

NUMERACY

VM
3&4

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AOS 6,8: & Applied 1-8

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- ⇒ 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

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Advice to students

You are about to embark on a learning journey into Numeracy Units 3&4 subject of your Vocational Major. Use this coursebook to build and develop knowledge and skills to assist your numeracy development over the year. But also be sure to apply what you are learning in classroom situations to your work placements, your VET course and other applied situations, and vice versa! And of course, you should cross-apply knowledge and skills both to and from Literacy, Personal Development Skills and Work Related Skills.

1. In **Numeracy Unit 3**, you will investigate 4 areas of study through 3 applied numeracies.
2. In **Numeracy Unit 4** you will investigate a further 4 areas of study through 3 more applied numeracies.

1
4 PS 2
3

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



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

Use this coursebook by completing the tasks in the spaces and pages provided. You will also need to maintain your own work folios to complete some tasks, as well as others given to you by your teacher.

You may need to collect and keep a work folio with copies of resources, handouts and evidence of you applying numeracy skills.



You should also use your Numeracy Skills Development Booklet to help build skills for various topics throughout the year. Look for the icon to show the corresponding topic.

You might be directed to complete some or even all of the assessment tasks, as well as others supplied by your teacher.

Throughout this coursebook there are a number of quick-reference **Numeracy Superskills**. Use the table opposite to locate these.

When dealing with problems related to visual numeracy it is a good idea to draw a diagram.

Remember that your development of numeracy skills will provide you with the tools for a more successful personal, social and vocational life. So best wishes with your numerical journey.

Numeracy Super Skills

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VCE: Vocational Major

--- All U1-4 now available ---	Printed Coursebook	Applied Vocational Booklet	Master license PDFs	e-version Master license PDFs
Literacy VM: 3&4	___ @ \$49.50	___ @ \$27.50	___ @ \$385	or ___ @ \$495
Numeracy VM: 3&4	___ @ \$49.50	___ @ \$27.50	___ @ \$385	or ___ @ \$495
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Vocational and Work Education Resources

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Work Experience Journal	___ @ \$22	or ___ @ \$165
Work Placement Journal	___ @ \$33	or ___ @ \$220
PDS Planner: VPC 1&2	___ @ \$33	or ___ @ \$220
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PDS Planner: VM 3&4	___ @ \$33	or ___ @ \$220
Foundation Numeracy	___ @ \$33	na
Senior Numeracy	___ @ \$33	na

WACE: Career and Enterprise

	Printed Text Coursebook	e-version Master PDFs
Career and Enterprise		
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

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Activities 1: Numeracy Skills		p.	Due date	Done	Comment
1A	Numerical language	3		<input type="checkbox"/>	
1B	Numeracy for Oz and me	4-5		<input type="checkbox"/>	
1C	Use it or lose it	7		<input type="checkbox"/>	
1D	Personal numeracy	8		<input type="checkbox"/>	
1E	Vocational numeracy	9		<input type="checkbox"/>	
1F	Everyday numeracy skills	11		<input type="checkbox"/>	
1G	My maths toolkit	12		<input type="checkbox"/>	
1H	Basic calculations	13		<input type="checkbox"/>	
1I	Calculating - Addition	17-19		<input type="checkbox"/>	
1J	Calculating - Subtraction	22-23		<input type="checkbox"/>	
1K	Multiplication	25		<input type="checkbox"/>	
1L	Division	27		<input type="checkbox"/>	
1M	Testing time	29		<input type="checkbox"/>	
1N	Working Together	31		<input type="checkbox"/>	
AT1	The Power of the Triangle	32-33		<input type="checkbox"/>	
PST	Problem-Solving Cycle and Maths Toolkit	34		<input type="checkbox"/>	

FULL DRAFT
PREVIEW
SAMPLE

Comments:

1.01 Introduction

Numeracy 101

Numbers play a significant role in our everyday lives. Numbers are not just abstract figures but essential tools we use for various purposes.

Numeracy exists all around us so we need to perform calculations to better manage our personal and vocational activities and responsibilities. When do you apply

numerical skills to these situations?

- ⇒ **Time:** We rely on numbers to plan and schedule our day and keep track of time.
- ⇒ **Travel:** Numbers help us with distances, speeds and travel planning.
- ⇒ **Work and income:** We use numbers to manage our finances and income.
- ⇒ **Shopping and budgeting:** Numbers guide our spending and budgeting decisions.
- ⇒ **Health and wellbeing:** Numbers are crucial for tracking health metrics.
- ⇒ **Cooking:** Precision in measurements, temperatures and timing is all about numbers.
- ⇒ **Sports, recreation and social activities:** Scores, times and stats involve numbers.
- ⇒ **Measurements and design:** Numbers are vital for sizes, dimensions and blueprints.
- ⇒ **Data analysis:** Numbers enable us to collect, analyse and make informed decisions.
- ⇒ **Life itself:** Our daily routines and leisure activities are governed by numbers.

You have to keep on building your numerical skills to improve your personal, social, educational and working lives.

Do you?



Image: unknown/
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Numerical Language

Increasing
(rising)

Half as much
(halve)

More expensive
(dearer)

Longer
(Further)

Bigger than
(More or greater than)



Smaller than
(Less than or fewer)

Decreasing
(falling)

Twice as much
(double)

Less expensive
(cheaper)

Shorter
(Closer)

Image: nuvolanevicata/
Depositphotos.com

Numerical language 1A

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

1. Create numerical statements that use each of the terms on p.2 with an applied example. e.g. The price of electricity seems to keep rising every year and our bill has gone up by about 10% since last year.

FULL DRAFT
PREVIEW
SAMPLE

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

2. Identify the occupation of these workers. What work-related problems would they have to solve? Which numeracy skills and tools would they apply to do their work tasks? Source another image for your work folio and do the same.

1
4 PS 2
3




Image: photography33/Depositphotos.com



Image: michaeljung/Depositphotos.com



Image: leaf/istock/thinkstock.com

Blank space for student response to the plumber image.

Blank space for student response to the florist image.

Blank space for student response to the hairdresser image.

1.03 Introduction

1B Numeracy for Oz and me

Part A: Aussie estimates



Numbers are used to describe amounts and relative quantities and sizes.

Estimate what you think might be the numerical answer to these questions about Australia. Go online and find out the answers. Note: Some will require you to include the period of time, (e.g. Employment as at Dec. 23.) How did you go?

Population?	Size of country?
Most populous state?	2nd most populous state?
Largest state?	Smallest state?
Most populous city?	Least populous state or territory?
Largest desert?	Longest river?
World rank in largest countries?	World rank in largest populations?
Total employment?	Average weekly income?
Indigenous population %?	Approx no. of Indigenous languages?
All-time rank in Summer Olympics?	All-time rank in Commonwealth Games?
Largest participant sport?	Number of beaches?
Lowest ever temperature?	Highest ever temperature?
Distance to nearest major city (CBD)?	Population of your nearest major city?

Part B: Me and numeracy

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.
3. Briefly explain how/when you have to solve problems related to this.

1
4 PS 2
3

Numbers in my life	Explanation	Example	Problem
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.	It's a problem fitting everything in the day, so I need to use a daily planner.
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 and creative tasks			
j. My practical/ technical tasks			
k. My work tasks			
l. My timetable			
m. My travel			

**FULL DRAFT
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SAMPLE**

1.05 Applied Numeracy

Working it out

As you know, there are many skills associated with numeracy. In VPC Numeracy 3&4 you are expected to demonstrate a suite of numeracy skills that not only master **adding**, **subtracting**, **multiplying** and **dividing**, but go well beyond these four basic calculating skills.

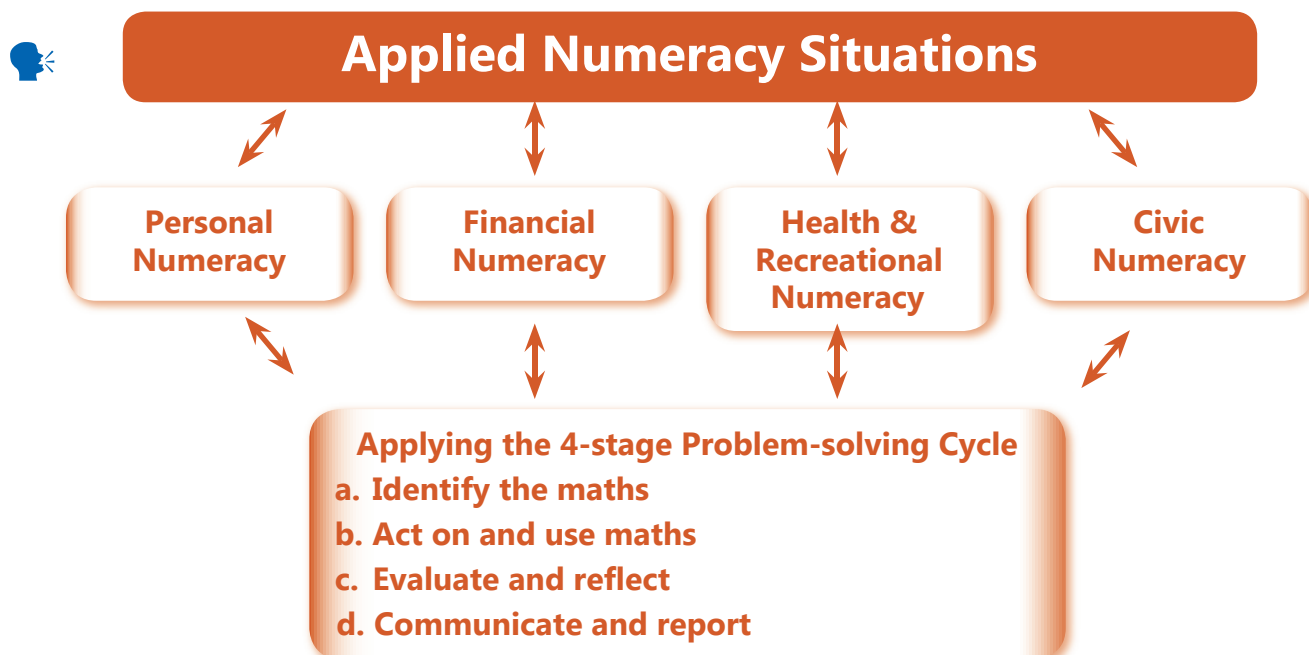
As you saw last year, people have varied levels of numerical capability. You would have seen that some of your peers are stronger in particular numeracy skills than you. And you might also have found it easier to master some other skills compared to your peers. This is a bit like in Literacy where people have preferred literacy styles as well as preferred learning styles.

In life we can't be good at everything. But like all skills, numerical skills can be improved and developed. When you are meeting your personal and vocational numerical responsibilities, you need to be willing and ready to step-up and improve in areas that you are weaker.

In these unit 3&4 studies you will revisit fundamental numeracy skills that you have been building throughout your life, and especially last year in VPC 1&2. In units 3&4 you will consolidate what you already know, learn some more sophisticated and challenging skills, and then develop and apply numerical concepts to varied personal and vocational situations.

The aim is to assist all of you to improve your ability to work with numbers and develop the confidence (and the skills and tools) to solve numerical problems. This will help make you more confident in your ability to live. Hopefully, this will also make you more **employable** in the long term.

The main skills or topic areas (listed in the diagram below) are explored throughout varied modules over the course of the year. And at all times you will need to apply the **4-stage Problem-Solving Cycle** when you are developing and applying the required numeracy skills in these modules.



Use it or lose it

It doesn't matter how much you develop your numeracy skills while you are in the classroom. If you don't apply these skills on a regular basis, then you will become **de-skilled!**

The saying, "Use it or lose it" is a valuable reminder that goes beyond the classroom, especially when it comes to numeracy skills like basic calculations. No matter how sharp your numeracy game is when you are on-task at school, keeping those skills alive requires **daily practice** in real-life situations.

Imagine the lifelong and very real problem of managing your own **budget**. If you don't regularly apply your numeracy skills - like **addition** and **subtraction** - while handling expenses, you might find it harder to keep track of your **money**. Whether it's calculating your weekly spending, or figuring out the best deals while shopping, integrating numeracy into your daily routine is crucial.

And it's not just about personal life; your future **career** will demand these skills too. All **workers** have to deal with **data** and **information**; most workers have to handle **financial** elements as part of their work, some have lots of day-to-day 'number crunching', and all **practical, manual** and **technical** work is essentially applied **numerical problem-solving** for all tasks.

So, use your numeracy skills both in your personal life and for your vocational experiences. Apply them regularly, challenge yourself with real-world problems, and remember that the more you engage with these skills now, the more you'll keep and strengthen them.

And if you do this well, then you should be able to handle many of the numerical challenges that come your way.

FULL DRAFT PREVIEW SAMPLE



Image: Vaichoslav/Depositphotos.com

Use it or lose it 1C

Describe varied examples to show how you use numerical skills and tools every day of your life. Images would be good too!



1.07 Applied Numeracy

Day-to-Day Personal Numeracy can involve...

Plan & organise what we do.

Balance our different responsibilities.

Manage a personal budget.

Manage our family duties.

Organise travel and transport.

Allocate and use resources.

Manage our social lives

Meet education commitments.

Learn practical skills.

Participate in sport, recreation and leisure.



Image: Khakimullin/Depositphotos.com

1D Personal numeracy



1. Give real-life examples of how you can use numerical skills and tools for 6 of the personal situations above.
2. What problems do you have to deal with when applying these skills on an ongoing basis? (e.g. Plan and organise what we do means I have to estimate how much time different personal responsibilities will eat up, and then enter these into a daily planner.)

1
4 PS 2
3

Day-to-Day Vocational Numeracy can involve...



Manage travel commitments.

Meet work and work duty timelines.

Maintain a timesheet.

Check wages and pay slip.

Make and keep appointments.

Calculate and process sales.

Pay expenses and for inputs.

Allocate and use work resources.

Estimate and order materials.

Manage rosters, opening hours and timetables

Vocational numeracy 1E

Image: Kuzma/Thinkstock.com

1. Give real-life examples of how you can use numerical skills and tools for 6 of the vocational situations above.
2. What problems do you have to deal with when applying these skills on an ongoing basis? (e.g. Manage travel commitments means I have to work out how long it will take me to get to and from work and also how much earlier I will need to get up on a work day to complete my morning routine and be on time.)

1
4 PS 2
3

Everyday Numeracy Skills

Estimation

Addition

Multiplication

Fractions

Decimals

Data

Tables

Charts

Measurements

Time

Distance

Shapes

Angles

Money

Discounts

Income

Percentage change

Rates

Formulae

Chances

Patterns

Subtraction

Division

Percentages

Place value

Information

Graphs

Units

Duration

Speed

Objects

Scale

Location

Rounding

GST

Expenses

Making change

Ratios

Change

Odds

Probability

Image: alphaspirt/Depositphotos.com



Playing sports requires the applied use of many numeracy skills. Which do you have?

FULL DRAFT PREVIEW SAMPLE

Image: Krakenimages.com/Depositphotos.com



Managing your money requires the applied use of many numeracy skills. Which do you have?

Calculation

1.11 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:

- | | | | | |
|----------------------------------|-------------------------------------|-------------------------------------|------------------------------------|---|
| <input type="checkbox"/> numbers | <input type="checkbox"/> quantities | <input type="checkbox"/> shapes | <input type="checkbox"/> times | <input type="checkbox"/> problems |
| <input type="checkbox"/> words | <input type="checkbox"/> symbols | <input type="checkbox"/> sizes | <input type="checkbox"/> patterns | <input type="checkbox"/> data |
| <input type="checkbox"/> images | <input type="checkbox"/> measures | <input type="checkbox"/> directions | <input type="checkbox"/> sequences | <input type="checkbox"/> proportions |
| <input type="checkbox"/> amounts | <input type="checkbox"/> dimensions | <input type="checkbox"/> angles | <input type="checkbox"/> questions | <input type="checkbox"/> relationships. |

2. Act on and use maths

Apply the estimates or calculations for fractions; and apply suitable technologies. 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.

FULL DRAFT
PREVIEW
SAMPLE

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:

- | | |
|---|---|
| <input type="checkbox"/> Did I perform the appropriate steps? | <input type="checkbox"/> Did I apply the correct tools? |
| <input type="checkbox"/> Does my answer seem correct? | <input type="checkbox"/> What did I do well? |
| <input type="checkbox"/> Is the result close to my estimate? | <input type="checkbox"/> What do I need to improve? |
| <input type="checkbox"/> 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.

- | | | |
|---|---|--|
| <input type="checkbox"/> Measuring devices | <input type="checkbox"/> Calculators | <input type="checkbox"/> Timing devices |
| <input type="checkbox"/> Software | <input type="checkbox"/> Apps | <input type="checkbox"/> Spreadsheets |
| <input type="checkbox"/> Tables | <input type="checkbox"/> Graphing | <input type="checkbox"/> Mapping |
| <input type="checkbox"/> Counters | <input type="checkbox"/> Designing | <input type="checkbox"/> Making |
| <input type="checkbox"/> Inputs | <input type="checkbox"/> Scanners | <input type="checkbox"/> Outputs |
| <input type="checkbox"/> Planners | <input type="checkbox"/> Organisers | <input type="checkbox"/> Rosters |
| <input type="checkbox"/> Drawing | <input type="checkbox"/> Recording | <input type="checkbox"/> Processing |
| <input type="checkbox"/> Data | <input type="checkbox"/> Statistics | <input type="checkbox"/> Information |
| <input type="checkbox"/> Collecting | <input type="checkbox"/> Communication | <input type="checkbox"/> Analysing |

My maths toolkit 1G

At the start of this year, what can you bring to my 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...

1.13 Calculating

Calculating

As you know, calculating is vital to every numeracy situation. When you solve numerical problems in personal or work-related situations you will be expected to make some type of numerical calculation (or many!).

So you need to keep developing and applying your suite of basic numerical calculating skills. Numerical calculation is important for:

- ⇒ personal activities such as cooking, shopping, socialising, and planning and organising travel and transport
- ⇒ financial activities such as purchasing goods and services, banking, earning an income, and managing your budget
- ⇒ health and recreation activities including playing sport, engaging with hobbies, creating, making and crafting, and even gaming
- ⇒ community and social (civic) activities including understanding data and information, analysing social and community issues, and dealing with government processes
- ⇒ work-related activities such as taking orders when working in a retail store, packing orders, making coffee for a customer, and organising your work duties and roster.

So how are you doing?

Right now, how would you rate your skills in the basic functions of **addition**, **subtraction**, **multiplication** and **division**?

What about calculating **percentages** and **fractions**, using **decimals**, and being able to **estimate** and **measure** length, area, distance and time?

Can you construct and interpret **graphs**, **charts** and **infographics**? What about visualising and manipulating **shapes** and **objects** both in real life and when using software? And then there's money - managing dollars needs sense! Well as we said previously, use it or lose it!

Basic calculations

Basic calculations are the 'sums' that you need to be able to do in **your head**, or **on paper** for more complex problems. Both these methods require you to **act on and use mathematics**. In complex situations you might need to use a **calculator** (or app), or use this digital tool to **check** your 'head' or 'paper' calculations.

Sometimes you have to think on your feet, so being able to do calculations in your head is important. For example, doing the shopping. Sometimes you have to do calculations on paper. For example, if the cash register breaks down and you have to add up orders manually.



Image: mentalmind/
Depositphotos.com

Calculating 1.14

And you always need to be able to check if the answer a 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!



Image: vchalup2/
Depositphotos.com

Basic calculations 1H

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

a. 24 minus 18	b. 66 divided by 3	c. 30 plus 16 add 19	d. 28 multiplied by 5
e. Buy lunch of \$12.50 5 times a week.	f. Eat a dozen apples each week for 3 months.	g. Travel for work is 42 minutes each way.	h. Do 50 crunches on each day in February.

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

a. $9 + 9 + 9 + 9 + 9 = 59$	b. 5 cans of Passiona = \$7.50
c. $95 - 25 - 70 = -5$	d. 3 Cheeseburgers = \$6.60
e. $20 \times 14 = 280$	f. 50 litres of petrol = \$110
g. $10 + 110 / 5 = 24$	g. Paid \$500 a fortnight = \$26,000 per year

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4 PS 2
3



1.15 Addition and Subtraction

Addition

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

You would 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.

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 will count the number of plates when you are setting a table for diners
- ⇒ you can count the number of beats when starting your dance moves
- ⇒ you will use counting when completing checkouts
- ⇒ when you count cash money!

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

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

$$5 + 4 = 9$$

$$14 + 18 = 32$$

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

$$\$50 + \$24.95 = \$74.95$$

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

$$6 + 2 + 1 = 9$$

$$15 + 25 + 150 = 190$$

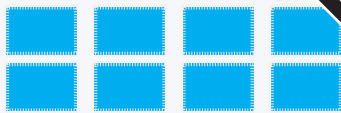
$$1/2 + 1/2 + 3/4 = 1 \text{ and } 3/4$$

$$25c + 99c + \$1.50 = \$2.74$$

$$19 + 11 + 85 + 15 = ?$$

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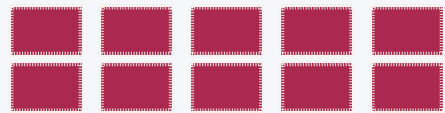
FULL DRAFT
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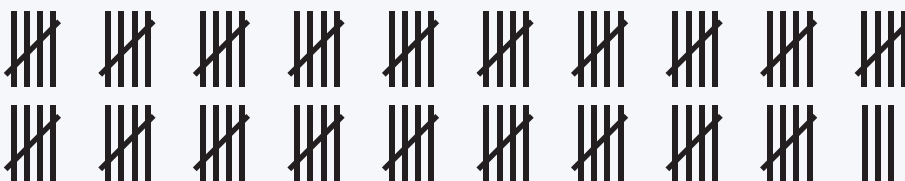


6



10

e.g. Total = $8 + 6 + 10$
Total = 24



Total
'sticks'?



Total number of workers in this photo?

Image: stockyimages/Depositphotos.com

Image: artiomp/Depositphotos.com

Number lines

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.

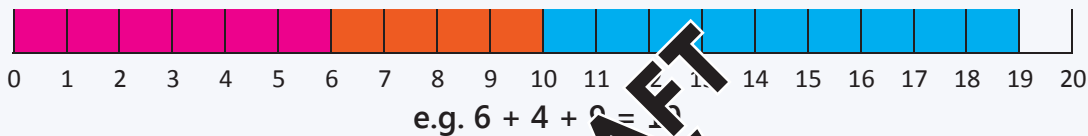
When you are using **rulers** to measure distance, and **thermometers** to measure temperature, you are actually using a number line.

For example, tradies use measuring tapes, rulers and digital devices all the time in their jobs. A measuring tape is an applied number line! This is a key applied tool for problem-solving.



Addition: Using a number line

Calculate = $6 + 4 + 9$



Mathematical sums

You have previously set out mathematical sums for addition, especially when the numbers become larger and more complex.

To do this, you set out the problem in a way 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: $23 + 66$

$$\begin{array}{r} 23 \\ + 66 \\ \hline 89 \end{array}$$

e.g. Calculate the total of: $8 + 43 + 175$

$$\begin{array}{r} 8 \\ 43 \\ + 175 \\ \hline 226 \end{array}$$

e.g. Calculate the total of: $34 + 7 + 350 + 115$

$$\begin{array}{r} 34 \\ 7 \\ + 350 \\ + 115 \\ \hline 506 \end{array}$$

1.17 Addition and Subtraction

1I Calculating - Addition

Part A: Complete the following addition calculations. Make sure that you show appropriate workings out.

a. $8 + 6 =$	b. $14 + 18 =$	c. $23 + 77 =$	d. $62 + 38 =$
e. $15 + 15 + 25 =$	f. $22 + 18 + 20 =$	g. $37 + 13 + 55 =$	h. $23 + 0 + 127 =$
i. $9 + 4 + 5 + 8 =$	j. $7 + 14 + 9 + 15 =$	k. $25 + 10 + 35 + 65 =$	l. $80 + 5 + 50 + 200 =$
m. eight plus forty-two =	n. twelve add five =	o. one hundred plus five =	p. the sum of five, twelve and forty =
q. $\$45 + \$24.95 =$	r. $\$7.95 + \$2.50 + 55 \text{ cents} =$	s. 2 hours plus 4 hours =	t. 6.5 hours + 45 mins =
u. $55 \text{ cm} + 46 \text{ cm} =$	v. $3.5 \text{ km} + 250 \text{ m} =$	w. $375 \text{ gm} + 550 \text{ gm} =$	x. $\$0 + \$1\text{m} =$

FULL DRAFT
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SAMPLE



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.

*Image: kalinovsky/
Depositphotos.com*

"Every day I have to plan and schedule my deliveries and load the van to do this efficiently."



Part B: Applied



Choose a work-related or volunteer situation you have participated in. Describe situations when you used addition in your 'work' roles. What 'tools' did you use?

Work/volunteer situation:			

1.19 Addition and Subtraction

Subtraction

When you subtract you are **taking away** amounts or numbers to get a total or a sum.

Just like addition, subtraction involves **counting**. This means you can use a **number line**. Number lines are particularly helpful for dealing with negative numbers.

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 by setting out mathematical sums.

Your teacher will go through these examples, 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. 25 take away 10 equals 15.

The difference between 50 and 30 is 20.

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 home and business situations.

For example, for our PDS fundraiser we made 5 dozen cupcakes (60). At the end we counted that we had 5 left. The difference is 55 (i.e. $60 - 5 = 55$).

Therefore we must have sold 55 cakes. But we can't be sure that we 'sold' 55. How could we find this out?



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.

$$9 - 3 = 6$$

$$50 - 28 = 22$$

$$4 - 1/2 = 3 \frac{1}{2}$$

$$\$85 - \$23 = \$62$$

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

$$6 - 2 - 1 = 3$$

$$1 - 1/2 - 1/2 = 0$$

$$\$100 - \$55 - \$46 = -\$1$$

$$1,000 - 500 - 250 - 100 = ?$$

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.

