriate **time periods** and a **time scale**. Analogue or digital?
4. Identify **key tasks** required to be done by **each time period** (or **milestone**). Analogue or digital?
5. Estimate the **time needed** to **complete** these **key** (milestone) **tasks**. Analogue or digital?
6. List **external people** and **suppliers** you might need to deal with and contact. Note important **contact information**. Analogue or digital?
7. Tick-off **milestone tasks** as you achieve them. Analogue or digital?
8. Create **specific to-do lists** for **smaller tasks** as required. Analogue or digital?
9. Check to see that you have **organised everything** you need to do. Analogue or digital?
10. Reflect on **which analogue** or **digital tools** and **apps** were more **useful**.

Final report

Present your plans to your teacher, including the use of analogue and digital tools.

If required, present your plans to the class using multimedia, and get feedback.

Note: In the final column, your teacher might also include an achievement level to indicate your level of performance for each part of the task.

Name(s):

Key dates:

Personal Numeracy Systematics Module 1

Tasks - AT3: 'Appy Birthday	Must Do?	Due by	Done	Level
Task planning				
Negotiate the task details with my teacher.	✓			
⇨ Decide on the location and the destination.	✓			
Determine digital or analogue tools and apps to use.	✓			
Plan and organise the party				
1. Create overall to-do list.	✓			
2. Prepare a timeline.	✓			
3. Create smaller time periods.	✓			
4. Identify key milestone tasks.	✓			
5. Plan time needed for key milestone tasks.	✓			
6. List external suppliers and contacts.	✓			
7. Tick-off milestone tasks.	✓			
8. Create specific to-do list(s).	✓			
9. Check that everything is organised.	✓			
10. Reflect on use of analogue tools, and on digital tools.	✓			
Task completion and reporting				
Use and apply appropriate digital tools and apps.	✓			
Use and apply appropriate analogue tools.	✓			
⇨ Use appropriate numerical language.	✓			
1 4 PS 2 3 **Describe applied use of the problem-solving cycle.**	✓			
Identify the maths / Act on & use maths / Evaluate & reflect / Communicate & report				
Develop and apply mathematical tools and techniques.	✓			
⇨ **Prepare and discuss my final plans with my teacher.**	✓			
Present a report to the class (if required).				

3.25 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task: **Names/Dates:**

AT3 -

1. Identify the maths					
Identify problem(s)	Done: ○ Level:	Recognise maths	Done: ○ Level:	Select information	Done: ○ Level:
Interpret information	Done: ○ Level:	Choose processes	Done: ○ Level:		Done: ○ Level:
2. Act on and use maths					
Perform estimations	Done: ○ Level:	Decide techniques	Done: Level:	Choose maths tools	Done: Level:
Select technologies	Done: ○ Level:	Perform calculations	Done: ○ Level:		Done: ○ Level:
3. Evaluate and reflect					
Check Estimations	Done: ○ Level:	Compare results	Done: Level:	Check processes	Done: Level:
Review actions	Done: ○ Level:	Check logical reasoning	Done: ○ Level:	Assess conclusions	Done: ○ Level:
Communicate and report					
Written processes	Done: ○ Level:	Written results	Done: Level:	Oral processes	Done: Level:
Oral results	Done: ○ Level:	Digital processes	Done: ○ Level:	Digital results	Done: ○ Level:

Mathematical Toolkit					
Analogue tools - What & how?		Digital Devices - What & how?		Software & Apps - What & how?	
Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy

Money 4

Activities 4: Money		p.	Due date	Done	Comment
4A	A world of money	77			
4B	Currency	79			
4C	Quick money calculations	81			
4D	Making change I	83			
4E	Making change II	85			
4F	Rounding purchases	87			
4G	Digital wallets	8			
4H	Multiplication	91			
4I	Division	93			
4J	Fractions and decimals	95			
4K	Fractions and decimals II	97			
4L	Comparing prices	99			
4M	Unit pricing	100			
4N	Basket of goods	101			
4O	Finding patterns	102-103			
AT4	Adding Up to Take Away	104-105			
PST	Problem-Solving Cycle and Maths Toolkit	106			

Comments:

4.01 Money

Money

When you hear the term money, what does it mean to you?

Money is used as the key tool to make purchase transactions, to pay wages, to build wealth from investments, and for a variety of other purposes.

Money is a **medium of exchange** that uses a recognisable **currency unit** (i.e. notes and coins).

Money might exist in **cash** form, or as **cheques** (mainly in business but becoming less common), and increasingly as **digital** credit values that utilise **eCommerce** payment methods.

Now in the 2020s, more than 50% of all **retail transactions** are made using digital payment methods. And this percentage is growing.

A huge growth in digital transactions occurred as a result of the COVID-19 pandemic. This event saw a lot of people switch to online shopping.

At the same time, there was also a move away from the use of cash in retail and hospitality outlets.

What about you? Are you mainly a cash buyer, a digital shopper, or an even mix of both - and why?

And raise your hand if you feel you have ... new.

Anyone?

Why do think this is the case?

Estimating & Calculating Money to...

- Add up totals
- Estimate change
- Make change
- Manage your personal finances
- Plan and manage a household budget
- Complete workplace transactions
- Manage business income and expenses
- Pay your bills
- Check your pay
- Plan and save for your future

Image: selensergen/Depositphotos.com

A world of money 4A

1. Match each of these **numbers** to the correct numerical **statement**.
2. Discuss as a class by talking about what these numbers show **about the world**.

- ❑ billion
- ❑ budget
- ❑ currency
- ❑ debt
- ❑ EFTPOS
- ❑ expenses
- ❑ income
- ❑ loss
- ❑ profit
- ❑ wage
- ❑ 5c
- ❑ 100
- ❑ $21.38
- ❑ $46.50
- ❑ $100

The number of cents in a dollar is: _____	**Notes and coins are referred to as:** _____	**One thousand millions is called a:** _____
Many people are paid according to an hourly: _____	**A business that earns more than it spends is making a:** _____	**A business that spends more than it earns is making a:** _____
The general term used for wages, salary, profit and interest is: _____	**The general term used for costs, overheads and expenditure is:** _____	**Buying things without enough funds to pay straight away leads to:** _____
Australia's biggest 'regular' currency unit is: _____	**Australia's smallest 'regular' currency unit is:** _____	**A planning tool to better manage finances is a:** _____
The minimum hourly adult pay rate for 2022/23 was: _____	**The average hourly wage in Australia (Jun 22) was about:** _____	**The general term for retail electronic transactions is:** _____

4.03 Money

Currency

In Australia we use a **decimal currency**. This means that $1 is made of up 100 cents. People then tend to count money in 10s, 100s, 1,000s, 10,000s and so on.

We use a combination of **coins** and **notes** as money. These coins and notes allow us to carry out everyday transactions. Most people also use **e-transactions** which **debit** (subtract) and **credit** (add) money from and to their bank accounts.

Small items we purchase are usually expressed in dollars and cents such as $2.50 for a Mars Bar.

Large items are usually expressed in dollars such as $19,990 for a new Hyundai Accent.

Wages are paid as dollars and cents, such as $12.50 per hour for a 16 year-old working in a take-away shop.

People in professional jobs are usually paid a salary expressed only in dollars, such as $65,000 per year.

How much currency do you estimate is in this picture?
Now calculate this. How close were you?

Image: robynmac/ iStock/Thinkstock

Cash vs digital

Although the use of e-transactions is growing rapidly, **cash** is still a preferred form of currency in some industries and businesses, especially for smaller transactions, for older people, and for younger people.

So you need to be able to work out the right **currency units** for different amounts of money.

This is important because **digital apps** and **e-payments** are doing the hard work and taking over the money-calculating tasks. But because people are getting de-skilled by their digital tools, we have to do even more training to manage our cash effectively.

Indicate the correct **combination** of **notes** and **coins** needed to represent each of these amounts. Try to use the least number of currency units.

i. $75 in notes.	$100 $50 $20 $10 $5 $2 $1 50c 20c 10c 5c
ii. $17.50 in notes and coins.	$100 $50 $20 $10 $5 $2 $1 50c 20c 10c 5c
iii. $37.75 in notes and coins.	$100 $50 $20 $10 $5 $2 $1 50c 20c 10c 5c
iv. $41.60 in coins.	$100 $50 $20 $10 $5 $2 $1 50c 20c 10c 5c
v. $245	$100 $50 $20 $10 $5 $2 $1 50c 20c 10c 5c
vi. $750.85	$100 $50 $20 $10 $5 $2 $1 50c 20c 10c 5c
vii. $995.95	$100 $50 $20 $10 $5 $2 $1 50c 20c 10c 5c

4.05 Money Calculations

In your head

One way to do simple money calculations is in your head. Developing this skill is important for many personal, social and work-related situations. Your teacher will do this example for the class as a better way of showing you how it is done.

Adding money

For **addition**, add the dollar amounts first. Then keep that number in your head.

e.g. $3.50 + $2.45 = $5 (i.e. $3 + $2)

Then add the cents amounts.

50c + 45c = 95c

Now if the cents amount is less than 100 just add the cents to your dollar amount.

$5 + 95c = $5 + 0.95 = $5.95

But if the added cents equal more than 100, then you need to add an extra dollar to your dollar calculation, plus the remaining cents:

e.g. $10.50 + $1.95c = $11 + 145c = $12.45

Now your teacher will work through these examples with the class.

i. $6.30 + $3.20 = ii. $5.60 + $3.90 =

Subtracting money

If **subtracting** use the same steps, but by taking away first subtract the dollars.

e.g. $3.50 - $2.45 = $1 (i.e. $3 - $2)

Then subtract the cents amounts.

50c - 45c = 5c

So the answer will be:

$3.50 - $2.45 = $1.05

If your subtracted cents amount is less than 0 then you need to take this amount away from your dollar calculation to get the final answer.

e.g. $7.40 - $3.80 = $4 (i.e. $7 - $3) and -40c (i.e. 40c - 80c)

= $4 - 40c

= $3.60

Now your teacher will work through these examples with the class.

i. $6.30 - $3.20 = ii. $5.60 - $3.90 =

Now, what if I tell you that you can do this quite easily in your head as long as you have a basic grasp how to add and subtract numbers? Do you believe me? Have a go!

In your head add: $5.50 + $2.20 = ? How about: $4.60 + $8.50 = ?

Now try a subtraction: $9.70 - $3.50 = ? And try: $8.25 - $4.75 = ?

See, it's easier to do this in your head rather than following the correct, but complex, instructions above. It's a natural numeracy skill you can develop through your life experiences. That's why these types of numeracy skills are about applied learning.

Note: If the calculation gets too complex then just set it out on paper and make sure you right-align! It's all about problem-solving.

Quick money calculations 4C

1. Complete the calculations based on money, '**in your head**'. Then **check** your answers using a **calculator**. How did you go?

a. 75 cents + $1 =	b. $10 + $5 =	c. $99 + $59.99 =
d. 50c + 90c + $2.45 =	e. $9 plus 900c =	f. $9.95 - $5.50 =
g. $7 + $0.75 - $3 =	h. $500 - $100 + $400 =	i. $17.55 - $6.55 - $11 =
j. $700 + $975 - $235 =	k. $50 [illegible] =	l. $24.95 - $12 + $27.95 - $16 =

2. Complete these real-life calculations '**in your head**'. You'll need to know, or **research**, or estimate **prices**. Then **check** your answers using a **calculator**.

a. A Big Mac, large fries and a large shake.	b. Train (or bus) fare from your suburb or town to the CBD, and back home again.
c. 50 litres of petrol, 91% blend.	d. A mobile phone contract of $10 per week for 12 months.

4.07 Making Change

Making change

When you are buying things using **cash** the **transaction** will often involve **change**.

The **change amount** is the difference between the **purchase price** and the **money tendered**.

If you are the **customer** it is important to know that you are being given the correct amount of change. This prevents you from being **short-change**d.

If you are the **worker** then you must be able to calculate change accurately. Even if you use an **electronic point-of-sale register** that tells you how much change to give, you will have to manually 'make' the correct change using notes and coins.

As more and more everyday purchases are transacted using **eCommerce,** the skill of making change actually becomes more important, rather than less important.

Why do you think this might be the case?

Making change

One step is used when:

- it is a single purchase, or
- the total is calculated using a cash register, POS terminal or some other means.

The correct process is:

'money tendered' less 'purchase price' equals 'change'.

For example: Purchase $75. Given $100

$100 - $75 = $25

Two (or more) steps are used when:

- there are multiple purchases, and/or
- you have to work out the totals manually.

The correct process is:

Step 1: Calculate total purchase price using addition and/or multiplication.

Step 2: 'Money tendered' less 'total purchase price' = 'change'.

e.g. Purchases of $50 and $35. Given $100

Step 1. Total purchases = $50 + $35 = **$85**

Step 2. $100 - **$85** = $15

e.g. Purchases of 5 items @ $12. Given $100

Step 1. Total purchases = 5 x $12 = **$60**

Step 2. $100 - **$60** = $40

NUM SUPER SKILLS

Image: pawelhelbik1985/ Depositphotos.com

Change process

Making change might involve 2 or 3 of the 4 basic calculation functions. Remember that the 'money tendered' is the amount that a customer hands over for payment.

- Addition: Calculating total purchases.
- Multiplication: Calculating total purchases for multiple items.
- Subtraction: Calculating the change by taking away the purchase amount from the amount given (tendered) by the customer.
- In some cases division might also be needed such as when calculating bill splitting.

Making change I 4D

1
4 PS 2
3

Indicate the correct **combination** of **notes** and **coins** needed to **make change** for these transactions. Try to use the **least** number of **currency units**.

	$100	$50	$20	$10	$5	$2	$1	50c	20c	10c	5c
i. Purchase of $55. Given a $100 note.	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____
ii. Purchase of $7.95. Given a $20 note.	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____
iii. Purchase of 2 items for $75 each. Given 2 x $100 notes.	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____
iv. Total sales = $73.50. Given a $50, a $20 and 2 x $2 coins.	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____
v. Purchase of 5 items @ $3:00 Given a $50.	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____
vi. Purchase of 3 x $2.50, 2 @ $5:00. Given 2 x $10 notes.	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____
vii. Purchase of $50 and purchase of $52.50. Given 5 x $20s.	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____	x ____

4.09 Making Change

Counting change

One tried and true method of making the correct change is by using a physical counting method.

The best physical counting method involves **counting up** from the purchase amount using the currency units to move to round numbers - making sure you say each step and amount aloud.

This usually involves placing the change either in the customer's hand, or down on the counter for contactless service.

Which method do you think you would prefer using? Have a go using training currency and try for yourself!

So for example, if the customer makes a purchase for $27.50 and tenders a $50 note the process is as follows.

"$27.50 plus 50c equals $28.
Plus $2 equals $30
Plus $20 equals $50."

A second method is to make the change from the biggest units through to the smallest units starting from the purchase price.

So for the same example:

"$27.50 plus $20 equals $47.50.
$47.50 plus $2 is $49.50.
And $49.50 plus 50 cents equals $50."

A third method is to just physically count the change amount.

So for the same example:

"[illegible] is $27.50 so your change is [illegible]
That's $20 plus $2 plus 50 cents.
Your change of $22.50 plus the purchase of $27.50 equals $50."

Counting change

You physically count and say aloud the currency units to make the change.

- State the amount tendered.
  "You gave me a $20."
- Then 'state' the purchase price
  "Your purchase was $14.50."
- Count up to whole numbers by counting the change out from lowest unit to highest unit.
  "$14.50 + 50c makes $15."
- Count the next highest unit.
  "$15 + $5 makes $20."
- Finish to get to the amount tendered.
  "Your change from $20 is $5.50."
  "Thank you and come again!"

When balancing your register at the end of the day, counting the coins can take the longest time!

Image: DannyIrvine/ iStock/Thinkstock

NUM SUPER SKILLS

Making change II 4E

1 4 PS 2 3

Work out the **change** for each of these **purchases** and **amounts** tendered. Then count out the currency notes and/or coins to **make** the **change**.

Purchase	Amount	Change	Currency
e.g. $7.50	$10	$2.50	$2 + 20c + 20c +10c
$5.00	$10		
$3.00	$10		
$9.50	$10		
$7.50	$10		
$2.20	$10		
$4.80	$10		
$1.45	$10		
$6.60	$10		
$0.75	$10		
$5.99	$10		

Purchase	Amount	Change	Currency
e.g. $16.30	$20	$3.70	$2 + $1 + 50c + 20c
$9.00	$20		
$17.50	$20		
$15.00	$20		
$3.75	$20		
$19.40	$20		
$1[illegible]	$20		
[illegible]	$20		
[illegible]	$20		
[illegible]	$20		
[illegible]	$20		

Purchase		Amount	Change	Currency
e.g. $26.50		$50	$23.50	$20 + $2 + $1 + 50c
a.	$11.00	$50		
b.	$3.50	$50		
c.	$29.95	$50		
d.	$48.50	$50		
e.	$49.75	$50		
f.	$17.50	$50		
g.	$22.00	$50		
h.	$0.95	$50		
i.	$32.50	$50		
j.	$15.25	$50		

Purchase		Amount	Change	Currency
e.g. $38.75		$100	$61.25	$50 + $10 + $1 + 20c + 5c
a.	$65.00	$100		
b.	$28.75	$100		
c.	$75.50	$100		
d.	$92.00	$100		
e.	$82.25	$100		
f.	$16.75	$100		
g.	$9.60	$100		
h.	$33.50	$100		
i.	$54.15	$100		
j.	$41.75	$100		

4.11 Money - Rounding

Round numbers

When dealing with money it is important to keep track of how much things **cost** (the purchase price).

It is also important to be able to know how much **change** you should give or receive when completing money transactions.

It is also important to know how much you are **spending** in total so as to have control over your own personal finances and budget.

A numerical skill that can assist you to do these things is **estimating**. One effective approach to numerical money estimating is to use rounding.

Rounding helps you to be able to estimate roughly how much you are **spending** when making purchases.

Rounding also enables you to **estimate** approximately how much **change** you should be given, or should give, when doing money **transactions**.

Image: aarestt/ iStock/Thinkstock

Rules for rounding

It is always better to round to friendly numbers that are more easily calculated in your head. e.g. 5, 10, 20, 50, 100

- When rounding for money purchases to even dollar amounts and 50 cent amounts. e.g. $3.90 becomes $4, $2.25 becomes $2.50. $1.05 becomes $1.

In most cases you should:

- **round up** for 'money spent' (e.g. costs, time, quotes, materials, expenses, etc.). This means that you are playing it safe and over-estimating potential costs.
- **round down** for 'money in' (e.g. income, revenue, time saved, etc.). This also means that you are playing it safe and under-estimating potential benefits.

For currency transactions, use rounding to estimate the major currency units you should use, or be given as change.

e.g. Purchase a meat pie of $4.80. Pay with a $10 note.

- By using rounding the pie costs about $5.
- By using rounding you should get at least $5 change.
- You will expect to receive a $5 note; or perhaps 2 x $2s and a $1 in your change (or some other combination of currency units); and a coin.

e.g. Purchase the pie for $4.80 and a Pepsi Max for $2.75. Pay with a $10 note.

- By using rounding the pie costs about $5 and the Pepsi costs about $3. Together the rounded total = $8.
- By using rounding you should get at least $2 change. You have rounded both of your purchases up so you will expect some more small coins as well as the $2.

NUM SUPER SKILLS

Rounding purchases 4F

1 4 PS 2 3

1. Use **rounding** to complete the table for the following transactions.
   (You might even use **training currency** for this task.)

Purchase amount	Rounded amount	Money tendered	Estimated change	Estimated currency	Exact change	Exact currency
e.g. $6.75	$7	$10	$3	$2 + $1	$3.25	$2 + $1 + 20c + 5c
$2.95	$	$5	$		$	
$1.25	$	$5	$		$	
$9.45	$	$10	$		$	
$7.80	$	$10	$		$	
$1.95	$	$10	$		$	
$14.80	$	$20	$		$	
$15.10	$	$20	$		$	
$17.75	$	$20	$		$	
$4.95	$	$20	$		$	
$33.75	$	$50			$	

2. Use **rounding** to complete the table for the following **multi-step** transactions.
   (Once again you could even use **training currency** for this task.)

Purchase amounts	Calculation	Rounded amount	Money tendered	Estimated change	Estimated currency	Exact change	Exact currency
e.g. $2.50 + $2.25	= $4.75	$5	$10	$5	2 x $2 + $1	$5.25	2x $2 + $1 + 20c + 5c
a. $1.90 + $1.99		$	$5	$		$	
b. $3.25 + $2.70		$	$10	$		$	
c. $4.95 + $3.95		$	$10	$		$	
d. 75c + $1.55 +$14.50		$	$20	$		$	
e. $2.75 x 3		$	$50	$		$	
f. $41 + $ 2.85		$	$50	$		$	

4.13 Digital Money

Digital wallets

A digital wallet is a mobile application that enables a person to:

- ⇨ make payments from their existing account balance (like a digital debit card), or
- ⇨ to make payments using credit from the app provider such as a bank (like a digital credit card); or
- ⇨ a combination of both debit and credit transactions.

Most digital wallets are operated through a **smart phone** or a **smart watch** or a **smart device**

Digital wallets can also store loyalty cards, discount coupons and other similar digital shopping add-ons.

So in the digitised world of the 2020s, digital wallets are quickly becoming a replacement for cash-based transactions.

As long as the user transfers money into their debit account, it's just like having cash in their wallet.

This can help a person more easily manage their budget or weekly spending limit. As they can't spend what is **not** in their digital wallet.

Many of the apps have push notifications that keep the user up-to-date on their balance and other information.

However, if the e-wallet is also tied into a credit card, or a similar type of credit feature, then it is very easy for a person to lose control of their spending, especially given the comparative ease of online and digital shopping.

And digital wallets can also be set up to easily and regularly transfer funds from an existing debit balance.

So in this age of all the smart apps and devices managing your life for you, it is even more important for you to "check your digits".

So what does your class reckon about digital wallets? Yea or nay!

Digital wallets 4G

1. List the major examples (i.e. **brands** or **providers**) of **digital wallets** in Australia.

2. What are the **advantages** and **disadvantages** of a digital wallet?

3. Do **you** use a **digital wallet** or do you use **cash**? Or **both**? Why so?

4. Think ahead to **2 years' time.** Do **you** think you'll mainly be a **cash user** or will you be more likely to use a **digital wallet**? Why so?

Research

a. Form into a team and find out the main types of digital wallets available to use in Australia, such as those from banks, from global tech giants, and other providers. Your teacher might allocate specific examples to your team.

b. Summarise the key features, costs and security measures associated with each.

c. Report to the class about which ones you would recommend and why; as well as which ones you'd steer clear of (hint: credit/loan types of digital wallets).

4.15 Multiplication and Division

Multiplication

With multiplication you are calculating an answer based on repeated 'adding' of a particular number.

The best way to clearly understand multiplication is by saying the words in the calculation out loud.

For example:

- ➪ Calculate: Four times six.
- ➪ This means you have to work out the total of four sixes.
- ➪ Four sixes is just: six plus six plus six plus six. i.e. 4 x 6.
- ➪ The answer to this, is of course, 24!

Multiplication (times)
...shown by a 'x' or '*' sign)

Multiplication involves repeated addition of the same number to find the answer (also called the **product**).

In other words, you are adding the same number together for however many times is specified. e.g.

2 x 4 = 8 or
(4 + 4 = 8)

5 x 7 = 35 or
(7 + 7 + 7 + 7 + 7 = 35)

12 * 11 = 132 or
(11 + 11 + 11 + 11 + 11 ...and so on).

Can you hear how saying the words out loud helps make multiplication much easier to understand? Multiplication is simply: <u>something</u> <u>times</u> <u>something else</u>.

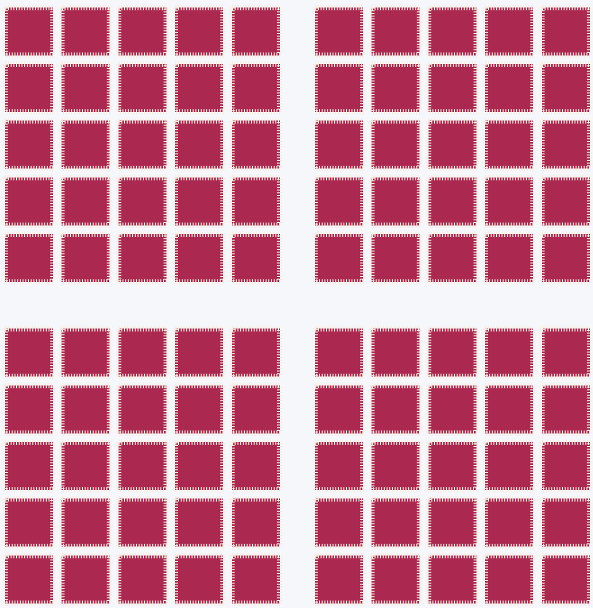
- ➪ Ten times ten? Well ten tens is a hundred.
- ➪ What about 20 x 5? Well 20 x 5 = 100.
- ➪ And how about nine by five? Sometimes people 'say' multiplication this way; i.e. something <u>by</u> something else. Nine times five is (9 + 9 + 9 + 9 + 9 = 45).

Multiplication using visual data

What is 20 x 5?

Well here we can show this visually.

- ➪ 5 boxes (in rows) repeated 20 times (and a nice pattern!)
- ➪ If we count the boxes you find there's 25 in each rectangle.
- ➪ If you count all of the boxes you will eventually get to 100. But this is going to take a long time. And your eyes will go all funny!



So it's easier just to do multiplication.

- ➪ Multiplication involves a particular number, multiplied by another number.
- ➪ So in other words, you count the first number, by the amount of **times** of the second number. i.e. 5 x 20. (And now you can do the calculation both ways because 5 x 20 is the same as 20 x 5!)

Multiplication calculations

When performing multiplication it is important to know these instructions.

- ⇨ You have to set out the question in the proper way. This includes making sure that you **right-align** the numbers.
- ⇨ You might also have to carry a number (or numbers). Your teacher will explain how to do this.
- ⇨ For bigger numbers you might have to include a 0 to show place value for 10s, and another 0 to show place value for 100s and so on. Once again your teacher will explain how to do this.

These might sound a bit confusing written in words. But when your teacher works through examples it will be much easier. This is because most people learn better from watching and doing numerical calculations, rather than from reading how they're done! Do you agree?

Tip: Always perform any calculations in brackets first!

Multiplication: Using calculations

e.g. Calculate the total of: 9 x 7

```
  9
x 7
---
 36
```

e.g. Calculate the total of: 110 x [illegible]

e.g. Calculate the total of: 15 x 15

```
  2
  15
x 15
----
  75
 150
----
 225
```

(Carry the 2 from 5x5 =25)

(Put a 0 to show place value for tens)

Multiplication 4H

In your workbooks complete the following **multiplication** calculations.
Make sure that you show appropriate workings out.

a. 9 x 6 =	b. 4 x 8 =	c. 12 x 10 =	d. 14 x 3 =
e. 15 x 5 =	f. 8 * 12 =	g. 13 by 11 =	h. 24 x 6 =
i. 20 * 12 =	j. 0.50 x 20 =	k. 35 by 15 =	l. $25 x $2 =
m. twelve times ninety =	n. one hundred by 20 =	o. seven times forty-six =	p. 10 x 60 mins =

4.17 Multiplication and Division

Division

With division you are calculating an answer based on how many times one number (the **divisor)** goes into another number. You can better understand division by saying the words in the calculation out loud. e.g.

- ⇨ Calculate: 30 divided by 10.
- ⇨ This means you have to work out how many 10s there are in 30.
- ⇨ So if we say "10", "10", "10" we quickly count up to 30.
- ⇨ The answer to this, is of course, 3!

But dividing for 10s is easy, as is working out division for small numbers by counting.

To deal with less uniform numbers, as well as bigger numbers, you will need to learn and apply the skills for calculating division. And you should also know that doing the division calculation is the opposite of doing the multiplication calculation.

- ⇨ Multiplication: 10 x 10 = 100. Division 100 / 10 = 10.
- ⇨ Multiplication: 25 x 4 = 100. Division 100 / 25 = 4 or 100 / 4 = 25.

Division (how many) ...shown by a '÷' or '/' sign)

Division involves finding the **quotient** of 2 (or more) numbers. In other words, how many times one number goes into another. e.g.

10 ÷ 5 = 2

(How many 5s are in 10?; there's 2!)

28 ÷ 2 = 14

150 / 10 = 15

Sometimes not all numbers are divisible (or go into each other) equally, which leaves a **remainder**.

You might express this remainder as a decimal or as a fraction. e.g.

9 / 2 = 4.5 (Remainder a decimal.)

9 ÷ 2 = 4 1/2 (Remainder a fraction.)

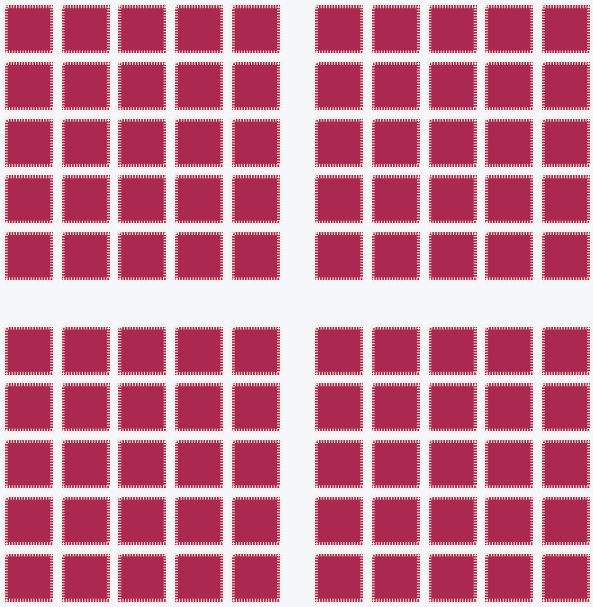
NUM SUPER SKILLS

Can you see the division/ multiplication relationship now?

Division: using visual data

We can once again use visual data to understand division.

- ⇨ Here are 100 boxes. You can count 20 rows of 5 (or 20 columns of 5).
- ⇨ You can also count 4 squares of 25.
- ⇨ You could even count 100 small squares (if you have time and good eyesight!)



Let's look at the **divisors** for 100 here.

- ✓ 1 is a divisor - there are 100 1s in 100!
- ✓ 2 is a divisor - there are 50 2s in 100!
- ✓ 5 is a divisor - there are 20 5s in 100!
- ✓ 10 is a divisor - there are 10 10s in 100!
- ✓ 25 is a divisor - there are 4 25s in 100!

We can see each of these divisors quite easily on the diagram. You could draw a circle around them.

However, there are other divisors for 100. What are they?

Perhaps you could try drawing 'circles' around the blocks using different colours to work these out.

Division calculations

When performing short division it is important to know these instructions.

- ⇨ You have to set out the question in the proper way. This includes using a division box as shown below.
- ⇨ You set out the **dividend** (the number you are dividing into) by the **divisor** (the number you are dividing by). i.e. 20 (the dividend) divided by 5 (the divisor).
- ⇨ You might also have to carry a number (or numbers) if you get a remainder. Your teacher will explain how to do this.

Remember that most people learn better from watching and doing numerical calculations rather than from reading how they're done! That's why your teacher will do some examples for the class and then get you to try some on your own.

Tip: Always perform any calculations in brackets first!

Division: Using calculations

Calculate the total of:
66 ÷ 6

```
   11
6 | 66
```

Calculate the total of:
95 / 5

```
   19
5 | 95
```

Calculate the total of:
132 ÷ 11

```
   12
  2
11 | 132
```

(Carry the 2 from 13/11 =1 plus 2 remainder)

Division 4I

In your workbooks complete the following **division** calculations.
Make sure that you show appropriate workings out.

a. 20 ÷ 10 =	b. 18 ÷ 6 =	c. 75 ÷ 5 =	d. 64 ÷ 8 =
e. 45 / 3 =	f. 100 ÷ 5 =	g. 160 / 10 =	h. 144 ÷ 12 =
i. 300 ÷ 20 =	j. 1000 / 10 =	k. 75 ÷ 37.5 =	l. 7.5 / 5 =
m. seventy divided by five =	n. 110 divided by 11 =	o. one hundred how many twos =	p. how many halves are in 5 =
g. $25 / $5 =	r. $140 ÷ $7 =	s. 6 hours divided by 2 =	t. how many 15 mins in 2 hours =

4.19 Fractions and Decimals

Fractions

A fraction represents a part or a portion of a whole number. Essentially a fraction divides the top number (**numerator**) by the bottom number (the **denominator**).

For example: Fractions

- An orange cut equally in two portions = 1/2 an orange + 1/2 an orange.
  If you eat one of these portions you have eaten 1/2 of an orange.
  And 1 divided by 2 = 1/2. (Or, "how many 2s go into 1: a half!")
- 25 cents = a quarter of a dollar or 1/4 (in the US they have 'quarter' coins and not 20c coins like in Australia; so our 20c = 1/5 of a dollar).
- A pizza sliced in 8 portions = 8 x 1/8. Each slice is 1/8.

Peckish?	2 slices = 1/4	(or 2 eighths or 2/8)
Hungry?	4 slices = 1/2	(or 4 eighths or 2/4 or 1/2)
Famished?	6 slices = 3/4	(or 6 eighths or 6/8 or 3/4)
Starving?	8 slices = 1	(or 8 eighths or 4 quarters, or 2 halves)

Now, Igor is really greedy and eats his whole pizza, which is cut into 4 pieces.

So that's 4 quarters (or 2 halves) d... how big his mouth is!

His friend Frankie goes to ... sauce and Igor quickly s... quarter slice of Frank...

Igor has now eaten one and a quarter pizzas (or 5/4 which is 4/4 plus another 1/4).

Now that is a very **improper** thing to do!

Image: ekizv/ Depsoitphotos.com

Fractions

Proper fraction:

A proper fraction is one where the number on top (**numerator**) is **less than** the number on the bottom (**denominator**).

This means that the number represented by the fraction will be less than 1 (for positive numbers). e.g. $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{3}{5}$ $\frac{1}{10}$ $\frac{5}{6}$ $\frac{1}{8}$ $\frac{3}{7}$ $\frac{13}{20}$ $\frac{25}{100}$

Improper fraction:

An improper fraction is one where the number on top (**numerator**) is **more than** the number on the bottom (**denominator**).

This means that the number represented by the fraction will be more than 1 (for positive numbers) e.g. $\frac{3}{2}$ $\frac{4}{3}$ $\frac{5}{4}$ $\frac{10}{5}$ $\frac{11}{10}$ $\frac{14}{6}$ $\frac{12}{8}$ $\frac{10}{7}$ $\frac{60}{20}$ $\frac{200}{100}$

NUM SUPER SKILLS

Decimals

A decimal is another way of representing a fraction. Decimals are based on our number system which uses the power of 10s, i.e. 1, 10, 100, 1000, 0.1, 0.01, 0.001.

Some numbers include a decimal point. These represent a whole number, such as 2, plus a fraction of a whole number, such as 0.5. Written together this will be 2.5 (or 2 and five tenths). 2.5 can also be written as 2 1/2.

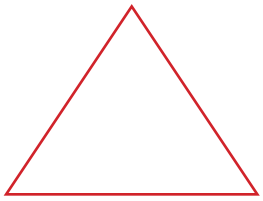
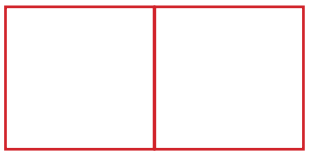
> For example, Ellie ran 2 full laps plus another half of a lap of the oval before she had to stop. In decimal terms, Ellie ran 2.5 laps of the oval.

For really accurate numbers such as in medicine, pharmacy and other technical and scientific jobs decimals might go up to the hundredth (i.e. 2 numbers after the decimal point; 0.01); or even to the thousandth, (i.e. 3 numbers after the decimal point; 0.001). For this stage of numeracy we can keep decimals to the tenth, which is one number after the decimal point, or 0.1.

However, when dealing with **money** you will need **2 decimal places**; and when converting measurements you might also require 2 (or even more) decimal places. Why is that?

Fractions and decimals 4J

1. **Colour** in the **shapes** to indicate each fraction.

1/4 	1/2 	1 
1/3 	2/5 	3/4 

2. Write each of these as their correct **decimal** or **fraction**.

1/2	1/4	1/3	1/5	1	2/4	2/3	3/5	7/10	3/4
0.5									

0.4	0.2	0.5	0.33	0.9	0.67	1.0	0.75	0.6	1.5
		1/2							

4.21 Fractions and Decimals

Working with fractions

Sometimes when you apply numeracy to financial, personal and vocational situations you might have to add or subtract using **fractions**. One way to do this is to say the numbers in your head. e.g.

- ⇨ "One half plus two halves means that I've got three halves (or one and a half)."
- ⇨ "One quarter plus two quarters equals three quarters."
- ⇨ "One minus a half = a half."
- ⇨ "Three quarters minus a half = 3/4 minus 2/4 which equals 1/4."

But if the calculation gets more complex then you will need to follow a numerical method. Your teacher will work through a number of examples with you.

Fractions: Addition and Subtraction

If the fractions have the same bottom number (**denominator**) then simply add or subtract the top numbers (**numerator**).

e.g. i $\frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1$

e.g. ii $\frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$

e.g. iii $\frac{5}{2} + \frac{4}{2} - \frac{3}{2} = \frac{9}{2} - \frac{3}{2} = \frac{6}{2} = 3$

But, if the fractions have different bottom numbers (**denominators**) then you will have to find the **lowest common denominator** (or lowest common multiple). After this you can then add or subtract the top numbers.

e.g. i

$\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4}$

$= \frac{3}{4}$

e.g. ii

$\frac{3}{4} + \frac{2}{4} = \frac{6}{4} + \frac{2}{4}$

$= \frac{8}{4}$

$= 2$

NUM SUPER SKILLS

Working with decimals

Working with decimals is common in life, especially in workplaces and job tasks that deal with money, and for measurements using the decimal system. The easiest way to do this is to use the same rules for calculating by setting this out vertically. But the key is to make sure your numbers are aligned based on the decimal point.

Adding and subtracting decimals

e.g. Calculate the total of: 0.5 + 0.2	e.g. Calculate the total of: 0.5 + 0.25	e.g. Calculate the total of: 2.5 + 3.4	e.g. Calculate the total of: 0.45 + 3.40	e.g. Calculate the total of: 1.5 + 2.3 - 1.6
0.5 + 0.2 0.7	0.50 + 0.25 0.75	2.5 + 3.4 5.9	0.45 + 3.40 3.85	1.5 + 2.3 3.8 - 1.6 2.2

Fractions and decimals II 4K

1. Calculate these **fraction** and **percentage** amounts.

a. 1/2 a dollar	b. 3/4 of $10	c. 1/4 of $100	d. 1/2 of $172.50
e. 25% of $10	f. 10% of $1,000	g. 30% of 30 + $50	h. 50% of $99.95

2. Perform the following calculations in **your head** or on **paper**. Time this.
3. Now do the same calculations using a **calculator**. Time this.
4. Estimate how many calculations you have done correctly.

   Your teacher will give the answers after the class has done both tasks.

a.	1/2 + 1/2 =	=	1/2 + 1/2 =	=
b.	0.5 + 0.25 =	=	0.5 + 0.25 =	=
c.	1.50 + 3.50 =	=	1.50 + 3.50 =	=
d.	1/4 + 2/4 =	=	1/4 + 2/4 =	=
e.	20 1/2 + 9 1/4=	=	20 1/2 + 9 1/4=	=
f.	$1 - $0.5 =	=	$1 - $0.5 =	=
g.	1 - 1/4	=	1 - 1/4	=
h.	$50 - 25.50 =	=	$50 - 25.50 =	=
i.	0.5 + 1/2 + 0.25 =	=	0.5 + 1/2 + 0.25 =	=
j	3.5 - 0.5 - 1/2 =	=	3.5 - 0.5 - 1/2 =	=
k.	1/8 + 3/8 - 1/4 =	=	1/8 + 3/8 - 1/4 =	=
Estimated correct		/11		/11
Total correct:		/11		/11

5. Discuss with the class how you went. What were the **patterns** around your own areas of **strength** and **weakness**? What about for class as a whole?

4.23 Comparing Prices

Comparing prices

An important numeracy skill that people need as part of their everyday lives is to compare prices. When comparing prices it is important that you take into account other issues such as product **quality**, product **features** and whether you actually **need** that **quantity** of product in the first place.

Developing the ability to compare prices will help you to:

- ⇨ be able to compare the **relative price** of different-sized products
- ⇨ make your dollar go further when making purchases to help save money
- ⇨ manage your finances as part of a personal budget
- ⇨ factor in issues such as personal preferences, product quality and product features.

Comparing Prices: Issues to Consider...

Price
Size
Quantity
Weight
Features
Preference
Warranties
Waste
Delivery
Quality

Image: photkas/ Depositphotos.com

False economy

The concept of false economy means that although you think you might be saving money in the short-term, you are likely to end up spending more money in the long-term. Here are some examples, but you should be able to think of more.

- ⇨ Buying more than you need and ending up wasting most of the item. e.g. You buy a discounted box of fruit and most of it goes bad before you can eat it all.
- ⇨ Buying cheaper items on special but then consuming more than you would've. e.g. Instead of 1 packet of chips for $4.50 you buy 2 for $7 on special. Not only do you spend more, you end up scoffing down twice as much!
- ⇨ Buying low quality goods that break down and need to be replaced, e.g. A tradie buys cheap power tools that end up costing more in money and lost time.

Comparing prices 4L

1 4 PS 2 3

1. Working in **pairs estimate** the **price** of these **common** household grocery and shopping **items**. You will have to take into account **product size** as well.

Milk	Loaf of bread	Roast chicken	1kg mince	Vegie sausages	Butter
1kg tomatoes	1kg apples	1kg bananas	1kg potatoes	Lettuce	Zucchini
Cheese slices	Can of tuna	Pasta	Pasta sauce	Coco pops	500g coffee
Tim Tams	2l of Cola	Corn chips	Block of chocolate	BBQ shapes	Ice cream
Toilet paper	Toothpaste	Dishwashing liquid	Soap	Deodorant	Shampoo

2. Now go **online** and find out the **current prices** of these items. Where will you look - just **one seller**, or will you **compare**?

Milk	Loaf of bread	Roast chicken	1kg mince	Vegie sausages	Butter
1kg tomatoes	1kg apples	1kg bananas	1kg potatoes	Lettuce	Zucchini
Cheese slices	Can of tuna	Pasta	Pasta sauce	Coco pops	500g coffee
Tim Tams	2l of Cola	Corn chips	Block of chocolate	BBQ shapes	Ice cream
Toilet paper	Toothpaste	Dishwashing liquid	Soap	Deodorant	Shampoo

3. In your workbooks, do **calculations** to show the **differences**.
4. How did you go? Did you **underestimate**, **over-estimate** or were you close?
5. Should **you do** the **shopping**? Why or why not?

4.25 Comparing Prices

Units costs

Under Australian law, large grocery and fresh produce retailers need to show unit pricing for relevant items. This is called the Unit Pricing Code.

What this means is that the shelf price tags and online options must include a unit price per relevant measure, such as $1 per 100g or 50 cents per 100 millilitres.

Unit pricing enables a shopper to do quick and easy **comparisons** on which size item might be the least expensive option.

For example: Unit pricing comparison

One of the most commonly purchased grocery items in most household shopping trolleys is Vegemite. But Vegemite (like most items) is available in a range of sizes. Based on prices from June 2022:

Vegemite: 150g jar = $3.50 Unit pricing is $2.33 per 100 grams

Vegemite: 220g jar = $4.00 Unit pricing is $1.82 per 100 grams

Vegemite: 380g jar = $6.50 Unit pricing is $1.71 per 100 grams

Vegemite: 560g jar = $8.45 Unit pricing is $1.49 per 100 grams

Vegemite: 200g squeezy bottle = $4.50 Unit pricing is $2.25 per 100 grams

Vegemite: 350g squeezy bottle = $7.00 Unit pricing is $2.00 per 100 grams

Vegemite: 145g travel pack tube = $4.00 Unit pricing is $2.76 per 100 grams

So which would you recommend people buy? Think carefully though - there might be other factors to consider rather than just unit price. Discuss this as a class. And how do these prices compare to prices today? What **inflation** occurred?

4M Unit pricing

1 4 PS 2 3

1. Work in pairs and go **online** or visit a **supermarket** to do **unit pricing comparisons** for 3 different items. Choose a **food** product, a **drink** product and **another** product. Record your results in the table.
2. What **advice** would you give about **choosing** between **different-sized** options?

Basket of goods 4N

1 4 PS 2 3

Jatz is having some friends over and she is going to offer some light snacks and sandwiches. After researching online and in catalogues, she has put together a table of this week's prices for the key products she wants to buy.

1. Calculate the column **totals** of the '**basket of goods**' at **each** of the **supermarkets**.
2. List an '**other**' source for each of these products along with a **price**.
3. From **which supermarket** or supermarket(s) would **you recommend** Jatz source her products? Explain using evidence.
4. What **other issues** should Jatz take into account when **choosing** between these different sellers?

Product	Size	Coolworths	Boles	IPA	Baldi	Other
Wholegrain bread	680 gm	$3.50	$3.50	$3.85	$2.79	
Free range eggs	dozen	$5.75	$6.25	$.99	$4.85	
Iceberg lettuce	na	$1.50	$.99	.50	$1.50	
Curry powder	100 gm	$2.45	2.	$1.	$2.15	
Tasty cheese slices	24 pack	$.	6.20	$5.99	$4.99	
Tomatoes	1 kg	$6.9	$	$5.99	$5.25	
Hummus dip	250 gm	$3.15	$2.99	$3.50	$1.79	
Packet of crackers	250 gm	$1.50	$1.25	$1.50	$0.99	
Cola drink	2 litres	$1.40	$1.10	$1.50	$0.99	
	Totals	$	$	$	$	

Applied: Comparing prices in action

1. Choose shopping items that your household regularly purchases.
2. Research their current prices from different sellers. Check for any items on special.
3. Complete a table like the one above. Calculate the total price for the 'basket of goods' and potential savings.
4. Make recommendations to help your family's shopping budget, e.g. should they shop around more?

4.27 Comparing Prices

4O Finding patterns

1. What **patterns** are occurring in each of these sets of numbers? What might be the **next number** in the series?

						Pattern?
$2	$4	$6	$8	$10	$	
$6	$5	$4	$3	$2	$	
2	4	8	16	32	$	
132	64	32	16	8	$	
$1	$3	$6	$10	$15	$	
$30	$29	$27	$24	$20	$	

2. Consider each of these products based on the size. **Predict** what the **next prices** would be, based on applying a **simple pattern**.

						Pattern?
Sugar	500g $2	1kg $4	1.5kg $6	2kg $8	2.5kg $	
Eggs	6 $3	12 $6	18 $9	24 $12	30 $	
Coffee	5 cups $25	4 cups $20	3 cups $15	2 cups $10	1 cup $	
Milk	1 litre $1.50	2 litre $3	3 litre $4.50	4 litre $6	6 litre $	

1 4 PS 2 3

3. As you know, when you buy many packaged items in **bulk**, the pattern of prices changes and you are more likely to save. Can you **find clear patterns** here? What is the **general trend** as you **upsize**?

					Pattern?
Sugar	500g $2	1kg $3.50	1.5kg $4.50	2kg $5.50	
Eggs	6 $3	12 $6	18 $8	24 $10	
Coffee	1 cup $5	2 cups $10	4 cups $20	5 cups $20	
Milk	1 litre $1.50	2 litre $2.75	3 litre $4.00	4 litre $5.25	
Soft drink	500ml $2.50	1.25 litre $3.50	2 litre $3.75	4 litre $5.00	

Sometimes we can use **patterns** to make it easier to estimate and calculate **discounts**. This is especially useful when shopping and seeing all different prices, offers and discounts - and needing to quickly **judge** which offers might be **suitable**.

As you know, calculating 10% of anything is really quite simple. Once you can calculate 10% of a number or a price, then you can easily double this for a 20% discount, or halve this for a 5% discount; and so on.

1 4 PS 2 3

4. Calculate a **10% discount** on these amounts. Then halve or double this for 5% or 20%, and so on.

Price	10%	New price	5%	New price	20%	New price	30%	New price	40%	New price	50%	New price
$100	$10	$90	$5	$95	$20	$80	$30	$70	$40	$60	$50	$50
$200												
$50												
$60												
$40												
$500												
$1,000												

Applied

You can also use number patterns to quickly estimate how much you might be **spending**. You can use amounts of $1, $2, $3, $4, $5, $10, $20 and so on depending on the price of your **purchases.** You **round up** the prices of products to the nearest **whole dollar** (ignore those misleading .99c and .95c amounts)

For example, to estimate if you have enough money to buy lunch for 4 people, using $20 'lots', you can look at the menu and say that:

Burgers = $5, fries = $3, drinks = $4.

So you might say: 4 burgers = $5, $5, $5 and $5 so that's one $20 lot.

People want 6 serves of fries = $3, $3, $3, $3, $3, $3 which = $18 which is almost another $20 lot.

And people want 4 drinks = $4, $4, $4, $4 = $16. This is almost another $20 lot.

So you are going to need approximately $60, but you should expect some change.

Pair up and **use this method** to **compare** a **lunch** for you **two** at different **fast-food outlets** Compare at least 3. Did this method make it **easier** and **faster** for you to estimate the total cost?

4.29 Assessment Task

AT4 Adding Up to Take Away
Financial Numeracy: Number

Overview

For this task, you are required to apply your financial numeracy skills to estimate and calculate the best **take-away dinner option** for your **family** within a **budget** of **$20**.

You should compare at least **3 different options**, including a meal from a major **national** chain and a **local** take-away meal option. Consider these possibilities.

- ☺ A major take-away hamburger chain.
- ☺ A major take-away chicken chain.
- ☺ A major take-away pizza chain.
- ☺ A local take-away hamburger shop.
- ☺ A local take-away fish 'n' chip shop.
- ☺ A local general take-away shop.
- ☺ Other take-away food options.

Your teacher might get you to work in pairs or in a group. You will submit a final investigation to your teacher, and perhaps also report to the class.

1 4 PS 2 3

At all stages of this task you will need to apply the 4-Stage Problem-Solving Cycle: **1 Identify the maths 2. Act on and use the maths 3. Evaluate and reflect 4. Communicate and report**.

You also have to develop and apply your understandings and techniques from your **Maths Toolkit**.

In your investigation you have to take into account these considerations.

- ❑ How many people are you needing to feed?
- ❑ How much does each person eat?
- ❑ Are there any dietary or cultural requirements?
- ❑ Does the meal option include drinks?
- ❑ Are there any meal deals available?
- ❑ Are there any specials or loyalty offers available through apps or coupons?
- ❑ Are there delivery fees, or will you pick-up the meal?
- ❑ Other issues relevant to availability, choice, price and preference.

Add any other important information here.

Note: In the final column, your teacher might also include an achievement level to indicate your level of performance for each part of the task.

Name(s):

Key dates:

Financial Numeracy
Number Module 2

Tasks - AT3: Adding Up to Take Away	Must Do?	Due by	Done	Level
Negotiate the task details with my teacher.	✓			
Investigation of take-away dinner options				
a. - Amount of food required?	✓			
- Dietary or cultural requirements?	✓			
b. - National take-away chain.	✓			
- National take-away chain.				
c. - Local (other) take-away provider.	✓			
- Local (other) take-away provider.				
d. Does the meal option include drinks?	✓			
e. - Meal deals available.	✓			
- Specials or loyalty offers available.	✓			
f. Delivery fees?	✓			
g. - Other issues:	✓			
- Other issues:				
Task completion and reporting				
⇨ Explain your recommendations and conclusions.	✓			
Use and apply appropriate digital tools and apps.	✓			
Use and apply appropriate analogue tools.	✓			
⇨ Use appropriate numerical language.	✓			
1 4 PS 2 3 **Describe applied use of the problem-solving cycle.**	✓			
Develop and apply mathematical tools and techniques.	✓			
Prepare and discuss my investigation with my teacher.	✓			
Present a report to the class (if required).				

Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report

4.31 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task: **Names/Dates:**

AT4 -

1. Identify the maths					
Identify problem(s)	Done: ○ Level:	Recognise maths	Done: ○ Level:	Select information	Done: ○ Level:
Interpret information	Done: ○ Level:	Choose processes	Done: ○ Level:		Done: ○ Level:
2. Act on and use maths					
Perform estimations	Done: ○ Level:	Decide techniques	Done: Level:	Choose maths tools	Done: Level:
Select technologies	Done: ○ Level:	Perform calculations	Done: ○ Level:		Done: ○ Level:
3. Evaluate and reflect					
Check Estimations	Done: ○ Level:	Compare results	Done: Level:	Check processes	Done: Level:
Review actions	Done: ○ Level:	Check logical reasoning	Done: Level:	Assess conclusions	Done: ○ Level:
Communicate and report					
Written processes	Done: ○ Level:	Written results	Done: Level:	Oral processes	Done: Level:
Oral results	Done: ○ Level:	Digital processes	Done: ○ Level:	Digital results	Done: ○ Level:

Mathematical Toolkit					
Analogue tools - What & how?		Digital Devices - What & how?		Software & Apps - What & how?	
Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy

Dollars and Sense 5

Activities 5: Dollars and Sense		p.	Due date	Done	Comment
5A	**Dealing with money**	109			
5B	**Fractions & percentages**	110			
5C	**Percentages**	111			
5D	**Income**	113			
5E	**Multiplication & money**	114-115			
5F	**Expenses**	117			
5G	**Expenses in action**	118-119			
5H	**Budgeting 101**	121			
5I	**Feed the kitty**	122			
5J	**Personal budget**	123			
5K	**Pay slips**	125			
5L	**Banking - Deposit accounts**	127			
5M	**Playing it safe - Cash**	129			
5N	**Playing it safe - Digital**	131			
AT5	**Applied Financial Numeracy**	132-133			
PST	**Problem-Solving Cycle and Maths Toolkit**	134			

Comments:

5.01 Dollars and Sense

Dollars and sense

Image: StudioM1/iStock/Thinkstock

In Section 4 you built and applied some key numerical skills to better understand money.

In this section, you are going to develop and apply more **financial numeracy** skills.

You will start to explore the different types of **income** that people are paid for working.

You will also develop financial numeracy skills to help you estimate and manage the common **expenses** of life.

You will investigate the importance of personal **budgeting** for financial numeracy, and create a basic 4-week budget for your own personal situation.

You will be given an introductory summary of a **pay slip**. Your teacher might expand this topic if you have a number of people in your class working, or soon to be working.

You will also be introduced to **personal banking**, including an investigation into **cash** and **digital security** to improve your awareness of the many ways that crooks can target a person's cash and digital money. That topic in itself could be the entire focus of an assessment task investigation.

Money at work

Work-related tasks are driven by financial matters in **profit-making** businesses such as local cafés, shops, farms, trades and manufacturers; all the way through to large organisations such as Woolworths and McDonald's.

You might have to use money when dealing with customers and clients, ordering stock and supplies, preparing quotes to cost jobs, and of course, when being part of a successful business!

People who work for **not-for-profit** enterprises such as schools, hospitals and welfare organisations, and **government agencies** such as local councils or government departments must meet strict **budgetary** constraints.

And of course there is also the issue of the **wages** you earn that are paid for your time, **labour**, skills and expertise. You need to know how to calculate your wages. You also need to be able to check that you are being paid correctly.

Sing it loud, sing it proud

Hit songs with money in the title!
Who sung these and when?

- Money
- Money, Money, Money
- Money (That's What I Want)
- Money Makes the World go Around
- Money Changes Everything
- Money for Nothin'
- She Works Hard for the Money

Hit songs about money!
Who sung these and when?

- Can't Buy Me Love
- Working Class Man
- Bills, Bills, Bills
- If I was a Rich Man
- Who Wants to be a Millionaire
- I Need a Dollar
- Don't Worry, Be Happy

Do you have any fave' contemporary performers who sing about money?

Advanced Numeracy Skill: Order of operations

When you work through some of the activities in this section of Numeracy: VPC you might have to combine calculations using addition, subtraction, multiplication and division, even though you won't be strictly assessed on this.

But knowing how to do this is a common skill needed for personal and work-related money management.

For example, you might earn $10 an hour for 30 hours, plus $12 an hour for another 10 hours of overtime. Working out your total pay for the week combines both addition and multiplication.

So, how might you set out the calculation to work this out?

e.g. = $10 x 30 + $12 x 10 = Total pay for the week =

Which do you think is the correct answer: $420 or $3,120?

Your teacher will discuss how to do this with the class and check to see who got it correct, and who made the common mistake that many people do.

There is a set of rules that govern the order in which to do these types of calculations.

This involves you following the correct **order of operations** for these types of calculations.

If your teacher thinks it's necessary to learn this they will show the class how to do it.

NUMERACY 12

Dealing with money 5A

1. Describe the main situations when you deal with **money**.

2. Describe some examples of when **other people deal with money for you**, or on your behalf.

3. How would you rate **your skills** in dealing with **money**? Explain.

5.03 Percentages

Percentages

A **percentage** represents a **portion** (or a fraction) of a whole amount. A percentage represents a **fraction** out of 100%. With percentages the whole amount is 100%. Half of that whole amount equals 50%. One quarter of that whole amount represents 25%. One tenth of the same whole amount represents 10%.

Percentages are used a lot when dealing with money including for **discounts**, for **cost mark-ups** and even for weekend **penalty rates** on **wages**.

Percentages are one of the most straightforward calculations going around, because a percentage simply represents a proportion of a whole! Every percentage is going to be between 0% (none) to 100% (all) of a total. But sometimes people can get confused. So the 4-stage Problem-Solving Cycle can be your 100% best friend here!

If you have a look at this image of the percentages of an orange we are showing the fractions as a percentage.

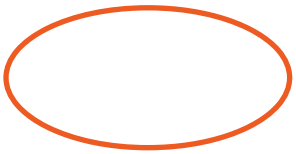
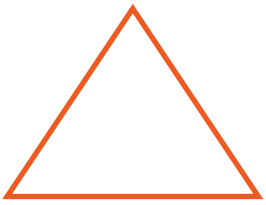
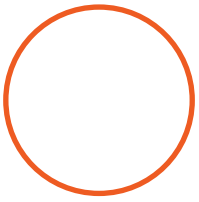
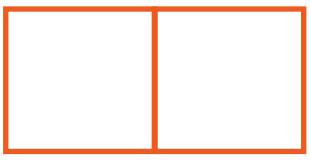
1 = 100% 1/2 = 50% 1/4 = 25% 1/8 = 12.5%

5B Fractions & percentages

1. Complete this table to show these fractions as **decimals** then as **percentages**.

1/10	1/6	1/4	1/3	1/2	6/10	2/3	3/4	4/5	1/1
		0.25							
							75%		

2. **Colour** in each of these **shapes** to show the **percentage**.

50% 	100% 	50% 
75% 	66% 	25% 

Calculating percentages

If there are 10 people at a McDonald's, and 6 of these buy a Big Mac, then the percentage of Big Mac eaters in this McDonald's is 60%. See it's easy in words. It's easy in numbers as well.

$$\frac{6 \text{ (number of Big Mac eaters)}}{10 \text{ (total number of people in McDonald's)}} \times \frac{100\%}{1}$$

$$= 0.6 \times 100\%$$

$$= 60\%$$

So to work out percentages you divide the amount or the portion you are focusing on, by the total amount. This gives a fraction or a decimal (such as 6/10 or 0.6).

You then multiply by 100% to express this as a percentage.

So if there are 25 people in Hungry Jacks who buy fries with their order and there are 50 diners in total, what percentage of Hungry Jacks diners bought fries? The fraction is 1/2 and the decimal is 0.5, so the percentage is 50%!

NUM SUPER SKILLS

Proportion as a percentage

A percentage represents a smaller proportion of a whole; let's consider these examples. And while you're are it, discuss what you estimate these made-up percentages might be.

- 50 out of every 100 Australians with a smart phone have an iPhone. That's 50%.
- 8 out of 10 people prefer Pepsi over Coke. That's 80%.
- 25 out of 100 adults do not have a driver's license. That's 25%.
- 10 out of 50 people surveyed agreed that watching MasterChef made them want to eat more food. That's 20%, i.e. 20 out of 100.
- 99 out of 100 Numeracy: VPC students believe that after doing this topic they will know how to calculate percentages. That's 99%, do you agree?

Percentages 5C

Calculate each of these **percentages**.

a. 10% of 100	b. 10% of 150	c. 50% of $500	d. 20% of $200
e. 25% of $1000	f. 75% of 500	g. 10% of $2 + 20% of $1	h. 33% of 300

5.05 Income

Income

So how's your income situation? Income is money that you earn from various sources. A lot of people commonly refer to this as their '**pay**'.

The most common form of income is from **wages** and **salaries** earned from being an **employee**. In Australia as at late-2022, about 13.5 million people are 'employed' - with most workers being paid a wage or a salary. However, some workers might instead receive a commission and/or a retainer (such as real estate agents, and sales representatives).

Of those 13.5 million, about 2 million are working to try to earn **profits** as a result of owning and operating businesses.

Other people might receive **transfer income** from the government through various **welfare payments** (such as aged pensions and the **JobSeeker** allowance).

Many people also earn **investment income** in the form of:

- ✓ **interest** from savings
- ✓ **dividends** from owning shares
- ✓ **capital gains** from selling assets (shares, property, etc.) and
- ✓ **rent** from investment properties.

These various sources of income allow us to enjoy a **standard of living** whereby we can purchase goods and services, **save** for the future, and try to achieve a decent **lifestyle**.

Image: p_saranya/ iStock/Thinkstock

Types of Income

Wages

- ⇨ Wages are income amounts paid for an employee's labour and determined on an hourly basis.
- ⇨ Wages normally apply in trades, for skilled and semi-skilled employees and other employees.

Salaries

- ⇨ Salaries are income amounts paid to professionals and 'higher-skilled' or managerial employees.
- ⇨ Salaries are calculated (but not paid) on a yearly (annual) basis.

Commission/Retainer

- ⇨ A commission is an incentive payment usually based on a proportion of sales, fees or revenue, and is often used for people in sales roles.
- ⇨ A retainer is a base level of payment made in conjunction with a commission.

Payment-in-kind

- ⇨ Payment-in-kind refers to non-monetary payments given in return for labour.
- ⇨ For example, a caretaker who is employed at an island resort might receive payment-in-kind of accommodation and meals in addition to their wages.

Income 5D

1. Complete the following sentences using the most appropriate '**income**' term. Then **calculate** the amounts asked in the question. Some require more **complex numerical skills** that your teacher might have to show the class.

a. Jon works at Splash Converters as a customer sales assistant. He is paid $25 for each hour he works. John's form of income is called a _____.

How much does John earn for a standard 38-hour full-time week? (multiplication)

b. Jon's partner Amal works at Rare Flares as a finance manager. She is paid according to an annual amount of $52,000. Amal's form of income is called a _____.

How much does Amal earn (approximately) for a standard full-time working week? (division)

c. Jon and Amal's housemate Sonya is a sales rep. Sonya is paid a $20,000 annual amount plus 20% of the total sales value she makes to clients (all paid monthly). Sonya's form of income is called _____ & _____.

If Sonya averages $200K of sales in a year, how much should she be paid for these sales; and also in total? (addition and percentage)

d. Sonya's brother Rodderick works as the maintenance caretaker for a holiday resort. He gets paid an annual salary of $[illegible] plus free accommodation (valued at $300/week) and free meals and non-alcoholic beverages (valued at $200/week). These extra income amounts are called _____ . (addition and multiplication). So how much does Rodderick 'get' in income per week, and per year?

e. Bessie is 77, doesn't work but is otherwise in good health. She receives a fortnightly welfare payment from the government of $936. This payment is likely to be the _____ .

Do you know anyone who receives payments from the government?

2. Do **you** receive or earn any forms of **income**? Which **types** and **how much**? For your situation, this can also include amounts such as **allowances**, etc..

5.07 Income

Multiplying money...shown by an 'x' or '*' sign)

Multiplication with money again involves repeated addition of the same number to find the answer (the **product**).

In other words you are adding the same number together for however many times is specified.

But this time there will be a dollar and cent component as well e.g.

4 x $4 = $16 or
($4 + $4 + $4 + $4 = $16)

5 x $7 = $35 or
($7 + $7 + $7 + $7 + $7 = 35)

12 * $11 = $132 or
($11 + $11 + $11 + $11...and so on).

Multiplication of more than two numbers involves finding the answer (or the product) of the first 2 numbers.

Then you multiply that answer by the next nu[illegible]and so on.

You always move from left to right. e.g.

[illegible] x [illegible] x [illegible] = ?

($7 + $7 [illegible] = ?

[illegible] = [illegible]

NUM SUPER SKILLS

5E Multiplying & money

1. Complete the following **multiplication calculations for money**. Make sure that you show appropriate **workings out**.

a. 9 x $6 =	b. $4 x 7 =	c. $12 x 8 =	d. $14 x 3 =
e. $12 x 5 =	f. $8 * 11 =	g. $10 x 15 =	h. $25 x 5 =
i. $20 * $12 =	j. 0.50 cents x 20 =	k. 30 by $15 =	l. 38 x $15 =

2. Money amounts are often communicated in **spoken** word form. Calculate the following totals.

a. Two dollars by ten.	b. Eleven times 50 cents.	c. 1 hundred by five.	d. Sixty-fixe by two.
e. Ten times ninety dollars.	f. $400 dollars by six.	g. Seventy-six cents by three.	h. 90 by nine dollars.
i. Pay 25 dollars a week for 52 weeks	j. Pay 50 dollars a month for a three years.	k. Paid $15 per hour for thirty hours =	l. Paid $500 a week for a year =

3. Sometimes you might have to calculate total dollar amounts for **work** situations. Complete these calculations either in your **head** or **on paper.** Then use a **calculator**. **Compare** your answers. How did you go with each method?

a. Customer orders 4 coffees at $4.95 each.	b. Customer orders 9 burgers at $9.99 each.	c. Customer needs 8 lengths of pipe each at $12.50.
d. You work 27 hours at $15 per hour.	e. You work 20 hours at $15 and 10 hours at $20.	f. You have 107 orders to process. Each should take between 4 and 5 minutes.

5.09 Expenses

Expenses

Well you all know it - living your life costs money. And the lifestyle you might **want** to live can be really expensive. And at times, living even just a basic life can be full of day-to-day, week-to-week, month-to-month and even year-to-year expenses just to meet your **needs**.

For **personal** situations, expenses might include mortgage repayments or rent, groceries, utilities, motor vehicle costs, bills, personal items, health and medical bills, education costs, entertainment and other outlays.