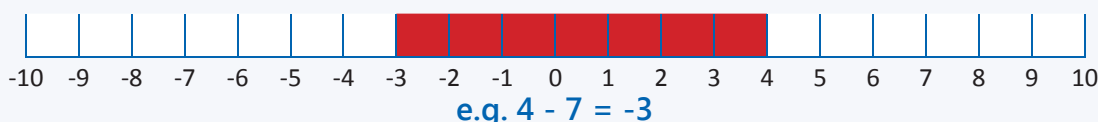
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Image: Anaisia29/
Depositphotos.com

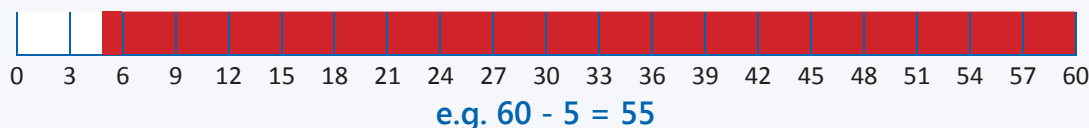


Subtraction: Using a number line

Calculate: 4 minus 7



Calculate: 60 minus 5



1.21 Addition & Subtraction

1J Calculating - Subtraction

Part A: Complete the following subtraction calculations. Make sure that you show appropriate workings out.

a. $6 - 2 =$	b. $28 - 7 =$	c. $81 - 44 =$	d. $155 - 55 =$
e. $150 - 120 - 10 =$	f. $92 - 44 - 30 =$	g. $199 - 55 - 45 =$	h. $750 - 0 - 150 =$
i. $18 - 4 - 5 - 7 =$	j. $32 - 12 - 10 - 5 =$	k. $175 - 100 - 30 - 5 =$	l. $140 - 40 - 50 - 60 =$
m. fifty minus five =	n. eighty-two take away twenty =	o. one hundred minus eight take away 12 =	p. 750 less 150 =
q. $\$75 - \$29 =$	r. $\$10 - \$7.25 =$	s. 3 and $\frac{1}{2}$ hours minus $\frac{1}{2}$ hour =	t. 2 and $\frac{1}{2}$ hours - 30 minutes =
u. $85\text{cm} - 32\text{cm} =$	v. 3.5km less 500m =	w. $1\text{kg} - 150\text{g} =$	x. $\$10\text{K} \text{ minus } \$500 =$

FULL DRAFT
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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 what time you need to leave to meet your friends in 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 work time as part of a timesheet or staff roster.
- ⇒ Calculating how much stock is left at the end of a day's trading.
- ⇒ Working out a business's profit (revenue less expenses) for the week.
- ⇒ Working out how much time is available in a work day after answering emails in the morning.

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



Image: S1photography/Depositphotos.com

Part B: Applied



Choose a work-related or volunteer situation you have participated in. Describe situations when you used subtraction in your 'work' roles. What 'tools' did you use?

Work/volunteer situation:			

1.23 Multiplication and Division

Multiplication

When you are multiplying you are calculating an answer based on the 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: Three times five.
- ⇒ This means you have to work out the total of three fives.
- ⇒ Three fives is just: five plus five plus five; i.e. 3×5 .
- ⇒ The answer to this, is of course, 15!

Can you hear how saying the words out loud helps make multiplication much easier to understand?

Multiplication is simply: something times something else.

- ⇒ Ten times ten? Well ten tens is a hundred.
- ⇒ What about 20×5 ? Well 20 times 5 is 100.
- ⇒ And how about nine by five? Sometimes people 'play' multiplication this way; i.e. something by something else. For example 9×5 is $(9 + 9 + 9 + 9 + 9 = 45)$.

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.

$$3 \times 4 = 12 \text{ or}$$

$$(4 + 4 + 4 = 12)$$

$$5 \times 9 = 45 \text{ or}$$

$$(9 + 9 + 9 + 9 + 9 = 45)$$

$$12 * 10 = 120 \text{ or}$$

$$(10 + 10 + 10 + 10 + 10 \dots \text{and so on}).$$

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SAMPLE



Multiplication: Using visual data

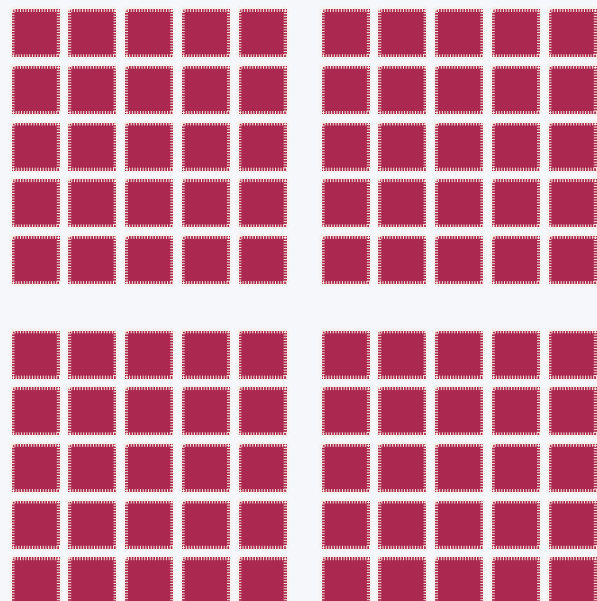
What is 20×5 ?

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 blurry!

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. 5×20 . (And now you can do the calculation both ways because 5×20 is the same as 20×5 !)



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: 8×9

$$\begin{array}{r} 8 \\ \times 9 \\ \hline 72 \end{array}$$

e.g. Calculate the total of: 110×7

$$\begin{array}{r} 110 \\ \times 7 \\ \hline 770 \end{array}$$

e.g. Calculate the total of: 12×15

$$\begin{array}{r} 12 \\ \times 15 \\ \hline 60 \\ 120 \\ \hline 180 \end{array}$$

(Carry the 1 from $2 \times 5 = 10$)

(Put a 0 to show place value for tens)

FULL DRAFT PREVIEW SAMPLE

Multiplication 1K

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

a. $7 \times 9 =$	b. $6 \times 7 =$	c. $10 \times 8 =$	d. $15 \times 11 =$
e. $9 \times 4 =$	f. $15 \times 12 =$	g. 7 by 14 =	h. $18 \times 12 =$
i. $20 \times 10 =$	j. $0.75 \times 16 =$	k. $20 \times 25 =$	l. $\$30 \times 5 =$
m. fifteen times six =	n. four hundred by 25 =	o. Eight times fifty-two =	p. $12 \times 45 \text{ mins} =$



1.25 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: $20 \times 5 = 100$. Division: $100 \div 5 = 20$.
- ⇒ Multiplication: $25 \times 4 = 100$. Division: $100 \div 25 = 4$ or $100 \div 4 = 25$.

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.

$$20 \div 4 = 5$$

(How many 4s are in 20?; there's 5!)

$$36 \div 6 = 6$$

$$150 \div 15 = 10$$

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.

$$11 \div 2 = 5.5 \text{ (Remainder a decimal.)}$$

$$12 \div 2 = 5 \frac{1}{2} \text{ (Remainder a fraction.)}$$

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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.

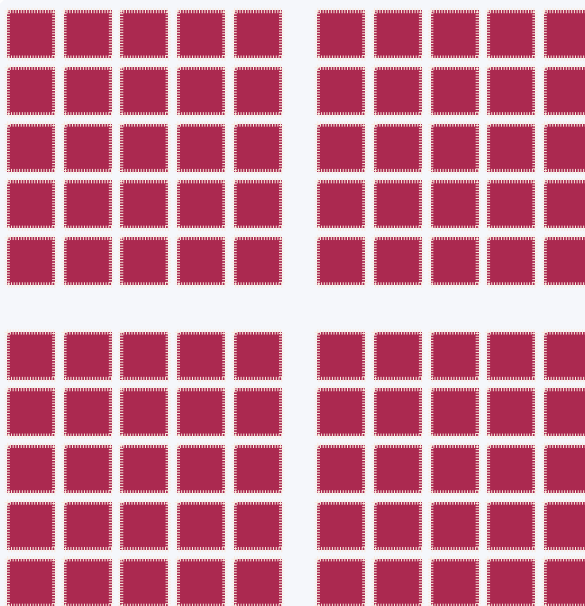
- ✓ 1 is a divisor - there are 100 1s in 100!
- ✓ 2 is a divisor - there are 50 2s in 100!
- ✓ 5 is a divisor - there are 20 5s in 100!
- ✓ 10 is a divisor - there are 10 10s in 100!
- ✓ 25 is a divisor - there are 4 25s in 100!

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: $99 \div 9$ $\begin{array}{r} 11 \\ 9 \overline{) 99} \end{array}$	Calculate the total of: $132 \div 12$ $\begin{array}{r} 11 \\ 12 \overline{) 132} \end{array}$	Calculate the total of: $200 \div 25$ $\begin{array}{r} 12 \\ 20 \overline{) 240} \end{array}$ <p style="font-size: small; margin-top: 5px;">(Carry the 4 from $24/20=1$ plus 4 remainder)</p>
--	--	---

Division 1L

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

a. $30 \div 15 =$	b. $24 \div 4 =$	c. $90 \div 9 =$	d. $56 \div 7 =$
e. $36 \div 6 =$	f. $125 \div 25 =$	g. $140 \div 7 =$	h. $200 \div 8 =$
i. $500 \div 20 =$	j. $1000 \div 25 =$	k. $77 \div 38.5 =$	l. $17.5 \div 5 =$
m. eighty divided by five =	n. 121 divided by 11 =	o. one hundred how many fours =	p. how many halves are in 8.5 =
g. $\$50 \div \$5 =$	r. $\$280 \div \$7 =$	s. 16 hours divided by 4 =	t. how many 15 mins in 2.5 hours =



1.27 Putting It Together

Addition and subtraction

In your personnel and vocational activities you are likely to have to done calculations that involve both addition and subtraction. This requires 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 \$900 currently in the bank.
- ⇒ You are paid \$500 in wages.
- ⇒ You spend \$200 on a new pair of sneakers.
- ⇒ You spend \$150 on a celebration dinner for friends.

How much is left in your bank account?

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

$$\begin{aligned} \text{e.g. } & \$900 + \$500 - \$200 - \$150 \\ & = \$900 + \$500 - \$200 - \$150 \\ & = \$1,400 - \$200 - \$150 \\ & = \$1,200 - \$150 \\ & = \$1,050 \end{aligned}$$

Applied numeracies

People naturally apply addition and subtraction to many personal and work-related activities. Discuss these and suggest other applied examples.

- ⇒ **Keeping track of time.** e.g. If you have a meeting at 2:30pm and it's currently 1:45pm, you might calculate the time remaining by subtracting the current time from the meeting time ($2:30\text{pm} - 1:45\text{pm} = 45$ minutes).
- ⇒ **Completing a timesheet.** e.g. If you worked from 9:00am to 5:30pm and took a 30-minute lunch break, you would add up the hours worked ($5:30\text{pm} - 9:00\text{am}$) and then subtract the break time to get the total hours worked ($8.5\text{hrs} - 0.5\text{ hrs} = 8$ hours).
- ⇒ **Planning a travel itinerary.** e.g. If your flight is at 11:00am and you need to be at the airport two hours before, you might subtract two hours from 11:00am as well as your travel time to determine when you should leave home. ($11:00\text{am} - 2\text{ hours} = 9:00\text{am}$ less your travel time).
- ⇒ **Managing your bank account.** e.g. If you have \$500 in your account and you spend \$75 on groceries, you would subtract the expense to calculate the remaining balance ($\$500 - \$75 = \$425$).
- ⇒ **Following a recipe.** e.g. If a recipe calls for 2 cups of flour and you've already added 1 cup, you would need to add another cup to meet the requirement ($1\text{ cup} + 1\text{ cup} = 2\text{ cups}$).

Testing time 1M

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.

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a.	$53 + 48$	=	$53 + 48$	=
b.	$89 - 37$	=	$89 - 37$	=
c.	$75 + 20 + 49$	=	$75 + 20 + 49$	=
d.	$120 - 50 - 30$	=	$120 - 50 - 30$	=
e.	$18 + 24 - 15$	=	$18 + 24 - 15$	=
f.	$38 - 19 + 55$	=	$38 - 19 + 55$	=
g.	$95 - 12 - 38$	=	$95 - 12 - 38$	=
h.	$120 + 30 + 45 - 60$	=	$120 + 30 + 45 - 60$	=
i.	$68 + 75$	=	$68 + 75$	=
j.	$84 - 29$	=	$84 - 29$	=
k.	$\$30 + \$25 + \$18$	=	$\$30 + \$25 + \$18$	=
l.	$\$200 + \15.75	=	$\$200 + \15.75	=
m.	$\$80 - \40	=	$\$80 - \40	=
n.	$\$250 - \$75 + \$125$	=	$\$250 - \$75 + \$125$	=
o.	45 minutes + 2 hrs	=	45 minutes + 2 hrs	=
Estimated correct		/15		/15
Total correct:		/15		/15

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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?

3



1.29 Putting It Together

Order of operations

In life we follow orders and procedures that assist us to accomplish tasks accurately and efficiently. For example:

- ⇒ if you are changing a tyre you need to follow a sequence of operations to do the task properly,
- ⇒ if you are baking a cake you need to follow a sequence of operations to do the task properly, and
- ⇒ if you are performing brain surgery you also need to follow a sequence of operations to do the task properly!

The same goes with calculations. You need to follow an order of operations. The basic rules, in order (and as explained below) are:

1. **First, calculate anything in brackets.**
2. **Move from left to right, and perform any multiplication or division.**
3. **Move from left to right, calculating any addition and subtraction.**



The tasks and responsibilities associated with occupations require workers to follow a well-planned and systematic order of operations.

Image: George Doyle/Stockbyte/Thinkstock



Have you seen the Order of Operations? or PEMDAS

Order order!

When performing a calculation, the order of operations is as follows.

Firstly, you must always **evaluate any brackets** before doing anything else:

$$\text{e.g. } 5 + (10 \times 6) = 5 + 60 = 65 \text{ (and not } 90\text{!!!)}$$

Secondly, you **move from left to right** performing any **multiplication or division**. It doesn't matter which of these you do first as long as you move from left to right. Tip: You can show this as a bracket ().

$$\begin{aligned} \text{e.g. } 6 \times 5 + 3 \times 13 &= \\ (6 \times 5) + (3 \times 13) &= \\ 30 + 39 &= 69 \text{ (and not } 429, 624 \text{ or } 1,170\text{!!)} \end{aligned}$$

Finally, you move from left to right performing any addition or subtraction. (Again, it doesn't matter which of these you do first, as long as you move from left to right.)

For example:

$$3 + 9 \times 7 = ??$$

$$3 + (9 \times 7) = ??$$

do this 1st

$$3 + 63 = 66$$

And another:

$$6 \times 5 - 9 \div 3 = ??$$

$$(6 \times 5) - (9 \div 3) = ??$$

do this 1st do this 2nd

$$30 - 3 = 27$$

And one more:

$$17 - (15 \div 3) + 5 \times 25 = ??$$

do this 1st

$$17 - 5 + (5 \times 25) = ??$$

do this 2nd

$$12 + 125 = 137$$

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1. Perform the following calculations using order of operations.

a. $15 + 6 / 3$	b. $24 \times 2 + 10$	c. $50 / 5 + 20$
d. $15 / 7.5 * 10$	e. $16 * 15 / 5$	f. $1,000 + 1,000 / 25$
g. $(9 + 3) \times 2 + 6$	h. $15 \times 12 / 30 - 10$	i. $\$49.95 \times 2 + \$50 \times 5 =$

2. Perform the following 'tricky' calculations.

a. $4 + 4 + 4 \times 4 =$	FULL DRAFT PREVIEW SAMPLE
b. $4 + (4 + 4) + 4 =$	
c. $(4 + 4) \div 4 + 4 =$	
d. $(4 + 4) * (4 - 4) =$	

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3. Gilbert has a \$5 note 3 x \$2 coins and 1 \$1 coin. He has to buy 6 cans of Broken Beans which are \$1.99c each. 3-packs of beans are \$5.50 per pack. Which purchase option should he make? Why? (Show your workings below.)



1.31 Assessment Task

AT1 The Power of the Triangle Personal Numeracy

1
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There are not many people who can resist the allure of a freshly-made triangle sandwich. And these tasty treats are the go-to food choice for many a luncheon, party, celebration, commemoration or event.



Image: Stocksolutions/Depositphotos.com

Required

Apply your numeracy skills and tools and use the 4-stage problem-solving cycle to plan for a 'spread' of home-made triangle sandwiches for an 'event'.

Assume you are catering for 30 people. As usual, these people will reflect the cultural diversity that makes up Australia. So you must consider allergens, cultural issues, ethical choices and other suitable menu choices.

So how many 'triangles' will you need to make? What fillings will you choose and how many of each? What menu options might you need to include, such as gluten-free and vegan? What ingredients should you avoid to be safe? Which sandwiches will cost more per item? Which will cost less? How far can you keep costs down? How can you speed production up? What laws, rules and laws do you need to meet? How long will this all take? And how much will this all cost?

Well, most of the answers require addition, multiplication, division and some subtraction, as well as order of operations (especially for \$ amounts).

Pair up or form into groups, start planning your menu, and in your work folios use the table headings to identify how you plan to deal with all of these issues.

Then, as you apply your numeracy and other skills and tools to complete this task, briefly describe what you did in your table. (e.g. Division: We used division by 4 to estimate total triangles from full sandwiches.)

Prepare a final report to the class. Share and compare menu items, calculations and costs. Is it viable to cater for your class? What does your teacher say?

Estimation	Ingredients/Fillings	Allergens
Religion	Culture and Ethics	Hygiene
Addition	Multiplication	Division
Subtraction	Order of operations	Cost
Time	Storage & Transport	Waste
Legal issues	Labelling	Plating/Serving

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.

Assessment Task 1.32

Name(s):	Key dates:	Unit 3 Applied generally		
Tasks - AT1: The Power of the Triangle	Must Do?	Due by	Done	Level
a. Number of 'triangles' that need to be made.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
b. Types of fillings.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
c. How many of each filling?	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
d. Inclusive and diverse menu options.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
e. Ingredients that will be avoided.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
f. Sandwiches that will cost more per item.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
g. Sandwiches that will cost less per item.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
h. How to keep costs down?	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
i. How to speed production up?	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
j. How to meet hygiene issues and laws?	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
k. How long will this take?	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
l. How much will this cost?	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
⇒ Applied use of addition & subtraction.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
⇒ Applied use of multiplication & division.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
⇒ Applied use of order of operations.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Applied use of other numeracy skills and tools.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Applied use of the problem-solving cycle.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report	
Develop and apply mathematical tools and techniques.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="text"/>
⇒ Prepare and submit your final report & explanations.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="text"/>
Present a report to the class (if required).		<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

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Additional information:

Signed: _____ Date: _____

1.33 // Problem-Solving Cycle // Maths Toolkit

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Task:		Names/Dates:			
AT1 -					
1. Identify the maths					
Identify problem(s)	Done: <input type="radio"/> Level: <input type="text"/>	Recognise maths	Done: <input type="radio"/> Level: <input type="text"/>	Select information	Done: <input type="radio"/> Level: <input type="text"/>
Interpret information	Done: <input type="radio"/> Level: <input type="text"/>	Choose processes	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>
2. Act on and use maths					
Perform estimations	Done: <input type="radio"/> Level: <input type="text"/>	Decide techniques	Done: <input type="radio"/> Level: <input type="text"/>	Choose maths tools	Done: <input type="radio"/> Level: <input type="text"/>
Select technologies	Done: <input type="radio"/> Level: <input type="text"/>	Perform calculations	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>
3. Evaluate and reflect					
Check Estimations	Done: <input type="radio"/> Level: <input type="text"/>	Compare results	Done: <input type="radio"/> Level: <input type="text"/>	Check processes	Done: <input type="radio"/> Level: <input type="text"/>
Review actions	Done: <input type="radio"/> Level: <input type="text"/>	Check conclusions	Done: <input type="radio"/> Level: <input type="text"/>	Assess conclusions	Done: <input type="radio"/> Level: <input type="text"/>
4. Communicate report					
Written processes	Done: <input type="radio"/> Level: <input type="text"/>	Written results	Done: <input type="radio"/> Level: <input type="text"/>	Oral processes	Done: <input type="radio"/> Level: <input type="text"/>
Oral results	Done: <input type="radio"/> Level: <input type="text"/>	Digital processes	Done: <input type="radio"/> Level: <input type="text"/>	Digital results	Done: <input type="radio"/> Level: <input type="text"/>

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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
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

More Numeracy Skills

2

2.01 Doing the Numbers36	2.17 Bar Graphs52
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Activities 2: More Numeracy Skills	p.	Due date	Done	Comment
2A How...	37	<input type="checkbox"/>	<input type="checkbox"/>	
2B Fractions and decimals	39	<input type="checkbox"/>	<input type="checkbox"/>	
2C Fractions and decimals II	41	<input type="checkbox"/>	<input type="checkbox"/>	
2D Fractions & percentages	42	<input type="checkbox"/>	<input type="checkbox"/>	
2E Percentages	43	<input type="checkbox"/>	<input type="checkbox"/>	
2F Percentage change	45	<input type="checkbox"/>	<input type="checkbox"/>	
2G Make an estimate		<input type="checkbox"/>	<input type="checkbox"/>	
2H Estimating in action	49	<input type="checkbox"/>	<input type="checkbox"/>	
2I Bar graphs	52-53	<input type="checkbox"/>	<input type="checkbox"/>	
2J Pie charts	54-55	<input type="checkbox"/>	<input type="checkbox"/>	
2K Line graphs	56-57	<input type="checkbox"/>	<input type="checkbox"/>	
AT2 CDS 4 U & Me	58-59	<input type="checkbox"/>	<input type="checkbox"/>	
PST Problem-Solving Cycle and Maths Toolkit	60	<input type="checkbox"/>	<input type="checkbox"/>	

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Comments:

2.01 Doing the Numbers

Numeracy 201

In the previous section you explored the basic numeracy functions for varied purposes and also how numeracy is an important part of your personal and work-related life. You also built your **calculating** skills by focusing on **addition** and **subtraction**, and **multiplication** and **division**.

In this section you will start by exploring **fractions**, **decimals** and **percentages**.

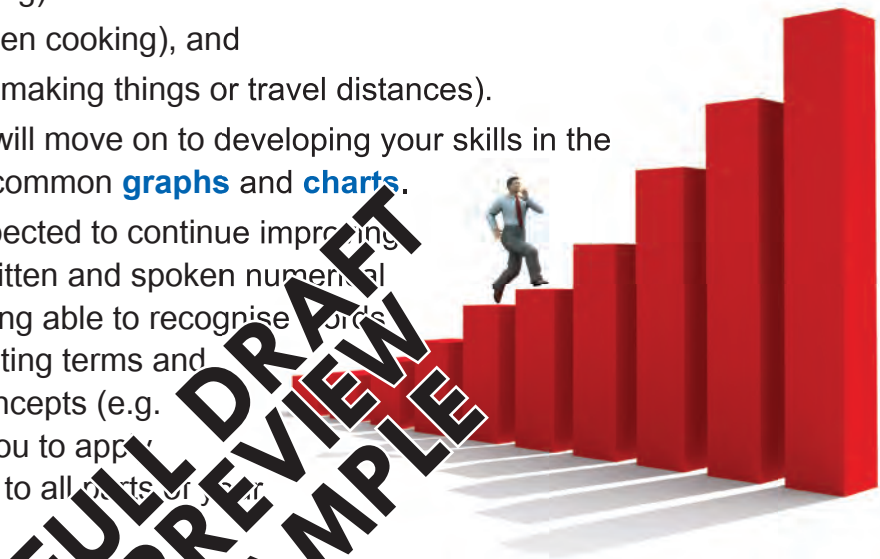
Then you will build your numeracy skills in **estimating**. Estimating numerical information is often done in relation to:

- ⇒ **money** (e.g. when budgeting)
- ⇒ **time** (e.g. when working)
- ⇒ **temperature** (e.g. when cooking), and
- ⇒ **measurements** (e.g. making things or travel distances).

Later in this section you will move on to developing your skills in the use of **data**, **tables** and common **graphs** and **charts**.

Of course you will be expected to continue improving your understanding of written and spoken numerical words and language. Being able to recognise words as numbers, and interpreting terms and phrases as numerical concepts (e.g. bigger than), will assist you to apply your numerical understanding to all parts of your life.

Image: Mike Kiev/
Thinkstock



How... what?

Sometimes when people ask numerical questions they might use the same term for questions that relate to varied numerical concepts. At first, this can be confusing.

To sort this out you will have to apply the problem-solving cycle very carefully, especially in Stage 1: Identify the maths! Asking questions can help you clarify.

For example, they might say the term, 'how much' in relation to:

- ⇒ cost (i.e. "How much is that jacket?") or
- ⇒ size (i.e. "How much chicken do you want?").

As another example, they might say the term 'how long' in relation to:

- ⇒ size (i.e. "How long does the belt need to be?") or

- ⇒ time (i.e. "How long is your performance?").

And they might say the terms, 'how near (or close)' or 'how far' in relation to:

- ⇒ distance (i.e. "How far is it to Bendigo?") or
- ⇒ time (i.e. "How near (or how far) away are you from finishing that order?").

So the different use of numerical terms and language, especially when speaking, can cause misunderstandings.

This is because sometimes the specific word that is used, such as 'far' or 'close' has its own meaning. (e.g. 'Far' usually = a long way away, whereas 'close' usually = quite nearby!)

So what do you usually say?

1. What types of words do you commonly use when communicating numerical information, such as when asking questions?



- close
- little
- many
- small
- far
- long
- much
- tall

How _____ ? ...twice your height.	How _____ ? ...usually 25-30 years.	How _____ ? ...just \$3 a week.	How _____ ? ...only a 10 minute drive.
How _____ ? ...enough to do 2 even coats.	How _____ ? ...3 for each person is enough.	How _____ ? ...about 200 kilometres.	How _____ ? ...less than Chihuahua.

2. Match these 8 examples below with the numerical amounts that might best suit.

How close?	How far?	How little?	How long?
How many ?	How much?	How small?	How tall?

- ...3 and a half hours.
- ...just around the corner.
- ...\$249.95.
- ...enough to fry an egg!
- ...at least 100 kms!
- ...less than 30cm.
- ...higher than a goal post.
- ...just a kid's size please.

3. Match the 8 'How' terms with examples you would most likely use these for.



How close?	How far?	How little?	How long?
How many ?	How much?	How small?	How tall?

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

Peckish?	2 slices = $\frac{1}{4}$	(or 2 eighths or $\frac{2}{8}$)
Hungry?	4 slices = $\frac{1}{2}$	(or 4 eighths or $\frac{2}{4}$ or $\frac{1}{2}$)
Famished?	6 slices = $\frac{3}{4}$	(or 6 eighths or $\frac{6}{8}$ or $\frac{3}{4}$)
Starving?	8 slices = 1	(or 8 eighths or 4 quarters, or 2 halves)

Do you remember greedy Igor? Igor eats the whole pizza, which is cut into 4 pieces.

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

His friend Frankie goes to get some Tostitos sauce and Igor quickly scoops up another quarter slice of Frankie's pizza.

Igor has now eaten one and a quarter pizzas (or $\frac{5}{4}$ which is $\frac{4}{4}$ plus another $\frac{1}{4}$).

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

Image: ekizv/
Depositphotos.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.

$$\frac{1}{2} \quad \frac{1}{3} \quad \frac{1}{4} \quad \frac{3}{5} \quad \frac{1}{10} \quad \frac{5}{6} \quad \frac{1}{8} \quad \frac{3}{7} \quad \frac{13}{20} \quad \frac{25}{100}$$

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.

$$\frac{3}{2} \quad \frac{4}{3} \quad \frac{5}{4} \quad \frac{10}{5} \quad \frac{11}{10} \quad \frac{14}{6} \quad \frac{12}{8} \quad \frac{10}{7} \quad \frac{60}{20} \quad \frac{200}{100}$$

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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 0.8. Written together this will be 2.8 (or 2 and four fifths). 2.8 can also be written as 2 and 4/5.

For example, Igor eats 2 garlic bread loaves plus 4 of the 5 slices from another one before he had to stop due to a pain in his guts! In decimal terms, Igor consumed 2.8 garlic bread loaves.

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 hundredth, which is two numbers after the decimal point, e.g. 0.15.

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 2B

1. Colour in the shapes to indicate each fraction.

3/4		1/4		1/2	
2/3		4/5		6/8	

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

1/2	1/4	1/3	1/8	1/5	1	3/4	1/3	4/5	9/10	3/8
0.5										

0.25	0.4	0.5	0.33	0.9	0.125	0.33	1.0	0.6	0.75	2.5
		1/2								



2.05 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 = $\frac{3}{4}$ minus $\frac{2}{4}$ which equals $\frac{1}{4}$.”

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 $\frac{6}{8} - \frac{2}{8} = \frac{4}{8} = \frac{1}{2}$ e.g. iii $\frac{6}{2} + \frac{1}{2} - \frac{3}{2} = \frac{13}{2} - \frac{3}{2} = \frac{10}{2} = 5$

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 $\frac{1}{2} + \frac{2}{4} = \frac{2}{4} + \frac{2}{4} = \frac{4}{4} = 1$ e.g. ii $\frac{5}{4} + \frac{1}{4} = \frac{6}{4} = \frac{3}{2} = 1\frac{1}{2}$

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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:
 $0.7 + 0.2$

$$\begin{array}{r} 0.7 \\ + 0.2 \\ \hline 0.9 \end{array}$$

e.g. Calculate the total of:
 $0.4 + 0.35$

$$\begin{array}{r} 0.40 \\ + 0.35 \\ \hline 0.75 \end{array}$$

e.g. Calculate the total of:
 $3.5 + 5.4$

$$\begin{array}{r} 3.5 \\ + 5.4 \\ \hline 8.9 \end{array}$$

e.g. Calculate the total of:
 $0.75 + 3.2$

$$\begin{array}{r} 0.75 \\ + 3.20 \\ \hline 3.95 \end{array}$$

e.g. Calculate the total of:
 $2.5 + 3.1 - 1.45$

$$\begin{array}{r} 2.5 \\ + 3.1 \\ \hline 5.60 \\ - 1.45 \\ \hline 4.15 \end{array}$$

1. Calculate these fraction and percentage amounts.

a. $\frac{1}{4}$ a dollar	b. $\frac{3}{4}$ of \$100	c. $\frac{1}{2}$ of \$250	d. $\frac{1}{2}$ of \$99.50
e. 75% of \$1,000	f. 15% of \$2,000	g. 25% of \$50 + \$50	h. 20% 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.	$0.75 + 0.25 =$	$=$	$0.75 + 0.25 =$	$=$
b.	$2.25 + 1.75 =$	$=$	$2.25 + 1.75 =$	$=$
c.	$\frac{1}{8} + \frac{3}{8} =$	$=$	$\frac{1}{8} + \frac{3}{8} =$	$=$
d.	$15 \frac{1}{2} + 7 \frac{3}{2} =$	$=$	$15 \frac{1}{2} + 7 \frac{3}{2} =$	$=$
e.	$\$5 - \$2.50 =$	$=$	$\$5 - \$2.50 =$	$=$
f.	$2 - \frac{1}{2} =$	$=$	$2 - \frac{1}{2} =$	$=$
g.	$\$75 - \$32.75 =$	$=$	$\$75 - \$32.75 =$	$=$
h.	$0.25 + \frac{1}{4} + 0.2 =$	$=$	$0.25 + \frac{1}{4} + 0.2 =$	$=$
i.	$\frac{1}{16} + \frac{7}{16} - \frac{1}{8} =$	$=$	$\frac{1}{16} + \frac{7}{16} - \frac{1}{8} =$	$=$
j.	$\frac{3}{5} + \frac{2}{5} =$	$=$	$\frac{3}{5} + \frac{2}{5} =$	$=$
k.	$\frac{2}{3} + \frac{1}{3} - \frac{1}{6} =$	$=$	$\frac{2}{3} + \frac{1}{3} - \frac{1}{6} =$	$=$
l.	$0.5 + 0.25 + 0.125 =$	$=$	$0.5 + 0.25 + 0.125 =$	$=$
Estimated correct		/12		/12
Total correct:		/12		/12

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?



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2.07 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.



$$1 = 100\%$$



$$1/2 = 50\%$$



$$1/4 = 25\%$$




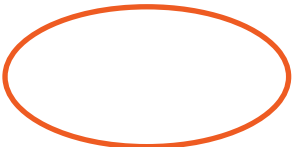
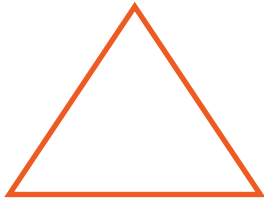
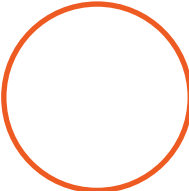


$$1/8 = 12.5\%$$

2D Fractions & percentages

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

1/10	1/8	1/6	1/4	1/3	1/2	6/10	2/3	3/4	4/5	9/10	1/1
			0.25								
								75%			

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

25% 	100% 	50% 
50% 	33% 	75% 

Calculating percentages

If there are 10 people at a KFC, and 8 of these buy a serve of chips, then the percentage of chip buyers in this KFC is 80%. See it's easy in words. It's easy in numbers as well.

$$\frac{8 \text{ (number of chip buyers)}}{10 \text{ (total number of people in KFC)}} \times \frac{100\%}{1}$$

$$= 0.8 \times 100\%$$

$$= 80\%$$

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 8/10 or 0.8).

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

So if there are 12 people in Red Rooster who buy chips with their order and there are 24 shoppers in total, what percentage of Red Rooster diners bought chips? The fraction is 1/2 and the decimal is 0.5, so the percentage is 50%!

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Proportion as a percentage

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

- ⇒ 90 out of every 100 Australians aged 15-19 have a smart phone. That's 90%.
- ⇒ 7 out of 10 people prefer a big cup to a Whopper. That's 70%.
- ⇒ 33 out of 100 people aged 18-24 are not married. That's 33%.
- ⇒ 40 out of 50 people surveyed agreed that watching TikTok influencer videos made them dumber. That's 80%, i.e. 80 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?

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Percentages 2E

Calculate each of these percentages.

a. 10% of 100	b. 10% of 200	c. 50% of \$250	d. 20% of \$400
e. 75% of \$1,000	f. 25% of 500	g. 10% of \$5 + 20% of \$10	h. 67% of 300



2.09 Percentages

Percentage change

Percentage change is a measure used to express the difference between two values, as a percentage of the original value. i.e. How much something has changed by (up or down) compared to what it was originally.

When we use percentage change we can more easily see any increase or decrease in a particular quantity. Percentage change is commonly used to measure:

- ⇒ changes in financial amounts, such as sales or profits
- ⇒ changes in size, such as height and weight
- ⇒ changes in health measures, such as a child's weight gain
- ⇒ changes in performance, such as personal bests and strength gains
- ⇒ changes in time, such as productivity measures and travel times
- ⇒ changes in weather, including rainfall and temperature averages.

And thousands more applied situations in specific personal and vocational situations.

Image: dimdimich/
Depositphotos.com



Percentage change

Percentage change is a way of comparing performance for one outcome, or time period, with another.

It involves looking at growth (or decline), then calculating this as a proportion of the original. For example:

If you earned \$1,000 in year 1, then \$1,500 in year 2 what is the % change?

$$\frac{\text{amount in year 2} - \text{amount in year 1}}{\text{amount in year 1}} \times \frac{100\%}{1}$$

$$= \frac{\$1,500 - \$1,000}{\$1,000} \times \frac{100\%}{1}$$

$$= \frac{\$500}{\$1,000} \times \frac{100\%}{1}$$

$$= 50\% \text{ (That's a lot of growth!)}$$



What would be the % change if year 2 was \$3,000; or if year 2 was \$500?

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Example: Percentage change

Biggie Bojangles has always been shorter than the other kids in class. His height at the beginning of the year is only 150cm. But then, after experiencing a growth spurt, his height increases to 180cm by the end of the year.

$$\text{Percentage change} = \frac{(\text{New height less Original height})}{\text{Original height}} \times \frac{100\%}{1}$$

$$\text{Biggie's change} = \frac{(180\text{cm less } 150\text{cm})}{150\text{cm}} \times \frac{100\%}{1}$$

$$\% \text{ change calculation} = 30\text{cm} / 150\text{cm} \times 100\%$$

$$\% \text{ change} = 20\%$$

Biggie has experienced a 20% increase in height in one year due to a growth spurt. And that is a big change!

Percentage change 2F

1. Calculate each of these to find out the percentage change. Explain whether this is a positive outcome.

<p>a. Jackie, aged 8, has grown from 100cm to 110cm over the year.</p>	<p>b. Jackie's Great Park Pup has gone from 20kg to 24kg over the year.</p>	<p>c. Jackie's mum's business had profit go from \$100,000 to 120,000 over the year.</p>
<p>d. Jackie's brother grew from 160 cm to 176 cm in 2024 and then to 193.6 cm by the end of 2025.</p>	<p>e. Jackie's uncle changed jobs and their income went from \$100,000 to \$80,000 over the year.</p>	<p>f. Jackie's sister Jackie's bank account balance went from \$3,000 to \$1,500 over the course of the year.</p>

2. When might you need to calculate percentage change in personal and vocational situations?



2.11 Estimating

Estimating accurately

Estimating is one of the most important and useful skills to help people better manage their personal, social and work-related 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 estimates related to:

- ⇒ money
- ⇒ time
- ⇒ size
- ⇒ length
- ⇒ distance
- ⇒ weight
- ⇒ temperature
- ⇒ quantity (amount).

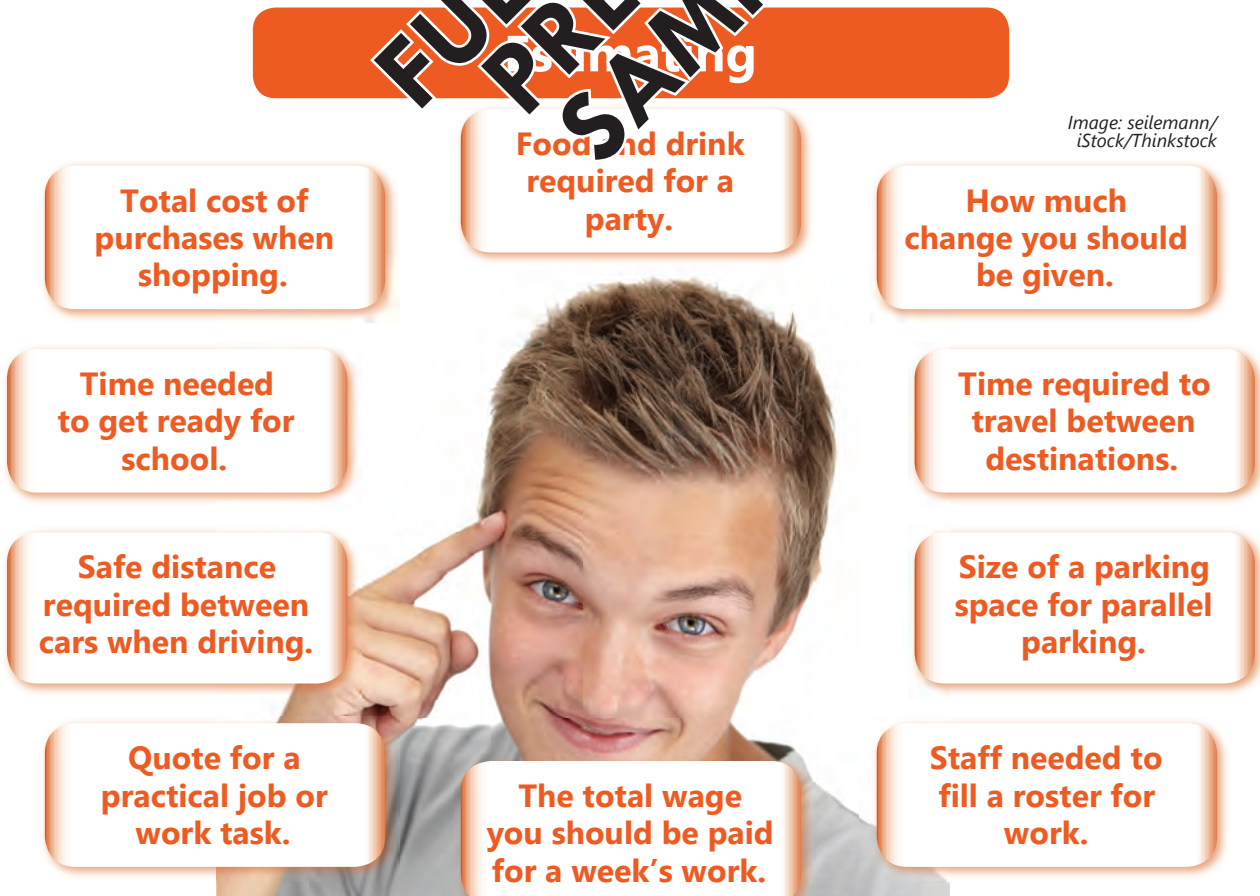
Examples are shown in the diagram below.

But there are many more times when people estimate, so come up with other examples as a class.

Estimating

- ⇒ Estimating involves making an initial 'guess' or coming up with a 'rough figure' based on a person's 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 staff they need to roster on for a busy shift.

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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 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 wheel) 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.		

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3. Complete this sentence using appropriate examples.

It is important for me to estimate things such as:

because...

2.13 Estimating

Round numbers

As part of your development of numerical skills you are expected to be able to do calculations on paper, by using a calculator, and in your head.

When you do calculations in your head you might not need to work out exact amounts. Rather you can make estimated calculations using round numbers. This enables you to get an idea of the result.

Sometimes this is called a 'ball park' figure. Then afterwards you can check the estimate on paper or with a calculator.

Rounded estimates are very useful when shopping, giving quotes, planning a dinner or a party, comparing deals and many other times.

Using rounded numbers for estimating can also help you to balance your own personal budget, make sure you have enough money to pay for day-to-day purchases and also avoid being trapped by tricky salespeople.

Image: carlacastagno/
Depositphotos.com



Rules for rounding

- ⇒ Round to nice, even friendly numbers that are more easily calculated in your head. e.g. 5, 10, 20, 50, 100.
- ⇒ Remove all fractions and decimals when rounding (e.g. 1.5 becomes 2, 1.4 becomes 1.)
- ⇒ Round up for bad things. (e.g. Costs, time, quotes, materials, expenses, etc.. This means that you are playing it safe and over-estimating potential costs.)
- ⇒ Round down for good things. (e.g. Income, revenue, time saved, etc.. This also means that you are playing it safe and under-estimating potential benefits.)

e.g. Suzie is shopping for a new TV. The salesperson says that she can pay it off using 18 payments of \$41. So Suzie works this out in her head.

- Suzie rounds the 18 payments up to 20.
- Suzie then rounds the \$41 amount down to \$40.
- Suzie estimates that the TV will cost about \$800; ($20 \times \$40 = \800).
- So how close was Suzie's estimate?



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1. Do these estimates and then calculate the result to see how close you were.

i. 11 Weeks pay @ \$90/ week.	ii. 9 monthly payments of \$52.50.	iii. 93 crowdfunding supporters each give \$11.
-------------------------------	------------------------------------	---

2. The following estimates are based on sound numerical logic. But it is important to be able to prove that logic by doing the maths. It's 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. This has been done for the first problem.

Discuss these estimates as a class and then do the calculations.

- a. Nancye estimates that she walks at about 6 kilometres per hour. She reckons it will take her about 3 and a half hours to walk 20 kms.
- i. If Nancye walks for 3 hours, what distance is she likely to travel?
 - ii. Do the calculations to assess whether Nancye's estimates are valid.
 - iii. What other factors might you need to consider when doing these estimates and calculations?

FULL DRAFT PREVIEW SAMPLE

- b. 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 estimate it will take them about 1 hour to prepare and assemble 20 spring rolls.
- i. Do the calculations to assess whether their estimates are valid.
 - ii. How many spring rolls do you think they could assemble in the 2nd hour? Why so?



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2.15 Data and Tables

Data

Data is a term used for various types of numerical information. When we collect, organise and analyse data we are more able to make informed decisions based on the numerical information we have collected.

For example, when you are comparing mobile plans from different providers you are comparing data such as call costs, download speeds, data limits and so on.

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, which involve looking at data that comes from external sources, such as government information about employment statistics. Data can also include both written and **numerical information** about customers, employees and other workplace stakeholders that might be stored in a database.

Data collection

Data collection involves collecting information and doing research to find out information. This might involve:

- ⇒ surveying people about their views
- ⇒ researching different information sources to find out prices
- ⇒ collecting information to update a customer database.

Data organisation

Data organisation involves taking the data you have collected and organising it in such a way as to be able to use this data. This might involve:

- ⇒ organising key statistics in a table
- ⇒ creating graphs and images to show this data
- ⇒ arranging information in a customer database so as to make it usable.

Data analysis

Data analysis involves looking at the information shown by the data and then using this to make a decision. This might involve:

- ⇒ working out what the key statistics are showing about people's choices
- ⇒ analysing the patterns and trends shown in graphs
- ⇒ analysing information in a customer database to work out which customers are vital to business success.

Too much data makes it hard to work out the 'true' from the 'false'.

*Image: Wavebreakmedia Ltd/
Wavebreak Media /Thinkstock*



Table

We often organise data in tables. This makes it easier to perform calculations, look for patterns and trends, and do comparisons. We can also show data in graphs. This enables us to ‘see’ various patterns and trends reflected in the numbers.

In the contemporary world we often access a lot of data from digital sources and use digital tools (such as spreadsheets) to help analyse the data. Although this enables us to access more data and numerical information, it also makes it harder to sort opinions from facts, as well as truths from mistruths.

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 calculations.

Customer purchase patterns - March 2024			
Customer	Purchases	\$	Average
Hal	14	280	\$20
Mal	6	600	\$100
Sal	4	800	\$200
Val	16	320	\$20
Totals	50	2,000	\$40

So, from the information in this table we can say that:

- Customers spent a total of \$2,000 in March 2024.
- There were 50 purchases made in March.
- The average transaction amount was \$40.
- Sal spent the most of any customer in March, \$800.
- Sal also has the highest average spend per transaction, \$200.
- Val made the most transactions in March, with 16.
- Hal spent the least in March, \$280, but he had the second most transactions, 14.
- Both Hal and Val had the lowest average spend per transaction, \$20.

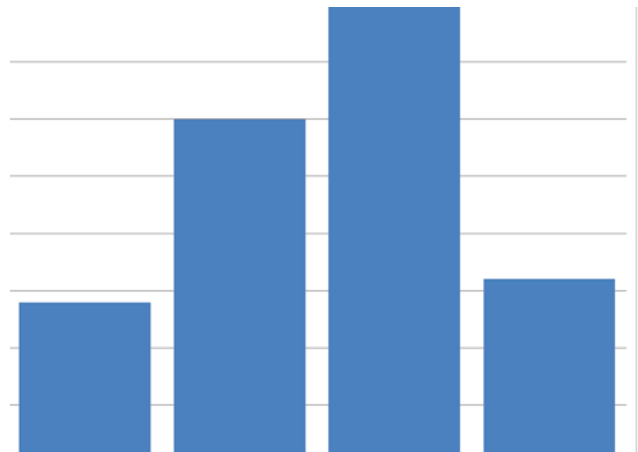


2.17 Bar Graphs

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): Lists the categories along the bottom, usually with spaces between the labels.
 - **Vertical (side) axis** (y): Plots the amount along the side, which is usually a number, unit of a percentage or a \$ amount.
 - **Heading** and **axis 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.

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2I Bar graphs

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The bar graph in the image above gives you an idea of how a bar graph should look. In fact this graph uses the data from Customer purchase patterns - March 2024 on p.51

However, this graph is not very useful because it doesn't include a heading, nor labels for the different bars on the bottom (the horizontal axis), nor \$ amounts up the left-hand side (the vertical axis).



1. In your workbooks construct a properly labelled bar graph to show how much each of the 4 customers spent in March, 2024.

You will need to have 4 'bars' along the bottom side, (1 for each of the 4 customers).

Your scale up the left-hand side will need to start at \$0 and will have to reach as high as \$800. Why so?

Bar graphs

Bar graphs are a good way to show numerical information because the user can very easily look at the size of the bars in order to interpret some information. 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:

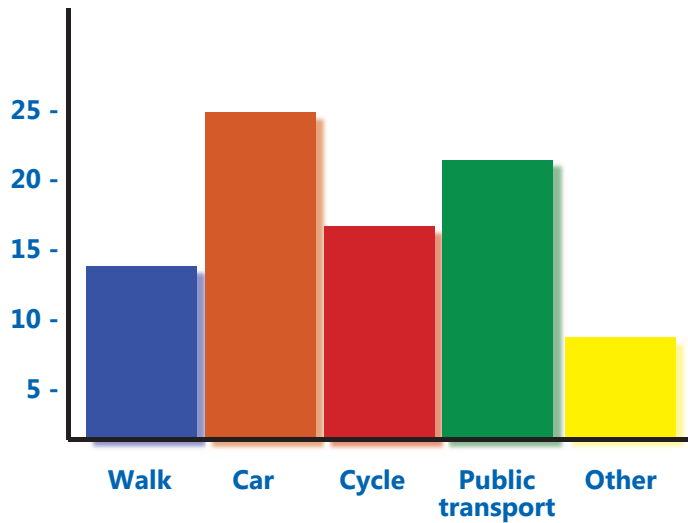
- ⇒ a person (sales by employees),
- ⇒ a time period (monthly electricity usage), or
- ⇒ a survey preference (favourite colour).

The height of the bars usually represent 'how much' a particular bar is measuring. For example,

- ⇒ total sales in \$ (for each salesperson),
- ⇒ total electricity used (for that billing period, i.e. 3 months), or
- ⇒ % of people surveyed whose favourite colour is pink (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.

Student travel method to school: Feb 4-8, 2024



FULL DRAFT PREVIEW SAMPLE

2. Answer each the following based on the bar graph shown above.

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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?

3. Construct a similar bar graph based on a survey of your own classmates.

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2.19 Pie Charts

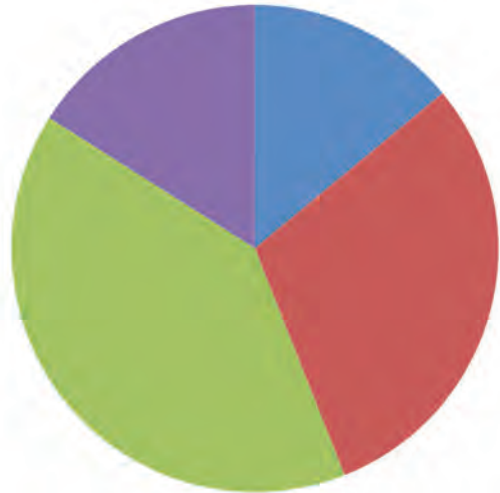
Pie chart

Pie charts are a good way to visually show numerical information that represents relative 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.



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 labels for segments, 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 to 'catch' all the smaller or less frequent amounts.

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2J Pie charts

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The pie chart shown in the image above gives you an idea of how a pie chart should look. This chart also uses that data from Customer purchase patterns - March 2024 on p.51.

However, once again this chart is not very useful because it also doesn't include a heading, nor labels that indicate which portion belongs to which customer, nor the % represented by each portion.



1. In your workbooks construct a properly labelled pie chart to show the relative proportion of how much each of the 4 customers spent in March, 2024. You will need to have labels that show which of the customers are represented by each of the coloured portions.

2. Answer each of the following based on the pie chart shown here.
3. In your workbooks show the information from the graph in a table.

Note: You also need to show a % amount for each portion of the pie. You can include this at the side (as a legend) or put the %'s on each portion.

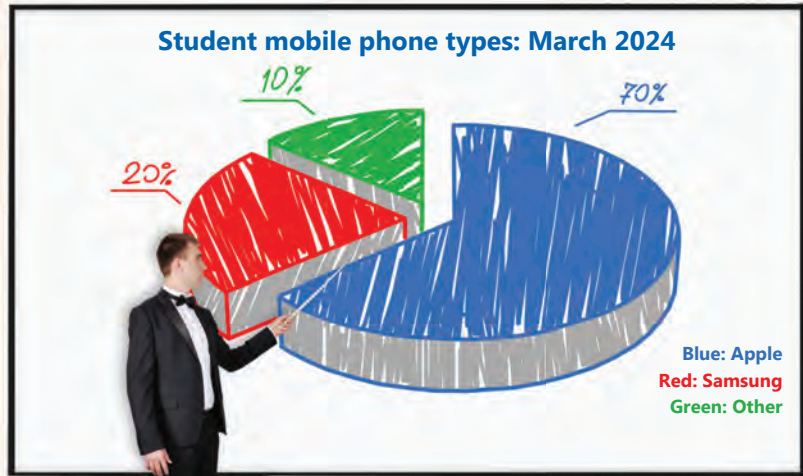


Image: vetkit/iStock/Thinkstock

What is being measured?	What is the time period?	What type of phone did most students have?	What might the 'other' include?
What about the number of phones if 50 students were surveyed?	About how many more students had Apple phones compared to Samsung phones?	If 100 students were surveyed what would be the number of phones in each category?	Do you think that this pie chart should have more segments? Explain.