Expenses can refer to the costs incurred in **business** such as wages, materials, utilities, stock, inputs, equipment, rent and many other expenses.

Sometimes expenses might simply be called **costs** or **outgoings**.

Expenses and you

Your most common and costly expenses at this stage of your life will be quite different from when you were 10-11 back in primary school.

In 2-3 years' time - as a young adult - you will also find your pattern of expenditure will be different from now.

And of course, when you are living independently, you will also have to take on responsibility for a whole new range of ac[illegible].

And should we mention the expenses associated with caring a parent sometime in the future? Well, that's a whole new ballgame.

The diagram below shows some of the main expense categories for young people, your age, attending school. How closely do these match your life? Add 2 more expenses that are more relevant to you.

Main Expenses Now...

Image: VaLiza/depositphotos.com

Expenses 5F

1 4 PS 2 3

1. Without calculations, **rank** these 10 major **expense items** (and add 2 more) in order from 1, highest, to 12, lowest, for you at **this stage of your life**.

- ❑ clothing & footwear
- ❑ digital subscriptions
- ❑ electronic items
- ❑ gifts & presents
- ❑ hobbies & interests
- ❑ phone & data
- ❑ public transport fares
- ❑ snacks & treats
- ❑ social outings
- ❑ sport & recreation
- ❑
- ❑

2. Estimate and then calculate how much **your expenses** are **per week**/or **per 4 weeks** in these categories.
3. Calculate a **total**. Calculate their amounts as a **percentage of your total**.

1.	2.
2.	4.
5.	6.
7.	8.
8.	10.
11.	12.

4. Think ahead to **2-3 years' time**.

   Estimate how much **your expenses** might be per week/or per 4 weeks, across your **top 10** major categories. Calculate an estimated **total**.
5. Calculate the amounts as a **percentage** of this **total.**
6. Comment on why these two sets of figures are **similar** or **different**.
7. What **might you** have to **change** in your life to cover these expenses?
8. Who **actually pays** for **your expenses** now? Is it you who covers the costs? Or is it your parents, your siblings, or someone else? Why is that?
9. How might this **change** in the **future**? Will you take the **responsibility** for some, most, or all of **your expenses** then? Or will you need to get **help**?

Extension

This activity would really suit using pie charts. Have you used pie charts before?

5.11 Expenses

5G Expenses in action

1 4 PS 2 3

1. Estimate **how much money** you will **need** to do the following activities. Add 2 more.
2. Find out the **actual** amounts.
3. What other **information**, such as amount, quality, etc. might you have to **consider** when making **decisions** about these activities?

How much money will I need to...	What is the actual cost of these activities?	What other information do I need, and what decisions might I have to make?
a. Buy lunch at Lord of the Fries?		
b. Go to the cinema?		
c. Go to the football?		
d. Take out my partner for a birthday dinner?		
e. Fill up the family car with a tank of petrol?		
f. Go on a 1-week holiday to the Gold Coast?		
g. Buy a new outfit for the school formal?		
h. Have Netflix for the whole year?		
i.		
j.		

1 4 PS 2 3

4. Use your numeracy skills to **solve** these **money problems**. Add 2 more.
5. What **decisions** might I have to make?

Money problems	Calculations	What decisions might you or they have to make?
a. You have $10. Can you make a dinner for 4?		
b. You have $20. Can you do a day out in the city?		
c. You have $50. Can you cater a birthday party for 10 people?		
d. You have $100. Can you buy your lunch at school for 4 weeks?		
e. You have $1,000. Can you buy a new iPhone?		
f. Jed has $50 Can Jed do his food shopping for a week?		
g. Zed has $20 on her Myki. Will it get her to school and back for 2 weeks?		
h. Ned worked 10 hours at $15. Can they buy new runners?		
i. Red has saved $2,000. Can she buy a decent car?		
j.		
k.		

5.13 Budgeting

Personal budgets

Being able to create and manage a **personal budget** is an essential skill for your life.

A budget will help you balance your '**money in**' (e.g. allowance, wages and so on) versus your '**money out**' (e.g. spending and other costs).

Many people find that their money out (their **expenditure**) far outweighs their money in (their **income**).

As a result, they have to go into **debt** - which can be a severe long-term problem!

It is essential that you manage your expenditure and minimise the use of **credit**; especially seemingly easy sources of credit such as credit cards, 'payday' or instant loans, buy-now pay-later and AfterPay borrowing, and interest-free purchase contracts.

You also need to explore income sources such as **wages** and **salaries**, interest income and **government benefits** and assistance.

Balancing your money out with your money in helps you to manage your day-to-day financial obligations. Doing this can help you plan and **save** for longer-term spending requirements, such as a new phone, a holiday, a car, or even to save for your future.

Budgeting

A budget is a financial management plan in which you list all of your estimated income and expenses over a period of time. A budget allows you to:

- estimate if you expect to have more money coming in, which is called a **surplus** (i.e. you earn more than you spend; so income > expenses = surplus)
- estimate if you expect to have more money going out, which is called a **deficit** (i.e. you spend more than you earn; so expenses > income = deficit)
- plan your spending more responsibly
- take control of your finances.

When budgeting, it is important to be as accurate as possible, and to list all of the expenditure items that you are likely to encounter.

You should also budget for 'other' expenses; some of these unknowns are likely to crop up unexpectedly.

Budgeting enables you to check to see how well you are doing at managing your money, and if you are being realistic in your spending.

Image: Violka08/iStock/Thinkstock

Budgeting 101 5H

1. What is a **budget**, and why is a budget **important**?

2. What are some of the most common **sources** of **income** (or **money in**) for a **young person** in your situation in life?

3. What are some of the most common types of **expenses** (or **money out**) for a **young person** in your situation in life?

4. What is the difference between a **surplus** and a **deficit**?

5. Calculate the following budget monthly outcomes (**surplus**, **deficit** or **balanced**).
   a. Income: $450, Expenses: $375. Result is a _____ of = $
   b. Income: $1,250, Expenses: $1,500. Result is a _____ of = $
   c. Income: 2 x $350, Expenses: $950. Result is a _____ of = $
   d. Income: $800 x 3, Expenses: $600 x 4. Result is a _____ of = $
   e. Income: $950, Expenses: $850 + $95. Result is a _____ of = $
   f. Income: $0, Expenses: $50. Result is a _____ of = $

5.15 Budgeting

5I Feed the kitty

1 4 PS 2 3

Consider this budget for Alain who lives in a sharehouse. Alain works as a regular casual, but Alain can't predict their exact work hours for each week.

The expenses in the budget represent the amount that Alain has to contribute to the household kitty for the month.

Therefore this budget doesn't include Alain's own personal expenses as part of their normal day-to-day lives.

1. Calculate whether Alain is likely to have a **surplus or deficit** for the month.
2. What would be some **other household expenses** Alain might have to meet?
3. Calculate whether Alain had an **actual surplus or deficit** for the month.
4. Why might this **variation** have occurred?
5. What is Alain **going to have to do** about their household budgeting and their own financial management?

Cash Budget/Financial Planner

Name: Alain (Sharehouse contribution)

Situation: Household budget *Date(s):* May, 2023

Income	Forecast $	Actual $	Expenditure	Forecast $	Actual $
Alain's income week 1	300	275	Rent	500	500
Alain's income week 2	350	300	Electricity	75	100
Alain's income week 3	350	350	Gas	25	50
Alain's income week 4	400	325	Food & beverages	200	300
			Internet	25	25
			Household products	25	10
			Insurance	20	0
			Entertaining	50	75
Other:			Other:	20	20
Total Revenue			**Total Expenditure**		
Forecasted Surplus			Forecasted Deficit		
Actual Surplus (savings)			or Actual Deficit (debt)		

Personal budget 5J

1 4 PS 2 3

1. Use this planner to forecast a **4-week budget for yourself** based on your current lifestyle situation.
2. Keep track of your **income** and **expenses**. Then at the end of the 4 weeks you can **compare** your budget **estimates** to your **actual income** and **actual expenses** to see how accurate you were.

Cash Budget/Financial Planner

Name: _____

Situation: _____ Date(s): _____

Income items	Forecast $	Actual $	Expense items	Forecast $	Actual $
Total Revenue			**Total Expenditure**		
Forecasted Surplus			**Forecasted Deficit**		
Actual Surplus (savings)			**or Actual Deficit (debt)**		

Research Go online and find some budgeting tools and apps. Try these to see how useful they are for young people at your stage of life. Report to the class.

Visit ASIC's Money Smart website - a trusted tool: **www. moneysmart.gov.au**

(Be careful with other free tools that are actually trying to sell you a product such as a budgeting service - which is not likely to be free at all!)

NUMERACY 15

5.17 Pay Slips

Pay slip

A pay slip is a hard copy or digital document that must be issued by law for each pay period. Pay slips should include the following.

"Which day do all workers like most - pay day of course!"

Image: kritchanut/ Depositphotos.com

Basic information:

- employer's name and ABN
- employee's name.

Pay information:

- the pay period and date of payment
- amounts for gross and net pay.

Pay rate information:

- If the employee is paid an hourly rate (i.e. a wage):
  - the ordinary hourly rate
  - the number of hours worked at that rate during the pay period
  - the total dollar amount of pay at that rate for the pay period.
- Or if the employee is paid a salary - the annual gross salary amount.
- A pay slip usually will also include:
  - loadings, allowances, bonuses, incentives, penalty rates, other entitlements, leave balances etc., and other information.

Deduction information:

- amount and description of each deduction such as income tax and employee superannuation contributions as well as total deductions made
- any superannuation contributions made by the employer for the employee
- details of the superannuation fund to which contributions have been made.

Summary information:

- The total gross and net payments made for the pay period.

P&Q Enterprises	**ABN: 45 214 4875**		**Date:**	**June 16, 2023**
Employee: Glonsork Elver			**Period:**	**June 9-13, 2023**
Entitlements			Deductions	
Ordinary hourly rate:	*Total*	*Total*		
$20	38	$950		
Overtime hourly rate:				
$30	4	$120		
Gross entitlement		**$1,070**	Tax deducted:	$214
Net entitlement		**$856**		
Paid into bank account: 016 534360 BSB 023 145				
Year to date		$3,210	Year to date	$642
Employer superannuation contribution				
RESFund		$107	Year to date	$321

Pay slips 5K

1 4 PS 2 3

1. Use the **pay slip** on p.124 to complete the **information** in this table.
2. Do the same for a **pay slip** of your **own**, or one supplied by your teacher, or for a pay slip from a worker you know.

Employer details	
Employee & bank account details	
Pay date/ pay period	
Ordinary hourly rate	
Ordinary hours worked	
Overtime/penalty rate(s)	
Hours worked	
Gross entitlement (pay)	
Tax deducted	
Net entitlement (pay)	
Net pay amount this year	
Employee's super fund	
Amount paid into fund this pay	
Amount paid into fund this year	
Other:	
Other:	
Other:	

5.19 Personal Banking

Deposit accounts

Banks, financial institutions and credit unions are a key part of the economy and play a major role throughout our lives.

People use various banking products to make **transactions** and to **save** for the future through **deposit accounts**.

People also **borrow** money from banks through **credit cards** and various **loan products**.

Nearly all workers will have their wages or salaries paid (or **deposited**) into a bank account.

We use **transaction accounts** to pay for goods and services using cards, EFTPOS, PayWave, online banking and an increasing range of digital wallets and apps.

People also withdraw cash from their bank accounts. However, the use of cash is declining in this digital age.

What do you use?

Image: AntonioFrancois/ Depositphotos.com

As people start to earn money throughout their lives they are likely to open a savings account to put away money for a holiday, a car or even a house!

Transaction accounts

Transaction accounts are the main type of everyday banking accounts. These are the types of accounts that workers get their pay paid into. Wages and any government payments are credited to these types of accounts.

Transaction accounts are designed for managing your day-to-day life. These accounts often have low, or no fees, for young people under 18 (with some limits).

People use transaction types of accounts to:

- ☺ withdraw cash for day-to-day living
- ☺ link up their digital wallets
- ☺ make EFTPOS, PayPass and PayWave purchases
- ☺ make online and mobile payments; and
- ☺ to set up ongoing regular direct debits, such as for electricity bills.

Beware:

- ☹ You will need to watch out for high transaction fees if you make too many transactions.
- ☹ You will need to be careful of overspending, especially using e-payment methods, as your bank balance can run down very quickly; and you can be hit with large fees for being overdrawn.
- ☹ Don't expect much, if any, interest on these accounts.
- ☹ The fees for just a few ATM withdrawals (from unsupported machines) can be higher than any interest you might ever earn on this account!

Savings accounts

As people start to earn more than they spend, they usually choose to open a savings account with a bank or financial institution. This is a safe way of storing accumulated money - much better than under the mattress.

A savings account usually pays a **higher interest rate**. This can help you to save for a long-term goal such as a bike, a phone or even a car!

The savings account might require a **minimum deposit** amount to get started, as well as a minimum amount that needs to be deposited regularly (e.g. monthly).

People use savings accounts to separate their money. They hold some money in transaction accounts to pay for their day-to-day lives, and put their left over money in their savings accounts.

A **term deposit** is a special kind of savings account where you 'lock your money' away for a period of time (e.g. six months) in return for higher interest. This imposes financial discipline, as you can't waste your money on things you don't need!

Banking - Deposit accounts 5L

1. What is the **difference** between a **transaction account** and a **savings account**?

2. What **type** of account is **your bank account**? Why so?

3. How **often do you use your** bank **account**, and **for what** purposes?

4. What **interest rates**, and **fees** and **charges**, apply to your account?

5.21 Keeping It Safe

Cash security

It is your responsibility to look after the security of your money. This means keeping your cash money safe.

There are a lot of shifty characters out there who are more than happy to steal from you if they see an opportunity to do so. Indeed some of these people actually make a 'living' from being a crook. So don't be one of their victims.

Lots of people get ripped-off when they are on the phone because their attention is elsewhere. Don't let this be you! *Image: VitalikRadko/ Depositphotos.com*

Cash smart

Cash is convenient and portable. But it is one of the easiest ways to be ripped off. So be cash smart!

Your teacher will read through this (unfortunately) long list with the class. So listen out for situations that relate to you.

Money Security: Cash

- Only carry the cash you need.
- Don't store too much cash at home. That is what the bank is for!
- Use a good quality wallet, purse, handbag, money carrier, etc..
- Carry your wallet, purse, handbag, etc. in a safe manner - not sticking out of your back pocket or slung back over your shoulder.
- Separate big notes from little notes so that when you open up your money stash only a small amount can be seen.
- Don't tell people about all your cash - and certainly don't show them.
- When travelling, or in large pushy crowds, at shopping centres, at ATMs, or on public transport, AND ON YOUR MOBILE, be aware of pickpockets and wallet/bag lifters (who often operate in teams).
- Don't leave a wallet, purse, handbag, etc. unattended; thieves can swoop before you even know it.
- Be careful what you say about your money on social media. Do you know the character of your friends-of-friends?
- Limit the cash you carry when going to the beach, playing sport, going to the gym and other situations where you have to leave your stuff unattended.
- Always be wary of people you don't know, or barely know, asking about your money situation.

  You can ask them, "You seem very interested in my money - why do want to know that?"

  If they get defensive - then be on your guard.

Playing it safe - Cash 5M

1. Your teacher will discuss all of the **cash security methods** with the class. Add others that are also important.

2. Develop a list of the **top 3-5** tips for **keeping cash safe**.
   Add images and other visuals, and set this up as a poster or multimedia work.
   You might do this in pairs, or as a group.

Start drafting your ideas here.

3. In pairs or groups, develop and act out a series of **role-play** scenarios about **safe cash security**.
   a. Develop a range of **scenarios** in **common situations** featuring some or all of the following:
      - ❑ people your age
      - ❑ people generally, such as your family
      - ❑ older people
      - ❑ people travelling, or in unfamiliar places or situations.
   b. Take turns **playing roles** such as the person with the cash, the crook or scammer, and other relevant people.
   c. You might also **video** your best scenario and show this to the class.
   d. Report back to the class about your best tips and guidelines for **keeping cash safe**.

5.23 Keeping It Safe

Digital security

One of the problems with contemporary methods of banking and paying electronically is that there are so many ways to get ripped-off! Scammers and crooks have devised many strategies to steal money from unsuspecting, naive, greedy or even trusting people.

Once again here is an unfortunately long list. Yet these are only some of the many digital rip-off methods for you to be on the lookout for.

Image: macrovector/ Depositphotos.com

Money Security - Digital

- Don't tell people your PIN, except relevant adults (i.e. family). No-one in the workplace, shops or in other situations can ever demand your PIN.
- Don't store your PIN and/or password with your card.
- With PayWave and other tap methods, your card or phone provides easy access to your bank account for crooks.

  They can quickly make a lot of small transactions using your money so keep your card, phone or watch safe!
- Use a transaction account, such as a digital wallet, for digital and online banking which only has a small portion of your funds as a safeguard.
- Keep your cards safe when out and about (refer to methods for carrying cash).
- Don't lend your cards to other people.

  If you are helping them out by giving them some money, then you make the transaction, not them.
- When your card is out of your hands, watch it carefully.
- If your card is lost or stolen then report this to the bank immediately.

  This will help cover you for any purchases that a crook might ring up using your account.
- Your phone might include many one-touch apps to make transactions.

  So what happens if your phone gets lifted? Crooks can start spending all your money. So know where your phone is at all times.
- Log out of one-touch apps; only log-in when you are using them.
- Be very wary of who you lend your phone to.
- Protect your phone and bank accounts with difficult passwords.
- If you are using a public computer or device (or someone else's) to make a transaction, then make sure you log out of the online portal when you are finished. Otherwise the next person could access your accounts.
- Don't post your PIN, your account details, or your signature on social media. This includes photos that might have these in the background.
- Be very, very careful of different online payment methods. These must be safe, secure and verified (usually with a https).
- Don't ever disclose account details, card numbers, passwords or PINs to people calling or emailing you and asking for these details.

  These scammers will often pretend they're from a bank, the Australian Taxation Office, Centrelink or some other authority.

  The real organisations will NEVER, EVER do this.

1. Your teacher will discuss all of the **digital financial security** methods with the class. Add others that are also important.

2. Develop a list of the **top 3-5** tips for achieving **digital financial security**. Add images and other visuals, and set this up as a poster or multimedia work. You might do this in pairs or as a group.

Start drafting your ideas here.

3. In pairs or groups, develop and act out a series of **role-play** scenarios about **digital financial security**.
   a. Develop a range of **scenarios** in **common situations** featuring some or all of the following:
      - ❑ people your age
      - ❑ people generally, such as your family
      - ❑ older people
      - ❑ people travelling, or in unfamiliar places or situations.
   b. Take turns **playing roles** such as the person using digital financial methods, the crook or scammer, and other relevant people.
   c. You might also **video** your best scenario and show this to the class.
   d. Report back to the class about your best tips and guidelines for achieving **digital financial security**.

5.25 Assessment Task

AT5 Applied Financial Numeracy
Financial Numeracy: Number & Change

Overview

For this task, you are required to complete **3 applied** Financial Numeracy **activities**.

Your teacher might change the nature and applied focus of some of these activities, and might add others that are more relevant for your own applied personal and vocational situations.

Part A: My budget

Prepare a basic **weekly** and/or **monthly budget** for your own **personal situation**.

Information, key dates, resources and tools to use.

Part B: Pay slip

Identify and **summarise** the key **information** from a pay slip.

Information, key dates, resources and tools to use.

Part C: Investigating prices

Investigate prices of common household items. Undertake:

- ❑ a price comparison of items from **different retailers**
- ❑ a **unit price comparison** of items with different sizes
- ❑ a comparison of **price changes over time** in items.

Information, key dates, resources and tools to use.

1 4 PS 2 3

At all stages of this task you will need to apply the 4-Stage Problem-Solving Cycle:
1 Identify the maths 2. Act on and use the maths 3. Evaluate and reflect 4. Communicate and report.

You also have to develop and apply tools and techniques from your **Maths Toolkit**.

Note: In the final column, your teacher might also include an achievement level to indicate your level of performance for each part of the task.

Name(s):	Financial Numeracy Number/Change Module 2			
Key dates:				
Tasks - AT5: Applied Financial Numeracy	**Must Do?**	**Due by**	**Done**	**Level**
Negotiate the task details with my teacher.	✓			
Part A: My budget				
1. Estimate weekly income.	✓			
2. Estimate weekly expenses.	✓			
3. Prepare a weekly budget.	✓			
4. Prepare a monthly (or 4-weekly) budget.				
5. Comment on the implications of the budget.	✓			
Part B: Pay slip				
1. Source a suitable pay slip.	✓			
2. Identify and understand key financial information.	✓			
3. Describe what information should be [illegible]	✓			
Part C: Investigating prices				
1. Price comparison from [illegible]	✓			
2. Unit price comparison [illegible]	✓			
3. Comparison of price changes over time.	✓			
4. Make conclusion and recommendations.	✓			
Task completion and reporting				
Use and apply appropriate digital tools and apps.	✓			
Use and apply appropriate analogue tools.	✓			
⇨ Use appropriate numerical language.	✓			
1 4 PS 2 3 Describe applied use of the problem-solving cycle.	✓			

Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report

Develop & apply mathematical tools and techniques.	✓			
Prepare and discuss my findings with my teacher.	✓			
Present a report to the class (if required).				

5.27 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task: **Names/Dates:**

AT5 -

1. Identify the maths					
Identify problem(s)	Done: ○ Level:	Recognise maths	Done: ○ Level:	Select information	Done: ○ Level:
Interpret information	Done: ○ Level:	Choose processes	Done: ○ Level:		Done: ○ Level:
2. Act on and use maths					
Perform estimations	Done: ○ Level:	Decide techniques	Done: Level:	Choose maths tools	Done: Level:
Select technologies	Done: ○ Level:	Perform calculations	Done: ○ Level:		Done: ○ Level:
3. Evaluate and reflect					
Check Estimations	Done: ○ Level:	Compare results	Done: Level:	Check processes	Done: Level:
Review actions	Done: ○ Level:	Check logical reasoning	Done: ○ Level:	Assess conclusions	Done: ○ Level:
Communicate and report					
Written processes	Done: ○ Level:	Written results	Done: Level:	Oral processes	Done: Level:
Oral results	Done: ○ Level:	Digital processes	Done: ○ Level:	Digital results	Done: ○ Level:

Mathematical Toolkit					
Analogue tools - What & how?		Digital Devices - What & how?		Software & Apps - What & how?	
Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy

Shapes and Objects 6

Activities 6: Shapes and Objects		p.	Due date	Done	Comment
6A	**Shape up**	137			
6B	**Basic shapes**	138			
6C	**Objects and shapes**	139			
6D	**Basic objects**	140			
6E	**Describing objects**	141			
6F	**Properties of shapes**	143			
6G	**Size**	145			
6H	**Colour**	[illegible]			
6I	**Changing size and co[illegible]r**	[illegible]			
6J	**Odd colours**	148			
6K	**Health and recreation**	149			
6L	**Changing shape size**	151			
6M	**Size**	153			
AT1a	**Art, Drawing and Design**	154-155			
AT1b	**Shape it Up**	156-157			
R6	**Problem-Solving & Toolkit**	158			

Comments:

6.01 Shapes and Objects

Shapes

For this module in Unit 2, you will focus on developing numeracy skills related to shape and measurement. Then, under guidance from your teacher you will apply these skills to various **health and recreation** situations and contexts.

This means that you will be required to think of how the skills you are developing apply to these contexts. So that requires always having the first 2 stages of the problem-solving process in mind. That is: **1. To identify the maths** and **2. Use and then apply the maths**.

When you are exploring shapes and objects for applied situations you are investigating design, function, aesthetics, and even the psychology that drives how we respond to, create and work with shapes and objects.

The clothes you are wearing now, your phone, buildings, structures, cars, food items, tools and technology all are designed and created to shape your life.

Then there's the natural world - all sorts of shapes exist in nature. And these natural shapes are usually non-uniform. Which is a good thing!

And we even use shape-related phrases for health and recreation such as, "get into shape", "I'm outta' shape", "shape up or ship out", "I was all bent out of shape".

So how important is shape to you? Are we really just talking about eating BBQ Shapes here - the original recipe of course!

Image: elenabs/ Depositphotos.com

Health and Recreational Numeracy

- Meal planning & Cooking
- Personal health & wellbeing
- Exercise & sports activities
- Physical health & wellbeing
- Recreation & social activities
- Emotional health & wellbeing
- Hobbies and interests
- Health & nutrition
- Personal transport & travel
- Arts, crafts, design and drawing

Image: TopVectors/ Depositphotos.com

Shape up 6A

1. Have a think about each of these numerical **situations**. Describe how the **numerical skill** would be **important** for **you** in your life.

   e.g. "**Understanding shapes** is important for me **when relaxing** because it is important that I get some time out from stress. I find that watching curvy and wavy lines moving on a big screen helps me calm down and breathe deeply. That's probably why I like sitting at the beach so much."

a. Understanding shapes In cooking...	b. Understanding shapes In art or design...
c. Understanding shapes When playing sport...	d. Understanding shapes When doing hobbies or relaxing...
e. Understanding and using measurements In cooking...	f. Understanding and using measurements In art or design...
g. Understanding and using measurements When playing sport...	h. Understanding and using measurements When doing hobbies or relaxing...

Applied

Choose a sport, a hobby or some activity you do for recreation. Describe some of the key shapes that are important in the activity. Source an image.
(Hint: Think of making, how things are designed, and movement patterns.)

6.03 Shapes and Objects

Shapes

Shapes are an important part of our lives and form the basis of design.

Some shapes are uniform and easy to recognise. These include squares, rectangles, circles, triangles and other common shapes.

We might encounter these shapes as road signs, as buttons on apps, as sporting fields and as the basic building blocks of 3D objects.

People who have well-developed **visual-spatial awareness** are good at recognising and manipulating different shapes. These people often go on to work in design, technical, practical, manual and other similar types of work.

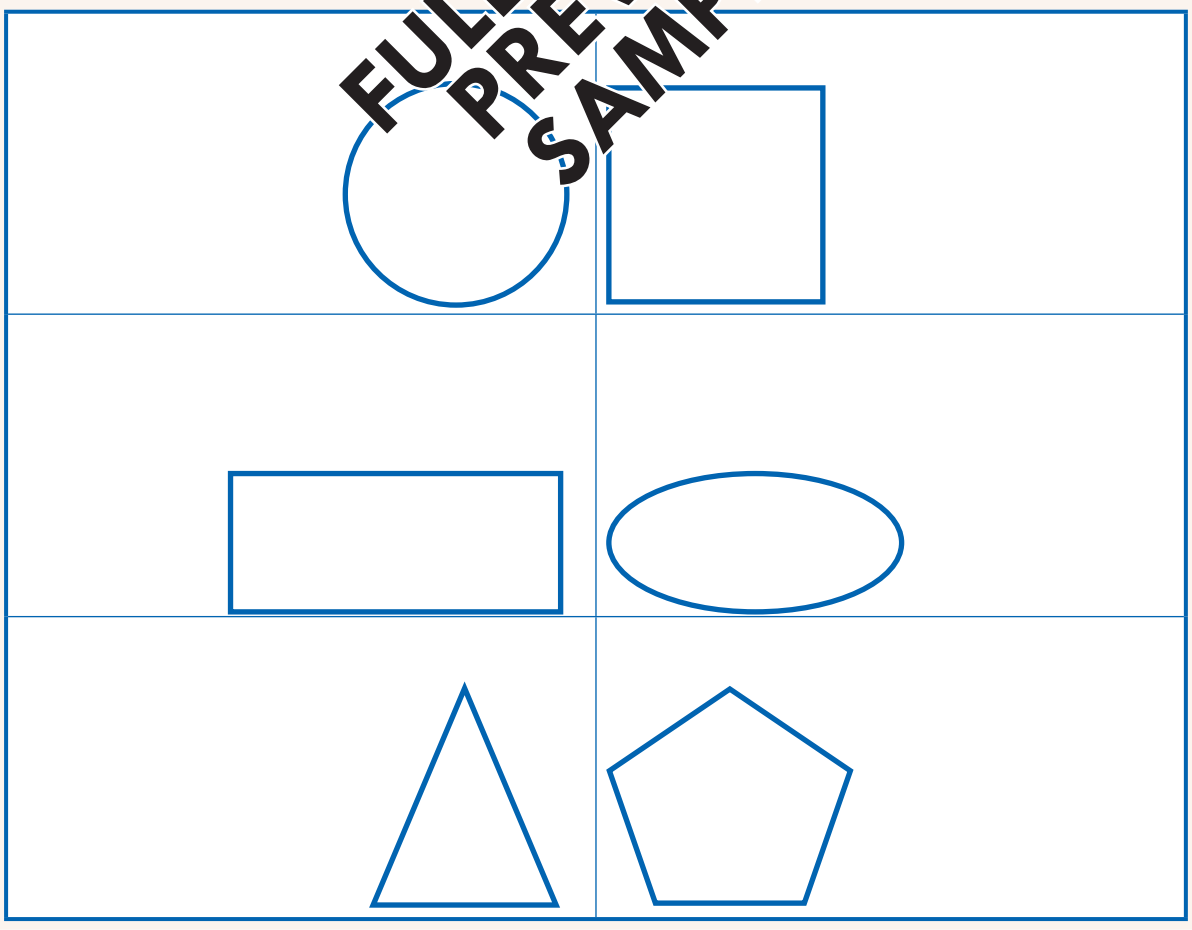
So, what types of jobs do you think they might do?

Image: theseamuss/ Thinkstock

Can you name each of these shapes?

6B Basic shapes

1. Name these basic **shapes**.
2. List 2 **objects** that **you** come into contact with in your life that have each shape. (Try to list a small object and a large object). Find an image of one of these.



Objects and shapes 6C

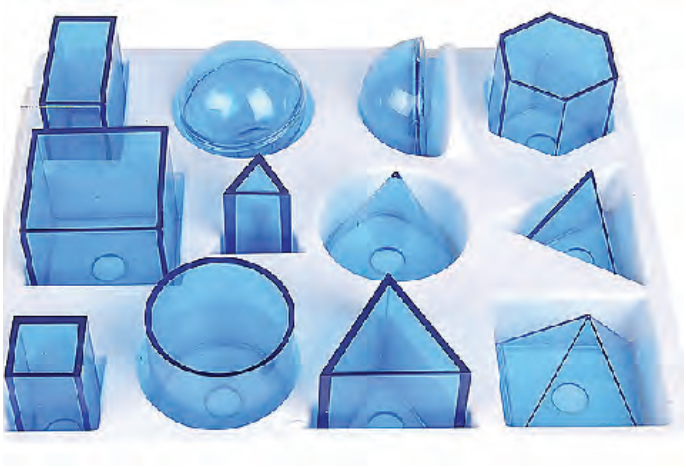
1 4 PS 2 3

1. Draw the following **objects** and then **describe** their basic **shape**. Add 2 more of your own, including images.
2. Estimate the **size** of these objects, and then **research** to check your estimates.

a. A single bed.	b. An iPad screen.
c. An AFL football playing field.	d. A pizza tray.
e. A 'Give Way' sign.	f. [illegible] shed
g.	h.
i. Describe the shapes that make up this outdoor studio shed. Also have a go at estimating its size on paper, and in real life. 	

6.05 Shapes and Objects

Objects



When we see and describe shapes such as squares, rectangles and circles we are usually operating in just 2 dimensions. In other words, we are seeing these shapes as flat.

This is fine when drawing on paper or viewing on a screen because those are 2D media. This means that we are seeing the outline of the shapes.

However, we are not taking into account that the shapes we see 'in the real world' have depth, because they are '**objects**'.

When we refer to objects, we are referring to the reality of the **3D** world in which we live. In the 3D world, (our world), all objects have **height**, **width** and **depth** - the 3 dimensions.

So in design terms, an object is the term we use to describe anything that has 3-dimensional depth. This includes all living creatures, all naturally occurring things in the world and space, and all man-made objects such as a large bus, a packing box or even a tiny micro-electronic circuit. So, that means just about everything that is real in the physical world.

6D Basic objects

1. Choose **4 shapes** and **draw** them as **3D objects**.
2. List **things** that you come into contact in with that **resemble** each **object**.

Describing objects 6E

1. Describe the **2D shape** of each of these **objects**, as well as their **3D form**. Add 2 more.
2. From memory, **draw** both the **2D shape** and **3D object**.
3. Find an **image** of the object, affix it here (or in your workbooks) and **describe** the **object's** shape and size.

a. An orange	b. A die (one dice)
c. A TV screen	d. A pyramid
e.	f.

4. Describe the shape of 5 objects from your classroom; and 5 from your home.

6.07 Properties of Shapes

Lines

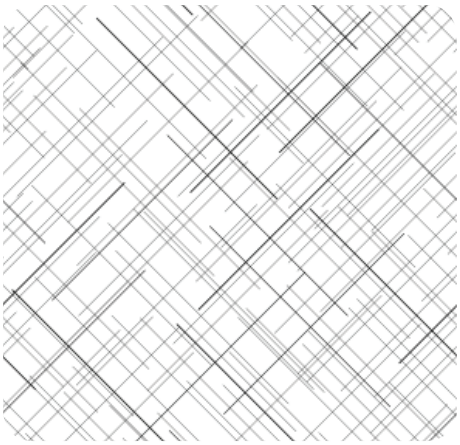


Image: Lora-Sutyagina// Depositphotos.com

Lines are 1D shapes. Lines might be straight, curved or even wavy!