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4. Survey the students in your class about their phones. Construct a table to collate the results and calculate the relative percentages.
5. Draw a properly labelled pie chart to show the results. Note: You are probably going to need more than 3 segments.
6. 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.



2.21 Line Graphs

Line graph

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 **high**s and **low**s, 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.

- FULL DRAFT PREVIEW SAMPLE**
- ⇒ A line graph shows a variable over an even period of time.
 - ⇒ The components of a line graph are:
 - **The Horizontal (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.

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2K Line graphs

Part A: 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.

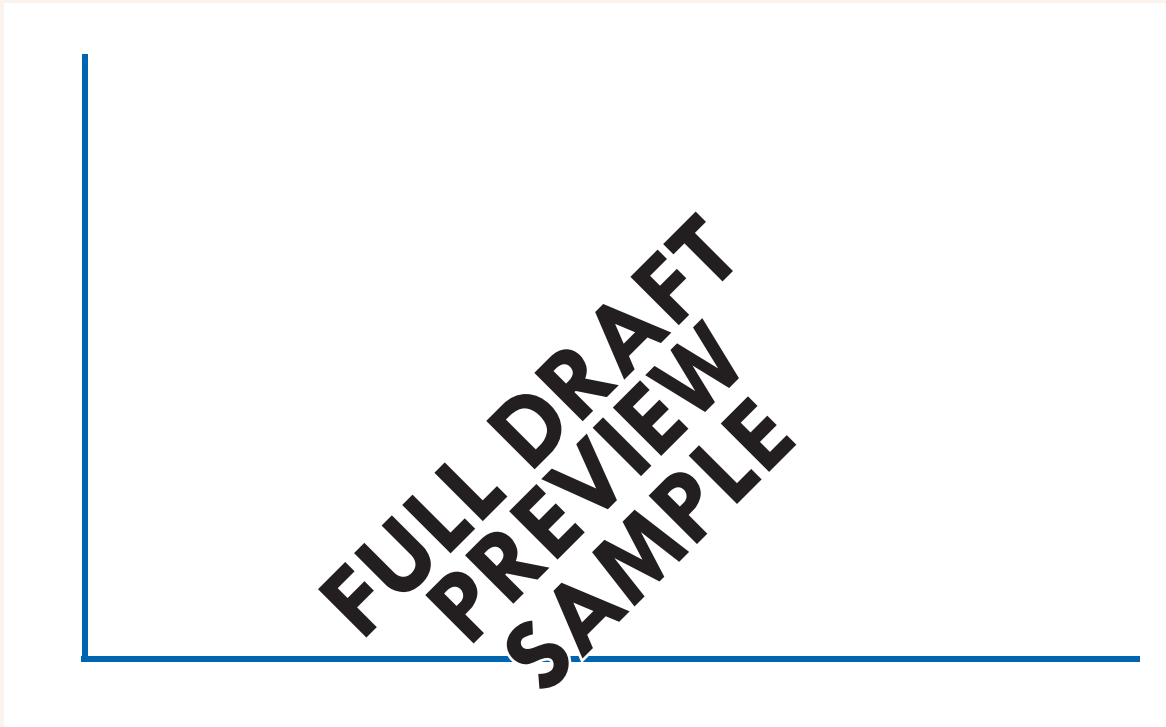
This graph has a starting point and then includes _____ periods of time. Overall, the t_____ of the graph is upwards.

Part B: Fuel lines

A line graph is a good way to visually represent changes in price over time.

e.g. Shazhah was keeping an eye on fuel prices at her local servo. She picked a Thursday as the comparison day. This week the price was \$1.96/litre. Last week it was \$1.92. The week before that it was \$2.08. 3 weeks ago the price was \$1.80 and the week before that the price was \$1.76.

1. Draw a properly labelled line graph based on Shazhah's investigation of petrol prices over time. (Below, in your work folios, or on a device).
2. In one sentence describe the trend of the graph in your work folios.



Do you notice that although Shazhah 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 \$1.70. How would you describe the trend of the line graph now? Does this give a better indication of the situation? Why/why not?

Part C: Up, up and away - or down?

Choose 3 items that you or your family commonly buy which can fluctuate 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.



2.23 Assessment Task

AT2 CDS 4 U & Me Personal Numeracy

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Overview

In November 2023, and after years of lobbying by different stakeholders, the Victorian State government finally introduced the 10c Container Deposit Scheme on designated cans, bottles and other qualifying recyclable beverage packaging. Refunds are available through reverse vending machines, recycling depots, over-the-counter sites and pop-up refund points.

The aim is to capture bulk quantities of the estimated 3 billion drink containers used by Victorians every year and divert some that would end up as landfill, as rubbish, and increasingly as floating plastic in waterways.

In the first week of the scheme 10,000,000 containers were recycled, returning a million dollars to collectors. By the end of 2023, 100 million containers were returned giving \$10 million back to ordinary people. So what's next?

You are required to apply the 4-stage problem-solving cycle and your growing numeracy skills and tools to complete parts A-C.

A. On your own

Use estimations, calculations and data tables.

1. How many containers do you and your family use weekly?
2. Where else could you collect from? How many could you get?
3. How much could you 'earn' from the scheme per week?
4. How much could you 'earn' from the scheme per year?
5. How much time do you think this would take?
6. Explain if it is worth your doing.

B. As a pair/team of 3-4

Use estimations, calculations, comparisons and data tables.

1. How many containers do all of you and your family use weekly?
2. Where else could you collect from? How many could you get?
3. How much could your team 'earn' from the scheme per week?
4. How much could your team 'earn' from the scheme per year?
5. How much time do you think this would take your team?
6. Explain now, if it is worth doing.

C. The entire class

Use estimations, calculations, comparisons, data tables and graphs.

1. How many containers do the entire class and their families use weekly?
2. Where else could your class collect from? How many could you get?
3. How much could your class 'earn' from the scheme per week?
4. How much could your class 'earn' from the scheme per year?
5. How much time do you think this would take?
6. Could it be a PDS project with your class managing the scheme for the entire school?
7. Explain if it is worth your doing.
8. How could you use the money collected to benefit others?



Assessment Task 2.24

Name(s):	Key dates:	Unit 3 Applied generally			
Tasks - AT2: CDS 4 U & Me		Must Do?	Due by	Done	Level
A. Collecting on your own. Estimate and calculate:					
1	Use of you and your family.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2	Other potential collection options and amounts.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3&4	Weekly and annual earnings.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
5	Time invested in collecting and returning.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
6	Evaluations of worthwhileness.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
B. Collecting as a pair/team of 3-4. Estimate and calculate:					
1	Use of your team and their families.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2	Other potential collection options and amounts.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3&4	Weekly and annual earnings.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
5	Time invested in collecting and returning.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
6	Evaluations of worthwhileness.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
C. Collecting as an entire class. Estimate and calculate:					
1	Use of your class and its families.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2	Other potential collection options and amounts.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3&4	Weekly and annual earnings.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
5	Time invested in collecting and returning.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
6	Explain whether this could be a PDS project.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
7	Evaluations of worthwhileness.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
8	How to use money collected to benefit others.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
1	Develop and apply numeracy tools and techniques.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2	Develop and explain graphs and tables.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
<div style="background-color: #f28b82; color: white; padding: 2px; display: inline-block; font-size: 0.8em;">1 4 PS 2 3</div>	Applied use of the problem-solving cycle.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report		
⇒ Prepare and submit your final report & documentation.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Present a report to the class (if required).		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>

2.25 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task:

Names/Dates:

AT2 -

1. Identify the maths					
Identify problem(s)	Done: <input type="radio"/> Level: <input type="text"/>	Recognise maths	Done: <input type="radio"/> Level: <input type="text"/>	Select information	Done: <input type="radio"/> Level: <input type="text"/>
Interpret information	Done: <input type="radio"/> Level: <input type="text"/>	Choose processes	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>
2. Act on and use maths					
Perform estimations	Done: <input type="radio"/> Level: <input type="text"/>	Decide techniques	Done: <input type="radio"/> Level: <input type="text"/>	Choose maths tools	Done: <input type="radio"/> Level: <input type="text"/>
Select technologies	Done: <input type="radio"/> Level: <input type="text"/>	Perform calculations	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>
3. Evaluate and reflect					
Check Estimations	Done: <input type="radio"/> Level: <input type="text"/>	Compare results	Done: <input type="radio"/> Level: <input type="text"/>	Check processes	Done: <input type="radio"/> Level: <input type="text"/>
Review actions	Done: <input type="radio"/> Level: <input type="text"/>	Check conclusions	Done: <input type="radio"/> Level: <input type="text"/>	Assess conclusions	Done: <input type="radio"/> Level: <input type="text"/>
4. Communicate report					
Written processes	Done: <input type="radio"/> Level: <input type="text"/>	Written results	Done: <input type="radio"/> Level: <input type="text"/>	Oral processes	Done: <input type="radio"/> Level: <input type="text"/>
Oral results	Done: <input type="radio"/> Level: <input type="text"/>	Digital processes	Done: <input type="radio"/> Level: <input type="text"/>	Digital results	Done: <input type="radio"/> Level: <input type="text"/>

FULL DRAFT
PREVIEW
SAMPLE



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

3

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Activities 3: Time and Place	p.	Due date	Done	Comment
3A Me and location & time	63	<input type="checkbox"/>	<input type="radio"/>	
3B Digital location systematics	52	<input type="checkbox"/>	<input type="radio"/>	
3C It's time	67	<input type="checkbox"/>	<input type="radio"/>	
3D Telling the time	69	<input type="checkbox"/>	<input type="radio"/>	
3E 24-hour time	70	<input type="checkbox"/>	<input type="radio"/>	
3F My daily time	71	<input type="checkbox"/>	<input type="radio"/>	
3G Converting time	72	<input type="checkbox"/>	<input type="radio"/>	
3H Estimating and converting		<input type="checkbox"/>	<input type="radio"/>	
3I What about place	75	<input type="checkbox"/>	<input type="radio"/>	
3J Preferred directions	77	<input type="checkbox"/>	<input type="radio"/>	
3K Map pathways	79	<input type="checkbox"/>	<input type="radio"/>	
3L Maps: Landmarks & scale	81	<input type="checkbox"/>	<input type="radio"/>	
3M Whereabouts?	82-83	<input type="checkbox"/>	<input type="radio"/>	
AT3a Marvellous Melbourne	84-87	<input type="checkbox"/>	<input type="radio"/>	
PST Problem-Solving Cycle and Maths Toolkit	88	<input type="checkbox"/>	<input type="radio"/>	

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Comments:

3.01 Personal Numeracy - Location

Personal numeracy

In Unit 3 you will be assessed on your understanding and application of both **Location** and **Systematics** in relation to Personal Numeracy. It is also important that you can apply this understanding to your vocational activities and responsibilities.

As always in your Numeracy studies, you are expected to apply the **4-stage Problem-Solving cycle**, as well as further developing and applying your **Mathematics Toolkit** including new tools.

Location

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

- ⇒ **directions**
- ⇒ **travel modes**
- ⇒ travel **routes**
- ⇒ travel **times**
- ⇒ **using maps**, and even
- ⇒ managing our own **personal space**.

Estimating and **calculating time** and **direction** play a large part in solving problems related to location and travel.

Location is also very important in vocational situations including:

- ⇒ getting to work **on time**
- ⇒ organising a safe and efficient **workspace**
- ⇒ locating **stock**, materials, equipment and other work-related **inputs** and **tools**
- ⇒ deciding how best to service **customers** and **clients**
- ⇒ working **efficiently** and **productively**
- ⇒ travelling from one **worksite** to another
- ⇒ organising **deliveries** and orders.

Although you will investigate **time** more explicitly in Unit 4 Module 1, you need to have a clear understanding of how to apply time **estimation** and **calculation** skills related to **location** as part of everyday **problem-solving** for personal and vocational situations.

Image: Krakenimages.com/
Depositphotos.com



“Where z ya?”
“Wherz tha at?”

“Behind you!”
“Seriously...?”

Location and Time Skills

Reading different times and time devices.

Estimating, planning, and organising time.

Keeping and using and daily planner.

Filling in timesheets and work schedules.



Interpreting rosters and timetables

Estimating distance and travel times.

Understanding direction and location.

Investigating places, maps and distances.

Giving and following directions.

Planning a travel route.

Reading, using and making maps.

Finding landmarks.

Meeting time lines and deadlines.

Interpreting scales and symbols.

Image: tashatuvango/Depositphotos.com

Me and location & time 3A

Rate your applied skills in each of the location and time actions above. Add 2 more. Be prepared to discuss your ratings.

3.03 Personal Numeracy - Location

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.

Location 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.

🧠 So do you use these digital systematics tools related to location?



Image: Milkos/Depositphotos.com

Location - Digital Systematics

Navigation apps

People use navigation apps like Google Maps to plan their routes and find directions to various locations, whether it's for driving, walking, or public transportation.

Ride-sharing

People without their own transportation may use ride-sharing apps like Uber where they input their current location and desired destination to secure a ride.

Event planning

When organising social events or gatherings, people may use apps to coordinate locations, timings, and other details. This can include scheduling events on platforms like Facebook or Snapchat or using event-specific apps to manage invitations and locations.

Geo-tagging

People often use systematics to add geotags to their social media posts, indicating the location where a photo or status update was posted. This can help them document their experiences and share their travels and whereabouts with friends.

Location sharing

Systematics can be employed for location sharing through apps like Find My Friends or Maze location-sharing features in messaging apps. This helps people coordinate meet-ups or let friends and family know their whereabouts.

Digital location systematics 3B

1. Do you use the digital systematics tools on p.64 related to location? List these in the table. Add up to 3 more that you use.
2. If so for what/when; and why?

Digital tools	For what do I use this?	Why do I use this?

FULL DRAFT
PREVIEW
SAMPLE

Investigation

Before the age of ‘apps’, how did people do these same things? Find out by asking some people (much) older than you.



3.05 It's Time

Time

A key part of understanding and describing **location** involves **time**. So we need to have a recap of the key concepts related to estimating and calculating time.

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** is the approximate time it takes the Earth to rotate on its axis: 24 hours.

An **hour** is broken into 60 **minutes**, each of which is broken into 60 **seconds**.

So there are 86,400 seconds in a day (60 x 60 x 24). That's a lot of seconds to use wisely. Tick. How did you use that one? Tock. What about this one?

The **standard full-time work week** in Australia is 38 hours, although some workers are on a 35-hour week.

Of course many people work more than a standard week performing both paid and unpaid **overtime**. Many people also work less than a standard week as **part-timers** or **casual** employees.

Most **self-employed** people work well over 38-hours each week. Some people have two or more jobs and really rack up the hours. And some people, for various reasons do not work at all as an employee. Even though they might perform a lot of unpaid **domestic work** and community **volunteering**.

Some **service** occupations **charge** by the hour (e.g. salon), half-hours (tradies), quarter hours (GPs) or even minutes (expensive lawyers!).

The approximate time it takes The Earth to orbit The Sun is one year. This of course = 365 days.

A standard work year for most employees in Australia = 240 work days less **public holidays** and **personal** leave.

But again some people perform more work days than this. This includes managers and professionals, people working overtime, people working more than 1 job, self-employed people, as well as workers in high demand or employed in occupations and industries with labour shortages. And then there are some people who work close to 365 days a year. Let's give a shout-out to those working the land!

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?

Image: Aleksei-veprev/
Depositphotos.com

🧠 Do you 'juggle' your time well? This guy seems to be stuck in a time warp! And his clockfaces aren't quite right either!



It's time 3C

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 after 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.

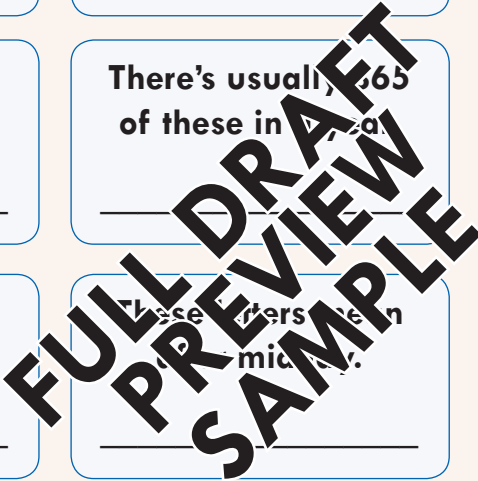
This term describes when something is expected to arrive.

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.



3.07 It's Time

'Telling' the time

Let's also have a recap of 'telling the time', because in this age of digital devices, some people are getting a bit rusty at being able to use all three time methods.

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 and businesses prefer **24-hour time**, especially in the world of work. For many of you, your future work rosters and timesheets are likely to be in 24-hour time.

And you may have found out when watching science fiction and time travel movies, time is also the 4th dimension! Just ask Marty McFly and Doc Brown!

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 the time in pm.

9:00 pm

24-hour time

24-hour time treats the day as **continuous** 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.

21:00

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.

Telling the time 3D



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.

<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="9:30"/>	<input type="text" value="10:45"/>	<input type="text" value="Quarter past two"/>
<input type="text" value="Half past four"/>	<input type="text" value="Midnight"/>	<input type="text" value="The current time"/>

FULL DRAFT
PREVIEW
SAMPLE



3.09 It's Time

3E 24-hour time



1. A lot of workplace rosters and transport times use 24-hour time. Use the signifiers of am and pm to interpret these digital displays as 12-hour time.

16:00	17:30	20:45	23:36
06:00	02:15	10:45	19:30
18:00	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 are your times for when you leave school and arrive home? Show these times on a 12-hour clockface, as digital time, and as 24-hour time.

	<input type="text" value="M"/>	<input type="text" value=":"/>
	<input type="text" value="M"/>	<input type="text" value=":"/>



My daily time 3F

1
4 PS 2
3



1. So how does time impact on your life in respect to location?
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 and location impact on, or influence, what you do.
e.g. School: - On a school day I have to travel 45 minutes to get to school.
- My workplace is only 15 minutes away from the school.
- But it takes 10 minutes to get to the café' for lunch.

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.

FULL DRAFT
PREVIEW
SAMPLE

Discussion
What tools and apps do you use to help you organise, plan and use your time?
Are any of these different for personal or vocational situations?



3.11 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: paulfle
Depositphotos.com

3G Converting time

Complete the following time conversions.

a. What is 3 hours in minutes?	k. What is 2 hours and 45 minutes in minutes?	c. What is 5 and 1/2 hours in minutes?	d. What is 6 hours in minutes?
e. What is 18 hours in minutes?	f. What is 3 3/4 hours in minutes?	g. What is 300 seconds in minutes?	h. What is 1 day in minutes?
i. What is 90 minutes in hours?	j. What is 240 minutes in hours?	k. What is 420 minutes in hours?	l. What is 2 days in hours?
m. What is 900 minutes in hours?	n. What is 1,320 minutes in hours?	o. What is 450 minutes in hours?	p. What is 45 minutes in hours?

Estimating duration

Planning and organising your life effectively involves the ability to make informed time estimates. This applied **problem-solving** skill requires:

- ⇒ **predicting** how long tasks will take
- ⇒ **estimating** travel durations, and
- ⇒ **gauging** the time spent on specific activities.

Estimating time **duration** involves applied numerical tools and techniques to calculate or predict how long a task will last.

As you know, problem-solving for duration is important in personal activities like cooking, travelling and even going out and socialising. This is also vital for nearly all work-related tasks that must 'run according to the clock'.

Estimating and converting 3H

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 both to and home from school?	b. How long it takes you to get both to and home from school for the entire week?
c. How much time you will spend today watching online videos?	d. How much time you will spend this weekend watching online videos?
e. How much time you will spend exercising today?	f. How much time you will spend exercising this month?
g. How long will it take you to make a tasty spag bol?	h. How long would it take you to make a tasty spag bol lunch for the whole class?
i. How long will it take you to get to the nearest surf beach?	j. How long will it take you to travel to Byron Bay?

1
4 PS 2
3



3.13 Getting Around

Location

Location simply 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** enables us to navigate the world better.

Spatial understanding is very important for work-related situations.

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.

These can include words such as “left” or “right”, “up” or “down”, “over there”, “behind”, “in front”, “beside”, “here”, or even “up the street and round 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?



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

Image: bennymarty/Depositphotos.com

FULL DRAFT
PREVIEW
SAMPLE

What About Place



Image: tashatuvango/Depositphotos.com



Describe how you have applied each of the ‘What About Place’ concepts in personal and vocational situations. Add 2 more.

What about place	Personal situations	Vocational situations
Location		
Directions		
Distance		
Estimating		
Planning		
Hard copy maps		
Digital maps		
Navigation		
Landmarks		
Travel & transport		

**FULL DRAFT
PREVIEW
SAMPLE**

3.15 Getting Around

Directions

So, how are you at giving and following directions to find your way (**navigate**) around? Giving and following directions is an important numeracy skill in personal and vocational situations and is applied use of the problem-solving cycle in action.

When someone asks you for directions you are taking responsibility for guiding that person efficiently and safely to where they want to go.

If you are working in a supermarket and a customer asks you where to find the Coco Pops, again you are taking responsibility for making their shopping experience easier.

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 a shopping mega-mall.
- ⇒ **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.

Combinations

When we give and receive instructions we usually use a combination of these methods. But as you have experienced, 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 like stumbling upon something new! Others are in a big hurry, some are stressed and some people can be very pushy and demanding - even though they themselves don't know how to get to where they want to be.

The world is full of diversity. For example, how would you ask for directions in China?

People may be differently abled; for example, how would you guide a visually-impaired person to the nearest McDonald's?

And some people may be in a rush! So how would you respond to a frantic driver who calls out to you while stopped at a set of traffic lights and begs you to tell him the location of the nearest hospital because his wife is going into labour in the back seat!?

- 🧠 So what type of method for 'directions' do you prefer to use when you are trying to navigate in **personal situations**? What about in **vocational situations** - do you switch methods when you have the **responsibility** of looking out for others?



Image:
lucianmilasan/
Depositphotos.com

1. What type of method for giving 'directions' do you prefer to use when you are trying to get around? Comment on each of these methods (for or against) to describe your preferences, and give an applied example to show this.



1
4 PS 2
3

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		

2. What type of method for giving directions do you prefer to use when you are helping someone else get around? Comment on each of these methods (for or against) to describe your preferences and give an applied example.

Method	Explanation for me	Example
e.g. Physical	When someone asks me how to find a place I point in the direction and also screw my arm around if they need to turn a corner.	An old man asked me how to get to the Centrelink nearby. I pointed up the road a long way and then screwed my arm left to show he had to turn.
Oral		
Written		
Visual		
Digital		
Physical		



3.17 Getting Around

There to here and back again

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 or to work, and back again, even if you use different travel methods and routes.

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

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



Using maps

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 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 into memory.

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

Many GPS and e-devices will come up with a pathway route when you enter 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.

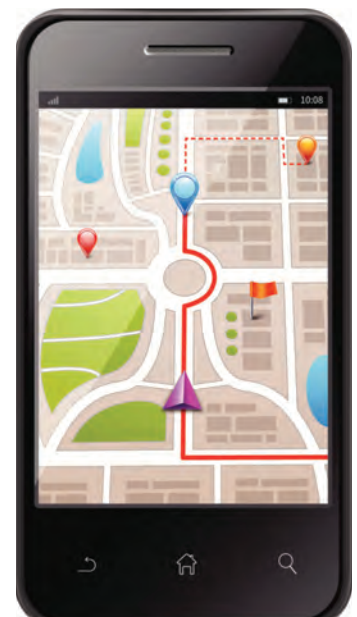


Image: macrovector/
iStock/Thinkstock

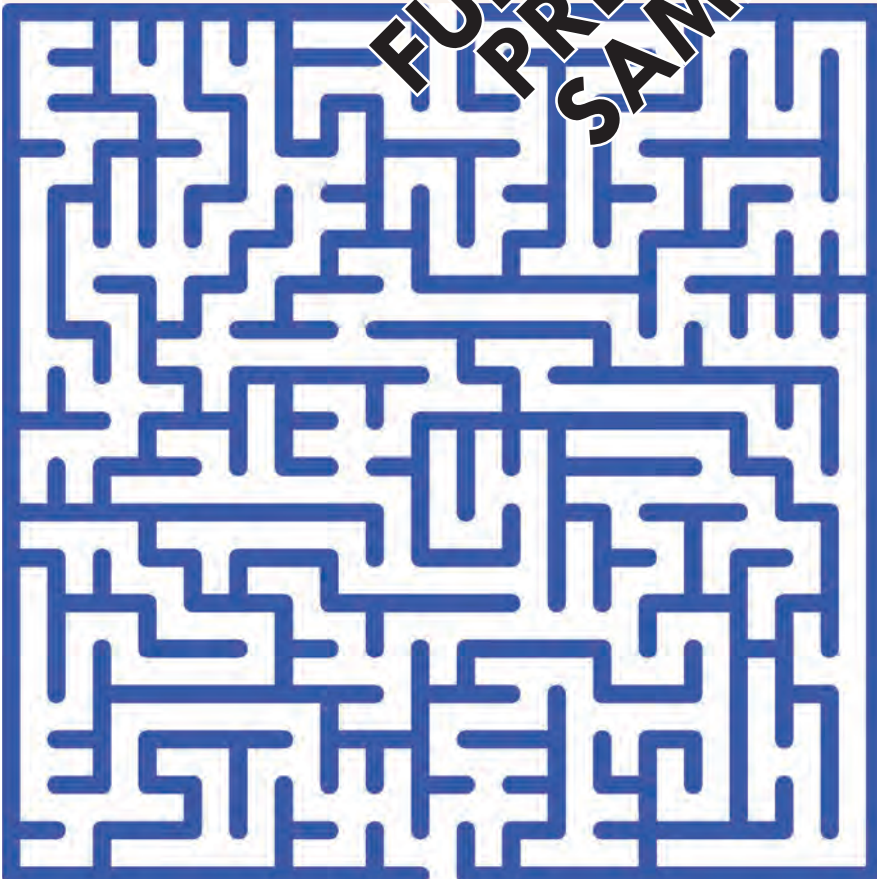


1. What is a map 'pathway'? Why is a map pathway important? When do you use map pathways?

1
4 PS 2
3

2. Creating map pathways can be like navigating a maze. Solve this maze. Then use short statements to describe the pathways that you took. e.g. Start at top. Turn left at first corner...