The most common types of lines we encounter are:

- ⇨ **horizontal** lines
- ⇨ **vertical** lines
- ⇨ **diagonal** lines
- ⇨ **parallel** lines
- ⇨ **perpendicular** lines.

One way to imagine lines is to think of dry spaghetti. If you accidentally drop the spaghetti on the floor you'll get lines going out in all directions.

Or perhaps consider your hair. There are likely to be lots of lines there. But if it is very curly then you'll have to pull your hair to extend it into a line.

So line-up everybody!

Shapes

Shapes (also known as polygons) are 2D shapes a[illegible]lack depth. The most common shapes are:

- ⇨ **circle** - curved.
- ⇨ **Triangle** - 3 sides (or edges), an[illegible]ngles (or vertices).
- ⇨ **Square** - 4 sides of equa[illegible]th, and 4 e[illegible]angles of 90%.
- ⇨ **Rectangle** - 4 sides, a[illegible]4 equ[illegible] angle[illegible]90%.
- ⇨ **Pentagon** - 5 sides, and 5 angles (o[illegible]rtices).
- ⇨ **Octagon** - 8 sides, and 8 angles.

Shapes can be either regular shapes or irregular shapes.

Regular shapes have all sides the same length; and also all inside angles will be the same as one another.

For example, a square has equal sides and 4 equal angles!

Many regular shapes look even and symmetrical. That's why we use regular shapes in building, product design, packaging and other man-made endeavours.

Irregular shapes may have sides of different lengths; and not all of their inside angles will be the same.

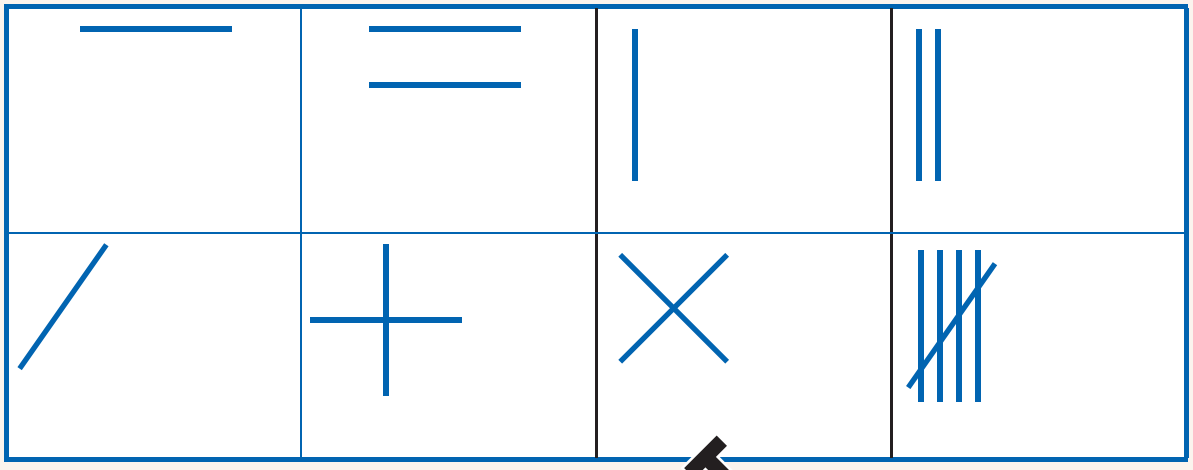
For example, a rectangle has all the angles the same, but different lengths, so it is irregular. A right-angled triangle doesn't have all sides the same length, and nor are all of its angles the same length.

Many irregular shapes look imperfect to the eye and **asymmetrical**. That's the way nature intended them to be. Nothing is perfect in nature, except nature itself. Some designers, artists, architects and even hairdressers and barbers use irregular shapes to break convention and make something look more striking!

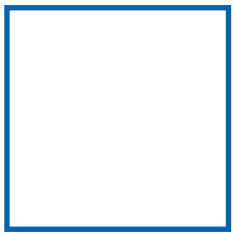
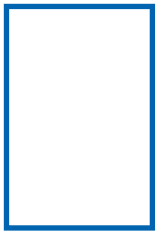
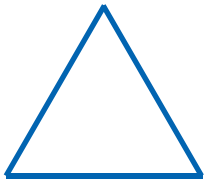
Properties of shapes 6F

1 4 PS 2 3

1. Name each of these **lines**. When do you **see them** in the **real world**?
2. Are all the **lines** the **same length**? **Measure** them. Is that what you expected?



3. Complete the table to **describe** these **shapes** and their **properties**. Add 1 more.

a. 	Shape? Measurements? How many sides? How many inside angles? Equal or unequal lengths? Regular or irregular?
b. 	Shape? Measurements? How many sides? How many inside angles? Equal or unequal lengths? Regular or irregular?
c. 	Shape? Measurements? How many sides? How many inside angles? Equal or unequal lengths? Regular or irregular?
d.	Shape? Measurements? How many sides? How many inside angles? Equal or unequal lengths? Regular or irregular?

6.09 Size and Colour

Size

Objects come in all shapes, sizes and colours. Some of these features are naturally occurring as part of nature. Living creatures, which really shouldn't be called objects, are diverse. Consider the size of your pet cat, dog or bird and compare this with a lion, a timber wolf or an eagle.

Have a think about the plants, trees, rivers, oceans, mountains and all the other **naturally occurring features** that exist. They are of varied sizes and contain every colour on the earth (of course)!

Image: picksell/ Depositphotos.com

"Look at how the shape, style and colour of our mobiles has changed. What's next?"

Man-made objects also vary in size and colour. Consider an ocean liner, the Sydney Harbour Bridge, a flashy red Ferrari, your home, your clothing, your phone and even the fries you may gobble down without even thinking about them.

The size of man-made objects relates to their functionality and to their utility.

Functionality simply refers to the purpose for which these objects were designed. This purpose can differ between industrial, commercial and personal use.

Utility refers to how well the object serves its purpose, or, is the object of a suitable size for the people using it, and does it do what it promises?

Megastructures such as skyscrapers, airports, sporting arenas and shopping centres are designed to service industry, thus their function and their utility. Smaller structures such as houses and apartments have a size that reflects their own different function and utility; i.e. people have to live in them.

Vehicles such as trains, trucks, cars, motorbikes and scooters also reflect function and utility - especially utes (an Aussie invention)!

Of course, we shouldn't forget about the influence of **fashion** on the design of objects. You could come up with hundreds of examples of how fashion has dictated how an object looks. How about discussing this as a class?

For example: Family Cars

Family sedans used to be larger with more room for passenger seating. This was because people had larger families.

Some sedans could even safely seat six people. The function these types of cars served was for family transport. You didn't buy a motor scooter as your family vehicle if you had four kids to cart around!

Families made use of (or utilised) the extra space given to them from a large family car, including boot space.

Features such as seating and roominess offered specific utility for large families. But times have changed.

Now people buy family SUVs instead of family sedans. What does that stand for?

Size 6G

1 4 PS 2 3

1. Use appropriate language to **compare** the **size** of each of these **pets**. **Identify** each **animal**. Are they pictured **to scale**? Name them if you like.

Image: lifeonwhite/ Depositphotos.com

2. Describe how a **man-made object** has had its **size decrease over time**. Explain **why** this might be the case.

   Find an **image** from the **past**, and a **current image**, to illustrate your description.

3. In your workbooks draw the following car 'shapes'. Try to get close to scale with your sizing as well. **Sedan, coupe, sportscar, ute, hatchback, convertible, SUV.**

6.11 Size and Colour

Colour

Another important design element is colour. Colour can be used for a variety of purposes.

- A **design** or **fashion feature**, e.g. pink iPhones or tortoise shell spectacles.
- A **warning**, e.g. using red in danger signs, stop signs or traffic lights.
- An **instruction**, e.g. green emergency exit signs or go lights.
- **Camouflage**, e.g. military uniforms and vehicles.
- A signifier of **level**, **rank** or **purpose**, e.g. a Karate brown belt, a store uniform or a soccer goalkeeper's jersey.
- An **identifier**, e.g. a football jumper.
- A **symbol**, e.g. green for the environment, red for fire, blue for water.

What other examples can you think of?

6H Colour

Find **4 images** that show how colour is a(n) important **design feature** or **function** of an object. Briefly describe why colour is an important design feature for this object, (e.g. safety).

Changing size and colour 6I

1
4 PS 2
3

Image: adapted from: alexandr55/Depositphotos.com

Have a close look at the **image above** then answer the following questions.

1. What is the image **depicting** in **general**?

2. What is the image **showing** more **specifically**?

3. Use **descriptive words** and terms to describe the **changes** to the 'object' depicted in the image.

4. Why do you think **these changes** might **have happened** over time? Suggest possible **time periods** to match the picture.

5. As a class discuss other 'objects' (or products) that have changed over time.

6.13 Size and Colour

6J Odd colours

1 4 PS 2 3

1. Form into pairs. Are any of **these signs** using the '**wrong**' **colour**? **Why** is that? Can a colour actually be 'wrong'?
2. Sometimes the use of colour is universal. But **different cultures** may treat colours differently. This is especially evident in art, fabrics, decorations, buildings, paints, food and celebrations. Find some **examples** to share with the class, including colours that are important for different Aboriginal and Torres Strait Islander peoples. Some of you may already know this from your own cultural experiences.

Health and recreation 6K

1. "Gee Sondra is looking a bit pale today?". In what circumstances is **colour important** for **health**? Describe some examples. Add 1 more.

A. Changes in skin colour.	B. Changes in face colour.
C. Changes in eyes.	D. Colour of food.
E. Colour of drinks.	f.

Applied

Many sporting and recreation activities make prominent use of colour. That's how we can distinguish between many athletes and teams.

Describe examples when colour is used to identify a team or an athlete. Sometimes it is their uniforms, but this can also be in the words of songs, nicknames and monickers. Source or create some visual samples.

6.15 Changing Size

Representing size

When drawing and designing you might often have to represent shapes and objects as different sizes from what they actually are. You will usually have to show large-sized shapes and objects as smaller design elements or images.

At other times you might have to do this representation the other way around, and make smaller shapes and objects bigger.

Two important numerical techniques that you can use involve **scale** and **ratio**.

Scale and ratio

A scale is used to represent the relative distance or size of a map, diagram, shape or object compared to itself in real life.

Scales use quantity ratios, e.g. 1:4, 1:20, 1:10,000 or even 2:1!

A map scale of 1:10 (in cm) means that every 1 cm on the map represents 10 cm in real life. Or, the map is 1/10th the size of real life.

An action figure might be in 1:6 scale. This means that every 1 cm of the action figure represents 6 cm in real life. So the action figure is 1/6th the size of the character it is representing.

A small object such as a fly might be drawn at 4:1. This means that the drawing is increasing the real-life size of the fly by a factor of 4.

NUM SUPER SKILLS

e.g. Tul draws a 3 cm square at a ratio of 1:1.

Measure this square to see how well he has done.

Now Tul draws the 3 cm square at a ratio of 2:1. He has doubled the size of the square.

Measure this square to see how well he has done.

Finally Tul draws the original 3 cm square at a ratio of 1:2. Now he has halved the size of the square.

How well did he do with this drawing?

Consider:

One thing you will notice about these scaled drawings is that the square that has doubled in size (2:1) actually looks a lot bigger than simply being doubled. Do you agree?

And the square that is half the original size (1:2) looks much smaller than being halved. And it looks much, much smaller than the 2:1 square.

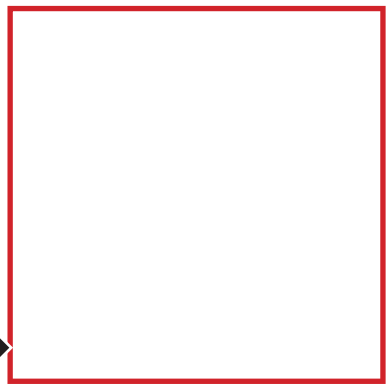
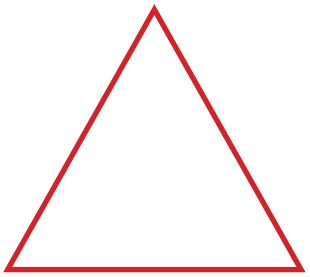
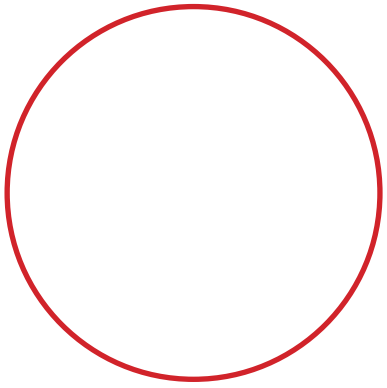
(The 2:1 square is actually 4 times the size of the smaller 1:2 square but it looks much larger than that!)

The reason for this 'difference' relates to measurements of area.

Changing shape size 6L

1 4 PS 2 3

1. First, **estimate** the **dimensions** (size) of these **shapes**.
2. Now, **measure** these shapes. How did you go with your estimates?
3. In your workbooks, or by using multimedia, **convert** these shapes by:
   - ⇨ **doubling** their size
   - ⇨ **halving** their size.
4. Check your answers by **measuring** the **new dimensions** of your enlarged and reduced shapes. How did you go?

Estimates	Measurements	Shape
		
		
		
		

6.17 Changing Size

Art and design

Representing size and scale is important in art and design and helps an image or a model to look 'right'.

As humans, we make size **comparisons** based on our experience of natural and built environments. And we look to relative size to help us perceive the world, including order, connection, safety, and even danger.

Size can be used to represent **relative scale**, such as a drawing of a person against a dinosaur, or a **floorplan** for a house.

Size can be used to create **models** such as an action figure in 1:6 scale, or an architectural model that scales-down buildings, inserts tiny people and vehicles, and uses other features such as trees and green spaces.

Size can also be changed to challenge **relativity** and **perception**, such as a toddler drawn larger than their parent. This suggests that the child is more 'important' than the adult!

Size can also be used to represent **mood** and **emotion**, such as a sad teenager represented as very small, sitting in the corner of a room.

Size also drives **aesthetics** such as the repeated use of geometric or abstract shapes and patterns in design, textiles or art.

Of course, size can indicate **strength** and **power** such as the relatively larger size of a 'level boss' in a video game, or even King Kong!

And size can also be used to influence **emotional connection** such as exaggerated facial features of cute drawings and toys, such as children's stuffed toys, Funko Pops and even sporting mascots.

Image: gurZZZa/ Depositphotos.com

This image is very aesthetically pleasing. Why is that?

Image: Natoushe/ Depositphotos.com

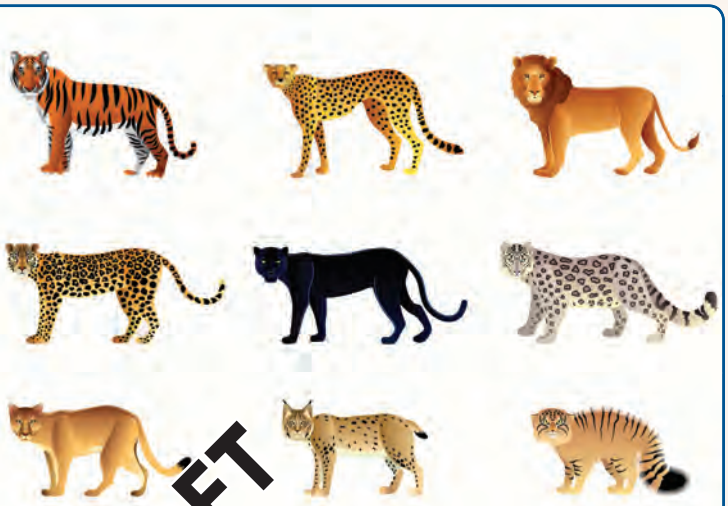
This image uses size and shape to influence emotions. How so?

Size 6M

1 4 PS 2 3

The animal world is full of wondrous beasts of all different shapes and sizes. This is also reflected in the pet world from Great Danes down to Chihuahuas, Maine Coons to moggies and Carpet pythons down to goldfish.

1. Form into pairs. Without research, **name** these big cats.
2. Number them in **order** of their **relative 'size'** i.e. height.
3. Will their **relative weight** be in the **same order**?



4. Go online and research the **species'** name and size.
5. Re-number them in **order** of their **relative 'size'** i.e. height.
6. Is their **relative weight** in the **same order**?

Applied

Find examples of how size is used in art and design to:

- illustrate relative scale
- challenge perception
- create mood and emotion
- indicate strength and power.

Report back to the class with your examples

6.19 Assessment Task

AT1a Art, Drawing and Design
Health & Recreational Numeracy

Overview

For this assessment task, you are required to investigate and report on how shape, size and colour of visual elements are used to create drawings, art or design works or products.

You will also investigate the use of visual elements in Indigenous art and design, and show how this is similar to, and different from, common visual elements used in a different culture.

Tasks

1. Elements of art, drawing and design

- ❑ Present annotated examples of art and/or drawing and/or design works.
- ❑ Explain how visual elements are used to effect.
- ❑ You are strongly encouraged to create your own visual work to use as one of the examples.

2. Indigenous art, drawing and design

- ❑ Present annotated examples of art and/or drawing and/or design works.
- ❑ Explain how these visual elements are used to effect.
- ❑ Compare the use of visual elements in Indigenous art with the visual elements commonly used in another culture.
- ❑ You are strongly encouraged to have a local First Nations artist or elder talk to the class, or to visit a First Nations cultural institute.

Task completion

To successfully complete this activity you must apply each of the **4 stages of the problem-solving cycle** where appropriate.

You must prepare a visual report that:

- ❑ Presents annotated examples of art and/or drawing and/or design works
- ❑ Explains how these visual elements are used to effect
- ❑ Presents annotated examples of Indigenous art or design works
- ❑ Explains how visual elements are used in Indigenous art or design works
- ❑ Compares visual elements in Indigenous art with another culture
- ❑ Describes how you applied each of the 4 stages of the problem-solving cycle.

Note: In the final column, your teacher might also include an achievement level to indicate your level of performance for each part of the task.

Name(s):

Key dates:

Health & Recreational Numeracy
Module 3
Shape

Tasks - AT 1a: Art, Drawing and Design	Do?	Due by	Done	Level
Part 1: Visual elements in art, drawing or design				
Negotiate the task details with your teacher.	✓			
a. Source examples of art, drawing or design.	✓			
b. Investigate and annotate on use of shapes.	✓			
c. Investigate and annotate on use of size.	✓			
d. Investigate and annotate on use of colour.	✓			
e. Create your own visual work	✓			
Part 2: Visual elements in Indigenous culture				
a. Source examples of art, drawing or design.	✓			
b. Investigate and annotate on use of shap	✓			
c. Investigate and annotate on use of siz	✓			
d. Investigate and annotate on u of	✓			
Step 3: Task completion and reporting				
Prepare a draft of your report for feedback.	✓			
⇨ **Use appropriate numerical visual language.**	✓			
1 4 PS 2 3 **Describe applied use of the problem-solving cycle.**	✓			
Identify the maths / Act on & use maths / Evaluate & reflect / Communicate & report				
Develop and apply mathematical tools and techniques.	✓			
⇨ **Prepare and submit your final report & visuals.**	✓			
Present a report to the class (if required).				

Additional information:

Signed: _____ Date: _____

6.21 Assessment Task

AT1b Shape it Up
Health & Recreational Numeracy

Overview

For this assessment task you are required to investigate the use, importance and application of shape in a sport, a hobby, a craft/art, or a similar recreational activity that you enjoy.

You will present your investigation in the form of an **annotated report** using text, numbers, images, illustrations, diagrams, and other visual elements such as video.

Tasks

In your investigation you should identify, describe and discuss the following for your chosen recreational focus. You can get some ideas by having a look at the examples.

1. Names and **types** of **lines**, **shapes** and **objects**.
2. Use of, and **importance** of, line and **lines**.
3. Use of, and **importance** of, **shapes** and **objects**.
4. Use of, and **importance** of, the **size** of lines, shapes and objects.
5. Use of, and **importance** of, the **colour** of lines, shapes and objects.
6. Use of, and **importance** of, **relative size** and **scale**.
7. Other visual elements related to your recreational focus.

Milo is going to report on how different visual elements are used in the design of video games and how this makes them more engaging.

is into fashion and will investigate how line, shape and colour can be used to assemble outfits for people with different body types and sizes.

Silo will report on how the shape and design of sports cars has changed over time and how these changes have impacted on performance.

Kyle is into drawing and will report on how comic artists use different visual elements to create a story and emphasise mood and action.

Wei loves footy and will investigate how the different size and shapes of grounds can be used to create a home ground advantage.

Zay is going to investigate how visual elements can be used to make and present healthier food options that children enjoy eating.

Problem-solving cycle

To successfully complete this activity you must apply each of the 4 stages of the problem-solving cycle where appropriate.

Reporting

Your teacher might also instruct you to present your annotated report to the class.

Note: In the final column, your teacher might also include an achievement level to indicate your level of performance for each part of the task.

Name(s):	Health & Recreational Numeracy Module 3 Shape
Key dates:	

Tasks - AT 1b: Shape it Up	Do?	Due by	Done	Level
Negotiate the task details with your teacher.	✓			
Focus:				
1. Types of lines, shapes and objects.	✓			
Visual evidence and examples.	✓			
2. Use of line and lines.	✓			
Visual evidence and examples.	✓			
3. Use of shapes and objects.	✓			
Visual evidence and examples.	✓			
4. Size of lines, shapes and objects.	✓			
Visual evidence and examples.	✓			
5. Colour of lines, shapes and objects.	✓			
Visual evidence and examples.	✓			
6. Relative size and scale.	✓			
Visual evidence and ex[illegible]	✓			
7. Other relevant visual elements	✓			
Visual evidence and examples.				
Step 3: Task completion and reporting				
Prepare a draft of your annotated report for feedback.	✓			
⇨ **Use appropriate numerical visual language.**	✓			
1 4 PS 2 3 **Describe applied use of the problem-solving cycle.**	✓			
Identify the maths / Act on & use maths / Evaluate & reflect / Communicate & report				
Develop and apply mathematical tools and techniques.	✓			
⇨ **Prepare and submit your annotated report & visuals.**	✓			
Present a report to the class (if required).	✓			

6.23 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task: **Names/Dates:**

AT1 -

1. Identify the maths					
Identify problem(s)	Done: ○ Level:	Recognise maths	Done: ○ Level:	Select information	Done: ○ Level:
Interpret information	Done: ○ Level:	Choose processes	Done: ○ Level:		Done: ○ Level:
2. Act on and use maths					
Perform estimations	Done: ○ Level:	Decide techniques	Done: Level:	Choose maths tools	Done: Level:
Select technologies	Done: ○ Level:	Perform calculations	Done: ○ Level:		Done: ○ Level:
3. Evaluate and reflect					
Check Estimations	Done: ○ Level:	Compare results	Done: Level:	Check processes	Done: Level:
Review actions	Done: ○ Level:	Check logical reasoning	Done: ○ Level:	Assess conclusions	Done: ○ Level:
Communicate and report					
Written processes	Done: ○ Level:	Written results	Done: Level:	Oral processes	Done: Level:
Oral results	Done: ○ Level:	Digital processes	Done: ○ Level:	Digital results	Done: ○ Level:

Mathematical Toolkit					
Analogue tools - What & how?		Digital Devices - What & how?		Software & Apps - What & how?	
Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy

Quantity & Measuring 7

Activities 7: Quantity & Measuring		p.	Due date	Done	Comment
7A	**Me and measures**	161			
7B	**Measuring up**	162			
7C	**Measuring out**	163			
7D	**Measuring length**	165			
7E	**Perimeter**	166			
7F	**Circumference**	167			
7G	**Measuring weight (mass)**	69			
7H	**Measuring fluid capacity**	7[illegible]			
7I	**Measuring solid volum[illegible]**				
7J	**Estimating vs measuring**	1[illegible]			
7K	**Room to move**	176-177			
7L	**The heat is on**	178			
7M	**Temperatures**	179			
7N	**Safe temperature investigation**	180			
7O	**Chef's choice**	181			
AT2a	**The Right Stuff**	182-183			
AT2b	**Measuring Up - Workers**	184-185			
PST	**Problem-Solving & Toolkit**	186			

Comments:

7.01 Health and Recreational Measuring

Measurements

For this part of the module in Unit 2, you are focusing on developing numeracy skills related to measurement. Then, under guidance from your teacher, you will apply these skills to various health and recreational situations and contexts.

This means that you will be required to think about how each of the skills you are developing applies to these contexts.

So that requires always having the first 2 stages of the problem-solving process in mind. That is, to **identify the maths** and then to **use and apply this maths**.

You should also reflect on how each of these measures, as well as the measure of **time**, is important in vocational situations.

- ⇨ **Length and distance**
- ⇨ **Perimeter**
- ⇨ **Weight**
- ⇨ **Fluid volume**
- ⇨ **Solid volume**
- ⇨ **Temperature**

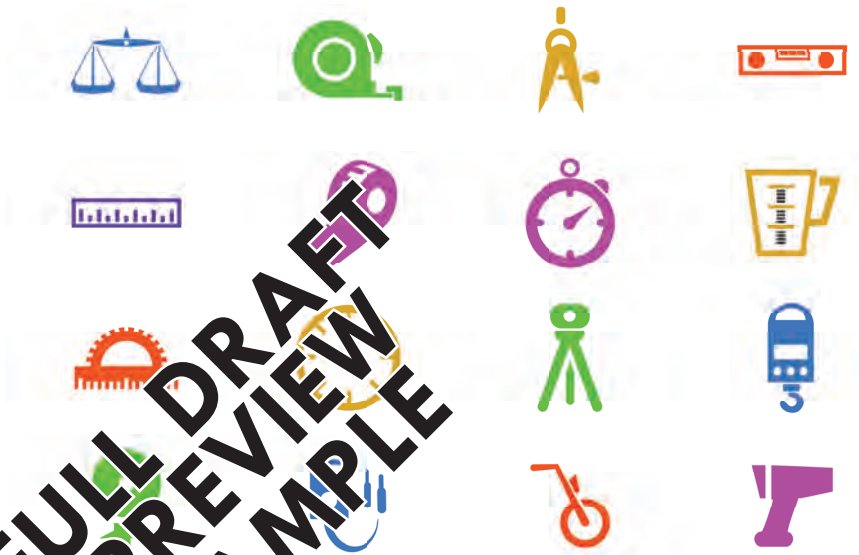


Image: (adapted from) Lisess/ Depositphotos.com

Health and Recreational Numeracy - Measuring

Meal ingredients and cooking

Distances for exercise

Sports measurements

Amounts of food and nutrients

Recreation & social activities

Time needed for recreation

Hobbies and interests

Time spent 'moving'

Work/life balance

Could you create a 'perfect' burger?

Arts, crafts, design and drawing

Image: rozelt Depositphotos.com

1. Describe **examples** in your **personal life** where **you** have to use **measurements**. Some prompts are given. Add 2 more. Use situations related to you.

Cooking	Exercising
Nutrition	Playing sport
Gaming	Art, crafts and design
Relaxing	Making or building

2. Describe **examples** in your vocational/career life where **you** might have to **use measurements**.

Applied

So what do you think? Could you create a 'perfect' burger?
How big would it be? What would be in it? And how much of each ingredient?

1 4 PS 2 3

7.03 Measuring Up

Measuring up

One very important set of numeracy skills involves the ability to make estimates, or to make accurate measurements, related to **length** (and distance), **mass** (or weight), **capacity** (or volume) and **area**.

We encounter these key measurements in our everyday personal and working lives. You learn how to make these measurements by choosing and using appropriate **measuring devices**.

You also need to be able to **estimate** key measurements when you don't have appropriate measuring devices available. And of course, you need to be able to understand appropriate **units of measurement** such as mm, cm, metres, grams, kg, mls and litres.

Image: lovleah/ iStock/Thinkstock

7B Measuring up

1. Match the **type** of **measurement** - either length, mass (weight), capacity or temperature with the appropriate **description**. Add 1 of your own.
2. Identify the most **suitable measuring device** for each.
3. List the appropriate **unit**(s) of measurement.

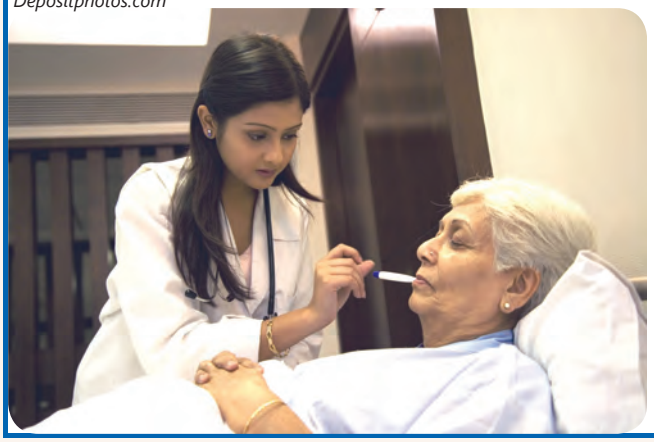
Description	Measurement	Example	Device	Unit
How light something is.	Mass (weight)	A pencil case might only weigh about 200 grams.	scale	grams
How long something is.				
How hot something is.				
How tall something is.				
How heavy something is.				
How far away a location is.				
How much fluid something can hold.				
How cold something needs to be.				
How much load a vehicle can carry.				
Other:				

1. For each of these **situations** identify what the **people** are **measuring**.
2. Identify the **measuring devices** they are using.
3. Estimate the **approximate** length, mass, capacity or temperature of the key **elements** shown in the images.

Image: SimpleFoto/ Depositphotos.co

Image: Dmitry Poch/ Depositphotos.com

Image: iphemant/ Depositphotos.com



7.05 Length and Distance

Length

Length is a **linear** measurement that tells us how long, or high or wide something is; or how far away (or how close) something is from us.

We often make length estimates as part of our everyday lives such as when moving our bodies, when cycling or driving, and when working with and using physical objects. We use devices such as **rulers** and **measuring tapes** to measure length. Length is usually expressed in **centimetres** (cm), or in **millimetres** (mm) for trades, and in **metres** (m) or **kilometres** (km) for travel distances.

For example. How tall are you?

In this case you are measuring your height, which is the total length from the top of your head to the bottom of your feet. We usually measure height in centimetres. And we are likely to use a tape measure or another similar measuring device to measure this length.

So if a 17 year-old person is 180cm tall they a[illegible]:

- ⇨ above average height
- ⇨ quite tall compared to people's hei[illegible] fro[illegible] 5[illegible]ars ago
- ⇨ quite small for an AFL male foo[illegible]
- ⇨ quite tall for an AFLW footb[illegible]ller.

So as you can see, length ca[illegible] me[illegible] height and may be descri[illegible] tall, o[illegible]maps even how short, a perso[illegible]s.

Height is a measurement of length. So what do you estimate the height of these cyber-creatures to be?

Image: Scott Maxwell/ Thinkstock

Length dimensions

Measuring length is important when you need to know the size of an object.

For example, if you are booking online to send a package by courier you will normally be asked to provide the object's length in 3 dimensions. These 3 **dimensions** are **width**, **depth** and **height** - so width, depth and height are essentially all examples of length.

Length, when expressed as height or width or depth is an important measurement for many situations. Some are listed below, but you could think of others.

- ⇨ What size bed to buy?
- ⇨ Whether a couch will fit in a space in the lounge room.
- ⇨ Whether a truck will fit in a parking space.
- ⇨ Knowing whether a vehicle will fit under a low bridge.
- ⇨ How to pack a moving or courier van.
- ⇨ Working out amounts of materials for construction, such as timber.

Image: abluecup/ iStock/Thinkstock

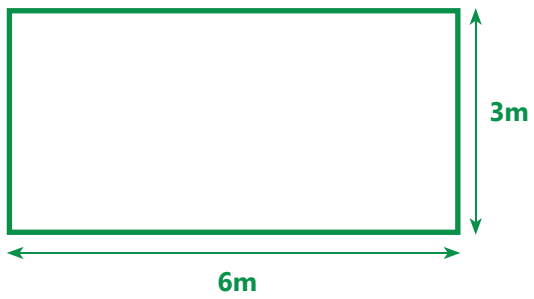
Measuring length 7D

Estimate and then **measure** the following **lengths**. You are likely to need to work with a partner using a measuring tape.

Note: There are 10mm in 1cm; 100cm in 1 metre & 1,000 metres in 1 kilometre.

i. Your height. Estimate: Measurement (mm): Measurement (cm): Measurement (m):	ii. Your height seated. Estimate: Measurement (mm): Measurement (cm): Measurement (m):
iii. The length of your arm from inside shoulder (armpit) to fingertip. Estimate: Measurement (mm): Measurement (cm): Measurement (m):	iv. The length of your lower body from your hips (top of your legs) down. Estimate: Measurement (mm): Measurement (cm): Measurement (m):
v. The length of your arm-span from fingertip to fingertip. Estimate: Measurement (mm): Measurement (cm): Measurement (m):	vi. Your height with one arm fully stretched above your head. Estimate: Measurement (mm): Measurement (cm): Measurement (m):
vii. The height, width and depth of your school table/desk. Estimate: Measurement (mm): Measurement (cm): Measurement (m):	viii. The height and width of the doorway of the classroom. Estimate: Measurement (mm): Measurement (cm): Measurement (m):

ix. Calculate the perimeter of this rectangle.



7.07 Length and Distance

Perimeter

One common measure of length (or distance) is perimeter. The **perimeter** measures the total distance around an object.

For example, if you walked around a soccer pitch (which is usually rectangular) then you are walking around its perimeter. The total distance walked will be the length of each of the four sides you walked.

So to calculate perimeter we simply add up the length of all sides of an object.

perimeter = length + width + length + width (or)

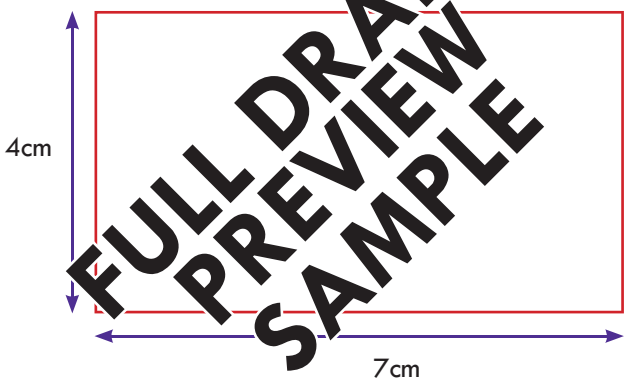
= l + w + l + w or

= 2l + 2w (for a rectangle)

Image: justinkendra/ Depositphotos.com

Perimeter: Rectangle

perimeter = l + w + l + w



⇨ perimeter of rectangle = 4cm + 7cm + 4cm + 7cm

perimeter = 22cm or 220mm (Note: nearly all trades use mm as measurements rather than cm).

NUM SUPER SKILLS

7E Perimeter

1. Calculate the **perimeter** of the **soccer pitch** shown above (100m x 60m).
2. How long do **you** think it would **take you** to walk/roll, and run **around this**?

Investigation: Are all soccer pitches the same size?

Perimeter: Circles

Strictly speaking, you don't need to investigate measures associated with circles this year. But being able to understand these is very important in many **vocational** roles, especially in design, trades, manual and practical jobs.

The perimeter of a circle has its own name - **circumference**. You might remember learning about that at some other time in your schooling. The circumference measures the total distance around a closed curve (i.e. a circle!).

Image: Max_776/Depositphotos.com

The distance around a circle (the circumference) will **always** equal the distance across a circle (the **diameter)** multiplied by a **constant amount**. This is true no matter how big or small the circle is. Do you know the name of that constant amount?

Circumference: Circle

circumference = diameter x 3.142 (which is pi or π)
or c = dπ

⇨ So for the circle above:
circumference = 5cm x 3.142
circumference = 15.7cm or 157mm

NUM SUPER SKILLS

Circumference 7F

Calculate the **circumference** of the **pizza** shown above (diameter = 30cm).

Investigation:
What are the different circumferences of the pizzas in your local shop?

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7.09 Weight

Weight (mass)

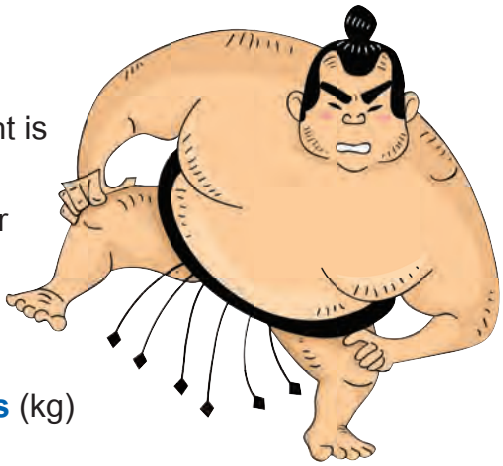
Weight simply refers to how heavy an object is. For example, when you buy a 1kg bag of sugar its weight is 1kg.

If you jump on the scale and it shows 70kg then your weight is 70kg.

A very small amount, such as a teaspoon of sugar, might have a weight of just 5 grams.

Weight is usually measured in **grams** (g), **kilograms** (kg) and **tonnes** (t).

There are 1,000 grams in a kilogram and 1,000 kilograms in a tonne. So 1 tonne (which is very heavy) = 1,000kg; and 1 kg = 1,000g.



"I weigh over 200 kgs which is fine, because in my line of work I need to be mass-ive!"

Image: lenmdp/ Depositphotos.com

1 gram can be broken into **micrograms** (ug), and this tiny measurement of weight might be used in pharmacy medications because absolutely exact small quantities are needed.

We measure weight using a **scale**, which will be calibrated with appropriate units such as grams and kilograms.

In our personal and working lives we often use the word '**weight**' when describing how heavy an object is, although technically this term is incorrect. This is because weight describes the force of gravity on an object.

If you recall the astronauts from the Apollo landings, you might have seen them leaping about very easily. They could do this because they 'weighed' much less on the moon than on Earth, and were able to jump higher and longer.

Technically, we should use the term **mass**. But imagine going to the deli and saying, "I want to buy some spiced olives with a mass of 500 grams." The deli server will think you are a bit strange!

However, in some industries such as transport and logistics they may use the term mass, especially for transport vehicles such as trucks and ships. But for nearly all situations you encounter, the heaviness of an object will be described by its weight. So you can use this term from now on.

Mass (and weight)

- Mass (weight) is usually measured in g, kg, and t.
- 1,000g = 1 kg; 1,000 kg= 1 tonne.
- We measure mass (weight) using scales.
- Cooking 'weights' might instead use amounts expressed in teaspoons, tablespoons and cups.
- We can use language such as *how heavy*, *how light*, *how much*, *how little* and so on. Essentially these are all measurements of weight.

NUM SUPER SKILLS

Measuring weight (mass) 7G

Estimate and then **measure** these '**weights**'. Some you will have to research.

Note: There are 1,000 grams in a kilogram; and 1,000 kg in a tonne.

a. Your 'weight'. Estimate: Weight (kg): Weight (g):	b. The weight of your favourite pet. Estimate: Weight (kg): Weight (g):
c. The total weight of your usual filled schoolbag. Estimate: Weight (kg): Weight (g):	d. The total weight of your family's usual grocery shopping bags. Estimate: Weight (kg): Weight (g):
e. The weight of your family's main motor vehicle. Estimate: Weight (kg): Weight (t):	f. The weight of your favourite take-away meal. Estimate: Weight (g): Weight (kg):
g. The weight of your mobile. Estimate: Weight (g): Weight (kg):	h. The weight of your favourite footwear. Estimate: Weight (g): Weight (kg):
i. Estimate the weight of this motor scooter, the weight of the young woman riding it (without a helmet!) and the combined weight.	

7.11 Volume - Fluids & Solids

Capacity

Capacity is a measure of how much material a 3-dimensional object can hold. Essentially capacity is another word for **volume** (but not the loudness volume for sound as that is an entirely different measure).

Capacity can relate to fluid volumes such as with drink bottles; and solid volumes such as with packing boxes.

Capacity (or volume) measures are very important in our everyday lives for cooking, medicine and of course, for fluid containers.

Think about different capacities of soft drink containers. You can buy 375 millilitre (ml) cans, 600ml plastic bottles as well as larger bottles with a capacity of 1.25 and 2 litres (l).

Most fluids are measured in millilitres (ml) and 1,000ml equals 1 litre. A millilitre is the same volume as a cubic centimetre (cc), which is a measure that is often used in medical fluids.

What do you think are the capacities (volumes) of each of the containers shown here?

Image: godruma/ Depositphotos.com

Cooking capacity

Cooking uses metric measurements for volume and this is important when you are buying ingredients. For example, 150ml of olive oil, 500ml of milk, 250g of butter and 1kg of flour.

However, many recipes actually use amounts that were based on the old-style imperial measures such as ounce, pound and fluid ounce.

We can convert fluid measures to our metric system using the guide opposite.

Fluids

- 1 teaspoon = 5 ml
- 1 tablespoon = 20 ml
- 1 cup = 250ml
- 1 fluid ounce = 28.41ml
- 1 pint = 568.26 ml
- 1 gallon = 4.564 litres

Capacity (volume)

- Fluid capacity (volume) is usually measured in ml and l.
- 1,000 millilitres = 1 litre.
- Solid capacity (for containers) is usually measured in g and kg.
- Cooking 'weights' might use amounts expressed in teaspoons, tablespoons and cups.
- Object volume (such as packing boxes) can be measured using length x width x height and is expressed in cubic cm (cm^3), or cubic metres (m^3) for very large objects like shipping containers.

NUM SUPER SKILLS

Measuring fluid capacity 7H

1 4 PS 2 3

Complete these **tasks** related to **capacity**. Some you will have to research.

Note: There are 1,000 millilitres in a litre and 1 million litres in a megalitre.

i. How many mls of fluid normally represent 1 tablespoon? What type of fluids might be measured using a spoon?

ii. Find out or (estimate) how many megalitres of water your family uses in a quarter (3 months).

iii. Estimate the amount of fluid you drink in an average week. Use categories of water, soft drink, fruit juice and other fluids, as required.

iv. Look at the measuring jug (or one of yc[illegible] wi[illegible]e capacity measurements.
Why does the capacity change for liqui[illegible]pa[illegible]to solids?
What else about this jug makes it very u[illegible]e?

Image: emmeci74/ Depositphotos.com

v. List examples from your own life when it is OK to just estimate fluid volume; and also when you need to measure fluid volumes more exactly.

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7.13 Volume - Fluids & Solids

Volume

When you learned about measuring area you were working in 2 dimensions, length x width. However, in the real world, objects come in 3 dimensions.

Sometimes we might need to estimate or measure how much space an object takes up in each of its **3 dimensions**; **length**, **width** and **height** (or depth).

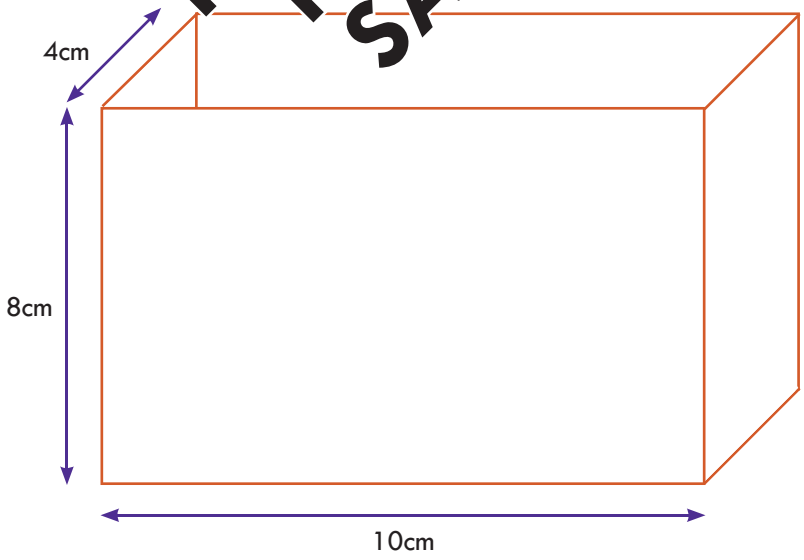
Consider situations involving a courier van, supermarket shelves or a packing box. These situations involve packing and fitting objects into a pre-determined space.

We can measure this 'space' using volume. The **volume** of an object refers to how much space it occupies. It might be helpful to think of an object's volume as its **capacity**, or how much it holds. i.e. How many soft toys can you cram into a claw machine?

Image: lenmdp/ Depositphotos.com

The kids are trying their luck at a claw machine. The space inside the glass with the prizes has a certain volume. The operator could put more toys in and make more profit. But in reality the operator wouldn't want to put so many prizes in. Why not?

Volume of a rectangular prism = l x w x h



⇨ volume of rectangular prism (object) = 4cm x 10cm x 8cm

volume (v) = 320cm^3

Note: Here the unit, cm, is cubed (^{3}). That's because cm is multiplied three times in the calculation (i.e. cm x cm x cm). And of course, you are working in 3 dimensions with volume, hence cm^3!

NUM SUPER SKILLS

Measuring solid volume 7I

1 4 PS 2 3

In life we often **estimate** the **volume** of **solids**. For example, you might take a punt on how many items you can fit in a shopping basket, how many suitcases you can fit in a car boot, or even how many chips you can fit in your mouth!

1. Use **estimates** of **volume** for these **situations**.

i. How many shopping items can you fit in a shopping basket? What does this depend on?
What would be in your shopping basket? And will these fit in your green bag?

ii. Estimate how many of these smaller boxes would fit into the huge packing box being carried (unsafely) by the dude.
When might you need to be able to estimate/calculate this?

Images: t: olly18/ b: ptasha/ Depositphotos.com

2. Calculate these **volumes**. Try **making these objects** out of card.

a. A box measuring 3cm x 10cm x 20cm.	b. A cube 5cm in size.

3. List **examples** where **you estimate volumes** 'naturally' in your everyday life. Share these situations with the class.

7.15 Estimating vs Measuring

Estimating vs measuring

When it comes to measuring quantities for personal and vocational situations you might have to make estimates, make calculations or even do both!

Estimates and calculations might involve food ingredients, building materials, heights and weights, lengths and distances - even how much hair to trim!

So have a think about when you rely on estimates for quantities; and when you instead use calculations for quantities.

For some situations it is easier, and more convenient, to make **estimates** rather than doing exact calculations.

Image: chesky_w/Depositphotos.com

For example: Parallel parking

When parallel parking a car you're not going to get out with a tape measure and measure each parking space, measure your car and then calculate which space to try for.

Instead you will make an estimate - and over time, with experience, you will become better at making this estimate.

So, how can you learn this skill?

...you are parking you will estimate distance and angles. However, automated parking systems will make many exact calculations.

However, for some situations it is actually easier, and better, to make close to accurate **measurements**, or even **exact measurements**, to calculate amounts.

For example: Getting the amounts right

If you need to buy a garden drip-watering system you will need to measure the lengths and widths of the garden areas in which the system will be installed.

If you rely just on estimates, you might purchase too little hosing and come up short needing to go back and buy a bigger length, wasting both time and money. Alternatively, you might buy too much hosing and waste money and resources.

What about if you are following a difficult recipe, such as baking a souffle? You will need to use quite exact measurements. You can be a couple of grams or millilitres out here or there, but in reality you will use measuring instruments and devices to make sure your measurements are as close to exact as possible.

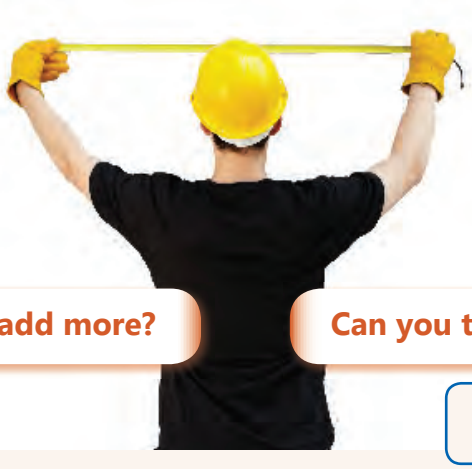
So as a class, discuss when it is OK, or even better to make estimates. Then discuss when you need to measure exactly.

To Estimate or to Measure?

Cost of materials

Your experience

Quality issues



Waste

Time/urgency

Danger

Can you add more?

Can you take away?

Image: Kuzmafoto/ Depositphotos.com

Estimating vs measuring 7J

1. List **examples** of when **you** make **measurement estimates**; and **when** you **need** to calculate **exact measurements**.

Estimates of measurements	Calculate exact measurements

2. Give an **example** for each of these **occupations** when they could **make** an **estimate**, and then when they would need to **calculate exact** measurements.

1 4 PS 2 3

Truck driver: Estimate of measurements	Truck driver: Exact measurements
Doctor: Estimate of measurements	Doctor: Exact measurements
Hairdresser: Estimate of measurements	Hairdresser: Exact measurements
Chef: Estimate of measurements	Chef: Exact measurements
Builder: Estimate of measurements	Builder: Exact measurements

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7.17 Estimating vs Measuring

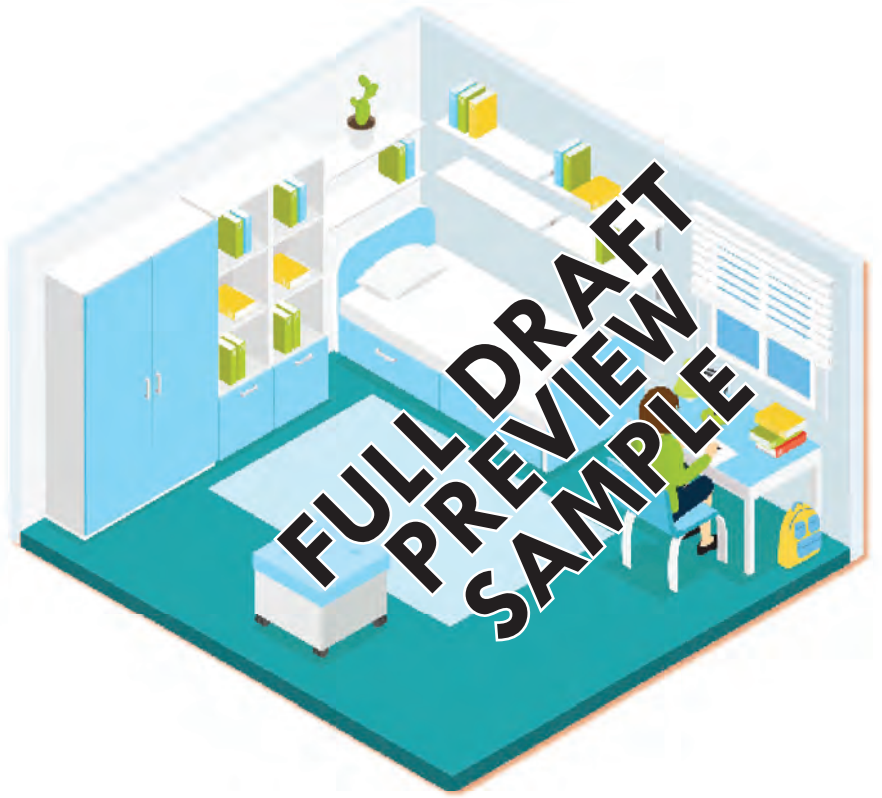
7K Room to move

1
4 PS 2
3

Part A

1. Estimate the **size** of this **bedroom**.
2. What **visual information** will **you use** to make your estimates?
3. Do you think that this **image** is drawn **to scale**? Why/why not?
4. How would the **size** of the **room compare** to **your** own **bedroom**? You should **sketch** your own bedroom to help.
5. What **visual** and **numerical information** can **you use** to make your **comparison**?

Image: Mogil/ Depositphotos.com



Part B

1. For this situation make **estimates** of any **items** or **amounts needed**.
2. Use the numeracy techniques you have learned to **calculate exact measurements**. Start out by using the **4-stage problem-solving cycle**.
3. Which do **you think** was the **better** and/or more **useful** method - **estimating** or **calculating**? Discuss why.

Selene has been given the job of buying soft drinks for the grand final party.

She can buy cans - but large bottles are more cost effective, which would mean that she'd have more drink to go around. They've got plenty of cups to use.

Her mate Ange reckons 20 people are coming, and of course being the grand final, they're going to be there for quite a few hours - and it's thirsty work cheering on your team!

Estimate the following.

a. How long are the guests likely to be there?
b. How much soft drink might Selene need to buy?
c. How many cups/glasses will this make?
d. How much drink could each person have?
e. How much might this soft drink cost?

Calculate the following.

f. Selene's got $20 to buy the drinks so she's headed off on her skateboard. Calculate the amount she's got to buy for the thirsty guests.
g. Calculate how much this would cost.
h. What brands/types should she buy? Why so?
i. Can you predict any problems Selene might have? Explain.

The game is just about to start and the cheer squad puts up the banner. It looks huge. The crowd is screaming and the players are coming down the race.

Complete the following.

j. Estimate what size you think the banner would be.
k. Use your estimates to calculate the perimeter of the banner.

Applied

How much soft drink do you estimate you consume in a year?

Now work this out by using daily and weekly estimates.

Compare this to others and discuss as a class.

7.19 Temperature

Temperature

Temperature can be commonly referred to as the intensity of heat of an object, fluid, surface or other substance.

The most common unit of measurement for temperature is Celsius which is a comparative scale, based on the freezing point of water 0^0C, and the boiling point of water 100^0C. However, some slight variations to this definition do exist for scientific purposes. Temperature is usually measured by a scaled mercury-based thermometer.

As a class discuss these temperature words and talk about what feelings and memories they evoke in you.

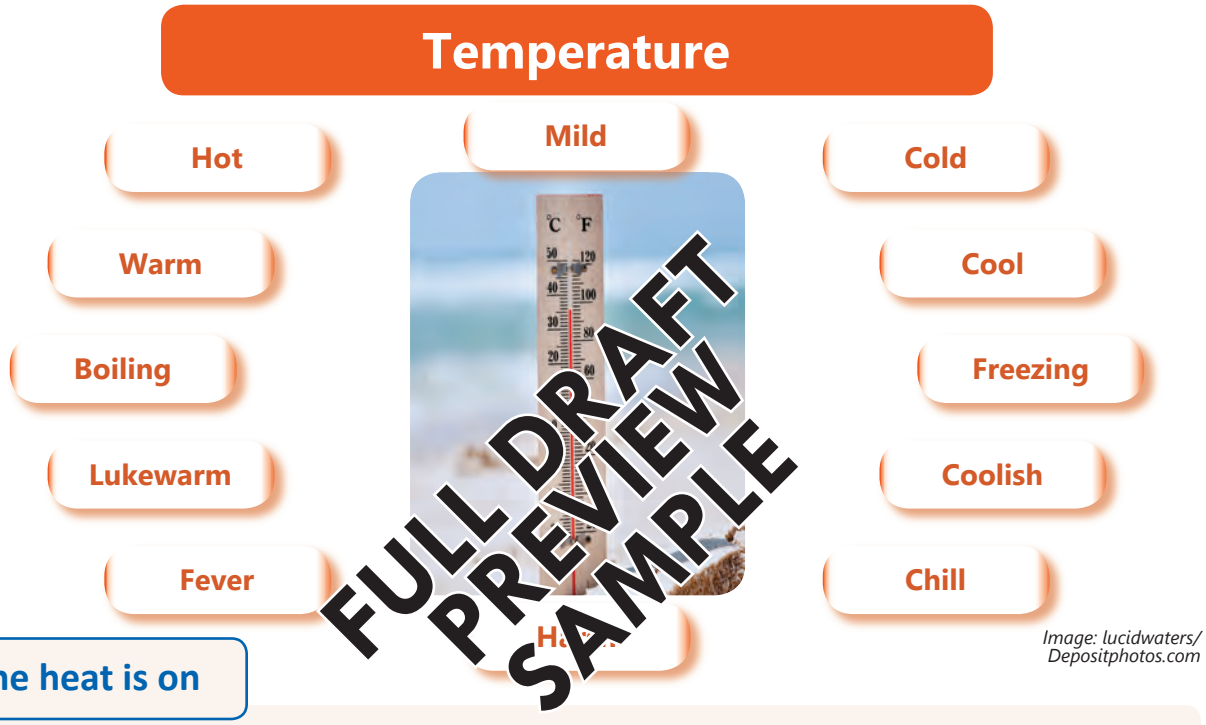


Image: lucidwaters/ Depositphotos.com

7L The heat is on

Briefly **answer** each question related to **your** own **circumstances**.

1. What is too hot?	2. When is too cold?	3. How does mild feel?
4. When is warm better?	5. When is cool better?	6. When is the sun harsh?
7. What should I boil?	8. What should I freeze?	9. What is lukewarm?
10. How are fever and chill related?		

Temperature in action

An awareness of temperature scales, and associated safe temperature ranges, is a vital concept for many personal, health, recreational and work-related situations. Can you think of more?

- Personal health and wellbeing, such as surface air temperature.
- Personal care and safety, such as bathing an infant.
- Household situations such as hot surfaces, heating and cooling, and clothing needs.
- Health diagnosis and medicine, such as fever, hypothermia, and other conditions.
- Food storage and preparation, such as perishables, dairy and meats.
- Employee OH&S/WHS such as exposure, heat and cool hazards, and fire risk.
- Cooking, such as cooking temperatures, and cooking times to kill bacteria.
- Manufacturing, engineering, food production and construction.
- Transport, such as refrigerated vans for perishables.
- Exercise, such as energy burning and safe body temperature zones.
- Electrical goods, such as cooling, heating, cooling systems and radiant heat.

Correct temperature is important in the beauty industry. Why so?

Correct temperature is important when cooking. Why so?

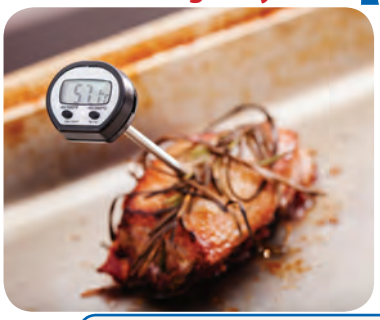


Image: Shebeko/ Depositphotos.com

Temperatures 7M

Estimate, and then **find out**, the **temperature** for each of the following.

Item	Estimated temp.	Exact temp.	Item	Estimated temp.	Exact temp.
The temperature in this room.			Hottest temperature ever in Australia.		
The temperature in LA today.			Coldest temperature ever in Australia.		
A caffe latte.			Car radiator fluid after a long drive.		
A bath suitable for a baby.			A shop fridge for milk.		
Healthy human temperature.			your choice		
A human with a fever.			your choice		

7.21 Temperature

7N Safe temperature investigation

1
4 PS 2
3

You are required to undertake an **investigation** into **safe temperature ranges** in a variety of personal, social/recreational and work-related situations.

Complete the tasks specified in the table by **describing relevant activities/items**.

You might also need to undertake some **online research**.

	Describe activity/item	Safe range/ hazard control	Potential hazards
Personal situations	Cooking of....		
	Electrical item....		
	other...		
	other...		
Social/ recreational situations	A day at the beach...		
	other...		
	other...		
Work-related situations	Safe working environment...		
	Storage of perishables...		
	other...		

Cooking

Who likes cooking? Many of you do. Some of you will have a whole range of cooking skills that you have developed. But even people who are not great cooks have something they can make and cook - even if it is a simple toasted sandwich.

Understanding temperature is vital for safe, tasty, nutritious and effective cooking. So do you know your blanching from your boiling? Time to skill up, or one day chef Ramsay might give you a dressing down!

Image: cookelma/ Depositphotos.com

Chef's choice 7O

1 4 PS 2 3

1. Explain the **meaning**, and temperature **guidelines**, for **each** of these. Add 2 more.
2. Describe a **food item** or **meal prep** that would **require** this cooking **method**.
3. Identify a specific **safety issue** that needs to be dealt with.

Cooking	Guidelines	Example of food/meal	Safety
boil			
roast			
poach			
simmer			

7.23 Assessment Task

AT2a The Right Stuff
Health & Recreational Numeracy

Overview

For this assessment task, you are required to prepare an **annotated report** that describes the use of measures and quantities for recreational activities that you like participating in.

It might be good to take an applied **health** focus to this assessment task, especially if you took an applied recreational focus for Section 6.

You will complete your annotated report using text, numbers, images, illustrations, diagrams, and other visual elements such as video.

Tasks

You might investigate:

- ❑ Making recipes healthier by substituting ingredients.
- ❑ Healthy eating and portion sizes.
- ❑ Amount of macronutrients, (protein, carbohydrates and fats) in different foods.
- ❑ Amount of refined sugar in food and beverages.
- ❑ General personal health indicators and measures.
- ❑ Condition-specific health indicators and measures.
- ❑ Safe cooking temperatures and times for different foods.
- ❑ Sports and fitness quantities and measures.
- ❑ Sports and fitness time-related measures and achievements.
- ❑ Quantities and measuring of materials in arts and crafts.
- ❑ Quantities and measures of materials for practical tasks such as woodwork, textiles, gardening, model-making, design, and so on.
- Or other health or recreational quantities and measures relevant to you.
- ❑

Problem-solving cycle

To successfully complete this activity you must apply each of the **4 stages of the problem-solving cycle** where appropriate.

Annotated report

In your report you must explain how these numerical knowledge and skills are applied; and describe the applied use of maths tools and techniques.

- ❑ **measuring units and devices**
- ❑ **time measures**
- ❑ **size and/or distance measures**
- ❑ **amounts and quantities**
- ❑ **temperature measures**
- ❑ **volume and capacity measures**

Note: In the final column, your teacher might also include an achievement level to indicate your level of performance for each part of the task.

Name(s):

Key dates:

Health & Recreational Numeracy
Module 3
Quantity & Measures

Tasks - AT2a: The Right Stuff	Must do?	Due by	Done	Level
Focus area:				
⇨ Measuring units.	✓			
Visual evidence and examples.	✓			
⇨ Measuring devices and techniques.	✓			
Visual evidence and examples.	✓			
⇨ Time measures.	✓			
Visual evidence and examples.	✓			
⇨ Size and/or distance measures.	✓			
Visual evidence and examples.	✓			
⇨ Amounts and quantities.	✓			
Visual evidence and examples.	✓			
⇨ Temperature measures.	✓			
Visual evidence and examples.	✓			
⇨ Importance of these measures.	✓			
⇨ Other portfolio tasks to satisfy Module 3 that are not part of the applied investigation.	○			

Task completion

1 4 PS 2 3 **Describe applied use of the problem-solving cycle.**	✓		○	
Develop and apply mathematical tools and techniques.	✓		○	
⇨ **Prepare and submit my annotated report.**	✓		○	
Present my report to the class (if required).	○		○	

Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report

Additional information:

Signed: _____ Date: _____

7.25 Assessment Task

AT2b Measuring Up - Workers Health & Recreational Numeracy

Overview

For this assessment task, you are required to investigate a range of quantities and measures, including time, that apply in work-related situations.
You should also focus on workers meeting **workplace health and safety guidelines**.

You will complete an **annotated report** using text, numbers, images, illustrations, diagrams, and other visual elements such as video.

Tasks

You might investigate:

- ❑ Work-related task times.
- ❑ Work-related measuring of shapes and objects.
- ❑ Specific work-related measuring tools and devices.
- ❑ Work-related temperatures including safe operating ranges.
- ❑ Work-related estimates and measures of quantities.
- ❑ Work-related estimates and measures of sizes.
- ❑ Work-related estimates and measures of volume and capacity.
- ❑ Work-related estimates and measures of mass (weight).
- ❑ Work-related estimates and measures of materials, ingredients and inputs.
- ❑ Work-related mixes, proportions and other measures;
- ❑ Other relevant work-related and vocational quantities and measures relevant to you.
- ❑

Problem-solving cycle

To successfully complete this activity you must apply each of the **4 stages of the problem-solving cycle** where appropriate.

In your report you must explain how and when these numerical knowledge and skills are applied; and describe the applied use of maths tools and techniques.

- ❑ **measuring units and devices**
- ❑ **time measures**
- ❑ **size and/or distance measures**
- ❑ **amounts and quantities**
- ❑ **temperature measures**
- ❑ **volume and capacity measures**

Note: In the final column, your teacher might also include an achievement level to indicate your level of performance for each part of the task.

Name(s):

Key dates:

Health & Recreational Numeracy
Module 3
Quantity & Measures

Tasks - AT2b: Healthy Workers	Must do?	Due by	Done	Level
Focus area:				
⇨ Measuring units.	✓			
Visual evidence and examples.	✓			
⇨ Measuring devices and techniques.	✓			
Visual evidence and examples.	✓			
⇨ Time measures.	✓			
Visual evidence and examples.	✓			
⇨ Size and/or distance measures.	✓			
Visual evidence and examples.	✓			
⇨ Amounts and quantities.	✓			
Visual evidence and examples.	✓			
⇨ Temperature measures.	✓			
Visual evidence and examples.	✓			
⇨ Importance of these measures.	✓			
⇨ Other portfolio tasks to satisfy Module 3 that are not part of the applied investigation.	○			

Task completion

	Must do?	Due by	Done	Level
1 4 PS 2 3 **Describe applied use of the problem-solving cycle.**	✓			

Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report

	Must do?	Due by	Done	Level
Develop and apply mathematical tools and techniques.	✓			
⇨ **Prepare and submit my annotated report.**	✓			
Present my report to the class (if required).	○			

Additional information:

Signed: _____ Date: _____

7.27 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task: **Names/Dates:**

AT1 -

1. Identify the maths					
Identify problem(s)	Done: ○ Level:	Recognise maths	Done: ○ Level:	Select information	Done: ○ Level:
Interpret information	Done: ○ Level:	Choose processes	Done: ○ Level:		Done: ○ Level:
2. Act on and use maths					
Perform estimations	Done: ○ Level:	Decide techniques	Done: Level:	Choose maths tools	Done: Level:
Select technologies	Done: ○ Level:	Perform calculations	Done: ○ Level:		Done: ○ Level:
3. Evaluate and reflect					
Check Estimations	Done: ○ Level:	Compare results	Done: Level:	Check processes	Done: Level:
Review actions	Done: ○ Level:	Check logical reasoning	Done: ○ Level:	Assess conclusions	Done: ○ Level:
Communicate and report					
Written processes	Done: ○ Level:	Written results	Done: Level:	Oral processes	Done: Level:
Oral results	Done: ○ Level:	Digital processes	Done: ○ Level:	Digital results	Done: ○ Level:

Mathematical Toolkit					
Analogue tools - What & how?		Digital Devices - What & how?		Software & Apps - What & how?	
Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy

Data and Information 8

Activities 8: Data and Information		p.	Due date	Done	Comment
8A	**Me and data**	189			
8B	**Data and information**	191			
8C	**Tables**	193			
8D	**The ladder**	196-197			
8E	**Bar graphs in action**	199			
8F	**Working with bar graphs**	2[illegible]			
8G	**Pie charts in action**	2[illegible]			
8H	**Working with pie chart**	2[illegible]-205			
8I	**Line graph**	206			
8J	**Line graphs in action**	207			
8K	**Working with line graphs**	208-209			
8L	**Infographics**	211			
AT8	**Analysing and Reporting a Civic Issue**	212-213			
PST	**Problem-Solving & Toolkit**	214			

Comments:

8.01 Data and Information

Data makes the world go around

Your life is driven by data.