Image: AlexanderZam/Depositphotos.com



3.19 Getting Around

Features and landmarks

Most maps will include common or key features or landmarks. These **landmarks** 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 oval then you’ve gone too far.”
- ⇒ “Turn right at the roundabout.”
- ⇒ “When you come to the park keep going, because mine is three doors down.”

💡 So, if you can find features and landmarks when 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 enables the map user to make a visual estimate of travel distance and time. This helps give spatial bearings.

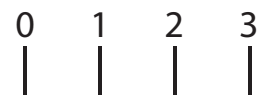
Not all maps are drawn to scale, nor do they need to be. When you are using a map see if it is **to scale**, or **close to scale**. But when you are constructing a map, then try to make it close to scale so that people can **estimate** approximate distance and time. Your teacher will help guide you with this.

If the map is for a short distance then the scale will be quite generous, e.g. 1cm = 1m (i.e. a school or shop map).

If the map is for a large distance the scale will be quite economical, e.g. 1cm = 1km (a street or town map).

Scale = 1:100

1 cm = 1 m



Using maps


With maps you need to make use of these three key features that help make maps both more effective and more efficient.

Pathways: When using or creating a map look for and show the most effective pathways route that suits that type of transportation mode being used by the person; e.g. walking, car, public transport, cycling, etc..

Features (and landmarks): Show key features and landmarks that the map user will look out for. These help a person gain a visual understanding of where they are. Key features on a map also help build location-memory.

Scale: A scale measures a ratio such as 1cm = 1km. This means that 1cm on the map corresponds with 1 km in real life. Scale might be written as 1:100 (e.g. 1cm = 1m). Making a map close to scale better represents distance and/or time.

NUM
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1. What are map 'landmark features'? Why are map landmark features important? 

2. When do you use or look for map landmark features? Which types? Draw some.

3. What is a map scale? How does a scale help a map user? When do you use or look for a map scale?

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Applied investigation: Maps vs apps

Even though many people prefer to use digital devices for navigation you will still experience that some people, especially older people, prefer to use printed maps such as the Melways street directory, especially for longer and unfamiliar journeys.

One of the main reasons for this is that with a street directory, you can get a much better 'big-picture' view of the journey because the page interface is much larger than a small screen interface.

You also develop spatial location memory as you yourself are creating the route rather, than just being told where to go, step-by-step by 'AI'.

Choose 3 journeys: Less than 30 mins. 30 mins to 1 hour. More than 1.5 hours. Use a street directory to plan your journey and to estimate travel time.

How did you go? Do you think that you have a better understanding of these journeys?

What advantages and disadvantages did you experience with this 'old-school' method?

1
4 PS 2
3



3.21 Putting it Together

3M Whereabouts?

1
4 PS 2
3

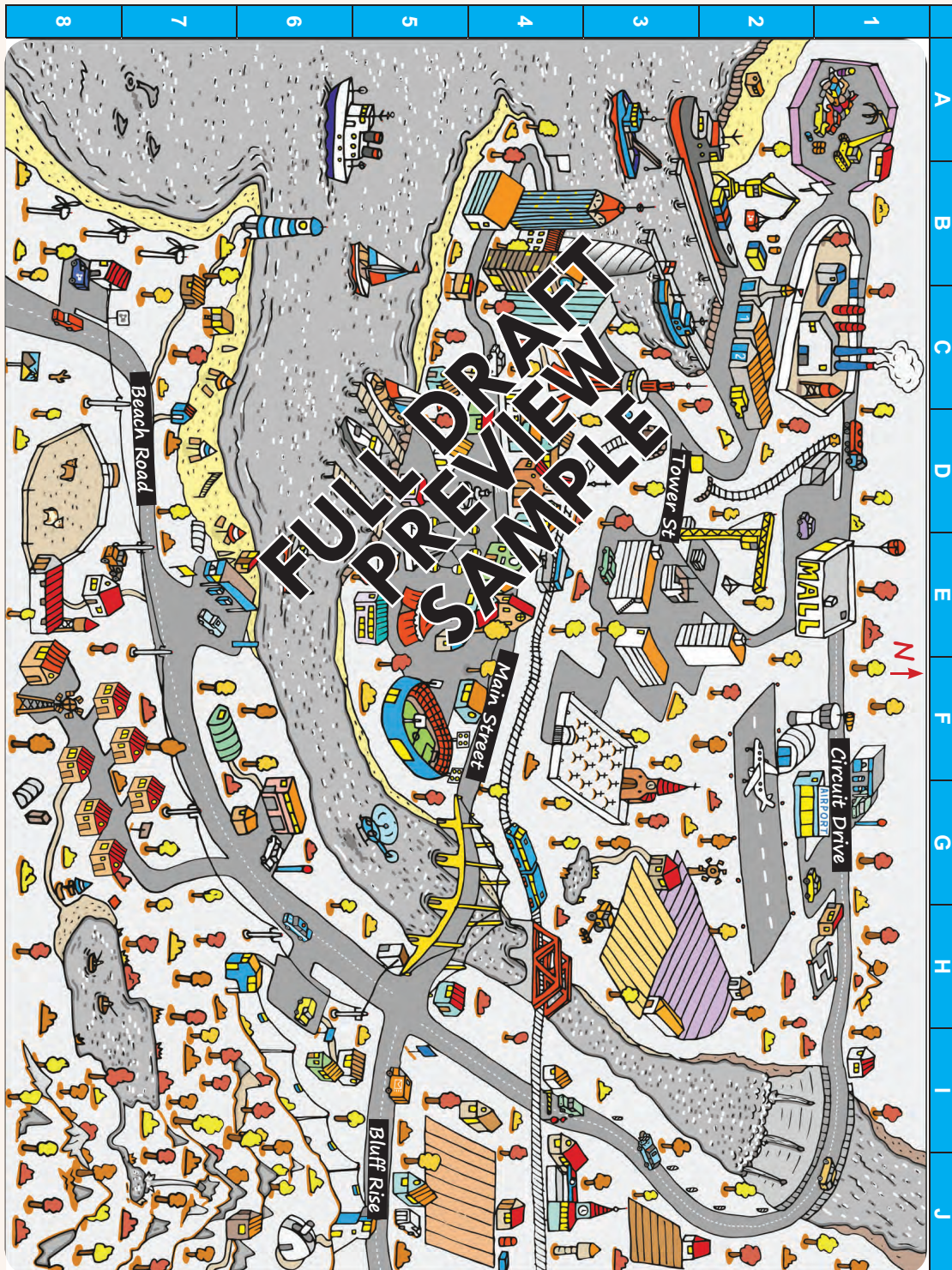


This map and its landmarks are not exactly to scale, but they are pretty close.

Find each of the landmarks listed opposite using the grid references. (There may be multiples, so choose.) Describe where each is using street, directional and landmark locations. Include compass directions if that helps. Add 6 more.

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



Putting it Together 3.22

Shopping mall	Circus	Dockyards
Junkyard	Cemetery	CBD
Airport	Lighthouse	Marina
Train station	Waterfall	Observation deck
Animal paddock	Crop farm	Church
Factory	Windmills	Petrol station
Lake	Railway bridge	Heliport
Chairlift	Observatory	Arena
Explain how long you think it would take to walk from the mall to the lighthouse.		Explain how long you think it would take to cycle from the marina to the factory.
Explain how long you think it would take to walk from the cemetery to the CBD.		Explain how long you think it would take to drive from the junkyard to the lake.
What do you think are the dimensions of this town as shown by the map?		What standard town amenities and features seem to be missing?

FULL DRAFT
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SAMPLE

3.23 Assessment Task

AT3a Marvellous Melbourne Personal Numeracy: Location

Shown opposite is a stylised rendered map of Melbourne CBD and surrounds. It's one of many cool pieces of work from the talented digital artist, 'Shlapak'.

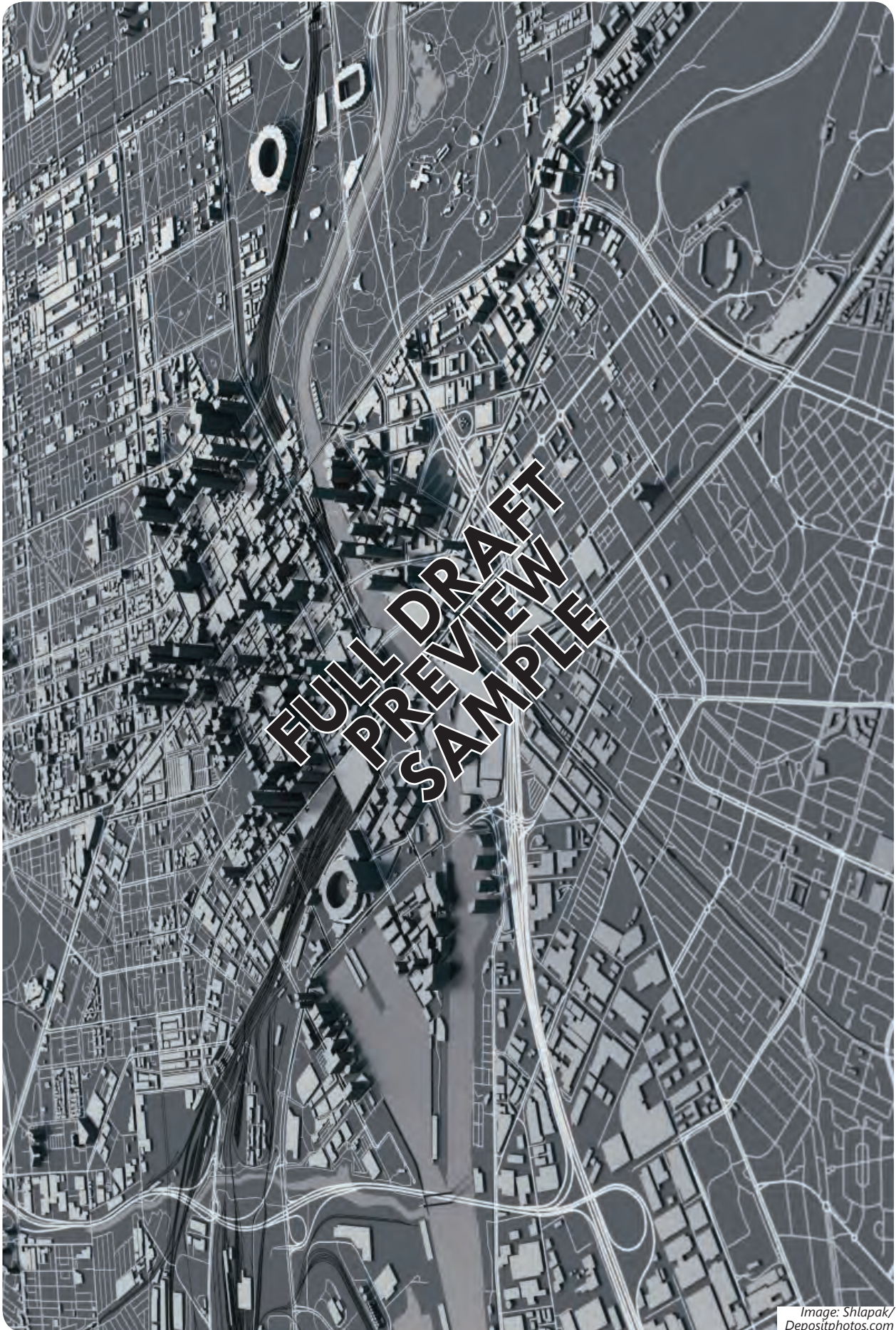


You are required to use this map, your own applied knowledge and other numeracy tools and techniques to complete the following tasks.

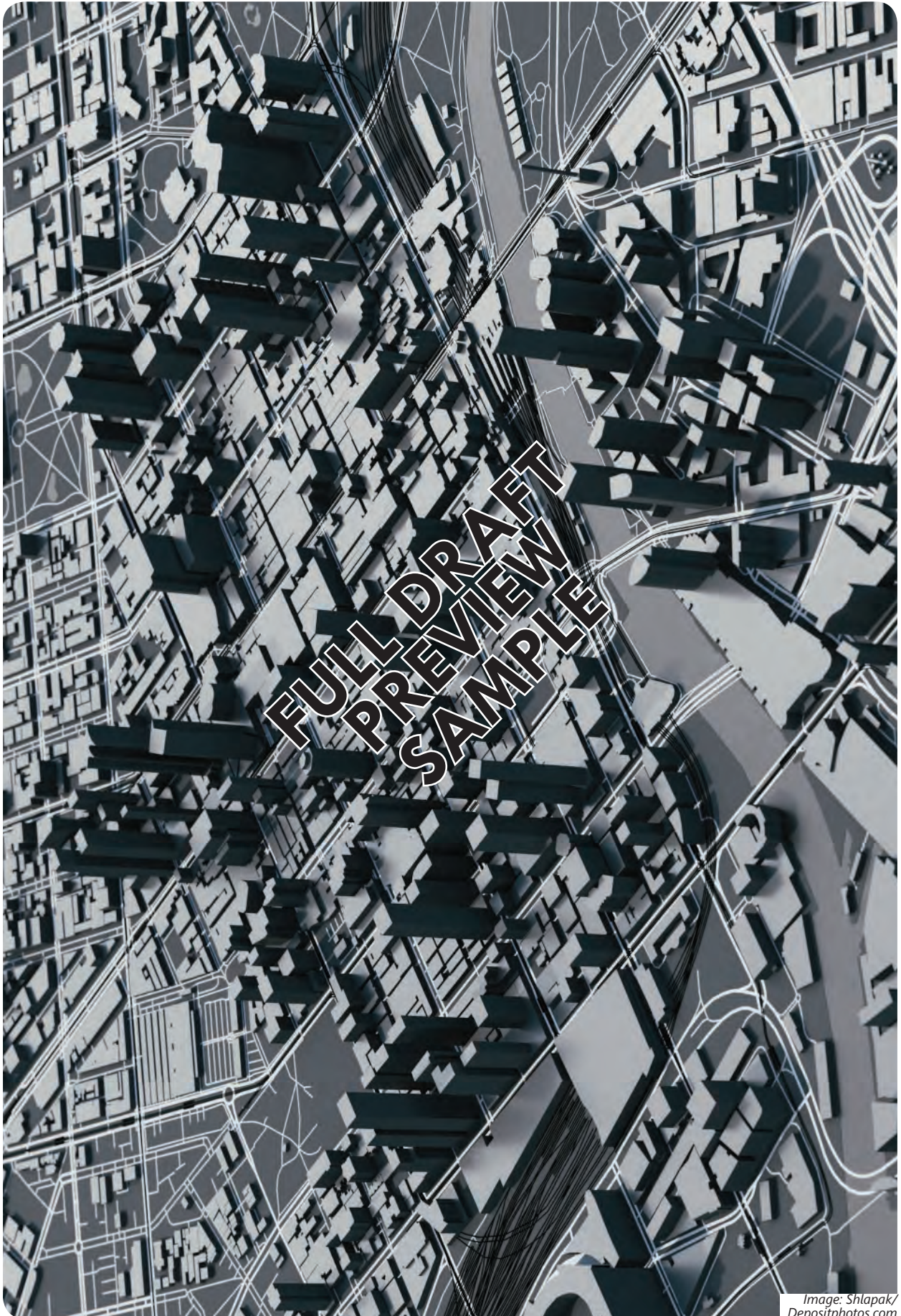
1
4 PS 2
3



1. Where are you viewing Melbourne from? Which direction are you looking? Identify and mark, N, S, E and W.
2. Estimate the size of the area that you think the map covers. How could you work this out? Check your estimates. How did you go?
3. Where are the boundaries of the map located? What suburbs do these involve? Describe these locations.
4. Which landmark features can you identify? Where are they located? You can use relative location, a grid system, directions and scale.
5. Which parks and waterways can you identify? Where are these located?
6. Large buildings and structures show up on the map but small houses and buildings do not. Identify and describe the location of key buildings/structures.
7. Identify the main 'streets' that make up the Melbourne CBD and describe their (relative) location on the map.
8. How long would it take you to walk north-south and east-west in the CBD? What about cycling? What about a tram ride? What about driving - and which routes would you use for that?
9. Where are the train stations? Where will the new train stations be? Identify and describe these locations.
10. Where have you been in the CBD most recently, or where do you visit regularly? Locate these. Why did you go there and how did you get there?
11. Identify the main 'thoroughfares' that lead into the Melbourne CBD as shown on the map and describe their (relative) location on the map.
12. Add other relevant information that would help visitors, pedestrians, cyclists, commuters, delivery drivers, commuters, tourists and others, including accessibility advice.



3.25 Assessment Task



Assessment Task 3.26

Name(s):	Key dates:	Unit 3 Module 1 Location		
Tasks - AT3: Marvellous Melbourne	Must Do?	Due by	Done	Level
1. Direction viewing Melbourne.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2. Estimate map size// Compare to actual.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3. Map boundaries, suburbs and locations.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
4. Landmark features and locations.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
5. Parks and waterways and locations.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
6. Large buildings and structures and locations.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
7. Main CBD streets and locations.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
8. Travel times & routes// Walking, cycling, train and driving.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
9. Train stations// And new stations.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
10. My locations and why?// How I got there.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
11. Main thoroughfares into CBD and its environs.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
12. Other:	<input type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
	<input type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
	<input type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
1 4 PS 2 3 Describe applied use of the problem-solving cycle.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report	
Develop and apply mathematical tools and techniques.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>
⇒ Prepare and submit your final report & documentation.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>
Present a report to the class (if required).		<input type="checkbox"/>	<input type="text"/>	<input type="radio"/>

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Additional information:

Signed: _____ Date: _____

3.27 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task:				Names/Dates:			
AT3 -							
1. Identify the maths							
Identify problem(s)	Done: <input type="radio"/> Level: <input type="text"/>	Recognise maths	Done: <input type="radio"/> Level: <input type="text"/>	Select information	Done: <input type="radio"/> Level: <input type="text"/>		
Interpret information	Done: <input type="radio"/> Level: <input type="text"/>	Choose processes	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>		
2. Act on and use maths							
Perform estimations	Done: <input type="radio"/> Level: <input type="text"/>	Decide techniques	Done: <input type="radio"/> Level: <input type="text"/>	Choose maths tools	Done: <input type="radio"/> Level: <input type="text"/>		
Select technologies	Done: <input type="radio"/> Level: <input type="text"/>	Perform calculations	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>		
3. Evaluate and reflect							
Check Estimations	Done: <input type="radio"/> Level: <input type="text"/>	Compare results	Done: <input type="radio"/> Level: <input type="text"/>	Check processes	Done: <input type="radio"/> Level: <input type="text"/>		
Review actions	Done: <input type="radio"/> Level: <input type="text"/>	Check conclusions	Done: <input type="radio"/> Level: <input type="text"/>	Assess conclusions	Done: <input type="radio"/> Level: <input type="text"/>		
4. Communicate report							
Written processes	Done: <input type="radio"/> Level: <input type="text"/>	Written results	Done: <input type="radio"/> Level: <input type="text"/>	Oral processes	Done: <input type="radio"/> Level: <input type="text"/>		
Oral results	Done: <input type="radio"/> Level: <input type="text"/>	Digital processes	Done: <input type="radio"/> Level: <input type="text"/>	Digital results	Done: <input type="radio"/> Level: <input type="text"/>		

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Mathematical Toolkit					
Analogue tools - What & how?		Digital Devices - What & how?		Software & Apps - What & how?	
Choice & Range <input type="text"/>	Skill & Accuracy <input type="text"/>	Choice & Range <input type="text"/>	Skill & Accuracy <input type="text"/>	Choice & Range <input type="text"/>	Skill & Accuracy <input type="text"/>

Location and Planning

4

4.01 Location and Planning.....90	4.22 Assessment Task 111
4.03 Compass and Angles.....92	4.25 Planning and Organising..... 114
4.09 Describing Location98	4.31 Assessment Task 120
4.17 Distance and Time..... 106	4.33 Problem-Solving & Toolkit..... 122

Activities 4: Location and Planning	p.	Due date	Done	Comment
4A How I use...	91	<input type="checkbox"/>	<input type="radio"/>	
4B Compass directions	92-93	<input type="checkbox"/>	<input type="radio"/>	
4C Angels	96-97	<input type="checkbox"/>	<input type="radio"/>	
4D Where can I find....	99	<input type="checkbox"/>	<input type="radio"/>	
4E Location	100-101	<input type="checkbox"/>	<input type="radio"/>	
4F Language of location	102-103	<input type="checkbox"/>	<input type="radio"/>	
4G Tour guiding	104-105	<input type="checkbox"/>	<input type="radio"/>	
4H Getting around	106-107	<input type="checkbox"/>	<input type="radio"/>	
4I Apps v maps	108	<input type="checkbox"/>	<input type="radio"/>	
4J Travel speeds	109	<input type="checkbox"/>	<input type="radio"/>	
4K Distance and time	110	<input type="checkbox"/>	<input type="radio"/>	
AT4a Off To Work I Go	111-113	<input type="checkbox"/>	<input type="radio"/>	
4L Calendars & diaries	115	<input type="checkbox"/>	<input type="radio"/>	
4M To-do list	116	<input type="checkbox"/>	<input type="radio"/>	
4N Timetables	117	<input type="checkbox"/>	<input type="radio"/>	
4O Rosters	119	<input type="checkbox"/>	<input type="radio"/>	
AT4b It's Up To Me	120-121	<input type="checkbox"/>	<input type="radio"/>	
PST Problem-Solving Cycle and Maths Toolkit	122	<input type="checkbox"/>	<input type="radio"/>	

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Comments:



1. Describe an applied example of how each of these location and planning terms relates to you in your personal life. What information/apps/tools do you use?
2. Describe an applied example of how each of these location and planning terms relates to you in your vocational life. What information/apps/tools do you use?

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

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4.03 Compass and Angles


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 describe **relative position**.

We also use **descriptors** that give an indication of how far, such as "pretty soon", "2-blocks", "200m", "in 2 minutes" or simply even, "just go around 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?



4B Compass directions













1. Label the compass pointers 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?

- Mark the correct points on the compass below and/or identify the correct compass directions (bearings).
- The needle on a compass always points north. But how do you use a compass to navigate? Research this online and summarise in your work folios.



<p>a. West</p> 	<p>b. South-East</p> 	<p>c. North-West</p> 
<p>d. East</p> 	<p>e. SW</p> 	<p>f. NE</p> 
<p>g. _____</p> 	<p>h. _____</p> 	<p>i. _____</p> 
<p>j. In degrees _____</p> 	<p>k. In degrees _____</p> 	<p>l. In degrees _____</p> 

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- Find out what types of occupations use compass directions and bearings as part of their day-to-day work roles. How well would you go at doing this?

1
4 PS 2
3

4.05 Compass and Angles

Angles

An angle measures the 'distance' between 2 **rays**. When drawn these rays might be represented by lines. In the **3-dimensional** world the 'rays' might represent the edges of physical objects, or expressions of direction.

An angle is measured in degrees. One full turn of an angle equals 360° . Therefore a $1/4$ turn represents 90° . This is called a **quadrant**. Therefore, four quadrants make up an entire 'turn'. Just like if you face north and turn 90° to face west, turn another 90° to face south, turn 90° again to be facing east, and then 90° once more; you're back facing north.

That's 360° in total. And you're back to the same direction you were in the beginning.

One of the most common ways of measuring degrees is to use a **protractor**. You probably are used to seeing them in sets of drawing and writing implements. You've also probably used a protractor many times in the past.

The major directional points on a compass each represent 90° .



Image: kontur-vid/iStock/Thinkstock



Image: Serhiy Stakhnyk/iStock/Thinkstock

Personal application

Using angles is a natural part of our lives. It's just that we don't really think about them that much. From the angle of our chin (to support) to the angle of high heels (discomfort), we use our visual spatial acuity to assess and accommodate angles on a daily basis.

- ⇒ We use angles to assess how our clothing fits on our bodies.
- ⇒ We use angles when driving and parking.
- ⇒ We open our mouths at different angles, depending on how big the burger we are trying to fit in is!
- ⇒ When singing, a different-angled vocal cavity can change pitch and volume.
- ⇒ When dancing, angles can be used to articulate line and to drive movement.
- ⇒ We try to get the best angles when watching screens.
- ⇒ We angle the cue stick and angle how we hit the cue ball when playing pool.
- ⇒ Angles are very important when parking a car, such as parallel parking, 45° parking (which is called angled parking!) and when making tricky turns.
- ⇒ Self-obsessed people try out angles when taking selfie after selfie in the mirror!

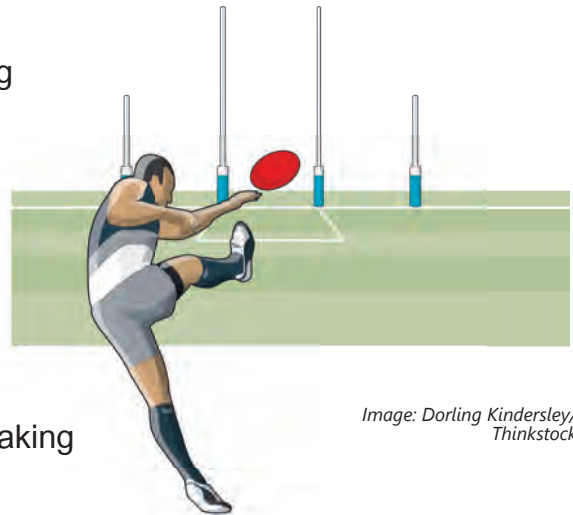
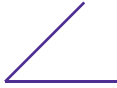







Image: Dorling Kindersley/Thinkstock

Types of angles

<p>Acute: An acute angle is less than 90°.</p>  <p style="text-align: center;">Looking down: Opening a door.</p>	<p>Straight: A straight angle is exactly 180°.</p>  <p style="text-align: center;">Looking side-on: Laying down flat.</p>
<p>Right: A right angle is exactly 90°.</p>  <p style="text-align: center;">Looking front-on: Wall meeting a floor.</p>	<p>Reflex: A reflex angle is greater than 180°.</p>  <p style="text-align: center;">Looking side-on: Doing a hyper-extension on a bench.</p>
<p>Obtuse: An obtuse angle is more than 90° but less than 180°.</p>  <p style="text-align: center;">Looking side-on: A reclining chair.</p>	<p>Full: A full angle is 360°.</p>  <p style="text-align: center;">Looking down: Performing a pirouette!</p>

NUM
SUPER
SKILLS

Vocational applications

Measuring angles is very important in many vocational situations. Experienced and skilled employees actually do this by developing and applying their visual-spatial skills, or through kinaesthetic application and muscle memory.