Data is all the measurements, records, facts, recordings and other information that can be expressed in numerical, visual and/or written form.

When we collect, organise, interpret and analyse data we are better able to make informed decisions based on the numerical information.

Data can be used to create **tables**, **graphs**, **statistics**, **infographics** and **reports** to communicate bulk information.

Government departments and agencies collect, analyse and communicate data about society, the economy, the environment, and of course that very important information that we check on every day - the weather!

Businesses use data to guide their production, stock, sales, pricing and distribution of various goods and services.

They use this information to create **databases** about their customers and their employees.

Schools use data to track attendance and report on student achievement.

Sporting teams use data to monitor players and to plan, develop and implement better performance strategies.

And what about those 'free' social media platforms? They love your data!

For them, you are a product.

They can use your **biodata** to target and sell advertising - some even sell your biodata to other businesses and agencies!

So what data is important for you in your life?

Image: monkeybusinessimages/iStock/Thinkstock

Some data might be technical in nature, such as readouts from industrial or production machinery.

Whereas other data might be financial in nature, such as budgets, graphs and sales charts.

Image: seb-ra/iStock/Thinkstock

Image: agsandrew/Depositphotos.com

Data

Numbers

Tables

Spreadsheets

Collect

Interpret

Communicate

Information

Biodata

Words

Graphs

Infographics

Organise

Analyse

Report

Image: royalty/ Depositphotos.com

Me and data 8A

"Your life is driven by data."

Describe **examples** of how **you use data** and **information** in your **personal life**.
Some prompts are given to guide you. Add 3 more situations relevant to you.

Eating	Exercising	Working
Public transport	Driving	Banking
Gaming	Arts & Crafts	Banking
Learning	Organising	Barracking

8.03 Data and Information

Collecting data

Data is really just a set of numbers, or a set of words, or a set of words and numbers. It is the interpretation of data that makes it useful. That's what turns data into useful **information**.

Data sources can include a survey which is a direct (or **primary source**) of information, e.g. surveying customers on their buying preferences.

Data also includes other (**secondary**) sources. These involve data that comes from external sources, such as government information about employment statistics.

In our contemporary world, **digital data** is collected, collated, analysed and communicated by varied means and media. These include:

- mobile phone usage data and billing
- banking and financial information
- internet and digital media usage
- search engines and digital assistants
- GPS location tracking
- Medicare and health-care information.

Data also includes personal information such as personal identity details (**biodata**), location, purchasing histories, income level, taxation and government information.

Not all data is 'digital'

Although you live in the digital age, it is important to acknowledge that a lot of data and information is not digital, especially in personal 'human' situations, and on-the-job in work-related roles.

We still use our eyes, ears, nose and other senses to take in data. We communicate data and information verbally or via non-verbal communication. And we do a lot of assessing of our physical environment using our bodies when playing sport, when driving or when doing manual and practical tasks.

Straightforward uses of data might involve measuring a room to determine the amount of carpet needed, listening to the sound of an animal's breathing to pick up possible ailments, and calculating how much time and money you might need when planning a personal holiday.

Data is often easier to read and interpret when organised in tables, graphs and other visual forms. So, it is vital that you can develop these skills for personal and vocational numerical situations.

Working with data information can sometimes be complex. Applying the **4-Stage Problem-solving Process**, step-by step, can really make it a lot easier.

There 'aint no app for that!

Image: khorzhevska/ Depositphotos.com

Checksheets

A checksheet is used to collect and record information. You have probably used variations of checksheets in your personal life to record and collate information.

Effective checksheets need the following.

1. A situation to be monitored and recorded.
2. A pre-prepared record sheet that is both easy to fill in and easy to extract information from.
3. A trained monitor to observe and record the information.

Checksheets might be used in vocational situations to record the:

- ⇨ number of customers at different times
- ⇨ type of product most ordered
- ⇨ reason for a customer complaint
- ⇨ cause of a breakdown.

Checksheet

Work task/activity: Cars parked illegally at Weglakes Primary School

Other information: Morning shift

Completed by: Aaron Tonto Day: Mon - Fri Dates: 17-21 Aug, 2024

Reason/factor	Mon	Tue	Wed	Thu	Fri	Total	%
double-parked	𝍸 𝍸 𝍸 II 17	𝍸 𝍸 𝍸 I 16	𝍸 𝍸 III 13	𝍸 𝍸 𝍸 III 18	𝍸 𝍸 𝍸 𝍸 20	84	34
overstaying time	𝍸 𝍸 10	𝍸 𝍸 𝍸 𝍸 20	𝍸 5	𝍸 II 7	𝍸 𝍸 𝍸 15	57	23
parking in no standing zone	𝍸 I 6	𝍸 I 6	𝍸 I 6	𝍸 I 6	𝍸 I 6	30	12
parking in front of driveways	III 3	III 3	II 2	III 3	II 2	13	5
parking too close to corner	IIII 4	IIII 4	IIII 4	III 3	II 2	17	7
other (describe) parking in bus zone	𝍸 I 6	𝍸 I 6	𝍸 I 6	𝍸 I 6	𝍸 II 7	31	13
all others together (all different)	IIII 4	III 3	III 3	III 3	III 3	16	6
Total	50	58	39	46	55	248	100
%	20	23	16	19	22	100	

Information to consider:
Someone else is calculating the total cars parking.

Data and information 8B

1. Complete these **words** about **data** and **information**.

❑ an _____	❑ di_____	❑ sec_____
❑ bio _____	❑ gr _____	❑ sp _____
❑ co _____	❑ info _____	❑ st _____
❑ com _____	❑ infor _____	❑ ta _____
❑ d _____	❑ pri _____	❑ re _____
❑ datab _____	❑ or _____	❑ wo _____

2. Have **you** ever **used** a **checksheet** before? **How** do **checksheets help** to **collect** and **organise data**?

8.05 Tables

Tables

You have probably already used data tables this year.

Tables enable the user to **organise** information. They make it easier to perform **calculations**, including the use of **spreadsheets.**

Tables enable users to look for patterns and trends, and to do **comparisons** between sets of data.

Have a look at the table shown here as an example. A table will usually contain certain types of information

Heading: This indicates the type of information organised in the table.

Time period or date: The data will often refer to a time period.

Column headings: These headings indicate the type of data that is being shown in the table (including appropriate units such as $).

Row headings: These headings indicate the variables being shown, such as people, customers, products, months of the year, etc..

Data: This is the collected information as shown in the table.

Totals: Row or column totals that perform a calculation.

Heading | Time period

Top 4 Goalscorers 2023 season			
Player	Goals	Games	Average
Ash	36	12	3
Bil	33	22	1.5
Clo	27	18	1.5
Dom	16	4	4
Totals	**112**	**56**	**2**

Column headings

Row headings

Data

Totals

Totals

So, from the information in this table we can say that:

- **The top 4 goalscorers kicked 112 goals between them in 2023.**
- **The top 4 goalscorers played 56 games in total in 2023.**
- **The average goals per game scored by these top 4, was 2.**
- **Ash scored the most goals, kicking 36 in 2023.**
- **Of the 4 top goalscorers, Bil played the most games with 22.**
- **Both Bill and Clo averaged 1.5 goals per game in 2023.**
- **Of the 4, Dom scored the least goals, but had the highest average per game, of 4.**

1 4 PS 2 3

1. Use the **data** in the Sunnyfried Cricket Club **table** to describe at least **5 clear points** of information.

Sunnyfried Cricket Club: Under 17s Top 4 Wicket takers - 2023 season

Player	Wickets	Games	Average
Zeb	15	10	1.5
Yan	18	3	6
Xie	33	11	3
Woz	10	5	2
Totals	**76**	**29**	**2.6**

2. Use the **data** in this **table** to describe at least **5 clear points** of information.

Average Minimum and Maximum Temperatures - Melbourne

Month	Long-term	
Jan	**16⁰**	**27⁰**
Feb	**16⁰**	**27⁰**
Mar	**15⁰**	**25⁰**
Apr	**12⁰**	**21⁰**
May	**10⁰**	**18⁰**
June	**8⁰**	**15⁰**
Jul	**8⁰**	**15⁰**
Aug	**8⁰**	**16⁰**
Sep	**10⁰**	**18⁰**
Oct	**11⁰**	**21⁰**
Nov	**13⁰**	**23⁰**
Dec	**14⁰**	**25⁰**

Source: www.bom.govau

8.07 Tables

Tables at Work

Over the course of this year you have dealt with numerical data and information in many different personal situations.

It is important to understand that all workers have to deal with **numerical data and information** as part of their day-to-day work tasks.

In the workplace you might deal with **internal** numeracy data and information from inside the business or organisation; as well as **external** numerical data and information from outside the business or organisation.

Common examples of data and information that might be collected and communicated in tables are listed below. But there are many others - including those specific to a particular industry or occupation. Can you think of some more?

Data and Tables at Work

- Organise time and roster
- Create pay slips and records.
- Filling out timesheets.
- Cost and price lists.
- Prepare orders.
- Organise and record materials and stock.
- Process purchase orders.
- Record customer information.
- Create and issue invoices.
- Organise sales data.
- Manage work schedules.
- Recording safety information.
- Estimates and measures.
- Measure quantities.
- Communicate instructions.
- Manage revenue and expenses.
- Report on performance.
- Create sales receipts.
- Monitor output and waste.
- Display and communicate technical and operational information.

Image: macrovector/ Depositphotos.com

Tables and spreadsheets

Tables are used to collate and organise data and information. This table records key information about 4 different chocolate products for a lolly shop. The table clearly gives information about product cost, quantities, total cost, different % mark-ups, retail price and total retail value of stock.

Item	SKU	Cost price	Quantity	Total Cost	Mark-Up	Selling Price	Total Value
Buntos	BUN	$1	1,000	$1,000	200%	$3	$3,000
Choclics	CHO	$2	500	$1,000	100%	$4	$2,000
Boxsters	BOX	$20	50	$1,000	50%	$30	$1,500
SpezSelec	SPZ	$50	40	$2,000	40%	$70	$2,800
Totals				$5,000			$9,300

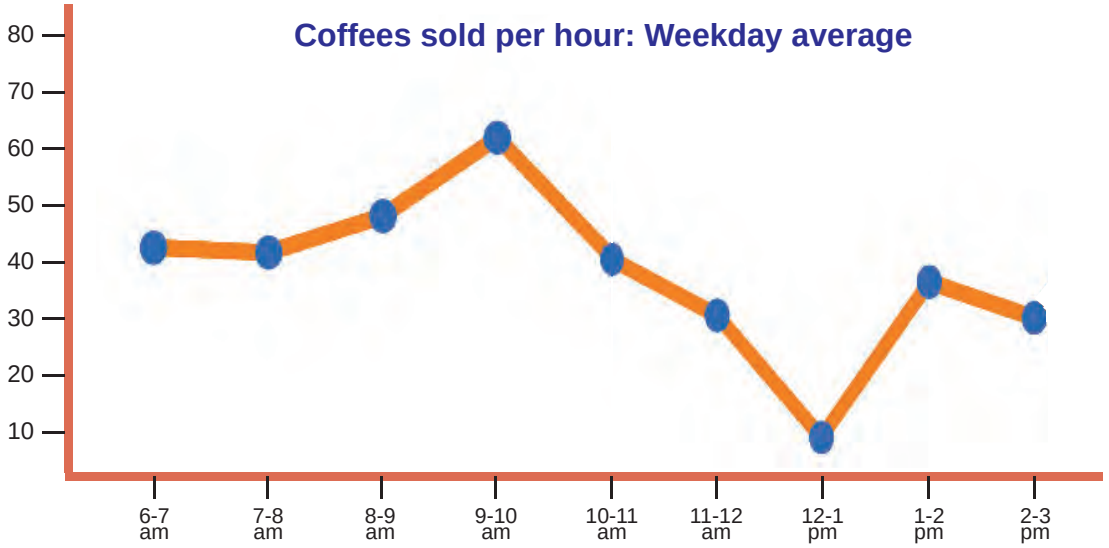
	A	B	C	D	E	F	G	H
1								
2					=C2*D2		=C2+(C2*F2)	=D2*G2
3					=C3*D3		=C3+(C3*F3)	=D3*G3
4					=C4*D4		=C4+(C4*F4)	=D4*G4
5					=C5*D5		=C5+(C5*F5)	=D5*G5
6					=SUM(E2:E5)			=SUM(H2:H5)
7								
8								

This table is also shown as a spreadsheet (formatted for entry). A spreadsheet uses formulae to do calculations.

So if the lolly shop had a thousand different products, the spreadsheet would handle all this information as soon as it was entered.

Graphs and charts

These can be used to communicate numerical data and information visually. This graph shows the number of coffees sold each hour by a busy coffee kiosk. The graph indicates a drop-off around lunchtime. Perhaps the kiosk needs to add a few snacks to the menu to attract more lunchtime customers?



8.09 Tables

8D The ladder

1 4 PS 2 3

One of the most commonly checked data tables is the AFL ladder. Of course, not everyone is a fan of Australian Rules Football. But sporting tables are a good example of how to set out data information. So let's see how you go creating a ladder based on some imaginary games.

AFL Ladder

P: Games played

W: Games won

L: Games lost

D: Games drawn

PF: Points For is the total points a team has scored in all their games.

PA: Points Against is the total points a team has had scored against them by their opponents, in all their games.

%: Is a score ratio calculated by PF/PA x 100%.

PTS: For the ladder. Teams receive 4 points for each win. Teams receive 2 points for each draw. Teams don't receive any points for a loss.

Round 1

Team	G	B	P	Result	Opponent	G	B	P
Melbourne	12	7	79	L	Port Adelaide	14	12	96
Geelong	21	12	138	W	Brisbane	15	15	105
Western Bulldogs	7	17	59	L	Sydney	18	6	114
GWS	14	14	98	W	Essendon	6	5	41
West Coast	3	11	29	L	St Kilda	9	18	72
Fremantle	7	18	60	L	Richmond	9	23	77
Carlton	12	14	86	W	Hawthorn	7	11	53
Adelaide	15	19	109	W	Gold Coast	12	8	80
Collingwood	9	9	63	L	North Melbourne	10	10	70

Round 2

Team	G	B	P	Result	Opponent	G	B	P
Port Adelaide	6	[illegible]	[illegible]	L	Geelong	10	14	74
Brisbane	[illegible]	[illegible]	[illegible]	L	Western Bulldogs	25	12	162
Sydney	[illegible]	[illegible]	[illegible]	W	GWS	14	11	95
Essendon	[illegible]	[illegible]	[illegible]	[illegible]	West Coast	6	9	45
St Kilda	8	8	56	[illegible]	Fremantle	5	11	41
Richmond	9	[illegible]	[illegible]	W	Carlton	8	12	60
Hawthorn	[illegible]	[illegible]	[illegible]	W	Adelaide	19	14	128
[illegible] Coast	14	[illegible]	97	L	Collingwood	19	17	131
[illegible]rth Melbourne	[illegible]	9	45	L	Melbourne	14	20	104

Round 3

Team	G	B	P	Result	Opponent	G	B	P
Western Bulldogs	7	9	51	L	Melbourne	9	9	63
GWS	12	14	86	W	Brisbane	8	11	59
West Coast	14	10	94	W	Sydney	11	12	78
Fremantle	9	15	69	L	Essendon	12	15	87
Carlton	18	11	119	W	St Kilda	7	7	49
Adelaide	6	12	48	L	Richmond	9	3	57
Collingwood	8	15	63	L	Hawthorn	14	21	105
Port Adelaide	14	7	91	D	Gold Coast	13	13	91
Geelong	17	5	107	W	North Melbourne	10	14	74

Round 4

Team	G	B	P	Result	Opponent	G	B	P
Collingwood					Carlton			
Hawthorn					Geelong			
Richmond					Essendon			
Sydney					Melbourne			
Brisbane					Gold Coast			
West Coast					Fremantle			
Adelaide					Port Adelaide			
North Melbourne					St Kilda			
Western Bulldogs					GWS			

1. Based on the **information** for the first 3 rounds **draw** up the **ladder** as a **table**.
   You could use your workbooks, software or even a spreadsheet.
   Use the information to answer the following questions
2. Who **won** the **most games**? How many?
3. Who **won** the **least games**? How many?
4. Who **drew** the most games? How many?
5. Which was the **highest scoring** team? How much?
6. Which was the **lowest scoring** team? How much?
7. Which team had the **least points kicked against** it? How many?
8. Which team had the **most points kicked against** it? How many?
9. Which team had the **highest percentage**? How much?
10. Which team had the **lowest percentage**? How much?
11. What **might happen next** round? Why is that?

Extension

The SANFL calculates percentage differently from the AFL. How does it do this? Is it more complex? And is it better?

8.11 Bar Graphs

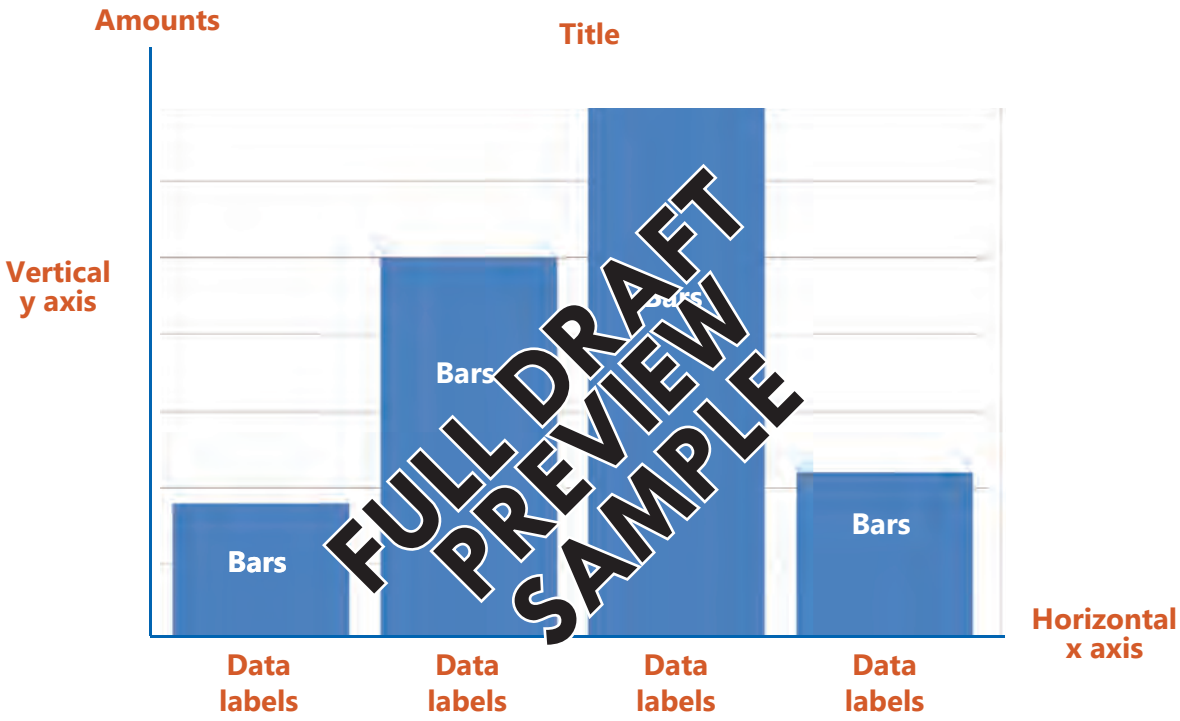
Graphs

One of the most useful elements of tables is the ability to turn the information into graphs.

Graphs allow a person to look at numerical information, including information involving lots of data, in a **visual form**.

This visual form can make it easier and faster to **interpret** data. A graph also allows for **comparisons** to be made more easily.

One very useful graph is a **bar graph** (or bar chart).



Bar graphs

- A bar graph shows a comparison between the data of various categories.
- A more complex bar graph can also be used to compare different variables on the same chart by using more than one 'set' of bars.
- The components of a bar graph are:
  - **Horizontal (bottom) axis** (x): Plots the categories along the bottom, usually with spaces between the bars.
  - **Vertical (side) axis** (y): Plots the amount along the side, which is usually a number, a count, a percentage, or a $ amount.
  - **Heading** and **data labels**: These tell the reader what is indicated by the graph so you know just what the graph is showing.
  - **Bars**: The height indicates the amount being graphed. The bars can be drawn using the same colour, or different colours, depending on what is represented on the graph.

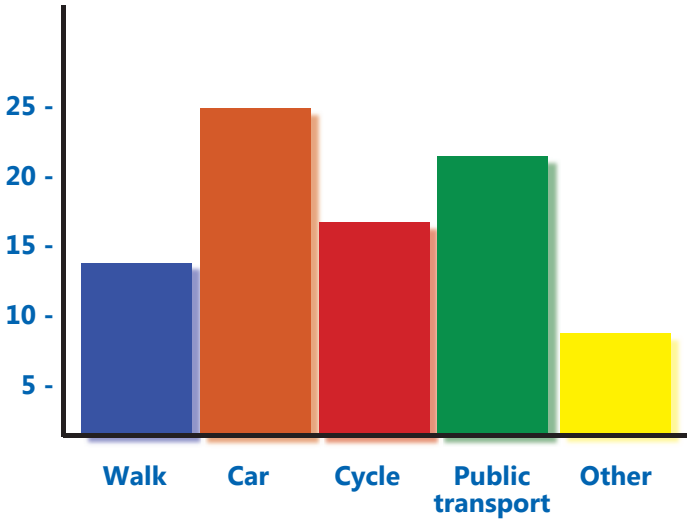
NUM SUPER SKILLS

Bar graphs

Bar graphs are good at showing numerical information because the user can easily look at the size of the bars to interpret the 'data'.

We look at what each bar represents (the **label**), and the **height** of each bar (the **scale**) in comparison with the other bars.

Of course, we also first need to look at the **heading**.



A bar represents a particular **category** such as:

- ⇨ a person (sales by employees),
- ⇨ a time period (monthly electricity gas usage), or
- ⇨ a survey preference (favourite colour).

The height of the bars usually represent '**how much**' each bar is measuring. e.g.

- ⇨ total sales in $ (for each salesperson)
- ⇨ total electricity used (for that billing period, e.g. 3 months), or
- ⇨ % of people surveyed whose favourite colour is blue (37%).

Comparisons can then be made using words such as "more", "larger" or "greater than", "less" (or "fewer"), "smaller" or "less than". We can also use comparison descriptors such as "twice as much", "half as much", "almost the same", "slightly more", "much more" (or "less") and so on. This will help the user to make key points and to interpret the visual graph in words.

Bar graphs in action 8E

1 4 PS 2 3

1. Answer each the following based on the **bar graph** shown **above**.

What is being measured?	What is the time period?	Approximately how many people used each method?	Which method was used most?
Which method was used least?	Which method was used about only half as much as the highest method?	Which methods were used more than walking?	What might the 'other' include?

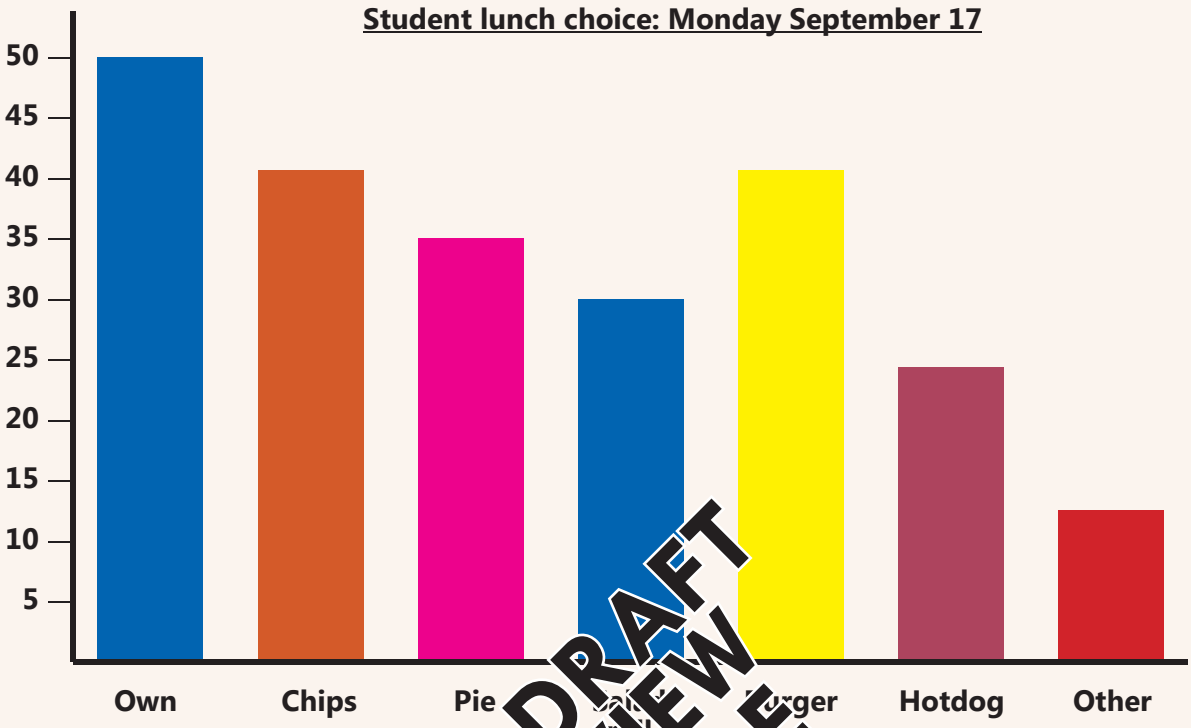
2. Construct a **similar bar graph** based on a **survey** of **your** own **classmates**.

8.13 Bar Graphs

8F Working with bar graphs

1 4 PS 2 3

Part A: Interpreting data and information



1. What **information** is shown on the bar graph? How **much** is **each** choice?
2. Which **lunch choice** was the **highest**? How many?
3. Which **lunch choice** was the **2nd highest**? How many?
4. Which **lunch** was chosen by **35** people?
5. Besides '**Other**', which lunch **choice** was the **lowest**?
6. What **choices** might have been in '**Other**'?
7. How **many** people **might be vegetarian**? How did you work this out?
8. Would the lunch choices be **different on a Friday**? Why/why not?
9. Do the lunch choices **reflect** what might **happen** in **your school**? Why/why not?
10. Construct a **bar graph** based on a **survey** of your **classmates**, or year level.

Part B: Driving hours

1. Construct a properly labelled **bar graph** to display this **data** and **information**. Use '**5**' bars. Use software or your workbooks.
2. Create concise **statements** to **describe** what the **data** and **information** is showing. You can write these below the table.

Monthly 'L' driving hours									
Name:					**Month:**				
1	2	8	1:30	15	1:10	22	0:50	29	1
2	1:30	9	1:15	16	nil	23	0:30	30	1
3	2	10	1:45	17	0:50	24	1:15	31	1
4	0:45	11	2	18	1	25	0:45		
5	nil	12	0:50	19	nil	26	nil		
6	0:15	13	0:30	20	0:25	27	0:30		
7	1	14	nil	21	0:3[illegible]	28	0:30		
Weekly total		Weekly total		Weekly total		Weekly total		Weekly total	
		Running total		Running total		Running total		Monthly hours	

Applied

This data table above is good as an informal personal record, but it will not be acceptable for your driving test.

a. What do learner drivers have to use to log, show and prove their hours?
b. What information must be recorded in the log book?
c. Who else must enter information in the log book?
d. Is there an app? If so, how does that work?

8.15 Pie Charts

Pie chart

Pie charts are a good way to visually show numerical information that represents proportions or amounts of a whole. So they are good for showing relative percentages.

The pie represents the whole. Each segment or slice of the pie represents a part of that pie.

Segments will usually be different sizes, unless the data is exact for each proportion. The size of the segment will correspond to the proportion (the % of the total).

Segments will also be coloured, which helps the viewer to easily identify each segment.

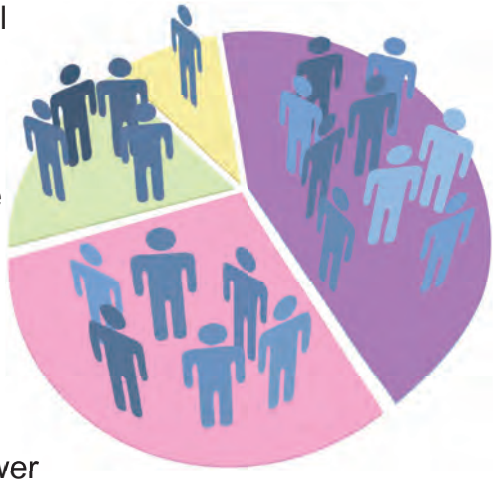


Image: michaeldb/ Depositphotos.com

Pie charts

- A pie chart shows the relative size of different amounts shown by pie segments of a proportional size.
- On a pie chart we can easily see the difference between variables shown by the size (or area) of the pie segments.
- The chart should include the segment, a legend, data values (or %) and a heading.
- When constructing a pie chart it is important not to have too many segments, otherwise it will be hard to make sense of the data. This might mean you will need an 'other' category which will the smaller or less frequent amounts.

NUM SUPER SKILLS

Surveys

A survey allows you to research, collect and collate data information.

Many people now use online tools such as Survey Monkey and Google Forms to design their surveys. However, tools such as these, if misused, still design 'poor' quality surveys. It's just that they look better, and can be shared electronically.

Consider these problem-solving steps to help you design effective surveys. These apply whether you are devising a survey for face-to-face, hard copy or e-version.

Step 1: What am I trying to find out?

Step 2: Who do I need to ask?

Step 3: Which closed and open questions will I need to ask to gather the data and information?

Step 4: Does my survey work?

Step 5: How should I report the findings of my survey?

Image: anttoholo/ iStock/Thinkstock

Pie charts in action 8G

1 4 PS 2 3

1. Answer each of the following **based** on **the pie chart** shown here.
2. In your workbooks **show** the **information** from the graph in a **table**.

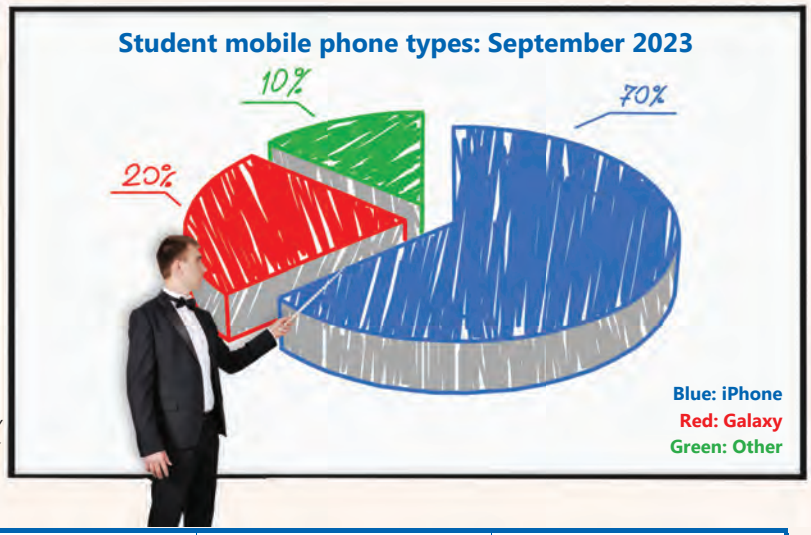


Image: vetkit/ iStock/Thinkstock

What is being measured?	What is the time period?	What type of phone did most students have?	If 100 students were surveyed, what would be the number of phones in each category?
What about the number of phones if 50 students were surveyed?	About how many more students had Apple phones compared to Samsung phones?	What might the 'other' include?	Do you think that this pie chart should have more segments? Explain.

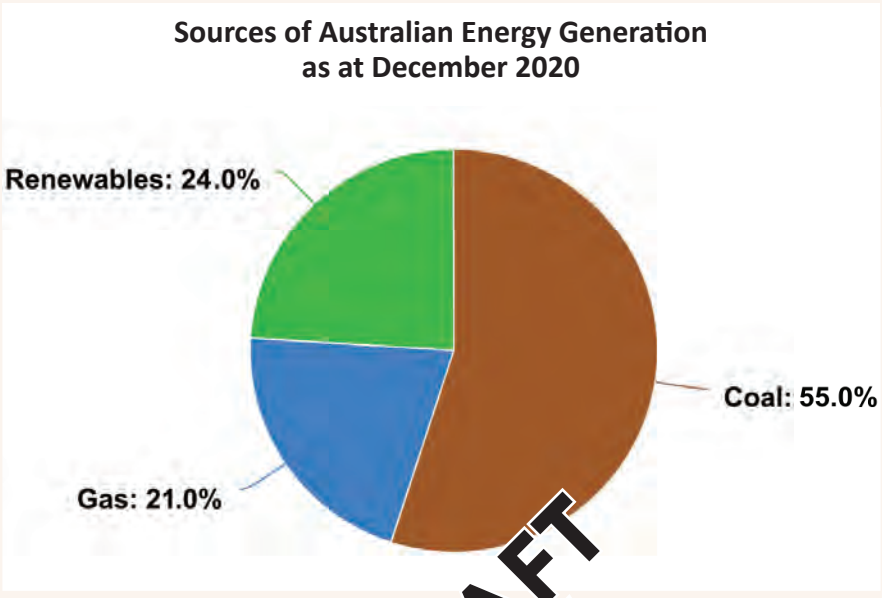
3. Conduct a **survey** of **students** in **your class** about **their phones**. Construct a **table** to collate the **results** and **calculate** the relative **percentages**.
4. Draw a properly labelled **pie chart** to show the results. Note: You are probably going to need more than 3 segments.
5. **Summarise** the results using words and numbers. Comment on whether the results are **what you would expect**, **or** if they are **different**. Suggest **reasons** for these results.

8.17 Pie Charts

8H Working with pie charts

1 4 PS 2 3

Part A: Interpreting data and information



Source: Australian Energy Statistics 2021, Commonwealth of Australia 2021, available through: www.energy.gov.au

1. What **information** is shown on the pie chart?
2. **What** is **shown** in **each segment**?
3. How much is **each segment**?
4. Which **resource** does Australia use for the **majority** of its energy generation?
5. Which **resource** does Australia use the **least** for its energy generation?
6. What **proportion** of Australian **energy production** is created from **renewables**?
7. What types of **energy sources** might be **part** of the **renewables** category?
8. How do you think the **proportions** would **compare** to **10 years ago**?
9. How do you think the **proportions** would **compare** to now?
10. Construct a pie chart based on the **current statistics**. Where will you find these?

Part B: New power or old power?

1. Create a properly labelled **pie chart** based on the **information** in the **table**. Use software, or do this 'old school' by hand.
2. Do a **class survey** and also show those results on **another pie chart**.
3. Create concise statements to **describe** what the **data** and **information** is showing. You can write these below the table.

Year 11 Student Survey: Preferred Choice of Electricity Generation: Sep 2023		
Coal 20%	Wind 15%	Solar 40%
Hydro 5%	Bioenergy 5%	Gas 15%

Numeracy VPC class: Preferred Choice of Electricity Generation		
When?		

Applied

Australia is slowly but steadily increasing the use of renewables for power generation. But the nation can't suddenly stop the use of coal and gas until there is enough renewable capacity in the electricity generation system.

Different states have achieved different levels in the use of renewables. Find out which is out front, and which is lagging behind. You could create pie charts to help you compare the information.

8.19 Line Graphs

Line graph

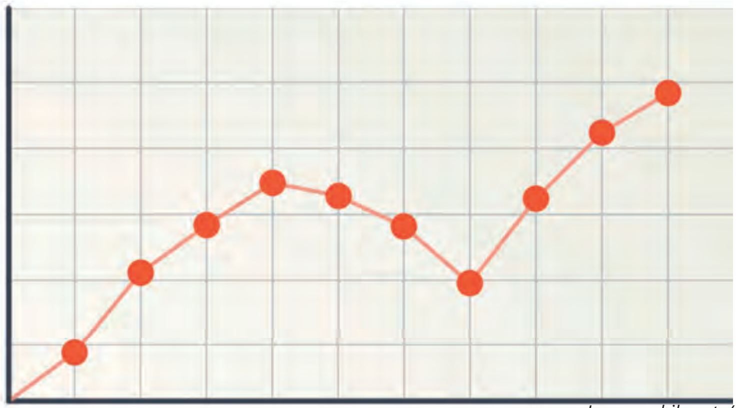


Image: whilerests/ iStock/Thinkstock

The most common way to show connected data or numerical information over **time** is to use a line graph. Line graphs are generally used to plot data that is connected as part of a **time series** (or over time).

A line graph spaces the **time periods** of the data (such as monthly sales) along the **bottom** (or horizontal) axis using an even scale.

The amounts indicated by the **data** (or the **numerical information)** are shown up the **side** of the graph, also using an even scale (the vertical axis).

Joining the dots gives us an easy way to see **highs** and **lows**, as well as the overall **trend** of the data.

Line graphs are commonly used to represent data such as the weather over time, business sales and profit, savings amounts, personal achievements such as fitness data and weight changes, and other information.

Line graph

- A line graph shows a variable over an extended period of time.
- The components of a line graph are:
  - **The Horizontal (or bottom) axis (x):** Plots the timespan (time series)
  - **The Vertical (or side) axis (y):** Plots the variable amounts over time
  - **Heading and data labels:** Tells the reader what is indicated by the **graph**
  - **Data line:** Shows the data in visual or graph form.
- A line graph can also be used to show different variables on the same chart so as to make quick and simple visual comparisons of the data.

NUM SUPER SKILLS

8I Line graph

Have a look at the line graph shown above. Once again it doesn't include headings or data labels. Fill in the blanks to explain what is missing.

Along the b_________ there should be some type of a t_______ period, such as weeks. Up the side there should be some type of a s_________ in numbers (or numerical information) to show what the graph is measuring.

This graph has a starting point and then includes ______ periods of time.

Overall, the t_______ of the graph is upwards.

Line graphs in action 8J

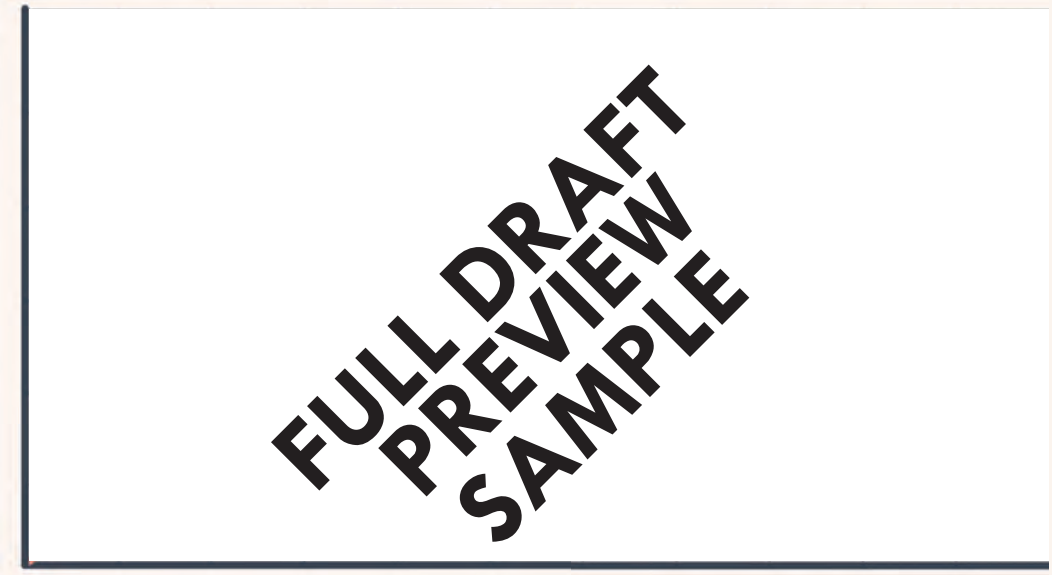
1 4 PS 2 3

Part A: Fuel lines

A line graph is a good way to visually represent changes in prices over time.

e.g. Sheree was keeping an eye on fuel prices at her local servo. She picked a Thursday as the comparison day. This week the price was $2.10/litre. Last week it was $1.90. The week before that it was $1.80. 3 weeks ago the price was $1.75 and the week before that the price was $1.70.

1. Draw a properly labelled **line graph** based on Sheree's **investigation** of **petrol prices** over time. (Below, in your workbooks, or on a device).
2. In one sentence **describe** the **trend** of the graph.



Do you notice that although Sheree has found that the price of petrol has varied a lot, the graph doesn't really 'show' much change visually? This means that plotting the full price might not give a true indication of price changes.

3. Cut out a piece of cardboard or paper to cover up your graph all the way up to $1.60. How would you describe the trend of the line graph now? Does this give a better indication of the situation? Why/why not?

Part B: Up, up and away - or down?

Choose **3 items** that you or your family **commonly buy** which can **fluctuate** (change) in price. e.g. Fresh fruit and vegetables, meat products, petrol, etc..

a. Record the **prices** of these items over a **4-week period**. Record in a table.
b. Draw **line graphs** to show these price changes over time.
c. Comment on your findings.
d. Do these price changes, or does this price stability, **surprise you**? Explain.

8.21 Line Graphs

8K Working with line graphs

Part A: Interpreting data and information

Source: NCVER, Apprentices and trainees 2021 historical time series available through: **www.ncver.gov.edu.au**

1. What **information** is shown on the line graph?
2. Use the graph to identify the approximate number of **apprentices in training** for **each** of the **10 years**.
3. What **year** had the **highest** number of apprentices in training? How many?
4. What **year** had the **least** number of apprentices in training? How many?
5. What is the **general trend** of the graph?
6. When did the **trend turn**?
7. What might be some **reasons** driving the **trend**?
8. What do you think the **current amount might be**? **Why** so? Find out!

Part B: Hot and colds

Create a properly labelled line graph based on the information in the table. Use software, or do this 'old school' by hand.

1. Create concise statements to describe what the data and information is showing. You can write these below the table.

Average daily maximum temperature: Melbourne (1991-2015)											
Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
27.0^0	26.9^0	24.6^0	21.1^0	17.6^0	15.1^0	14.5^0	15.9^0	18.1^0	20.5^0	22.9^0	24.8^0

Source: **www.bom.gov.au** accessed via Wikipedia, 'Climate of Melbourne', April 9, 2022

2. Find a series of **comparison data**, such as averages for the most recent year, average minimum temperatures, or temperatures from a**nother region**.
3. Plot this data on the **same graph**. **Comment** on the **differences**.

Applied

a. People love talking about the weather and Melbourne is known for its changeable weather. Find out some interesting facts about Melbourne's unstable climate.

b. Do you think we should still be using the transplanted ideas of the 4 seasons from Western Europe?

c. What might be a more suitable understanding of the seasons for Australia's varied regions?

8.23 Infographics

Infographics

An infographic is a pictorial way of representing data and information. Infographics use a combination of:

- **words** (describing the data and information)
- **numbers** and percentages (presenting the statistics or observational data)
- **images** (pictures, symbols and pictograms presenting the information, the data or a combination of both).

Infographics are usually prepared using **digital design** software and specialised **apps.**

The aim of an infographic is to use design elements to communicate both linked and varied numerical data and information.

Infographics are increasingly being used to communicate information across **digital platforms**. Infographics also present well as **posters**.

Pictograms

Infographics often use pictograms, which have been around since pre-historic times.

Pictograms are recognisable symbols that we can easily associate with an object or a concept.

Digital **icons** and even **emojis** have become contemporary pictograms.

What would the Ancient Egyptians think of that!

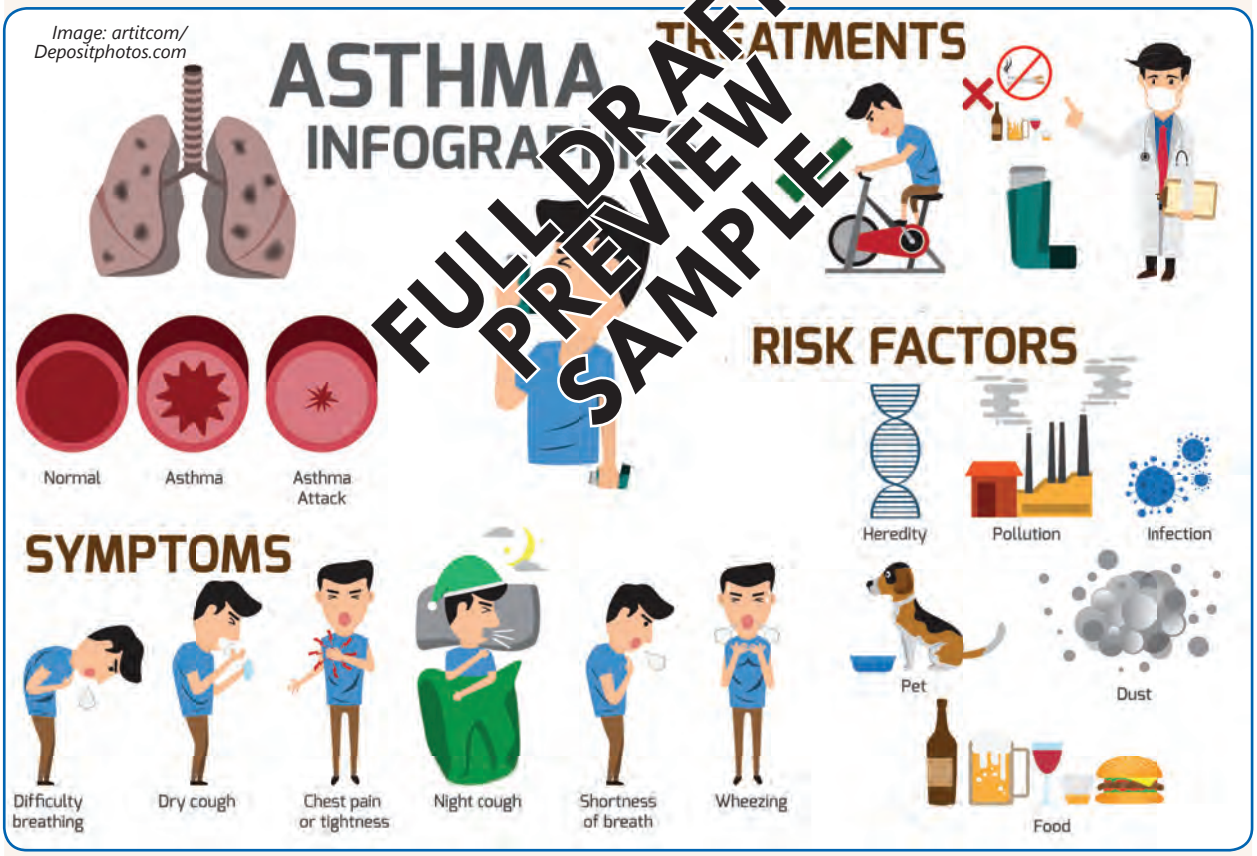
Common examples include:

- the human form
- male and female gendered figures
- representations of common objects or themes, and
- other signs and symbols that relate to the specific data and information.

What visual elements can you spot in this unorganised infographic?

Infographics 8L

Have a look at the **asthma infographic**. What can **you see**, what did **you already know**, and what have you **learned**? Is this infographic **effective**?



Applied

a. The way you organise and display your apps on the screens of your smart device is a bit like an infographic. How do you recognise your favourite apps?

b. What does the way that your apps are organised say about you?

c. Compare your apps to different people. Comment on the similarities and differences between you and others.

8.25 Assessment Task

AT3 Analysing and Reporting a Civic Issue
Civic Numeracy

1
4 PS 2
3

For this assessment task you are required to collect, organise, analyse and report on data and information about social issues and civic situations.

The issue might be something you feel strongly about, or of local concern, or related to your Personal Development Skills, Literacy or Work Related Skills studies.

1. Choose a civic issue to investigate.

Your teacher will guide you and your class through this.

2. Design and use a survey.

Decide on the respondents, type of questions, format, and other matters.

3. Organise the data in a table.

Organise your data and information in a meaningful way.

4. Create visual representations of the results.

Represent the data in a clear, user-friendly visual format.

5. Source existing data, information and/or reports about the same issue.

Evaluate potential sources of suitable data and information.

6. Compare your results to the existing data and information.

Analyse both sets of data and information to find similarities and differences.

Problem-solving cycle

To successfully complete this activity you must apply each of the **4 stages of the problem-solving cycle** where appropriate.

Note: In the final column, your teacher might also include an achievement level to indicate your level of performance for each part of the task.

Name(s):

Key dates:

Civic Numeracy Module 4 Data

Tasks - AT3: Analysing and Reporting a Civic Issue	Must do?	Due by	Done	Level
Negotiate the task details with my teacher.	✓			
1. Issue:	✓			
2. Design and use a survey.	✓			
3. Collate, tabulate and organise the results.	✓			
4. Create visual representations of the results.	✓			
5. Source existing data and information	✓			
6. Compare results to existing data and information	✓			
Draft my report and submit for feedback.	✓			

Task completion

1 4 PS 2 3 **Describe applied use of the problem-solving cycle.**	✓			

Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report

Develop and apply mathematical tools and techniques.	✓			
⇨ **Prepare and submit your final report.**	✓			
Present a report to the class (if required).	✓			

8.27 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task: **Names/Dates:**

AT1 -

1. Identify the maths					
Identify problem(s)	Done: ○ Level:	Recognise maths	Done: ○ Level:	Select information	Done: ○ Level:
Interpret information	Done: ○ Level:	Choose processes	Done: ○ Level:		Done: ○ Level:
2. Act on and use maths					
Perform estimations	Done: ○ Level:	Decide techniques	Done: Level:	Choose maths tools	Done: Level:
Select technologies	Done: ○ Level:	Perform calculations	Done: ○ Level:		Done: ○ Level:
3. Evaluate and reflect					
Check Estimations	Done: ○ Level:	Compare results	Done: Level:	Check processes	Done: Level:
Review actions	Done: ○ Level:	Check logical reasoning	Done: Level:	Assess conclusions	Done: ○ Level:
Communicate and report					
Written processes	Done: ○ Level:	Written results	Done: Level:	Oral processes	Done: Level:
Oral results	Done: ○ Level:	Digital processes	Done: ○ Level:	Digital results	Done: ○ Level:

Mathematical Toolkit					
Analogue tools - What & how?		Digital Devices - What & how?		Software & Apps - What & how?	
Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy

Making Sense of the World 9

Activities 9: Making Sense of the World		p.	Due date	Done	Comment
9A	**What's next?**	216			
9B	**Dollars and sense**	217			
9C	**Uncertainty**	219			
9D	**Coincidence**	221			
9E	**Luck**	223			
9F	**Chance**				
9G	**Randomness**				
9H	**A toss of the coin**				
9I	**Probabilities**	228			
9J	**50 and 16.7?**	229			
9K	**Make an estimate**	231			
9L	**Making predictions**	232-233			
AT4	**Working it Safe**	234-239			
R9	**Problem-Solving Cycle and Maths Toolkit**	240			

Comments:

www.delivereducation.com.au michael@delivereducation.com.au

9.01 Likelihood and Uncertainly

Making sense of it all

In life we are all faced with so much information and data that sometimes it is hard to make sense of it all. So, it is important that you develop numeracy skills to help you to better understand about '**likelihood**'.

Civic situations impact on your **personal** life and your **vocational** life. We all need to make sense of what is happening in broader **society**. Understanding likelihood will help you to make **predictive statements** about the chances of events **happening**.

Forecasting

Information and data is used to make **predictions** such as with weather forecasting, all the way through to **planning** for a better future for ourselves and for society.

At other times, civic information and data is **reporting** on events that have happened, such as economic data about employment growth and unemployment levels.

Analysing civic data and information helps to develop **behaviours** and **strategies** to reduce and avoid potentially negative outcomes.

This helps us all learn how to plan and make decisions to achieve more positive outcomes. You explored some of these actions in PDS through your investigations into personal health and wellbeing.

It's not just young people that struggle with making sense of data and information, it's a lifelong challenge!

Image: RawPixel/ Depositphotos.com

9A What's next?

Predict the most **likely outcome** for each of these situations. Briefly explain **how** you **made** each **prediction.** Discuss with the class.

							Reason
a.	2	4	6	8	10		
b.	32	16	8	4	2		
c.	red	amber	green	amber	red		
d.	heads	tails	heads	tails	heads		
e.	21^0	20^0	21^0	20^0	21^0		
f.	red	black	red	red	black		

For example: Jobs and prices

In times of strong employment growth we might say, "It is a good time to enter the labour market because the **likelihood** of me finding work is quite strong."

We experienced this in 2022 and 2023 in the post-pandemic world of work. Employers in many industries were having severe difficulties filling job vacancies as the economy recovered, due to skills shortages. This made it much easier for many people to find work.

Another example related to the economy, was the resurgence of inflation throughout 2022 and 2023 as the prices of most good and services rose.

Prices rise when there is higher demand. This can happen when the economy grows and people increase their spending. This can lead to shortages of items which forces prices up.

Prices can also rise when there is reduced supply of goods and services. This can happen when events occur to reduce supply levels, such as with the effect of flooding on vegetable crops.

Do you remember the great lettuce shortage of mid-2022 when prices for a single, withered and sad-looking lettuce g[illegible] over $12? What did your family do in response to this?

In times of high inflation we can p[illegible]dict that prices are likely to continue to rise, until suppliers are able to catch up to demand. When things get back to normal, the prices of fruit, vegetables and meat might then drop. However, we generally find that most other prices do stay high.

See, this is not so hard to understand. What you have just learned is applied economics in action. These are events that people have to deal with as part of everyday life. People have to monitor the prices of what they need and want to buy; as well as the likelihood of having stable and secure employment.

Dollars and sense 9B

What is the main **information** that **you took in** from the example 'Jobs and prices'?

Discussion: How would you rate your ability to understand the explanations in 'Jobs and prices'? Why is that?

9.03 Likelihood and Uncertainly

Uncertainty

If there's one thing that is certain in life it is that nothing is certain. We live our personal, educational, social and vocational lives through a series of actions and events.

Our actions help determine outcomes. So an important part of your actions is recognising, and dealing with, **uncertainty**.

One strategy to help you do this is by having more **information** at your disposal. The better information you have, then the more likely you are to make better **decisions**.

A second strategy is to develop an understanding about **risk**, and then implement ways to **minimise risk**.

Risk is a normal part of life. All actions have an element of risk. From driving a car to flying in a plane. From starting a job to opening a business. From playing a sport to starting a new relationship.

It's how we understand and deal with risk that is important. Especially, the risk associated with actions that can cause harm to ourselves and others, including when driving motor vehicles.

Another strategy is to understand abo… **likelihood**. This involves understanding chance, randomness, probability an… cause and effect. What this do… involve is relying on luck, … 'carnival tricks' such as cons…lting a psychic.

"In your future I predict another shortage of toilet paper! That will be $50 thankyou."

Image: everett225/Depositphotos.com

Uncertainty

Likelihood

Probability

Odds

Luck

Chance

Probable

Unlikely

Coincidence

Random

Conditional

Unconditional

Cause

Effect

Prediction

Image: mammothis/ Depositphotos.com

Uncertainty 9C

1 4 PS 2 3

1. In **life**, what are **you certain of**? Why is that?

2. In **life**, what are **you uncertain of**? Why is that?

3. Describe an **event** that is **probably going to happen** to you before the day ends.

4. Describe an **activity** in your life where you have to **manage risk**. **How** do you manage this risk?

5. Are you **lucky**? Explain why or why not using examples.

Investigation: People use varied terms, language and sayings to describe likelihood. This is especially apparent with different generations and different cultures.

Find out the meaning of these terms. Have you ever heard them used? Ask different people you know about the words and phrases they use to describe likelihood.

Deadset.	Dead cert.	Buckley's.
No way.	Even money.	A snowflake's chance.
Put down your glasses.	On any given Sunday.	Don't hold your breath.
Without a doubt.	A freak event.	Once in a blue moon.
A needle in a haystack.	On the first of never.	Six of one, half a dozen of the other.

9.05 Coincidence and Luck

Coincidence

Image: FotoHelin/Depositphotos.com

As humans, we need to assign 'order' to the world around us. One way that we do this is by noticing **coincidence**.

Coincidence occurs when we connect two or more unrelated events to each other. As part of coincidence we make a **connection** that isn't really there. Instead, we **infer** a connection, by **linking random events** together.

Coincidence isn't reality. But it feels like it. Especially if there is a strong emotional connection between people, or if the outcome is important (either positively or negatively), or if the event has significant meaning such as special date or anniversary.

So have you got any strange or freaky coincidences to share with the class?

Coincidence in Action

Manny was thinking about an old crush he had back in school.

He checks his Facebook notifications and one of his friends has commented on a school reunion post by his old flame and tagged Manny.

Manny is not connected with his past 'love' at all!

Manifesting Manny!

Teonie has bought a dress for the formal. She keeps it a tight secret.

On the big night she arrives in style, steps out of the limo to pose for the photos and her bff appears wearing the same dress.

Winning Teonie!

Mo is calling a football game.

The big forward lines up for a set shot from 30m out, directly in front.

Mo proclaims that this is a simple shot and it will go through for a goal. But, the forward shanks the kick and Mo laments the commentator's curse.

Mozzing Mo!

Surhan is playing his first game of cricket. In a rush to get dressed he puts on odd socks.

Surhan makes a century on debut. He puts it down to the socks!

After that, Surhan always wears odd socks when batting. But he doesn't always make a century - in fact, far from it.

Superstitious Surhan!

Sam has lost his keys again.

He posts online and his friend Psi says "Have you looked in the front door lock?"

Sure enough the keys are still hanging there!

Psychic Psi!

Laki likes to go to the casino with his best mate Ulbo.

Whatever colour Ulbo chooses, Laki bets on the opposite colour.

Ulbo always seems to lose and gives up after two bets.

Unlucky Ulbo! Lucky Laki!

Coincidence 9D

1 4 PS 2 3

1. In your own words, **explain what was happening** to each of the guys on **p.220**. Are their 'feelings' correct?

Manny	Teonie
Mo	**Surhan**
Sam	**Psi**
Laki	**Ulbo**

2. Why do we, as humans, **[illegible] and patterns** that **don't** really **exist**? Have you? Show [illegible]ency to **influence** our **decision-making?** Explain and discuss using examples.

Discussion: What does this statement mean?

"Of course coincidences are real. But they are a reality of our own making."

9.07 Coincidence and Luck

Luck

People love to believe in luck. Luck can a real thing. An event happens and you either benefit from it (winning lotto) or avoid harm from it (surviving a lightning strike). That's good luck.

But it could have just as easily gone the other way. If so, that would be bad luck!

In your personal life, good luck is when you drop your toast and it lands butter side up. Bank it and move on. But don't think it will happen like that next time.

Or you get out of bed quickly and catch the earlier bus. And then you see them. Your heart skips a beat. Your eyes meet, and it's happily ever after. That's good luck. Some call this **destiny**.

Some cultures have strong beliefs in luck. Lucky and unlucky numbers. Lucky and unlucky words. Lucky and unlucky colours. Lucky and unlucky charms. Lucky and unlucky signs and symbols. Lucky and unlucky rituals. How do you think these beliefs evolved over time?

The thing about luck is it's just that - luck! If you start to apply patterns to luck then you're in for a big shock. Luck is not about fate. It's about **randomness**, and **likelihood**; or even more relevant, **unlikelihood**.

So are you lucky? Why is that?

Being lucky vs being fortunate

People often say "I'm lucky because I have a good life", or "I'm lucky that I have good health". Sometimes you even get told "You're lucky" because you have a roof over your head", or "You're lucky because you are clean and fit." But these things don't happen by accident; and certainly not by luck.

It is better to say that we are **fortunate**. Fortunate to have a secure job that brings a steady income into the home. Fortunate to enjoy good health and to not have any chronic illnesses or debilitating conditions. Fortunate to have a stable home; or fortunate to have good genetics or self-discipline.

You might know of people in life who might not realise just how fortunate they are.

They try and chase luck and make luck work for them.

Sure a few dollars a week on lotto might not do much harm. But dreaming of a better life 'when' they get their big win, because 'they' deserve it - well that's not a very healthy approach to life at all.

We can make our own luck. We can do this by planning, organising, skilling ourselves and taking action.

Image: Pazhyna/ Depositphotos.com

Luck 9E

Part A

Why do **people want to believe in luck**? Find out about the different 'beliefs' about luck held by **different cultures**. Some of these might be strongly held in your own family circles. Share with the class and learn from each other.

Part B

Meet unlucky Phil. Each time something bad happens to Phil he moves to a new place. But bad luck just seems to follow unlucky Phil also does not believe in climate change. He says he has a right to a different opinion that. Do you agree?

Find out the **likelihood** of each of these events happening in **Australia**. Are there **locations** in Australia where these are more likely to happen? What about other **places** in the **world**? What about where you live? Report back.

Image: leremy/ Depositphotos.com

9.09 Chance and Probability

Chance

Chance simply refers to the **likelihood** of an event occurring. Chance doesn't mean that something will occur. Instead it refers to the likely **possibility** of an **event** happening.

We might hear people say, "What are my chances?" "There's no chance of that happening." "I'll take a chance, anyway." "Really, you're going to leave it to chance?"

Sometimes people get ahead of themselves and might say. "Put your glasses down, there's no chance she'll miss this shot!"

One of the everyday events in life that people want to find out the 'chance' of happening is the daily weather forecast.

Weather forecasting is conducted by the Bureau of Meteorology using scientific methods. It makes **predictions** such as maximum and minimum temperatures for different locations and regions, temperature ranges throughout the day and night, amounts and timing of rainfall, wind speed and direction, and other localised weather phenomenon.

Meteorologists make forecasts by using sophisticated **modelling** processes and **observational data**. They take past **information** and apply this to 'measuring' the weather patterns that are probable to impact.

But weather forecasting is, after all, what the name suggests, a **forecast**. It is not an exact science. It is an imprecise science.

So do they get it right most of the time? What do you think? Or should they just roll the dice?

Image: Brother_Grin/ Depositphotos.com

9F Chance

1. What is **chance**? **When** has **chance** been your **'friend'** and brought **you luck**?

2. Ways to **improve** your **chances** of **success** include gathering **information**, developing **skills**, and gaining **experience**. How **can doing these** things help you **improve** your **chances** of **finding** a **job**?

Randomness

In life, we sometimes hear people saying, “How about that hailstorm, gee that was so random!” But what do they really mean, and is this the correct term to use?

Randomness refers to the absence of a noticeable or measurable pattern or sequences to events. Essentially, a random event occurs without any real reason as to why.

For example, consider rolling a fair die. Most dice are numbered from 1 to 6. And if the dice aren’t loaded (i.e. weighted to favour one outcome over others), then the number that is rolled will be random - it could be anything from 1 to 6.

So you have as much likelihood or chance of rolling a ‘1’ as you do a ‘6’.

On the next roll, the outcome again is random. And so on. And so on. And so on!

Sometimes people try to influence random events. They might blow on the die, or shake it very hard. They might try to cajole a favourable spin out of a die with lines such as “Pappa needs a new pair” or “Bring it home baby.” You might have seen people in movies getting an attractive onlooker to kiss the dice.

This behaviour is all about drama and suspense. It can be a bit of fun really, and is more about people trying to impose some control over random events - in their favour.

“Pick a card, any card, pick a card at random.”

Image: Artkot/ Depositphotos.com

Randomness 9G

1. What is **randomness**? What ‘**random**’ things **happen** in **your life**?

2. Some things in life might appear random, but they might follow a **pattern** or a **sequence**; and/or **indicate something important**. Are these 2 **situations random**, **or** are they **something else**? Can you think of others?

Traffic lights	Flashing lights on a printer

1 4 PS 2 3

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9.11 Chance and Probability

Probability

You are likely to have heard the term probability before, even if some of you might not fully understand what it means.

It is important to be aware of the concept of **probability** because you might be in a work or community situation, and a manager or colleague might use the term to make a **prediction** about the **likelihood** of an outcome.

“There’s almost zero probability of any customers coming in after 7pm.”

“I reckon there’s a 75% probability of it raining later. We might have to reschedule the BBQ!”

In simple terms, probability means how **likely** it is that something will happen. This means that probability measures **chance**. And if you like, you can always substitute the word chance for the numerical term, probability.

‘Tails never fails’

A good way to illustrate probability is with a simple coin toss. When tossing a coin, there are 2 potential **outcomes**. Heads or tails. (Yes, there is a minute chance that the coin could land on its edge, but that is so small that you can ignore it...or wait until you see some flying pigs!).

Image: robynmac/ Depositphotos.com

So the chance of landing as heads is 1 in 2. The chance of landing as tails is also 1/2. There is an equal likelihood of spinning heads or tails. That’s 50/50.

If you **predict** a head, you have 50% chance of being correct. If your friend predicts tails. Then they also have an **even chance** of guessing correctly.

So the likely outcome is the same.

But see and hear how different language was used. ‘1 in 2’, ‘1/2’. ‘50/50’. ‘50%’. ‘Even chance’.

The language used doesn’t alter the chances. The coin will do what it likes. And over time, if you spin a coin long enough, it will land on heads about 50% of the time, just as it will land on tails about 50% of the time.

But that doesn’t mean it will alternate heads, tails, heads, tails, etc.. Nothing could be further from the truth.

The outcome is **random**. So this is where people can get sucked in. They try to see or predict **patterns** in an event that is random. And that’s why gambling on chance can only ever see you lose, unless you quit after your first ever win and bet never, ever again!

What is the Likelihood?

Certain
Probability =1
This is the highest possible likelihood. e.g. a 100% chance of happening!

Likely
Probability is between 0.5 and 1.
This is more likely to happen than not, especially as the probability moves away from 0.5 and gets closer to 1, e.g. 0.75.

Even chance
Probability = 0.5.
This is as likely to happen as it is not likely to happen. e.g. 50/50.

Unlikely
Probability between 0 and 0.5
This is more likely **not to happen**, especially as the probability moves away from 0.5 and gets closer to 0, e.g. 0.25.

Impossible
Probability =0
This is the lowest possible likelihood. This will not happen! e.g. a 0% chance.