- ⇒ Carpenters and joiners assemble their fittings using varied angles.
- ⇒ Tilers have to cut tiles to geometric patterns based on the calculation of angles.
- ⇒ Multimedia designers rotate design elements based on angles.
- ⇒ Clothing makers use angles to determine garment shape and hang.
- ⇒ Furniture makers design and build chairs for different sitting angles.
- ⇒ Nurses and carers have to support patients at different angles, often using a motorised bed, trolley or chair.
- ⇒ Truck and lorry drivers use angles to make turns and to reverse park their vehicles and loads.
- ⇒ Hairdressers style and cut geometric hair shapes and patterns.
- ⇒ Furniture removalists calculate angles when moving large-sized or bulky items through narrow spaces.
- ⇒ Construction workers use angles for many tasks, including the safe placement of a ladder.
- ⇒ Sportspeople rely on the use of angles, such as footballers and soccer players kicking for goal, cricketers when bowling and batting, hockey players hitting the ball, soccer goalkeepers making a save; and many more diverse applications in basketball, archery and even darts!

4.07 Compass and Angles

Angles in action

Sometimes people use angles when describing **direction** and **location**. This is especially relevant in **practical**, **manual** and **technical** occupations, and in many **movement**, **transport** and travel situations.

Angles are also used for describing direction and location in **performative areas** such as dance, in sports, in many creative areas such as photography, design, staging and lighting, and in some health and recreation situations.

One of the best ways to apply directional angles is to rotate an object, or yourself, the number of turns signified by the angle.

So given that a quarter turn is 90° , this will see you or the object, facing in a totally different direction. Four quarter turns and you are back to where you started.

Angles and degrees are also used as descriptive terms in 'artistic' sports to describe body rotations such as twists, flips and somersaults in snowboarding, ski-jumping, water skiing, skating, BMX, diving and gymnastics.


 For example, "Woo-hoo, Jump, Jaxxon just landed a 720 on the pipe! How rad is that!"



Image: adapted from bojanovic/Depositphotos.com

4C Angels

1. Match the type of angle with the correct explanation. In your work folios, draw a representation of each angle.

- | | |
|--|--|
| <input type="checkbox"/> An angle that is less than 90° . | <input type="checkbox"/> An angle that is exactly 180° . |
| <input type="checkbox"/> An angle that is exactly 90° . | <input type="checkbox"/> An angle that is greater than 180° . |
| <input type="checkbox"/> An angle that is more than 90° but less than 180° . | <input type="checkbox"/> An angle that is 360° . |

Acute	Full	Obtuse
Reflex	Right	Straight

2. Draw or represent these common angles.

a. 15°	b. 30°	c. 45°	d. 60°	e. 90°	f. 120°	g. 135°
h. 160°	i. 180°	j. 225°	k. 270°	l. 315°	m. 360°	n. 0°

3. Trace this journey by following the direction using angles. Start at the dot.
 Travel North for 3 cms. Turn 90° west and continue for 5 cms. Turn 90° to face south and travel 10 cms. Turn 90° to the East and travel 8 cms. Turn 90° to face North and travel 7 cms. Finally turn 90° to the West and travel 5 cms.

1
4 PS 2
3

4. Describe how an understanding of applied angles is important in recreational situations, and in vocational situations.



Angles in personal situations

Angles in vocational situations

4.09 Describing Location

Location

It is important to emphasise that the language of location is not universal. However, that being said, the language of location in occupation-specific situations is expected to be consistent because workers use a shared technical or professional vocabulary.

You need to develop both a personal and a 'professional' location vocabulary 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**
- ⇒ organising and setting out **personal** and **residential space**
- ⇒ helping people deal with **spatial issues**
- ⇒ helping people **locate items**
- ⇒ in **sport** and **recreation** activities
- ⇒ **navigating** the **external world** including **driving**, and
- ⇒ many other situations from cooking through to dancing and pet care through to gardening.

Image: MarkB/Depositphotos.com



Cricket is a sport that relies heavily on the applied use of location.

In the vocational world correct terminology in work-related situations assists to:

- ⇒ train and instruct co-workers on equipment
- ⇒ help workers organise and find routes, materials and stock
- ⇒ plan and organise a workspace or work stations
- ⇒ create pleasing merchandise displays for customers and clients
- ⇒ organise safe and efficient storage
- ⇒ communicate about physical movement requirements
- ⇒ deal with care and medical situations
- ⇒ create safe work environments
- ⇒ organise transport, logistics and production requirements
- ⇒ position themselves around work stations
- ⇒ guide a customer to find different items in a store.

Image: whitestar1955/Depositphotos.com



Breaker, breaker, transport and logistics is governed by time and location systematics.

Where can I find.... 4D

1
4 PS 2
3

1. Assume you are working at your local supermarket. How would you communicate to a customer the directions to these items? Add 6 more.

Fresh bread	Ice cream	Toilet paper
Vinegar	Sardines	Vegetarian sausages

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2. Why do supermarkets locate the items in the way that they do?

3. Just from your own memory, how is the work environment laid out in your favourite take-away outlet? Why is it set out this way? Start a sketch and finish it in your work folio or using a digital device.



4.11 Describing Location

Language of Location



4E Location

1. Take a look at your classroom. For these terms, describe what you see located at this relative position. Add 4 more.

Up	Down	In front	Behind
Beside	Opposite	Above	Below
Top left	Bottom right	Under	Together



2. Take some time to study this image. Describe the relative location of 16 different people. How would you describe those people? Report back to the class.



Image: macrovector/Depositphotos.com

4.13 Describing Location

4F Language of location



1. Describe the relative position of the objects in this formal dinner service image. Can you name them based on their purpose?

Image: belchonock/Depositphotos.com



1	2		4
5	6		8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	



- 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: Sunmax/Depositphotos.com

4.15 Describing Location

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. In pairs discuss this example and report back to the class.



Li Wei, a local artist, is enjoying a leisurely stroll through the vibrant laneway market in the city. A traveller, holding a crumpled city map, approaches Li Wei with a puzzled look. In broken English, the traveller gestures toward the map, trying to convey their quest to find the city's famous art gallery.

Li Wei takes the map from the traveller, recognising their language barrier. She flips the map around to match the current street layout and points in the direction the map is now facing. "Art gallery that way," she says with a friendly smile.

Li Wei takes the time to visually guide the traveller, using hand gestures to represent landmarks.

"Go straight - 5 minutes, turn left - 3 minutes, pass by the mural (Li Wei paints an imaginary stroke in the air), turn right - 5 minutes, and there you'll find the art gallery."

She points confidently at the gallery's location on the map. "Understand?"

The traveller nods appreciatively, trying their best to express gratitude. "Thank you, good art place," they say before setting off in the correct direction.

Li Wei smiles, acknowledging the universal language of art and wondering how her city's creative scene is perceived by visitors from diverse cultural backgrounds.



Image :michaelpuche/
Depositphotos.com

4G Tour guiding

1
4 PS 2
3

1. Which methods for giving directions did Li Wei use? Give examples.

2. How effective were the directions given by Li Wei? Why so?

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

4. What apps exist that can help people and tourists get around in unfamiliar or foreign places? Have you used any of them?

FULL DRAFT
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5. When would a printed map be a better option for a traveller than a device?

Extension

You're at Flinders Street Station. Choose another place in the CBD that is an 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.



1
4 PS 2
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1
4 PS 2
3



4.17 Distance and Time

Distance

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 north? And those living east, west, south, outer east, or north, or north east or south east? What about those in Yarram, Warracknabeal, Horsham, Drouin or Lakes Entrance?

How about those in Geelong, Bendigo, 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 are sitting right now - to the city? How will you know?

Time

When we are travelling, knowing the distance of our total journey from our **origin** to our **destination** is only one part of the equation. The more important number that we need to work out, is the **time** it might take to travel that distance.

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 need to worry about how far you have to travel. What you are likely to be more concerned with is how long it takes you to complete the journey.

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

If you are travelling by car, you may only need someone else's expertise to advise you.

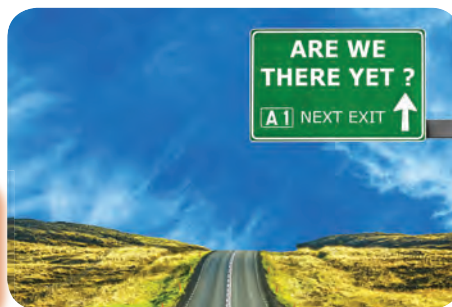
They are likely to be able to estimate travel time based on their own **knowledge** and **experience** of travelling at this time of the day.

However, if you are getting there under your own power, such as by cycling, then you will need to know the distance as you will have to use this to estimate how long your journey will take.

Travelling: How long?

Distance of journey from origin to destination.

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



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

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

Image: Alexis84/
Depositphotos.com

Familiarity with journey.

Weather conditions.

Getting around 4H

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1. Estimate the distance to each of these destinations. How much time do you think it will take to travel to these destinations using these transport methods?
2. Research these distances and times using maps, GPS or other resources. Set up another table in your work folios. How well did you estimate?



Journey	Estimated distance	Journey time: by car	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.				

FULL DRAFT PREVIEW SAMPLE

3. Estimate the distance to each of these destinations. Add 4 more. Choose a travel mode. How much time do you think it will take to travel to these destinations using these transport methods?
4. Research these distances and times using maps, GPS or other resources. Set up another table in your workbooks. How well did you estimate?



Journey	Estimated distance	Travel Mode/ Journey time	Journey	Estimated distance	Travel Mode/ Journey time
The MCG			The SCG		
Gumbuya World			Dreamworld		
The Big Koala			The Big Prawn		
Poowong			Dunedoo		
Mount Disappointment			Uluru		

4.19 Distance and Time

Issues to consider

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

As you know, a **scale** shows the distance ratio that a map represents in 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 have more of the same issues, because the 'computer' does not know about local issues and shortcuts.



4I Apps v maps

Nowadays, most 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 reading maps can be very useful, and is a great way of embedding knowledge about location and travel.



When would you prefer to use a map app; and when might you consider using a hard-copy map? Why?



Travel speeds

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

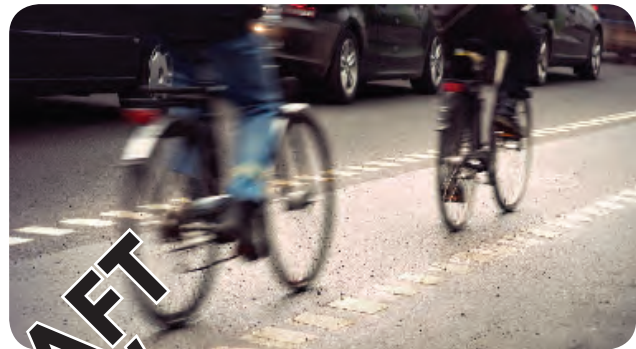
This **relationship** can be expressed as a **rate**, such as kilometres per hour (km/h or kmh), or metres per second (m/s or mps).

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.

Image: PinkBadger/Depositphotos.com

The fastest human can run at about 44km/h in a short 'Bolt'. A sublime cheetah can reach 100-120 km/h in a short burst. A sailfish in full swim can reach a little over 100 km/h. And then there is the majestic peregrine falcon which can exceed 380 km/h when diving to catch prey.



So how fast can you move?



Most commuters cycle to work which can be much faster than peak hour driving!

FULL DRAFT PREVIEW SAMPLE

Travel speeds 4J

Match these travel modes to the most likely speed of travel.

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

2-3 kmh	4-5 kmh	6-7 kmh
6-9 kmh	7-10 kmh	9-12 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	900 kmh

4.21 Distance and Time

4K Distance and time

1. Calculate the following travel times.

Distance: 60km at 60kmh	Distance: 30km at 30kmh	Distance: 10km at 100kmh
Distance: 3km at 6kmh	Distance: 6km at 18kmh	Distance: 2km at 2kmh

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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				



Overview

As part of your vocational studies, you are likely to undertake work experience and/or work placements. Some of you might even be working in a school-based Australian Apprenticeship. Let's just call these work placements for this task.

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

- | | |
|---|--|
| <p>1. Create a map that shows the journey from your home to your work placement.
What types of information and landmarks should you show on your map?</p> | <p>2. What travel modes does this journey involve?
3. How much time should this journey take? How do you know this? Use timetables, apps, etc.?
4. How effective or convenient is this travel journey?</p> |
|---|--|

Part B: Assume your normal transport mode is available.

- | | |
|---|--|
| <p>5. Create a new map that shows the journey from your home to your work placement.
What types of information and landmarks should you show on your new map?</p> | <p>6. What travel modes does this new journey involve?
7. How much time should this new journey take? How do you know this? Use timetables, apps, etc..
8. How effective or convenient is this new travel journey?</p> |
|---|--|

Part C: Old-school vs new-school

- | | |
|---|--|
| <p>9. Use digital technology to re-plan your 1st journey. Compare the results to the 1st map you created.
10. What were the similarities and differences between the analogue and the digital journeys?
11. Which format, your map or the digital map, suggested a better journey? Why?</p> | <p>12. Use digital technology to re-plan your new journey. Compare the results to the 2nd map you created.
13. What were the similarities and differences between the analogue and the digital journeys for the 2nd journey?
14. Which format, your map or the digital map, suggested a better 2nd journey? Why?</p> |
|---|--|

Part D: Recommendations

- | | |
|---|--|
| <p>15. So, which was better? Your own hand and brain-created analogue maps - or the digital maps. Why so?</p> | <p>16. What skills did you develop applying each method?</p> |
|---|--|



4.23 Assessment Task

Name(s):		Key dates:		Personal Numeracy U3: Module 1 Systematics	
Tasks - AT4a: Off To Work I Go		Must Do?	Due by	Done	Level
1. Create analogue journey map, information & landmarks.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2. Explain travel modes.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3. Estimate and calculate travel times.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
4. Evaluate effectiveness of journey.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
5. Create new analogue map, information & landmarks.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
6. Explain travel modes.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
7. Estimate and calculate travel times.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
8. Evaluate effectiveness of journey.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
9. Re-plan 1st journey using digital-only tools.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
10. Similarities and differences between 1st and 2nd journeys.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
11. Which format suggested better journey and why?		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
12. Re-plan 2nd journey using digital-only tools.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
13. Similarities and differences between 1st and 2nd journeys.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
14. Which format suggested better journey and why?		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
15. Which was better - analogue or digital/ and why so?		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
16. Skills I developed applying each method.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
	Use and apply appropriate digital tools and apps.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
	Use and apply appropriate analogue tools.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
1 4 PS 2 3	Describe applied use of the problem-solving cycle.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Identify the maths		Act on & use maths		Evaluate & reflect	
Communicate & report					
	Develop and apply mathematical tools and techniques.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
⇒	Prepare and discuss my final plans with my teacher.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
	Present a report to the class (if required).	<input type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>

// Problem-Solving Cycle // Maths Toolkit 4.24

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4 PS 2
3

Task: AT4a -	Names/Dates:
------------------------	---------------------

1. Identify the maths

Identify problem(s) Done: <input type="radio"/> Level: <input type="text"/>	Recognise maths Done: <input type="radio"/> Level: <input type="text"/>	Select information Done: <input type="radio"/> Level: <input type="text"/>
Interpret information Done: <input type="radio"/> Level: <input type="text"/>	Choose processes Done: <input type="radio"/> Level: <input type="text"/>	

2. Act on and use maths

Perform estimations Done: <input type="radio"/> Level: <input type="text"/>	Decide techniques Done: <input type="radio"/> Level: <input type="text"/>	Choose maths tools Done: <input type="radio"/> Level: <input type="text"/>
Select technologies Done: <input type="radio"/> Level: <input type="text"/>	Perform calculations Done: <input type="radio"/> Level: <input type="text"/>	

3. Evaluate and reflect

Check Estimations Done: <input type="radio"/> Level: <input type="text"/>	Compare results Done: <input type="radio"/> Level: <input type="text"/>	Check processes Done: <input type="radio"/> Level: <input type="text"/>
Review actions Done: <input type="radio"/> Level: <input type="text"/>	Check oral processes Done: <input type="radio"/> Level: <input type="text"/>	Assess conclusions Done: <input type="radio"/> Level: <input type="text"/>

4. Communicate the report

Written processes Done: <input type="radio"/> Level: <input type="text"/>	Written results Done: <input type="radio"/> Level: <input type="text"/>	Oral processes Done: <input type="radio"/> Level: <input type="text"/>
Oral results Done: <input type="radio"/> Level: <input type="text"/>	Digital processes Done: <input type="radio"/> Level: <input type="text"/>	Digital results Done: <input type="radio"/> Level: <input type="text"/>

FULL DRAFT
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SAMPLE

Mathematical Toolkit

Analogue tools - What & how?	Digital Devices - What & how?	Software & Apps - What & how?
Choice & Range <input type="text"/>	Skill & Accuracy <input type="text"/>	Choice & Range <input type="text"/>
Choice & Range <input type="text"/>	Skill & Accuracy <input type="text"/>	Choice & Range <input type="text"/>
Choice & Range <input type="text"/>	Skill & Accuracy <input type="text"/>	Choice & Range <input type="text"/>



4.25 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. This is where the applied use of **systematics** comes into play whereby you:

- ⇒ read and interpret existing data, such as from a timetable
- ⇒ input data into tables, spreadsheets, diaries and apps
- ⇒ read and interpret output data to make planning and organising decisions, such as with a timesheet or your roster.

Organising involves setting **short-term** or day-to-day **goals** using tools including 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 integrating and using **timetables**, **schedules**, and **rosters**

By planning and organising you can achieve a better balance between personal, work-related and other commitments. This helps you to:

- ⇒ set and achieve short-term, mid-term and long-term **goals**
- ⇒ use your time more **efficiently** and get more done
- ⇒ improve your **punctuality** and **reliability**
- ⇒ better manage **transport** and travel **requirements**
- ⇒ meet **deadlines** and complete tasks more **productively**
- ⇒ achieve a better **work/life balance**, and
- ⇒ improve your own **personal wellbeing**.

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:

1. **calendars**
2. **to-do lists**
3. **rosters** and
4. **timetables**.



Image: VCTStyle/
Thinkstock

1. Calendars & diaries

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.

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

Many people now use systematics tools such as **e-dairies** and **apps** to manage their personal and vocational commitments and responsibilities. They use their **devices** to plan and track dates, and to record important personal and work 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 and deadlines. These calendars are synched together across the organisation to enable management to plan and organise a big-picture view of staffing and other resourcing commitments

An advantage of this **systematics** approach is that it sends people advanced 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 diary. However, e-diary and **apps** are a good way to keep you on track.

FULL DRAFT
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SAMPLE



Image: tarik_vision/
Depositphotos.com

Calendars & diaries 4L

1. When do you use a calendar? Why?
Is this hard copy and/or digital?

2. When do you use a diary? Why?
Is this hard copy and/or digital?



4.27 Planning and Organising

2. To-do list

A to-do list is still one of the most useful tools you can use at the first stage of any planning and organising process. A to-do list enables you to visualise a series of required actions as a step-by-step 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.

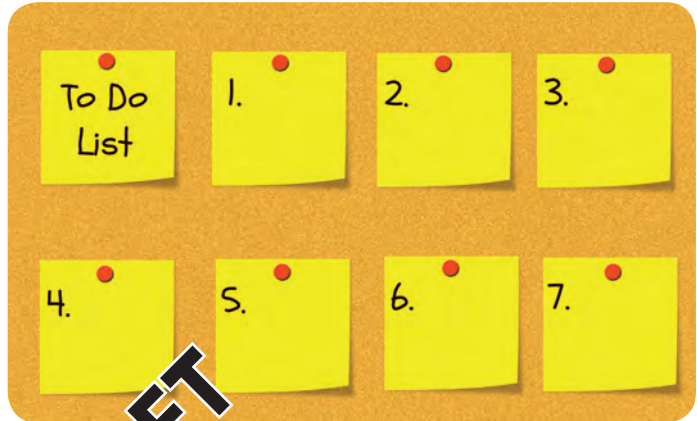


Image: mybaitshop/
Depositphotos.com

4M To-do list

1
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3



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

Investigate potential TAFE courses and find one that suit me for next year.

1. Identify the key smaller tasks or steps, number these steps in order, then estimate how long it is likely to take you to do each task or step.
2. In your work folios write a list of tasks as a complete to-do list!
3. Use Post-It Notes to complete and attach to-do list for a task related to your school program, such as a PDS activity, or a responsibility you have to meet.

3. 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.

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 balance the needs of students, teachers, classrooms, facilities (such as prac rooms) and many other variables to construct a suitable timetable. Of course, you have to follow that timetable.

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



Public transport timetables are non-negotiable. They won't wait for you!

Image: furtaev/Depositphotos.com

FULL DRAFT
PREVIEW
SAMPLE

Timetables 4N

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



4.29 Planning and Organising

4. 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 periods.
- ⇒ Rosters need to be communicated to all employees involved.
- ⇒ Rosters should ensure that an appropriate range of skills, training and authority is covered by the workers.

Crafts Jobs - Carri Weekly Roster						
Monday March 20 - Sunday March 26, 2024						
Times	8-10am	10am-12pm	12-2pm	2-4pm	4-6pm	6-8pm
Monday 20/3	Ngoc V	Ngoc V	Ngoc V	Ngoc V		
	Simi L	Regi K				
Tuesday 21/3		Ngoc V	Ngoc V	Ngoc V	Ngoc V	
	Simi L	Regi K				
Wednesday 22/3		Mo P	Mo P	Mo P	Mo P	
	Ngoc V	Ngoc V	Ngoc V	Ngoc V		
Thursday 23/3			Ngoc V	Ngoc V	Ngoc V	
	Simi L	Regi K				
Friday 24/3		Mo P	Mo P	Mo P	Mo P	Mo P
	Ngoc V	Ngoc V	Ngoc V	Ty B	Ty B	
Saturday 25/3	Ty B	Ty B	Ty B		Turl O	Turl O
	Simi L	Regi K	Freddie F	Freddie F	Freddie F	
Sunday 26/3	Ty B	Ty B	Ty B			
		Ngoc V	Ngoc V	Ngoc V	Ngoc V	

Jimi N’Krikets works at Tennessee’s Tasty Grits. The boss has just texted Jimi with the roster for next week. But it’s a long string of information!

Monday: 10am to 7pm; Tuesday: 7am to 5pm; Wednesday & Thursday: Days off; Friday: 11am to 8pm; Saturday: 10am to 2pm then 6pm to 10pm; Sunday: 10am to 6pm.

Jimi 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 Jimi’s roster for the upcoming week. How many hours will Jimi 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.118 for Crafties Cash & Carry to tally the weekly hours for each worker. How many hours do staff work in total? When is the shop less busy? How do you know? Which shifts would you prefer? Why so?



4.31 Assessment Task

AT4b It's Up To Me Personal Numeracy: Location & Systematics

1
4 PS 2
3



Overview

This year you have to apply planning and organising skills to achieve a number of goals associated with finishing Year 12 to embrace your expanding adult responsibilities such as applying for a course, finding a job, saving for a car, or even perhaps moving out of home.

For this assessment task, you are required to use a range of planning and organising skills, tools and techniques to guide your achievement of a significant personal goal.

The goal is most likely to be a mid-term or long-term goal and might not even be achieved until next year! That's fine. This task is about applied planning and organising to guide you through on a step-by-step basis. (And as you know, this always leads to doing and involves ongoing reviewing.)

Some possible goals include these, but you might have a specific goal that is more relevant to your own personal, educational or vocational needs. So you must negotiate your goal with your teacher.



- Getting your license/saving for and purchasing a vehicle.
- Staging an event or celebration.
- Planning and organising a holiday and saving for this adventure.
- Investigating further study options and then applying for courses.
- Investigating pathways options and applying for jobs.
- Investigating moving out and developing an independence plan.

Process: At all stages you need to consider and apply both analogue and digital tools. You also need to review on an ongoing basis and get feedback and advice.