A toss of the coin 9H

1. What is the **chance** of a **coin toss** landing **heads**? Why is that?

2. What is the **chance** of a **coin toss** landing **tails**? Why is that?

3. A coin toss results in a **head**. What is the **chance** of it **next being heads**? Why?

4. A coin toss results in a **tail**. What is the **chance** of it **next being tails**? Why?

5. What is the **chance** of **2 heads in a row**? Think carefully now.

9.13 Chance and Probability

Language of probability

Probability is often expressed using different **terms** and **language**. This can make it a bit hard to understand the potential **likelihood** of an event occurring.

Consider these examples. Some are about making a **choice**, or about playing a **game**, which can be about having a bit of fun.

But many of these examples are based on gambling - which by its very nature - is precisely calculated. **Gambling** is precisely calculated to ensure that almost every person participating will **lose** their **money**. That's why gambling is called a **fool's game** and is something to avoid as much as possible.

- ⇨ Coin toss = 50/50 (which is an even chance).
- ⇨ Drawing a heart card = 25% or 1/4.
- ⇨ Die Roll = 1 in 6.
- ⇨ American Roulette spinning a single number = 37 to 1.
- ⇨ Saturday Lotto = One in 8,145,060 chance.
- ⇨ PowerBall Australia = Almost 135 million to 1.

Image: luplupme.gmail.com/ Depositphotos.com

9I Probabilities

1 4 PS 2 3

1. Put these chance likelihoods of occurring in order from **most likely**, to **least likely**.
   - ⇨ Being attacked by a shark (in Australia).
   - ⇨ Drawing a spade card.
   - ⇨ Guessing the Melbourne Cup winner.
   - ⇨ Rolling a 3 (6-sided die).
   - ⇨ Spinning a 13 (on roulette wheel).
   - ⇨ Tossing a tail.
   - ⇨ Winning lotto (Australia).

2. Describe the **likelihood** of **these probabilities** using 'very high chance', 'fairly high chance', 'even chance', 'fairly low chance', 'very low chance', 'no chance'.

⇨ 50/50	⇨ 99 out of 100	⇨ 10 in 15
⇨ 3 in 4	⇨ 1/2	⇨ 2 chances in 5
⇨ 1 in 10	⇨ 1 in 36	⇨ You walking on the moon

50 and 16.7? 9J

1 4 PS 2 3

1. Pair up. You will each **take turns tossing a 20c coin**. Record your results.

Toss	Your call	Result	Their call	Result
1				
2				
3				
4				
5				

Toss	Your call	Result	Their call	Result
6				
7				
8				
9				
10				

Analyse the results and make conclusions about chance.

Times heads:	% heads:	Time tails:	% tails:
Times you correct:	% you:	Times them correct:	% them:
Times both correct:	% correct:	Times both wrong:	% wrong:

Extension: You could toss the coin 100 times and see what patterns happen.

2. Change your pairs. You will take turns rolling a **sided die 36 times**. You each need to nominate 1 number only to roll. Record your results.

   Analyse the results, and in your workbook. Make conclusions about chance. Report back to the class.

Roll	You	Them	Result
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Roll	You	Them	Result
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

Roll	You	Them	Result
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			

3. Why is this **activity named '50** and **16.7**?'

9.15 Estimating and Predicting

Estimating accurately

Estimating is one of the most important and useful skills to help people better manage their personal, social and vocational lives.

Sometimes we don't always have enough time to make exact calculations. So it is important to be able to do quick and fairly accurate estimates. You might make numerical estimates related to:

- time
- length
- distance
- money
- size
- weight
- temperature
- quantity (amount).

Many examples are shown in the diagram below. But there are other times when people estimate, so come up with some more examples as a class.

Estimating

- Estimating involves making an initial 'guess' or coming up with a 'rough figure' based on knowledge, skills and past experience.
- Numerical estimating is important for things such as size, cost, time, distance and shape.
- At home you might estimate the time taken to mow the lawns; or the amount of cash needed to shop at the market.
- At work a carpenter might make estimates as part of a quote to build a new deck.
- A retailer might estimate how many workers they need to roster on for a busy shift.

When estimating you naturally use and apply the 4-stage problem-solving process.

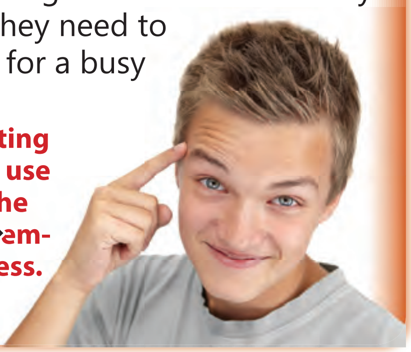

Image: seilemann/ iStock/Thinkstock

Estimating...

Total cost of purchases when shopping.

Food and drink required for a party.

How much change you should be given.

Time needed to get ready for school.

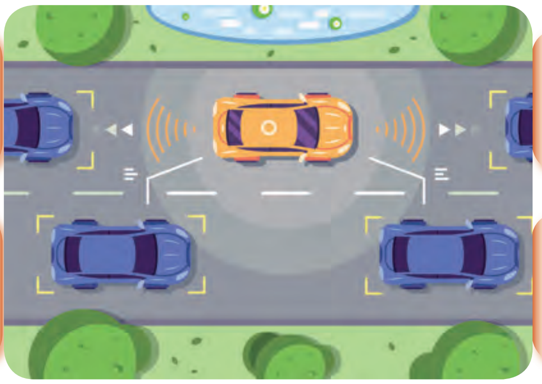

Image: Kit8net/Depositphotos.com

Time required to travel between destinations.

Safe distance required between cars when driving.

Size of a parking space for parallel parking.

Quote for a practical job or work task.

The total wage you should be paid for a week's work.

Staff needed to fill a roster for work.

Make an estimate 9K

1 4 PS 2 3

1. **Estimate** answers for these questions, but make sure that you do this **quickly** and **without calculations**.

   Your teacher will then work through each example with the class, and show you how to best go about doing these estimates.

2. Work in pairs to **calculate** the **actual answers** to 3 of these examples. How close were your original estimates? Why so?

	Question	Estimate	Exact calculation
1	Estimate the height of the table at which you are sitting.		
2	Estimate your foot length in centimetres.		
3	Estimate the length of your greatest arm span from fingertip to fingertip.		
4	Estimate how many students are enrolled in your school.		
5	Estimate how many students are absent today.		
6	Estimate the number of hours you spend a week using social media.		
7	Estimate the number of hours you spend a week exercising.		
8	Estimate the number of hours you spend a week sleeping.		
9	Estimate how many weeks it would take you to save up $1,000.		
10	Estimate how long it would take you to 'run' (or roll) 1 km.		
11	Estimate how much money your family spends on food each week.		
12	Estimate how long it would take to drive from your school to the CBD.		

3. Complete this sentence using appropriate examples.

   It is important for me to estimate things such as _____

   because _____ .

9.17 Estimating and Predicting

Predicting

Predicting is different from estimating because predicting often involves dealing with unknowns. But people do have to make predictions in their personal, social or vocational lives. In some cases we can use past knowledge, or information about situations, preferences and trends, and apply this to make more accurate predictions, or even forecasts. Some common predictions might be about:

- numbers of visitors or attendees who will turn up
- the outcome of sporting contests
- amounts of income and sales for a business
- when an event is likely to happen
- the biological sex of a newborn baby
- whether and when an invention might occur
- the likelihood of someone succeeding in life, and especially
- the weather!

So what do you predict is going to happen? And about what?

Image: Kacpura/ depositphotos.com

9L Making predictions

1 4 PS 2 3

1. Make these **predictions**. Discuss in small groups and report back to the class.

The team that wins the AFL grand final next year.	The number of gold medals won by Australia at the next Olympics.	The number of gold medals won by Australia at the next Commonwealth Games.
Your age when you get your first full-time job.	A % chance prediction of you earning $1 million before you turn 40.	Predict how much you might earn from working in your lifetime.
When Australia will source more than 50% of its energy needs from renewables.	When humankind will next land on the Moon?	When humankind will land on Mars.
Who the next Prime Minister will be?	How much you will need to pay for your first motor vehicle?	Which of Instagram or TikTok will first cease to be important?

2. Predict the greater **likelihood between** these situations. Give **reasons** for your choice. You add 2 more comparisons.

a. Car accident as a driver vs as a passenger?	b. Being unemployed at age 18 vs age 28?
c. If the weather tomorrow will be sunny vs overcast vs rain?	d. You earning $1m in your lifetime vs you winning $1m in lotto?
e. Regions in your state experiencing bushfires vs floods?	f. Experiencing a shark attack vs being struck by lightning?
g.	h.

3. This prediction is based on sou[illegible] numerical logic. But it is important to be able to prove that logic by doing the [illegible]. It is also a good skill to be able to turn spoken or written words into numbers. One way to do this is to underline all the numbers, as well as all of the numeracy concepts.

Discuss these **estimates** as a class and **then do** the **calculations**.

a. Vinh and Joy are making spring rolls for a multi-cultural lunch as part of a PDS group activity. It takes them 20 minutes to chop all the ingredients, and approximately 2 minutes to assemble a spring roll. They predict it will take them about 1 hour to prepare and assemble 20 spring rolls.

   i. Do the **calculations** to **assess** whether their **predictions** are **valid**.

   ii. How many s**pring rolls** do you think they could **make** in the **2nd hour**? Why?

1 4 PS 2 3

16

9.19 Assessment Task

AT4 Working it Safe
Civic Numeracy

1
4 PS 2
3

Introduction

A key part of civic responsibility is the responsibility of employers and managers to keep their workers safe as part of workplace health and safety measures.

There are many risks associated with working, with some industries, occupations and work-related tasks having a higher risk, or likelihood, of injury and illness.

Employers, and workers within organisations, must also ensure that they carry out their work duties in a way that does not harm other work-related stakeholders including colleagues, suppliers, visitors and of course, customers and clients.

Added to these risks, is the sad, but very real fact that younger workers are more likely to be injured in work-related situations. This means that you have to take extra steps to reduce the likelihood of work-related injury. These steps can include

- ⇨ undergoing suitable induction and training,
- ⇨ using and wearing mandated personal protective equipment (PPP), and
- ⇨ making sure that at all times you follow safety procedures.

Young workers face a greater risk of injury in the workplace than any other group of workers. According to WorkSafe Victoria:

- ☹ young workers are 1½ times more likely to be injured at work than any other age group[1]
- ☹ when young workers are injured, they are 21% more likely to be hospitalised as a result of their injuries[1]
- ☹ males working in rural and regional areas are particularly at risk[1].

[1]Source: ABS, (2006), Work-Related Injuries, Australia 2005-06. via www.worksafe.vic.gov.au

The most dangerous work environments for young people include:[2]

- ☹ retail: especially fish'n'chip shops and takeaway food
- ☹ cafés and restaurants
- ☹ manufacturing: especially meat products, metal fabrication, and wood and joinery sectors
- ☹ construction: especially plumbing, electrical and carpentry work.

[2] Source: www.workfsafe.vic.gov.au PDF: Young_worker_safety_Tips_for_educators.pdf)

In 2015/16, 49 Victorian workers aged 15-24 were injured every week. Most injuries were caused by poor manual handling, and commonly occurred to hands, fingers and backs.[3] So special care needs to be taken to ensure that young workers are safe in the workplace.

[3] Source: www.workfsafe.vic.gov.au 'Young workers vulnerable to workplace injuries', News, Sep 2016.

Required

For this assessment task, you are required to investigate the likelihood of workplace injury and illness.

You will then use this information to prepare an annotated numerical report that provides suggestions on how to reduce the risk of workplace injury and illness, especially for younger workers.

Tasks

1. Use **WorkSafe Victoria's injury hotspots** for young workers.

   www.worksafe.vic.gov.au/injury-hotspots

   a. Access at least 2 of the 5 industry young worker infographics.

   b. Describe the incidence of workplace injury and illness affecting different parts of the body in this industry.

   c. Create pie charts to show these relative proportions.

   d. Identify the main hazards causing these injuries.

   e. List strategies and actions recommended to reduce the likelihood of injury and illness occurring.

   f. Create an infographic, a video, or a demonstration that communicates this information for 1 industry. You might use you, or other workers, as the model(s).

2. Repeat steps a-f above for another injury hotspot infographic (not 1 of the 5 young worker ones).

9.21 Assessment Task

Extension

3. Investigate the most common mechanism (**cause**) of workplace injury and illness.
   a. Create a bar graph to show this data.
   b. Develop at least 3 statements that use numerical evidence to show the likelihood of this happening.

4. Investigate the incidence of workplace injury and illness by **age** group.
   a. Calculate the 2021 percentages.
   b. Develop at least 3 statements that use numerical evidence to show the likelihood of this happening at different ages.

5. Investigate the incidence of workplace injury and illness by age and gender for **young workers** aged 15–24 years.
   a. Create a pie chart to show the gender proportions.
   b. Develop at least 3 statements that use numerical evidence to explain the likelihood of this happening.

6. Investigate the incidence of workplace injury and illness by **occupation**.
   a. Identify and describe the riskiest occupations.
   b. Develop at least 3 statements that use numerical evidence to explain the likelihood of this happening.

WorkSafe Victoria claims reported by mechanism of injury: 2011 & 2021		
Mechanism of Injury/Disease	**2011**	**2021**
Falls, Trips and Slips of a Person	5762	5924
Hitting Objects With a Part of the Body	1189	961
Being Hit by Moving Objects	3742	4453
Sound and Pressure	1689	2078
Body Stressing	12044	10586
Heat, Electricity and Other Environmental Factors	208	214
Chemicals and Other Substances	218	338
Biological Factors	106	198
Mental Stress	2846	3844
Vehicle Incidents and Other	1527	881
Total	**29331**	**29477**

In 2011 there were 29,331 claims with WorkSafe Victoria for injury (or illness). The most common mechanism (cause) was Body Stressing with 12,044 claims, representing 41% of all claims. By 2021 Body Stressing was still the most common case, but had fallen to 10,586; and now represented 36% of all claims.

WorkSafe Victoria claims reported by age: 2011 & 2021				
Age group	**2011**	**%**	**2021**	**%**
15 - 19	677	2.3	592	
20 - 24	2037	6.9	2040	
25 - 29	2408	8.2	2720	
30 - 34	2517	8.6	2834	
35 - 39	2916	9.9	2838	
40 - 44	3670	12.5	2855	
45 - 49	4066	13.9	3376	
50 - 54	4344	14.8	3803	
55 - 59	3569	12.2	[illegible]	
60 - 64	2290	7.8	3012	
65 +	823	2.8	1534	
Not Stated	7	0	1	
Under 15	7	0	1	
All	**29331**		**29477**	

In 2011 there were 29,331 claims with WorkSafe Victoria for injury (or illness). The most common age group was 50-54 [illegible] 14.8 % of claims. By 2021 workers aged 50-54 were still the most common injury group and had risen to 3,789 claims; which now represented 12.9% of all claims.

Of the 29,331 claims with WorkSafe Victoria for 2011, there were 677 claims by workers aged 15-19 (2.3% of all claims).

By 2021 claims by workers aged 15-19 had fallen to 592; and now represented 2% of all claims.

Although this is a small proportion, the number of workers and total hours worked by those aged 15-19 is also very small.

WorkSafe Victoria young worker claims reported by gender and age: 2011 & 2021						
Gender & Age	**2011 Claims**	**2011 Total claims by Gender**	**2011 % of age & gender**	**2021 Claims**	**2021 Total claims by Gender**	**2021 % of age & gender**
Male 15 - 19	488	19148	2.5	428	18690	2.3
Female 15-19	189	10183	1.9	164	10787	1.5
Male 20-24	1425	19148	7.5	1291	18690	6.9
Female 20-24	612	10183	6.0	749	10787	6.9
Under 15	M4 F3		na	F1		na

Sources: WorkSafe Victoria, Claims Statistical Reports, 2021 & 2011

In 2011 there were 488 claims by males aged 15-19 and 189 by females aged 15-19.
2.5% of all injury claims by males were by workers aged 15-19, for females this was 1.9%
In 2021 there were 428 claims by males aged 15-19 and 164 by females aged 15-19.
2.3% of all injury claims by males were by workers aged 15-19, for females this was 1.5%.

9.23 Assessment Task

Name(s):				Civic Numeracy Module 4 Likelihood
Key dates:				
Tasks - AT4: Working it Safe	**Must do?**	**Due by**	**Done**	**Level**
Negotiate the task details with my teacher.	✓		○	
1. Young worker infographic 1	✓		○	
b. Incidence of injury and illness affecting parts of the body.	✓		○	
c. Create pie chart.	✓		○	
d. Identify the main hazards causing injuries.	✓		○	
e. Strategies and actions to reduce the likelihood of injury.	✓		○	
f. Infographic, a video, or a demonstration.	✓		○	
1. Young worker infographic 2	✓		○	
b. Incidence of injury and illness affecting parts of the body.	✓		○	
c. Create pie chart.	✓		○	
d. Identify the main hazards causing injuries.	✓		○	
e. Strategies and actions to reduce the likelihood of injury.	✓		○	
f. Infographic, a video, or a demonstration.	✓		○	
2. Industry general infographic	✓		○	
a. Incidence of injury and illness affecting parts of the body.	✓		○	
b. Create pie chart.	✓		○	
c. Identify the main hazards causing injuries.	✓		○	
d. Strategies and actions to reduce the likelihood of injury.	✓		○	
e. Infographic, a video, or a demonstration.	✓		○	
Task completion				
1 4 PS 2 3 **Describe applied use of the problem-solving cycle.**	✓		○	
Identify the maths / Act on & use maths / Evaluate & reflect / Communicate & report				
Develop and apply mathematical tools and techniques.	✓		○	
⇨ **Prepare and submit your final report.**	✓		○	
Present a report to the class (if required).	✓		○	

Name(s):

Key dates:

Civic Numeracy Module 4 Likelihood

Tasks - AT4: Working it Safe - Extension	Must do?	Due by	Done	Level
Negotiate the task details with my teacher.	○		○	
3. Investigate mechanism (cause) of workplace injury.	○		○	
Create bar graph.	○		○	
Develop likelihood statements.	○		○	
	○		○	
4. Investigate injury and illness by age group.	○		○	
Calculate percentages.	○		○	
Develop likelihood statements.	○		○	
	○		○	
5. Investigate injury by age and gender for [illegible]	○		○	
Create pie chart.	○		○	
Develop likelihood statements.	○		○	
	○		○	
6. Investigate injury by occupation.	○		○	
Describe risky occupations.	○		○	
Develop likelihood statements.	○		○	
	○		○	
Draft my report and submit for feedback.	○		○	

Task completion

	Must do?	Due by	Done	Level
1 4 PS 2 3 **Describe applied use of the problem-solving cycle.**	○		○	

Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report

Develop and apply mathematical tools and techniques.	○			
⇨ **Prepare and submit your final report.**	○			
Present a report to the class (if required).	○			

9.25 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task: **Names/Dates:**

AT5 -

1. Identify the maths					
Identify problem(s)	Done: ○ Level:	Recognise maths	Done: ○ Level:	Select information	Done: ○ Level:
Interpret information	Done: ○ Level:	Choose processes	Done: ○ Level:		Done: ○ Level:
2. Act on and use maths					
Perform estimations	Done: ○ Level:	Decide techniques	Done: Level:	Choose maths tools	Done: Level:
Select technologies	Done: ○ Level:	Perform calculations	Done: ○ Level:		Done: ○ Level:
3. Evaluate and reflect					
Check Estimations	Done: ○ Level:	Compare results	Done: Level:	Check processes	Done: Level:
Review actions	Done: ○ Level:	Check logical reasoning	Done: ○ Level:	Assess conclusions	Done: ○ Level:
Communicate and report					
Written processes	Done: ○ Level:	Written results	Done: Level:	Oral processes	Done: Level:
Oral results	Done: ○ Level:	Digital processes	Done: ○ Level:	Digital results	Done: ○ Level:

Mathematical Toolkit					
Analogue tools - What & how?		Digital Devices - What & how?		Software & Apps - What & how?	
Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy

How Does it Work? 10

Activities 10. How Does it Work?		p.	Due date	Done	Comment
10A	**What can I do?**	243			
10B	**My strengths**	244-245			
10C	**Unpacking my strengths**	246-247			
10D	**My weaknesses**	248-249			
10E	**I think they can?**	250-251			
AT5	**Learning to learn**	252-255			
PST	**Problem-Solving Cycle and Maths Toolkit**	256			

Comments:

10.01 Context-Based Learning

Context-based learning

Applied learning is one of the best ways to develop real skills that will make you more employable.

You have consistently applied what you have learned across your Vocational Pathways program and VET studies. And you have also applied learning from your vocational and VET experiences to each of your VPC subjects.

Context-based learning is when we combine theoretical learning and applied learning to better understand why we are learning.

By being aware of the context, you can make deeper connections. You not only understand **what** you are learning, but also **why** you are learning this.

Context-based learning helps you to see the **connections** between the different requirements that lead to successful task completion. This is a bit like applying the **4-Stage Problem-Solving Cycle**.

When you embrace context-based learning you become better at **problem-solving**, **decision-making**, **information recall** and **task-based** knowledge.

Essentially you start to **learn how to learn** - because everything you are now learning has a purpose.

You are most likely to have undertaken context-based learning in your personal life to develop **personal** and **social competencies**.

Consider driving a car, playing an instrument, mastering an art or craft, playing sport, beating a video game, learning new languages, and managing your money. How about learning how to cook, to garden, to build, to dance, to code, to communicate?

People learn these things because they want to, or they come to a point in their life or career when they need to. It is about **growing** and **maturing**.

Context-based learning isn't about finding out information and knowledge, **just-in-time**. A brain surgeon doesn't just Google it before an operation. A chef doesn't go on YouTube to learn a recipe for something they've added to the menu. And a train driver doesn't post on Facebook asking what is the next station after Glen Iris.

Sometimes it's easy to forget that we are surrounded by people who know how to do different things. And some of these things you might always have wanted to learn, like riding a unicycle.

Other things you might need to learn, like basic nutrition for better health and wellbeing.

Some skills could save money. Some could save time. And some skills could save a life.

So maybe it's time to find out: "How does it work?"

The most important part of a puzzle is always you.

Image: chaiyapruek/ Depositphotos.com

What can I do? 10A

1. Describe 3 things that you believe you are very good at doing, or that you understand well.

i.

ii.

iii.

2. Describe 3 things that you are good at doing, when you are working with someone else or in a team.

i.

ii.

iii.

3. Describe 3 things that you've always wished that you could do.

i.

ii.

iii.

4. Describe 3 things you have no idea of how they work, but knowing these will improve your personal life.

i.

ii.

iii.

5. Describe 3 things that you have no idea how to do, but knowing how to do these will improve your career prospects.

i.

ii.

iii.

6. Describe 3 'mysteries' of the world that have always baffled you.

i.

ii.

iii.

10.03 My Strengths

10B My strengths

1. List your **strongest** tasks, activities, knowledge and understanding for the **4 numeracies** and for **Vocational numeracy**. These will be things that can do and understand well. This means that you can do these things over and over again.

My Personal skills

My Financial skills

My Health & Recreational skills

My Civic skills

My Vocational skills

2. Look at your lists and think about **how you learned** to develop these strengths.

   Was it at school, at work, on your own, asking for help, being trained or coached, shown by a family member, through practice, through online research and so on?

   Also reflect on **why you developed these strengths**. What **motivated** you?

The main ways I developed my **Personal numeracy skills** were:	Why I developed these skills.
The main ways I developed my **Financial numeracy skills** were:	Why I developed these skills.
The main ways I developed my **Health and Recreational numeracy** skills were:	Why I developed these skills.
The main ways I developed my **Civic numeracy skills** were:	Why I developed these skills.
The main ways I developed my **Vocational numeracy skills** were:	Why I developed these skills.

10.05 My Strengths

10C Unpacking my strengths

1. Choose **3** of your **strongest task skills** and/or areas of **knowledge**. Try to feature different numeracies.
2. Think about how you **apply** each of the **4-stages** of the **problem-solving cycle to do this** task or activity, and/or to demonstrate your knowledge and understanding.
3. Explain how you use and apply **mathematical tools** and techniques for these tasks or knowledge, including analogue, digital and technological tools.

My skills strength is...	Numeracy area
1. Identify the maths involved in the task. What tools and techniques do I use?	2. Use and apply the maths to do the task. What tools and techniques do I use?
3. Evaluate and reflect on what I've done. What tools and techniques do I use?	4. Communicate and report for others. What tools and techniques do I use?

My skills strength is...	Numeracy area
1. Identify the maths involved in the task. What tools and techniques do I use?	2. Use and apply the maths to do the task. What tools and techniques do I use?
Evaluate and reflect on what I've done. 3. What tools and techniques do I use?	Communicate and report for others. 4. What tools and techniques do I use?

My skills strength is...	Numeracy area
1. Identify the maths involved in the task. What tools and techniques do I use?	2. Use and apply the maths to do the task. What tools and techniques do I use?
Evaluate and reflect on what I've done. 3. What tools and techniques do I use?	Communicate and report for others. 4. What tools and techniques do I use?

10.07 My Weaknesses

10D My weaknesses

1. List tasks, activities, knowledge and understanding for each of the **4 numeracies**, and for **Vocational numeracy**, that **you struggle with**.

   These are **your skills-gaps** and represent areas in which you should, and need, to develop your skills.

My Personal skills-gaps

My Financial skills-gaps

My Health & Recreational skills-gaps

My Civic skills-gaps

My Vocational skills-gaps

2. Take a look at these lists and think about **why you have these weaknesses** or skills-gaps. Is it because:
   - ❑ you don't understand the task, or
   - ❑ you've never been motivated to learn about it, and/or
   - ❑ you have never been shown or taught how to do it, and/or
   - ❑ you have poor skills in this area generally, and/or
   - ❑ you are avoiding it!

Why I haven't developed these personal skills.	Why I need to develop these?
Why I haven't developed these **Financial** skills.	Why I need to develop these?
Why I haven't developed these **Health & Recreational** skills.	Why I need to develop these?
Why I haven't developed these **Civic** skills.	Why I need to develop these?
Why I haven't developed these **Vocational** skills.	Why I need to develop these?

10.09 My Network

10E I think they can?

1. In the digital age, people are over-relying on the internet and social media to find out information about how to do things.

   But they are forgetting that they are surrounded by people in their networks who already know about different things, and that they might already know people who can do complex tasks. So it's time to tap into the **knowledge** of **your network**.

What might my classmates know about - what's their expertise?

⇨

⇨

⇨

⇨

What might my friends in other classes know about - what's their expertise?

⇨

⇨

⇨

What might my teachers know about - what's their expertise?

⇨

⇨

⇨

⇨

What might the other teachers know about - what's their expertise?

⇨

⇨

⇨

⇨

What might my work contacts know about - what's their expertise?

⇨

⇨

⇨

⇨

What might my community contacts know about - what's their expertise?

⇨

⇨

⇨

⇨

What might my family members know about - what's their expertise?

⇨

⇨

⇨

⇨

What might the contacts of my family know about - what's their expertise?

⇨

⇨

⇨

⇨

2. Now it's time to find out what these people know and can do.

   But don't use digital methods to contact them. Ask them face-to-face, or call them on the phone.

   You'll be surprised how much more you'll learn that way.

   Take summary notes of what you find out, or video what you learn to do.

10.11 Assessment Task

AT5 Learning to Learn
Applied Numeracies

1 4 PS 2 3

Consider these situations.

Tone is always late but their classmate Yi is always on time. Tone is worried that they won't be able to get to their work placement on time.

Yi wants to be a tradie and will need to get a manual license. But Yi had one lesson and kept stalling. Sam has already clocked up 90 learner hours driving in a manual car and found using a clutch a very natural skill to master.

Sam would like to start their own business one day but has no idea of budgets and basic accounting concepts. Red does accounting and finds it all very relatable because they work as a casual at the local newsagency.

Red's partner loves dancing but Red has a poor sense of rhythm and is too embarrassed to tell their partner. So Red avoids going out anywhere with their partner if it involves music. Tone is a natural on the dance floor and can pick up any dance style very quickly.

What's going on here? What do you think these guys should do?

Required

For this assessment task, you are required to share your knowledge and skills to help other people. You will also learn new knowledge and skills from other people.

Add important task information here.

Step 1: Can do

- ⇨ Your teacher will give each class member 4 pieces of stiff card.
- ⇨ On each card write down 4 areas of knowledge, or specific skills, that you understand or can do very well. Do not put your name on these.

Step 2: Can't do

- ⇨ Your teacher will give each class member another 4 pieces of stiff card.
- ⇨ On each write down 4 important areas of knowledge, or specific skills, that you do not understand, or that you can't do or improve at. Again, no names.

Step 3: Class noticeboard

- ⇨ Your teacher will shuffle the 'Can do' cards and then put them up on a wall on one side of the room.
- ⇨ Your teacher will shuffle the 'Can't do' cards and then put them up on the wall on the other side of the room.

Step 4: Skills and skills-gaps

- ⇨ Go to the 'Can do' cards and find at least 3 that feature knowledge or skills that you'd like to learn, or need to learn.
- ⇨ Go to the 'Can't do' cards and find at least 3 that are asking for knowledge or skills that you'd be able to help that person with.

Step 5: Helpers and helpers

- ⇨ Find the 'Can do' and 'Can't do' people and work out if you could help one another.

Step 6: Look close - Your strengths/Their weaknesses

1. Work with a **classmate** to help them develop their knowledge and/or skills.
2. Identify how each of the 4 stages of the problem-solving process applies to this knowledge or skill.
   - ❑ Identify the maths involved
   - ❑ Act on and use the maths
   - ❑ Evaluate and report
   - ❑ Communicate and report
3. Describe the appropriate use of maths tools and techniques.
4. Summarise the objectives, the learning processes used, and the outcomes that are achieved.
5. Make a summary video, or perform a demonstration for the class.

10.13 Assessment Task

Step 7: Look close - Your weaknesses/Their strengths

1. Work with a **classmate** with them helping you to develop your knowledge and/or skills.
2. Clarify how each of the 4 stages of the problem-solving process applies to this knowledge or skill.
   - ❑ Identify the maths involved
   - ❑ Act on and use the maths
   - ❑ Evaluate and report
   - ❑ Communicate and report
3. Describe how to use and apply maths tools and techniques.
4. Summarise the objectives, the learning processes used, and the outcomes that are achieved.
5. Make a summary video, or perform a demonstration for the class.

Step 8: Look further - Your strengths/Their weaknesses

1. Work with an **external experienced person** to help them develop their knowledge and/or skills.
2. Identify how each of the 4 stages of the problem-solving process applies to this knowledge or skill.
3. Describe the appropriate use of maths tools and techniques.
4. Summarise the objectives, the learning processes used, and the outcomes that are achieved.
5. Make a summary video, or perform a demonstration for the class.

Step 9: Look further - Your weaknesses/Their strengths

1. Work with an **external experienced person** from your network with them helping you to develop your knowledge and/or skills.
2. Clarify how each of the 4 stages of the problem-solving process applies to this knowledge or skill.
3. Describe how to use and apply maths tools and techniques.
4. Summarise the objectives, the learning processes used, and the outcomes that are achieved.
5. Make a summary video, or perform a demonstration for the class.

Step 10: So what do you know?

Name(s):	Modules 1-4 Applied Numeracies		
Key dates:			

Tasks - AT7: Learning to Learn	Do?	Due by	Done	Level
1-3 **Identify strengths and weaknesses.**	✓			
4-5 **Match strengths to weaknesses; and vice versa.**	✓			
6. **Train a classmate.**	✓			
1 4 PS 2 3 - Identify and apply the problem-solving cycle.	✓			
- Description of maths tools and techniques.	✓			
7. **Learn from a classmate.**	✓			
1 4 PS 2 3 - Clarify use of the problem-solving cycle.	✓			
- Description of maths tools and techniques.	✓			
8. **Train an external person.**				
1 4 PS 2 3 - Identify and apply the problem-solving cycle.				
- Description of maths tools and techniques.				
9. **Learn from an external person.**	✓			
1 4 PS 2 3 - Clarify use of the problem-solving cycle.	✓			
- Description of maths tools and techniques.	✓			
10. **So what do you know?**	✓			
Task completion				
1 4 PS 2 3 **Describe overall use of the problem-solving cycle.**	✓			

Identify	Act on & use maths	Evaluate & reflect	Communicate & report

Develop and apply mathematical tools & techniques.	✓			
Present or report to the class (if required).				

Additional information:

Signed: _____ Date: _____

10.15 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task: **Names/Dates:**

AT5 -

1. Identify the maths					
Identify problem(s)	Done: ○ Level:	Recognise maths	Done: ○ Level:	Select information	Done: ○ Level:
Interpret information	Done: ○ Level:	Choose processes	Done: ○ Level:		Done: ○ Level:
2. Act on and use maths					
Perform estimations	Done: ○ Level:	Decide techniques	Done: Level:	Choose maths tools	Done: Level:
Select technologies	Done: ○ Level:	Perform calculations	Done: ○ Level:		Done: ○ Level:
3. Evaluate and reflect					
Check Estimations	Done: ○ Level:	Compare results	Done: Level:	Check processes	Done: Level:
Review actions	Done: ○ Level:	Check logical reasoning	Done: ○ Level:	Assess conclusions	Done: ○ Level:
Communicate and report					
Written processes	Done: ○ Level:	Written results	Done: Level:	Oral processes	Done: Level:
Oral results	Done: ○ Level:	Digital processes	Done: ○ Level:	Digital results	Done: ○ Level:

Mathematical Toolkit					
Analogue tools - What & how?		Digital Devices - What & how?		Software & Apps - What & how?	
Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy	Choice & Range	Skill & Accuracy

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