My goal is:

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



Assessment Task 4.32

Name(s):	Key dates:	Personal Numeracy U3: Module 1 Systematics		
Tasks - AT4b: It's Up To Me	Must Do?	Due by	Done	Level
Task planning				
Negotiate the task and goal details with my teacher.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
⇒ Decide on my goal and the timeframe. Goal:	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Determine digital and analogue tools and apps to use.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Plan and organise for my goal achievement				
1. Create overall to-do list.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2. Prepare a timeline.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3. Create smaller time periods.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
4. Identify key milestone tasks.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
5. Plan time needed for key milestone tasks.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
6. Create a financial plan or budget.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
7. List external suppliers and contact details.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
8. Tick-off milestone tasks.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
9. Create specific to-do lists.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
10. Check that everything is organised.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
11. Get feedback and advice and act on this.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
12. Reflect on use of analogue tools, and on digital tools.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Task completion and reporting				
Use and apply appropriate digital tools and apps.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Use and apply appropriate analogue tools.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
⇒ Use appropriate numerical language.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
1 4 PS 2 3 Describe applied use of the problem-solving cycle.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report	
Develop and apply mathematical tools and techniques.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
⇒ Prepare and discuss my final plans with my teacher.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Present a report to the class (if required).	<input type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>

4.33 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task:		Names/Dates:			
AT4b-					
1. Identify the maths					
Identify problem(s)	Done: <input type="radio"/> Level: <input type="text"/>	Recognise maths	Done: <input type="radio"/> Level: <input type="text"/>	Select information	Done: <input type="radio"/> Level: <input type="text"/>
Interpret information	Done: <input type="radio"/> Level: <input type="text"/>	Choose processes	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>
2. Act on and use maths					
Perform estimations	Done: <input type="radio"/> Level: <input type="text"/>	Decide techniques	Done: <input type="radio"/> Level: <input type="text"/>	Choose maths tools	Done: <input type="radio"/> Level: <input type="text"/>
Select technologies	Done: <input type="radio"/> Level: <input type="text"/>	Perform calculations	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>
3. Evaluate and reflect					
Check Estimations	Done: <input type="radio"/> Level: <input type="text"/>	Compare results	Done: <input type="radio"/> Level: <input type="text"/>	Check processes	Done: <input type="radio"/> Level: <input type="text"/>
Review actions	Done: <input type="radio"/> Level: <input type="text"/>	Check conclusions	Done: <input type="radio"/> Level: <input type="text"/>	Assess conclusions	Done: <input type="radio"/> Level: <input type="text"/>
4. Communicate report					
Written processes	Done: <input type="radio"/> Level: <input type="text"/>	Written results	Done: <input type="radio"/> Level: <input type="text"/>	Oral processes	Done: <input type="radio"/> Level: <input type="text"/>
Oral results	Done: <input type="radio"/> Level: <input type="text"/>	Digital processes	Done: <input type="radio"/> Level: <input type="text"/>	Digital results	Done: <input type="radio"/> Level: <input type="text"/>

FULL DRAFT
PREVIEW
SAMPLE



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
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Money

5

5.01 Money	124	5.13 Comparing Prices	136
5.05 Money Calculations	128	5.21 Money and Percentages.....	140
5.07 Making Change	130	5.25 Assessment Task	148
5.11 Money - Rounding.....	134	5.27 Problem-Solving & Toolkit.....	150

Activities 5: Money		p.	Due date	Done	Comment
5A	A world of money	125		<input type="checkbox"/>	
5B	Money	126-127		<input type="checkbox"/>	
5C	Quick money calculations	129		<input type="checkbox"/>	
5D	Making change I	131		<input type="checkbox"/>	
5E	Making change II	133		<input type="checkbox"/>	
5F	Rounding purchases	135		<input type="checkbox"/>	
5G	Making comparisons	137		<input type="checkbox"/>	
5H	Unit pricing	139		<input type="checkbox"/>	
5I	Basket of goods	140		<input type="checkbox"/>	
5J	Setting up house	140-141		<input type="checkbox"/>	
5K	Finding patterns	142-143		<input type="checkbox"/>	
5L	Percentages	145		<input type="checkbox"/>	
5M	Discounts	147		<input type="checkbox"/>	
AT5	Working the Money	148-149		<input type="checkbox"/>	
PST	Problem-Solving Cycle and Maths Toolkit	150		<input type="checkbox"/>	

FULL DRAFT
PREVIEW
SAMPLE

Comments:

5.01 Money

Money

Every day, day in and day out, you will experience people talking about money. But when you hear the term 'money', what does it really 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 drives the commercial transactions that we need to do so that we can live in contemporary society.

In essence, 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 far less common), and increasingly as **digital** credit values that utilise **eCommerce** payment methods.

According to the Reserve Bank of Australia, the share of payments (<\$10K) made using cash has declined from around 70% of payments in 2007 to just 13% in 2022.

(Source: Reserve Bank's 2022 Consumer Payments Survey.)

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. And now it seems that digital is going to keep on growing and growing, with cash being a more scarce commodity - preferred by old people, young people and people in the regions.

So 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're a former money. Anyone? Why is that?

Estimating & Calculating Money to...

Estimate change

Add up totals

Make change

Manage your personal finances

Plan and manage a household budget

Complete workplace transactions

Manage business income and expenses

Pay your bills

Plan and save for your future

Check your pay

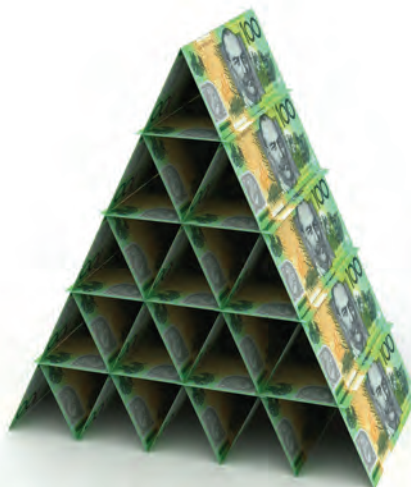


Image: selensergen/Depositphotos.com

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



- | | | |
|-----------------------------------|----------------------------------|----------------------------------|
| <input type="checkbox"/> billion | <input type="checkbox"/> income | <input type="checkbox"/> \$38.20 |
| <input type="checkbox"/> budget | <input type="checkbox"/> loss | <input type="checkbox"/> \$39.50 |
| <input type="checkbox"/> currency | <input type="checkbox"/> profit | <input type="checkbox"/> \$40.50 |
| <input type="checkbox"/> debt | <input type="checkbox"/> wage | <input type="checkbox"/> 87% |
| <input type="checkbox"/> EFTPOS | <input type="checkbox"/> 5c | <input type="checkbox"/> \$100 |
| <input type="checkbox"/> expenses | <input type="checkbox"/> \$23.23 | <input type="checkbox"/> 1,000 |

The number of cents in 10 dollars 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 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 the money that goes into a business 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 2023/24 was:

The proportion of non-cash payments in Aust (Dec 22) was:

The general term for retail electronic transactions is:

The average hourly wage in Australia (Aug 23) was about:

The average hourly wage for men in Aust (Aug 23) was about:

The average hourly wage for women in Aust (Aug 23) was about:

FULL DRAFT SAMPLE

5.03 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 Cherry Ripe or \$7.55 for a Big Mac.

Large items are usually expressed in dollars such as \$70,000 (ish) for a new Tesla Model 3 Long Range AWD or \$1,200 for an iPhone 14.

Wages are paid as dollars and cents, such as \$14.50 per hour for a 16 year-old working in a milk bar.

People in professional jobs are usually paid a salary expressed only in dollars, such as \$75,000 per year.

Cash vs digital

Although the use of e-transactions is now well over 85%, **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 **best currency uses** 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.



Image: robynmac/Depositphotos.com

FULL DRAFT
PREVIEW
SAMPLE

5B Money



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

1. For what type of transaction do you and your family commonly use cash; and when do you and they use digital payment methods? Why is that?

--	--



2. 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. \$85 in notes.	<table border="1"> <tr> <td>\$100</td> <td>\$50</td> <td>\$20</td> <td>\$10</td> <td>\$5</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>\$2</td> <td>\$1</td> <td>50c</td> <td>20c</td> <td>10c</td> <td>5c</td> </tr> </table>	\$100	\$50	\$20	\$10	\$5	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	\$2	\$1	50c	20c	10c	5c
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ii. \$19.50 in notes and coins.	<table border="1"> <tr> <td>\$100</td> <td>\$50</td> <td>\$20</td> <td>\$10</td> <td>\$5</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>\$2</td> <td>\$1</td> <td>50c</td> <td>20c</td> <td>10c</td> <td>5c</td> </tr> </table>	\$100	\$50	\$20	\$10	\$5	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	\$2	\$1	50c	20c	10c	5c
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iii. \$47.85 in notes and coins.	<table border="1"> <tr> <td>\$100</td> <td>\$50</td> <td>\$20</td> <td>\$10</td> <td>\$5</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>\$2</td> <td>\$1</td> <td>50c</td> <td>20c</td> <td>10c</td> <td>5c</td> </tr> </table>	\$100	\$50	\$20	\$10	\$5	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	\$2	\$1	50c	20c	10c	5c
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x _____	x _____	x _____	x _____	x _____																		
\$2	\$1	50c	20c	10c	5c																	
iv. \$33.60 in coins.	<table border="1"> <tr> <td>\$100</td> <td>\$50</td> <td>\$20</td> <td>\$10</td> <td>\$5</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>\$2</td> <td>\$1</td> <td>50c</td> <td>20c</td> <td>10c</td> <td>5c</td> </tr> </table>	\$100	\$50	\$20	\$10	\$5	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	\$2	\$1	50c	20c	10c	5c
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\$2	\$1	50c	20c	10c	5c																	
vi. \$850.95	<table border="1"> <tr> <td>\$100</td> <td>\$50</td> <td>\$20</td> <td>\$10</td> <td>\$5</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>\$2</td> <td>\$1</td> <td>50c</td> <td>20c</td> <td>10c</td> <td>5c</td> </tr> </table>	\$100	\$50	\$20	\$10	\$5	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	\$2	\$1	50c	20c	10c	5c
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x _____	x _____	x _____	x _____	x _____																		
\$2	\$1	50c	20c	10c	5c																	
vii. \$9,950	<table border="1"> <tr> <td>\$100</td> <td>\$50</td> <td>\$20</td> <td>\$10</td> <td>\$5</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> <td>x _____</td> </tr> <tr> <td>\$2</td> <td>\$1</td> <td>50c</td> <td>20c</td> <td>10c</td> <td>5c</td> </tr> </table>	\$100	\$50	\$20	\$10	\$5	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	x _____	\$2	\$1	50c	20c	10c	5c
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x _____	x _____	x _____	x _____	x _____																		
\$2	\$1	50c	20c	10c	5c																	

FULL DRAFT PREVIEW SAMPLE

3. Try out the 'change maker' at:

<https://www.mathsisfun.com/money/money-master.html>



5.05 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. $\$7.50 + \$2.35 = \$9$ (i.e. $\$7 + \2)

Then add the cents amounts.

$$50c + 35c = 85c$$

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

$$\$9 + 85c = \$9.85$$

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. $\$14.50 + \$2.95 = \$16 + 145c = \17.45

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

i. $\$9.30 + \$2.20 =$

ii. $\$15.80 + \$3.99 =$



Subtracting money

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

e.g. $\$4.50 - \$2.30 = \$2$ (i.e. $\$4 - \2)

Then subtract the cents amounts.

$$50c - 30c = 20c$$

So the answer will be:

$$\$4.50 - \$2.30 = \$2.20$$

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. $\$8.40 - \$4.80 = \$4$ (i.e. $\$8 - \4) and $-40c$ (i.e. $40c - 80c$)

$$= \$4 - 40c$$

$$= \$3.60$$

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

i. $\$9.30 - \$3.25 =$

ii. $\$45.60 - \$23.90 =$



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: $\$7.50 + \$2.20 = ?$ How about: $\$6.60 + \$8.50 = ?$

Now try a subtraction: $\$9.70 - \$2.20 = ?$ And try: $\$9.25 - \$4.75 = ?$

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 applied problem-solving.

Quick money calculations 5C

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



a. 65 cents + \$2 =	b. \$20 + \$15 =	c. \$99 + \$39.99 =
d. 80c + 70c + \$3.45 =	e. \$18 plus 900c =	f. \$19.95 - \$7.50 =
g. \$17 + \$0.75 - \$8 =	h. \$750 - \$125 + \$375 =	i. \$27.55 - \$9.50 - \$11 =
j. \$1,700 + \$950 - \$235 =	k. \$75.95 + \$10.99 + \$3 =	l. \$44.99 - \$12 + \$19.95 - \$4.50 =

FULL DRAFT PREVIEW SAMPLE

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.



1
4 PS 2
3



a. A Whopper, large chips and a large Coke.	b. Train (or bus) fare from your suburb or town to Frankston, and home again.
c. 50 litres of petrol, 91% blend.	d. A streaming subscription of \$10.99 per week for 12 months.

5.07 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-changed**.

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 \$82. Given \$100

$$\$100 - \$82 = \$18$$

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'.

Example: Purchases of \$60 and \$25. Given \$100

Step 1. Total purchases = $\$60 + \$25 = \$85$

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

Example: Purchases of 7 items @ \$12. Given \$100

Step 1. Total purchases = $7 \times \$12 = \84

Step 2. $\$100 - \$84 = \$16$

NUM
SUPER
SKILLS

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.



Image: pawelhelbik1985/
Depositphotos.com

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

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<p>i. Purchase of \$63. Given a \$100 note.</p>	<p>\$100 \$50 \$20 \$10 \$5</p> <p>x _____ x _____ x _____ x _____ x _____</p> <p>x _____ x _____ x _____ x _____ x _____ x _____</p> <p>\$2 \$1 50c 20c 10c 5c</p>
<p>ii. Purchase of \$9.50. Given a \$20 note.</p>	<p>\$100 \$50 \$20 \$10 \$5</p> <p>x _____ x _____ x _____ x _____ x _____</p> <p>x _____ x _____ x _____ x _____ x _____ x _____</p> <p>\$2 \$1 50c 20c 10c 5c</p>
<p>iii. Purchase of 3 items for \$30 each. Given 2 x \$50 notes.</p>	<p>\$100 \$50 \$20 \$10 \$5</p> <p>x _____ x _____ x _____ x _____ x _____</p> <p>x _____ x _____ x _____ x _____ x _____ x _____</p> <p>\$2 \$1 50c 20c 10c 5c</p>
<p>iv. Total sales = \$77.50. Given a \$50, a \$20 a \$5 and 2 x \$2 coins.</p>	<p>\$100 \$50 \$20 \$10 \$5</p> <p>x _____ x _____ x _____ x _____ x _____</p> <p>x _____ x _____ x _____ x _____ x _____ x _____</p> <p>\$2 \$1 50c 20c 10c 5c</p>
<p>v. Purchase of 6 items @ \$3:50 Given a \$50.</p>	<p>\$100 \$50 \$20 \$10 \$5</p> <p>x _____ x _____ x _____ x _____ x _____</p> <p>x _____ x _____ x _____ x _____ x _____ x _____</p> <p>\$2 \$1 50c 20c 10c 5c</p>
<p>vi. Purchase of 4 x \$2.50 and 2 @ \$9:00. Given 3 x \$10 notes.</p>	<p>\$100 \$50 \$20 \$10 \$5</p> <p>x _____ x _____ x _____ x _____ x _____</p> <p>x _____ x _____ x _____ x _____ x _____ x _____</p> <p>\$2 \$1 50c 20c 10c 5c</p>
<p>vii. Purchase of \$120 and purchase of \$85. Given 4 x \$50s.</p>	<p>\$100 \$50 \$20 \$10 \$5</p> <p>x _____ x _____ x _____ x _____ x _____</p> <p>x _____ x _____ x _____ x _____ x _____ x _____</p> <p>\$2 \$1 50c 20c 10c 5c</p>

FULL DRAFT PREVIEW SAMPLE

5.09 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:

"My purchase is \$27.50 so your change is

"\$20 minus \$27.50 is \$2.50. That's \$2 plus 50 cents.

Your change of \$22.50 plus the purchase price of \$27.50 equals \$50."

**FULL DRAFT
PREVIEW
SAMPLE**

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



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Making Change 5.10

Making change II 5E

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.

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Purchase	Amount	Change	Currency
e.g. \$7.50	\$10	\$2.50	\$2 + 20c + 20c + 10c
\$5.00	\$10		
\$7.00	\$10		
\$6.50	\$10		
\$2.35	\$10		
\$9.80	\$10		
\$7.25	\$10		
\$1.15	\$10		
\$7.60	\$10		
\$0.85	\$10		
\$4.99	\$10		

Purchase	Amount	Change	Currency
e.g. \$16.30	\$20	\$3.70	\$2 + \$1 + 50c + 20c
\$8.00	\$20		
\$13.50	\$20		
\$12.00	\$20		
\$6.75	\$20		
\$18.40	\$20		
\$10.50	\$20		
\$9.95	\$20		
\$21.00	\$20		
\$9.50	\$20		
\$20.25	\$20		

FULL DRAFT
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Purchase	Amount	Change	Currency
e.g. \$26.50	\$50	\$23.50	\$20 + \$2 + \$1 + 50c
a. \$14.00	\$50		
b. \$4.50	\$50		
c. \$39.95	\$50		
d. \$42.50	\$50		
e. \$39.75	\$50		
f. \$15.50	\$50		
g. \$26.00	\$50		
h. \$0.95	\$50		
i. \$32.75	\$50		
j. \$18.25	\$50		

Purchase	Amount	Change	Currency
e.g. \$38.75	\$100	\$61.25	\$50 + \$10 + \$1 + 20c + 5c
a. \$75.00	\$100		
b. \$38.75	\$100		
c. \$65.50	\$100		
d. \$94.00	\$100		
e. \$81.25	\$100		
f. \$15.75	\$100		
g. \$8.30	\$100		
h. \$32.60	\$100		
i. \$58.15	\$100		
j. \$43.75	\$100		

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5.11 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: aarett/
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 use even dollar amounts and 50 cent amounts. e.g. \$3.90 becomes \$4, \$2.35 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.

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1. Use rounding to complete the table for the following transactions.
(You could 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
\$3.85	\$	\$5	\$		\$	
\$1.15	\$	\$5	\$		\$	
\$9.35	\$	\$10	\$		\$	
\$7.70	\$	\$10	\$		\$	
\$2.95	\$	\$10	\$		\$	
\$14.95	\$	\$20	\$		\$	
\$15.50	\$	\$20	\$		\$	
\$12.75	\$	\$20	\$		\$	
\$6.95	\$	\$20	\$		\$	
\$43.75	\$	\$50	\$		\$	

2. Use rounding to complete the table for the following multi-step transactions.
(Once again you could 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 + \$2.99		\$	\$5	\$		\$	
b. \$3.15 + \$2.85		\$	\$10	\$		\$	
c. \$4.99 + \$4.95		\$	\$10	\$		\$	
d. 75c + \$1.25 + \$16.50		\$	\$20	\$		\$	
e. \$3.90 x 4		\$	\$50	\$		\$	
f. \$44.25 + \$3.80		\$	\$50	\$		\$	

5.13 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...



Image: 06photo/
Depositphotos.com

False economy

Remember the concept of false economy? 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 prawns and most of them go bad before you can eat them all.
- ⇒ Buying cheaper items on special but then consuming more than you would've. e.g. Instead of 1 packet of chips for \$4.85 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.

10 Strategies for comparing prices

1. Unit pricing

Compare prices on a per-unit basis to determine the actual cost of the product. This is particularly important when dealing with different sizes or quantities of the same item.

2. Quality considerations

Take into account the quality of the product. A lower-priced item might seem like a good deal initially. But if it lacks durability or doesn't meet your needs, it may end up costing more in the long run.

3. Product features

Evaluate the features and specifications of the products you are comparing. Sometimes, a slightly more expensive item may offer additional features or better performance, making it a better value in the long term.

4. Necessity

Consider whether you actually need the quantity of the product you are thinking of purchasing. Buying in bulk may seem cost-effective, but it's not always necessary, especially if the excess might go unused.

5. Personal preferences

Factor in your personal preferences and needs. Sometimes a brand or specific product may be worth the extra cost due to factors such as taste, reliability, or customer support.

6. Long-term savings

Consider the long-term savings associated with certain products. For example, energy-efficient appliances may have a higher upfront cost but can result in significant savings on utility bills over time.

7. Warranties and guarantees

Check if the products come with warranties or guarantees. A higher-priced item with a longer warranty may offer better value and peace of mind.

8. Sales and discounts

Keep an eye out for sales, discounts, and promotions. Timing your purchases to coincide with special offers can significantly reduce the overall cost.

9. Reviews and ratings

Read customer reviews and ratings to gauge the experiences of others with the product. This can provide valuable insights into the quality and performance of the item.

10. Budget management

Use your ability to compare prices as part of your budget management. Allocating resources wisely based on your needs and preferences can help you make better financial decisions.



Image: Chamja/Depositphotos.com

Making comparisons 5G

In your work folios, explain how you would apply these strategies to compare 'prices', and the types of goods or services you might use these for.

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Price	Quality	Size	Quantity
Weight	Features	Preference	Warranties
Waste	Need v Want	Sales/Discounts	Delivery

5.15 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

The most famous soft drink in the world is of course, Coca-Cola. But Coke (like most items) is available in a range of sizes. Based on supermarket prices from January 2024:

Coke (can): 375ml = \$2.30 Unit pricing is \$6.13 per litre

Coke (Classic bottle): 385ml = \$3.75 Unit pricing is \$9.74 per litre

Coke: 600ml = \$4.05 Unit pricing is \$6.75 per litre

Coke: 1.25 litre = \$3.55 Unit pricing is \$2.84 per litre

Coke: 2 litre = \$3.60 Unit pricing is \$1.80 per litre

Coke (mini can 6-pack) 250ml x 6 = \$9.17 Unit pricing is \$6.11 per litre

Coke (can 10-pack) 375ml x 10 = \$19 Unit pricing is \$5.07 per litre

Coke (can 24-pack) 375ml x 24 = \$36.70 Unit pricing is \$6.03 per litre

Coke (can 30-pack) 375ml x 30 = \$44.90 Unit pricing is \$3.50 per litre

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. Do a comparison with Pepsi Max which is also available in Australia. And how do these prices compare to prices you've seen in other countries? Has inflation occurred?

Coke and Pepsi Max are usually on special in at least one of the big 3 supermarkets each week.

FULL DRAFT SAMPLE



5H Unit pricing



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?



Rizzo is having some friends over and she is going to make her famous salmon, cheese and mayo rolls and provide some other items. 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 Rizzo source her products? Explain using evidence.
4. What other issues should Rizzo take into account when choosing between these different sellers?

Product	Size	Coolworths	Boles	IPA	Baldi	Other
Bread rolls	6 pack	\$3.50	\$3.50	\$3.85	\$2.79	
Smoked salmon	250 gm	\$7.75	\$7.25	\$57.99	\$5.25	
Cos lettuce	na	\$2.99	\$2.99	\$2.50	\$2.50	
Danish Blue cheese	150 gm	\$7.50	\$6.5	\$6.9	\$4.99	
Mayonnaise	250 ml	\$4.75	\$4.9	\$3.99	\$3.85	
Block dark chocolate	100 gm	\$4.95	\$4.79	\$3.25	\$3.50	
White grapes	250 gm	\$5.00	\$4.50	\$5.99	\$4.25	
Cashew nuts	200 gm	\$4.00	\$4.50	\$7.50	\$3.99	
Creaming soda drink	2 litres	\$2.40	\$2.10	\$2.50	\$1.75	
Totals		\$	\$	\$	\$	

FULL DRAFT PREVIEW SAMPLE

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?

5.19 Comparing Prices

5K Finding patterns



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

\$2	\$4	\$6	\$8	\$10	\$12	\$	Pattern?
\$7	\$6	\$5	\$4	\$3	\$2	\$	
2	4	8	16	32	64		
132	64	32	16	8	4		
\$1	\$3	\$6	\$10	\$15	\$21	\$	
\$30	\$29	\$27	\$24	\$20	\$15	\$	

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

Sugar	500g \$2	1kg \$4	1.5kg \$6	2kg \$8	3kg \$12	Pattern?
Free-range eggs	6 \$4	12 \$7	24 \$14	36 \$21	48 \$28	
Coffee	5 cups \$25	4 cups \$20	3 cups \$15	2 cups \$10	1 cup \$5	
Milk	1 litre \$2	2 litre \$3.50	3 litre \$5	4 litre \$6.50	6 litre \$10	

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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?

Sugar	500g \$2	1kg \$3.50	1.5kg \$4.50	2kg \$5.50	Pattern?
Eggs	6 \$4	12 \$7.50	18 \$10.50	24 \$13	
Coffee	1 cup \$5	2 cups \$10	4 cups \$18	5 cups \$22	
Milk	1 litre \$2	2 litre \$3.50	3 litre \$6.00	4 litre \$7	
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.

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
\$250												
\$50												
\$80												
\$30												
\$1,000												
\$5,000												

FULL DRAFT
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Applied

You can also use number patterns to quickly estimate how much you might be spending. You can use amounts of \$1, \$2, \$5, \$10, \$20, \$50, \$100 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 dinner for 4 people, using \$20 'lots', you can look at the menu and say that:

Pizza = \$9, dessert = \$4.50, drinks = \$4.

So you might say: 4 pizzas = \$9, \$9, \$9 and \$9 which = \$36 so that's almost two \$20 lots.

People want 4 desserts = \$4.50, \$4.50, \$4.50, \$4.50 which = \$18. This is also another \$20 lot.

And people want 4 drinks = \$4, \$4, \$4, \$4 = \$16. This is on its way to another \$20 lot.

So you are going to need approximately \$80, but you should expect a decent amount of change. How much?

Form a group of 4 and use this method to compare a dinner for you all at different eateries. Compare at least 3. Did this method make it easier and faster for you to estimate the total cost?



5.21 Money and Percentages

Percentages

A percentage simply refers to a proportion. It is also another way of representing a fraction. But fractions can be messy when dealing with money so instead we use percentages. Percentages are important for calculating amounts for many personal and vocational situations including:

- ⇒ sales discounts
- ⇒ volume discounts
- ⇒ bulk purchases
- ⇒ GST
- ⇒ price mark-ups
- ⇒ fees and costs
- ⇒ overtime and penalty rates.



For example: Percentages

A store is having an end of financial year clearance sale and all stock is to be discounted by 20%; or by 25% if customers buy two or more items. You have your eye on two items. How do you do these calculations?

20% off

Normal price = \$50

Discount = \$50 x 20% = \$10

New price = \$50 - \$10 = \$40

25% off for 2 or more

Normal price = \$50 and \$30

Discount = (\$50 + \$30) x 25% = \$20

New price = \$80 - \$20 = \$60

Example 2

You are paid \$20 an hour normal time, 25% more for overtime, and time and a half (50%) for working on Saturday. What is the hourly rate for each?

What if you work 20 hours normal, 4 hours overtime and 6 hours on Saturday? How much in total?

Normal rate = \$20

Overtime rate = \$20 + 25% = \$20 + (\$20 x 25%) = \$20 + (\$5) = \$25

Penalty rate = \$20 + 50% = \$20 + (\$20 x 50%) = \$20 + (\$10) = \$30

Total pay

Rates	= \$20 x 20 hours	+ \$25 x 4 hours	+ \$30 x 6 hours
	= \$500	+ \$100	+ \$180
	= \$680		

Example 3

GST is calculated at 10% of the price for eligible goods and services.

GST exc to inc

Normal price = \$90 (GST exc)

GST = (10% of \$90)

GST = \$9

GST inc price = \$99 (i.e. \$90 + \$9)

GST inc to exc

Price = \$99 GST inc

GST = \$99/11

GST = \$9

GST exc price = \$90 (i.e. \$99 - \$9)

1. Calculate these fraction amounts as money. First, convert the fraction into a percentage. Then calculate the % money amount.

a. $\frac{1}{2}$ of \$80 =	b. $\frac{1}{4}$ of \$150 =	c. $\frac{2}{3}$ of \$300 =
d. $\frac{4}{5}$ of \$2,000 =	e. $\frac{3}{8}$ of \$1,000 =	f. $\frac{3}{4}$ of \$25 =
g. $\frac{9}{10}$ of \$5,000 =	h. $\frac{1}{5}$ of \$99.95 =	i. $\frac{15}{20}$ of \$10,000 =

2. Calculate these percentage amounts as money.

a. 40% of \$100 =	b. 50% of \$180 =	c. 65% of \$1,500 =
d. 15% of \$3,000 =	e. 33% of \$10,000 =	f. 10% of \$12.95 =
g. 20% of \$50 + 25% of \$200 =	h. 15% of \$500 + 30% of \$150 =	i. 10% of \$9.95 + 15% of \$100 - 5% of \$50 =

3. In your work folios, write these as numerical expressions. Calculate the answers.

<p>a. Abe has to calculate the GST for a customer's order. The order involves two items at five dollars, 10 items at 10 dollars and 25 items @ \$20. All these prices are GST exc.</p>	<p>b. Baal has to calculate the GST already included in a supplier's invoice. The order involves five items at \$11 dollars, ten items at \$22 and 20 items at \$49.50. All these prices are GST inc.</p>
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5.23 Money and Percentages

Discounts

Discounts are amounts deducted from the normal or regular price, or cost, of an item. It is important to understand discounts from both the consumer (or customer's) point-of-view as well as from the point-of-view of businesses.

Price discounts are generally used by businesses to encourage consumers either; to buy more from them, to switch their business to them, or to remain loyal to them.

These discounts can include:

- ⇒ targeted **specials**
- ⇒ items on **sale**
- ⇒ **seasonal** discounts
- ⇒ **clearance** items
- ⇒ **2-for-1** offers
- ⇒ **loyalty** discounts, and even
- ⇒ discounts for using **cash**.

We could also call these price discounts **sales incentives**, even though the businesses involved might not be retailers in the traditional industry sense (such as electricity suppliers, cafés and hairdressers).

For example, a clothing store might discount the end of season stock at 50% to clear items in the lead-up to the new season's fashions coming in. Or a sporting goods store sells 2 basketballs for the price of 1.

Cost discounts are used by businesses to encourage other businesses to purchase from them. These discounts occur on the wholesale side (or supply side) of business transactions. Cost discounts (or **trade** or **wholesale** discounts) can include volume discounts, wholesale trade discounts, bulk purchase discounts, early payment discounts and other business-to-business (B2B) discounts.

For example, a publisher will give a 40% trade discount to retail bookstores off the RRP (recommended retail price). This 40% then becomes the retailer's margin.

Large booksellers such as Big W, K-Mart and others are likely to receive a bigger discount, as they sell higher volumes at lower prices by taking advantage of the benefits achieved by **economies of scale**.

This is also why you'll see higher prices for goods in milk bars as compared to supermarkets.

"I saved like heaps you know, everything was buy 2 and get the 3rd free!"

"Did you really Shoana, you just went out for a juice!"



Image: count_kert/
Depositphotos.com

FULL DRAFT PREVIEW SAMPLE



Image: Yakobchuk/
Depositphotos.com

Discounts

Discounts are normally applied as a % reduction to a retail or wholesale price. Most (but not all) discounts are calculated using percentages.

e.g. i: End of season clearance on dresses - save 50%!

e.g. ii: Buy 2 and save 40% off both.

i. 50% off

Normal price = \$200
 Discount = $\$200 \times 50\% = \100
 New price = $\$200 - \$100 = \$100$

ii. 40% off for 2 or more

Normal price = \$30 and \$30
 Discount = $(\$30 + \$30) \times 40\%$
 Discount \$ = $\$60 \times 40\% = \24
 New total = $\$60 - \$24 = \$36$

e.g. iii: Order two meals get a third for free! (Offer applies to lowest priced item).

iii. Order two meals get a third free.

Normal price = \$16, \$14 and \$10 = \$40
 Total price paid = $(\$30 + \$0)$
 Discount \$ = $\$40 - \$30 = \$10$ (normal price less price after discount)
 Discount % = $\$10/\$40 \times 100\%$
 = 25%

(So, what is the average price of each meal after the discount is applied?) 

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Discounts 5M

Calculate the discount amount and the new price(s) on each of these transactions. How much was the total discount %?

<p>a. 'End of season sale: Save 20%.' Buy:</p> <ul style="list-style-type: none"> - Boots \$150 (normal price) - Jacket \$200 (normal price) - Shirt \$80 (normal price) - Hat \$50 (normal price) - Socks \$6 (normal price) 	<p>b. Order 3 meals get the 4th free. (Offer applies to lowest price item.)</p> <ul style="list-style-type: none"> - Meal 1: \$23 - Meal 2: \$18 - Meal 3: \$25 - Meal 4: \$24
--	--

5.25 Assessment Task

AT5 Working the Money Financial Numeracy: Number & Change

Overview

For this task, you are required to complete **3 applied** Financial Numeracy **activities**.



Some of these activities may come from Section 5. 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: Working with currency/Making change

Calculate transaction totals and change. Use currency units to make change.

Information, key dates, resources and tools to use.

Part B: Investigating and comparing prices

Investigate prices of relevant items. Undertake

- a price comparison of items from different retailers
- a **unit price comparison** of items with different sizes
- a comparison of **price changes** for some items.

Information, key dates, resources and tools to use.

Part C: Calculating and evaluating discounts

Investigate discounts on selected items. Calculate discounted prices and savings. Evaluate if the discounts represent a 'good value' purchase or not.

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.

Assessment Task 5.26

Name(s):	Key dates:	Financial Numeracy		
		U3: Module 2 Number/Change		
Tasks - AT5: Working the Money	Must Do?	Due by	Done	Level
Negotiate the task details with my teacher.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Part A: Working with currency/Making change				
1. Participate in transaction situations.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2. Calculate transaction totals.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3. Calculate change required.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
4. Use currency units to make change.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Part B: Investigating prices				
1. Price comparison from different retailers.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2. Unit price comparison of different sized items.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3. Comparison of price changes over time.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
4. Make conclusion and recommendation.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Part C: Calculating and evaluating discounts				
1. Investigate discounts on selected items.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2. Calculate discounted prices.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3. Calculate savings from discounts.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
4. Evaluate the 'value' of the discounts.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Task completion and reporting				
Use and apply appropriate digital tools and apps.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Use and apply appropriate analogue tools.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
⇒ Use appropriate numerical language.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
1 4 PS 2 3 Describe applied use of the problem-solving cycle.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report	
Develop & apply mathematical tools and techniques.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Prepare and discuss my findings with my teacher.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Present a report to the class (if required).	<input type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>

5.27 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
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Task:		Names/Dates:			
AT5 -					
1. Identify the maths					
Identify problem(s)	Done: <input type="radio"/> Level: <input type="text"/>	Recognise maths	Done: <input type="radio"/> Level: <input type="text"/>	Select information	Done: <input type="radio"/> Level: <input type="text"/>
Interpret information	Done: <input type="radio"/> Level: <input type="text"/>	Choose processes	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>
2. Act on and use maths					
Perform estimations	Done: <input type="radio"/> Level: <input type="text"/>	Decide techniques	Done: <input type="radio"/> Level: <input type="text"/>	Choose maths tools	Done: <input type="radio"/> Level: <input type="text"/>
Select technologies	Done: <input type="radio"/> Level: <input type="text"/>	Perform calculations	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>
3. Evaluate and reflect					
Check Estimations	Done: <input type="radio"/> Level: <input type="text"/>	Compare results	Done: <input type="radio"/> Level: <input type="text"/>	Check processes	Done: <input type="radio"/> Level: <input type="text"/>
Review actions	Done: <input type="radio"/> Level: <input type="text"/>	Check conclusions	Done: <input type="radio"/> Level: <input type="text"/>	Assess conclusions	Done: <input type="radio"/> Level: <input type="text"/>
4. Communicate report					
Written processes	Done: <input type="radio"/> Level: <input type="text"/>	Written results	Done: <input type="radio"/> Level: <input type="text"/>	Oral processes	Done: <input type="radio"/> Level: <input type="text"/>
Oral results	Done: <input type="radio"/> Level: <input type="text"/>	Digital processes	Done: <input type="radio"/> Level: <input type="text"/>	Digital results	Done: <input type="radio"/> Level: <input type="text"/>

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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
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Dollars and Sense

6

6.01 Dollars and Sense.....	152	6.19 Budgeting	170
6.03 Income and Pay.....	154	6.25 Credit and Loans	176
6.07 Pay Rates.....	158	6.29 Assessment Tasks.....	180
6.11 Earning an Income	162	6.33 Problem-Solving & Toolkit.....	184
6.15 Expenses.....	166	6.37 Unit Review and Reflection.....	186

Activities 6: Dollars and Sense	p.	Due date	Done	Comment
6A Dealing with money	153		<input type="checkbox"/>	
6B Types of income	155		<input type="checkbox"/>	
6C Pay up	156-157		<input type="checkbox"/>	
6D Apprenticeship and traineeship pay rates	160-161		<input type="checkbox"/>	
6E Timesheets	162		<input type="checkbox"/>	
6F Pay slips	164		<input type="checkbox"/>	
6G Next year?	165		<input type="checkbox"/>	
6H My expenses	167-168		<input type="checkbox"/>	
6I Surplus or deficit?	169		<input type="checkbox"/>	
6J Feed the kitty	172		<input type="checkbox"/>	
6K Personal budget - Basic	173		<input type="checkbox"/>	
6L My budget - Advanced	174-175		<input type="checkbox"/>	
6M Mortgages and loans	177		<input type="checkbox"/>	
6N 'Easy' money, hard debt	179		<input type="checkbox"/>	
AT6a Applied Financial Numeracy	180-181		<input type="checkbox"/>	
AT6b Researching Wage Rates	182-183		<input type="checkbox"/>	
PST Problem-Solving Cycle and Maths Toolkit	184-185		<input type="checkbox"/>	

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Comments:

Recap: Order of operations



When you work through some of the activities in Numeracy: VPC you might have to combine calculations using addition, subtraction, multiplication and division. Knowing how to do this is a common skill needed for personal and work-related money management.

For example, you might earn \$20 an hour for 30 hours, plus \$25 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?

$$\text{e.g.} = \$20 \times 30 + \$25 \times 10 = \text{Total pay for the week} =$$

Which do you think is the correct answer: \$850 or \$6,250?

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.



Dealing with money 6A

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

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

3. How would you rate your skills in dealing with money in personal situations and in vocational situations? Explain using applied examples.

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6.03 Income and Pay

Income

Income is money that you earn from various sources. The most common form of income is from **wages** and **salaries**. Some people earn **profits** as a result of them owning and operating businesses. Other people receive **transfer income** from the government through various **welfare** payments and pensions.

Many people also earn **investment income** from their holdings of wealth such as:

- ⇒ **interest** from savings
- ⇒ **dividends** from owning shares
- ⇒ **capital gains** from selling assets (shares, property, etc.)
- ⇒ **rent** from investment properties.

This income provides a **standard of living** whereby we can purchase the goods and services that we need and want to maintain our chosen lifestyle.



Image:
PhillipMinnis/
Depositphotos.com

Types of Pay

Wages

- ⇒ Wages are income amounts paid for an employee's labour.
- ⇒ Wages are determined on an hourly basis.
- ⇒ Wages normally apply in most trades, and for millions of semi and lower-skilled employees.

Salaries

- ⇒ Salaries are income amounts that are usually paid to professional staff and high-level employees such as some managers; often paid fortnightly or for 4-weeks.
- ⇒ 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. These are 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 isolated island resort might receive payment in kind of accommodation and food, in addition to their wages.

Piece rate

- ⇒ A piece rate refers to a type of payment made when a person (often a sub-contractor) is paid depending on the amount of items (or units) they produce.
- ⇒ For example, someone sewing garments might receive \$2 per garment; or someone delivering pamphlets might receive \$20 per 1,000.

Types of income 6B

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1. Match the types of pay from p.154 with the correct description. Complete the numerical calculation (of the example related to this) in your work folios.

Description	Type of pay	Example & calculation
When a worker gets non-monetary payments given in return for their labour.		Szujette is working as a live-in nanny. On top of her 'pay' of \$500 she receives free board and food worth \$500. Calculate %'s and weekly 'pay'?
Pay set down for a professional role and calculated as an annual amount.		Alborto is paid \$78,000 as a manager. So, how much per week?
An amount given as an incentive for making sales or generating revenue.		Sambine works in a high fashion store and has registered \$380,000 in sales this year. She got 20% that as an extra payment. So, extra pay 'per week'?
A pay amount based on a designated job classification - 'earned' on an hourly basis.		How much does he earn annually? How much does he earn per hour? How much does he earn per week? How much does he earn per month?
A payment amount given per item of production often using sub-contracted labour.		How much does he earn per hour? How much does he earn per week? How much does he earn per month?
A lower base rate paid to a worker (usually in sales jobs) 'topped up' by commissions.		How much does he earn per week? How much does he earn per month? How much does he earn per year?

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2. How much are people in your class being paid for working? List names, jobs and hourly wages. Use your work folios if you need more space. Discuss as a class.



6.05 Income and Pay

6C Pay up

1. Find out the current full-time median weekly earnings for the 10 occupations listed in the first table. (You could also calculate weekly earnings and approximate hourly amounts based on a 38-hour week).
2. Choose 10 occupations and find the most recent amounts for full-time median earnings. (Note: As at early '24 the current amounts were still based on 2021.)



Use: <https://labourmarketinsights.gov.au> search on an Occupation and then find Weekly Earnings. You can scroll down for more information; and find out 'when'.

Occupation Full-time weekly earnings	Median earnings 2015	Median earnings '2021'	Median earnings 20__
Accountant	\$1,400	\$1,756	
Plumber	\$1,142	\$1,419	
Chef	\$1,050	\$1,250	
Police officer	\$1,600	\$2,188	
Primary school teacher	\$1,350	\$1,984	
Civil engineer	\$1,916	\$2,211	
Sales assistant - General	\$850	\$1,055	
GP	\$1,850	\$2,535	
Cleaner - commercial	\$706	\$903	
Hairdresser	\$800	\$1,056	
Average all occupations	\$1,230	\$1,593	

Source: ABS, Survey of Employee Earnings and Hours, May 2021.
ABS EBTUM survey August 2015 cat. no. 6310.0.

Occupation Full-time weekly earnings	Median earnings 20__
Average all occupations	

Source:

3. Calculate how much each of these people earns for their week's work. What jobs might these people be working in?

a. Rancy works 24 hours and is paid \$14.50/hour.

b. Jix works 20 hours and is paid \$20 for 12 hours; with 8 hours overtime with an extra 25% loading.

c. Valarie works three 4-hour casual shifts. The standard rate is \$18 per hour and the casual loading is 25%.

d. Corrine works a standard full-time week with an hourly wage rate of \$23.23.

e. Ngoc is 15 and works a standard full-time week in a job with an hourly rate of \$25. He is paid 50% of the adult rate.

f. Tahir is a 2nd year apprentice earning \$15 per hour. Next year his wage will increase by 20%.

g. Micho works a public holiday and receives double time for his 4-hour shift normally paid at \$20/hour.

h. Felicia is in a supervisory role and works 5 hours. She is paid at \$28/hour.

i. Latu, 22 is not covered by an award or agreement and is paid at the lowest allowable pay rate for their 38 hours work.

j. Adot is paid a salary of \$104K per year. He doesn't get paid overtime. He works an average of 50 hours per week.

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6.07 Pay Rates

Pay

Being paid is one of the most important reasons for working, and every worker deserves to be paid fairly for their labour. Most workers are paid either according to a **wage** (per hour) or a **salary** (per year).

Employees in most entry-level jobs such as **Australian Apprenticeships** will be paid a wage based on the number of hours worked. The wage rate is set down in an **award**, or a **registered agreement** or as part of the **National Wage Case**.

Some awards and registered agreements provide **penalty rates** when working shiftwork, odd hours, on weekends, during public holidays or for overtime.

Workers under 21 are normally paid a percentage of an adult rate based on their age. For example, most retail employees aged 18 usually receive 70% of the adult rate. **Apprentices** and **trainees** will be paid a proportional rate according to their job, stage of completion, and/or age.

These rates, and the relevant proportions of an adult rate, will be set down in the relevant award, or the relevant registered agreement under which the apprentice or trainee is employed.

Casual workers are normally paid extra (usually 25%). However, in return they forego non-monetary conditions such as annual leave and personal and carers' leave.

Awards

As you might remember from WRS, most employees in Australia are paid according to either a rate set down in an **award** (most common), or according to a **registered agreement**.

Most awards are **national awards** and apply across an **industry** or industry **sub-sector** Australia-wide. Awards set down **minimum** rates of **pay** and other **conditions** for employees depending on their job **classification**. Apprentices and juniors will be paid a proportion of the adult rate.

Awards will also specify information about penalty rates, overtime, allowances and other pay-related issues. (Note: WA will have some employees covered under WA state awards).

For example, many retail workers are covered under the General Retail Industry Award (2020), which of course has its rates updated annually.

Many hospitality workers will be covered under the Hospitality Industry (General) Award 2020 which also has been updated.

And many child-care workers are covered under the Children's Services Award (2010) - and yes, it too is updated annually, because 2010 was a very long time ago!

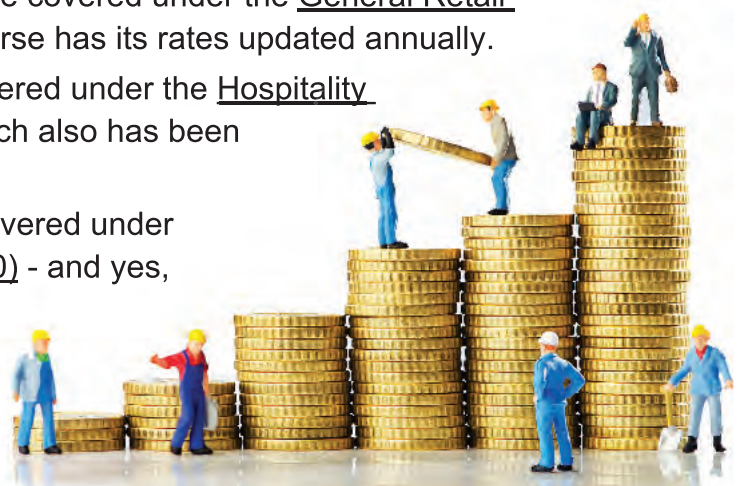


Image: pogonici/Depositphotos.com

Registered agreements

Many workers, including Australian Apprentices, are employed under a registered agreement. **Registered agreements** (sometimes still referred to as Enterprise Bargaining Agreements or **EBAs**) are usually negotiated between employers and unions (on behalf of workers) for similar enterprises in the same industry; or even for one specific enterprise (usually a larger enterprise).

What this means is that workers in the one business, or in a particular geographic location or operation of a business, or in a group of similar businesses from the 'same' industry, are all covered by the one specific registered agreement.

Registered agreements must have **minimum conditions** that are at least as **favourable** as **awards**. As a result, many registered agreements do tend to have more favourable wages and conditions than awards.

For example, in retail there is the Woolworths Supermarkets Enterprise Agreement 2020, the Priceline Retail Employees Enterprise Agreement 2021, and many more.

*Image: photography33/
Depositphotos.com*

Traineeships

Nearly all trainees are paid according to a pre-determined rate known as **the National Training Wage**. The **Fair Work Commission** has set down this rate in the Miscellaneous Award 2020.

This information is then used for awards throughout other industries (except for nine specific modern awards). So nearly all awards will refer employers and employees to the rates and conditions contained in **Schedule E** in the **Miscellaneous Award 2020**.

It is important to note that trainees will get their other entitlements such as **penalty rate** % loadings, **overtime** % loadings as well as specific job-related or industry-related **allowances** from the industry or occupation award that covers them.

There will still be some trainees who will have their wages and other conditions set down in a specific registered agreement.

And once again, the National Training Wage rates, just like all other minimum rates, are updated annually.

Different National Training Wage rates apply for **Wage Level A**, **Wage Level B** and **Wage Level C** trainees. This Wage Level classification varies according to industry type (and therefore job type) and also the qualification's certificate level.

There are varied National Training Wage pay rates based on the number of years out of school (up until when a trainee becomes an adult).

There are also **part-time** rates, rates related to **disability classification** and rates for **Australian School-based Apprentices**.

So that's a lot of information! But the maths is straightforward - just multiplication and division - and the rates themselves are based on percentages.



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6.09 Pay Rates

Workplace arrangements, pay and conditions

You have investigated various elements related to workplace arrangements, including wages and salaries. But you need to re-engage with these elements on an ongoing basis as part of your investigation into, and development of, your future career pathway.

So in small groups, discuss what you remember, know and understand about these terms.

Workplace Arrangements, Pay & Conditions

Wages & salaries

Fair Work Ombudsman

Penalty rates

Awards

PACT tool

Overtime

Registered agreements

Apprentice rates

Allowances

Minimum pay rates

National training wage

Superannuation

6D Apprenticeship and traineeship pay rates

Part A: Apprenticeships pay rates

Given below are rough approximations of what non-adult apprentices might earn at different stages of their training. Calculate how much each would earn per hour, per week (38 hours) and per year, based on the 'Adult' wage rates.

Note: These %'s are only a general guide and are not relevant to all jobs and industries, nor do these include allowances, penalty rates and other conditions.

'Adult' wage	1st year 55%	2nd year 60%	3rd year 80%	4th year 95%
\$24	Pay: \$13.20/hour	Pay:	Pay:	Pay:
	Week: \$501.60	Week:	Week:	Week:
	Year: \$26,083	Year:	Year:	Year:
\$27	Pay:	Pay: \$16.20/hour	Pay:	Pay:
	Week:	Week:	Week:	Week:
	Year:	Year:	Year:	Year:
\$30	Pay:	Pay:	Pay: \$24/hour	Pay: \$28.50/hour
	Week:	Week:	Week:	Week:
	Year:	Year:	Year:	Year:



Part B: Traineeship pay rates

Given below are National Training Wage rates for a **non-adult** trainee as applicable for 2023/24, based on school level and years out of school.

1. Calculate how much a trainee would earn per hour and annually.

To calculate wage per hour you will need to divide the weekly wage by 30.4 (and not 38) as a traineeship has a shorter 'working' week - 4 days instead of 5).

National Training Wage Pay Rates: 2023/24 According to the Miscellaneous Award 2020, Schedule E (Wage Level A)			
School Leaver Wage Level A	...and has completed Year 10	...and has completed Year 11	...and has completed Year 12
Just left school	Week: \$384.30	Week: \$423.10	Week: \$503.30
	Hour: \$12.64	Hour:	Hour:
	Year: \$19,983.60	Year:	Year:
Plus 1 year out of school	Week: \$423.10	Week: \$503.30	Week: \$585.70
	Hour:	Hour: \$16.55	Hour:
	Year:	Year: \$22,437.60	Year:
Plus 2 years out of school	Week: \$503.30	Week: \$585.70	Week: \$681.60
	Hour:	Hour:	Hour: \$22.42
	Year:	Year:	Year: \$35,433.20

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2. Find out the current rates for this year. Complete the same type of table.

National Training Wage Pay Rates: 20__ / __ According to the Miscellaneous Award 20__, Schedule E			
School Leaver Wage Level A	...and has completed Year 10	...and has completed Year 11	...and has completed Year 12
Just left school	Week:	Week:	Week:
	Hour:	Hour:	Hour:
	Year:	Year:	Year:
Plus 1 year out of school	Week:	Week:	Week:
	Hour:	Hour:	Hour:
	Year:	Year:	Year:
Plus 2 years out of school	Week:	Week:	Week:
	Hour:	Hour:	Hour:
	Year:	Year:	Year:



6.11 Earning an Income

Timesheets

Timesheets are used to record employee working hours, work days, break times, rates of pay, as well as other information relevant to the particular work setting and employee. Timesheets often use a **24-hour clock**. Timesheets are used to calculate weekly (or fortnightly) gross pay amounts.

In some workplaces it might be your responsibility to fill in your own timesheets; and it is definitely your responsibility to check that your timesheets are correct.

Crazy Cracka's Discount p/l: Weekly Timesheet							
Name:		Robbi Grenoble		Work period:		August 19 - 25, 2024	
Employee number:		9875698		Classification:		Retail Worker Level 1 Age: 18	
	Date	Start	Finish	Break	Hours Worked	Rate	Total
Monday	19/8	10:00	19:00	12:30-13:30	8	\$18	\$144
Tuesday	20/8	—	—	—	—	—	—
Wednesday	21/8	10:00	19:00	13:30-14:00	8.5	\$18	\$153
Thursday	22/8	10:30	20:00	13:30-14:00	8.5	\$18	\$153
Friday	23/8	12:00	19:30	13:30-14:00	6.5	\$18	\$117
Saturday	24/8	12:30	18:00	13:30-14:00	6	\$27	\$162
Sunday	25/8	10:00	17:30	13:30-14:00	7.5	\$36	\$270
Totals					45		\$999

6E Timesheets



1. Use the sample timesheet above to interpret and communicate 10 clear and concise points of numerical information.



2. Complete a timesheet based on the following information. Make up personal and work-related information as required and add this below.

Adult retail employee working a standard, 38-hour week, Monday to Friday.

- ⇒ Sign-on is 08:45 am.
- ⇒ Unpaid lunch break is from 13:00 to 13:45.
- ⇒ The employee is paid \$23.23 per hour (as per the *National Minimum Wage* for 2023/24 but you can update this figure with the current amount for this year).
- ⇒ The worker does 2 hours overtime (at time and a half) on Thursday, after a break of 20 minutes. You need to adjust the timesheet's format slightly to show this.

3. Complete a timesheet based on your most likely work situation for next year.

4. Obtain an actual timesheet from a workplace and analyse how it is the same as, and/or different from, the sample shown above.



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.

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 in the pay period.

Crazy Cracka's Discount p/l		ABN: 4225 2117 375		Date:	August 27th, 2024
Employee: Robbi Grenoble				Period:	August 19-25, 2024
<u>Entitlements</u>	<u>Total</u>	<u>Total</u>	<u>Deductions</u>		
Ordinary hourly rate:					
\$18	31.5	\$567			
Overtime hourly rate:					
\$22.50	nil	nil			
Saturday penalty rate:					
\$27	6	\$162			
Sunday penalty rate:					
\$36	7.5	\$270			
Gross entitlement		\$999	Tax deducted:	150	
Net entitlement		\$849			
Paid into bank account: 046 334360 BSB 093 1345					
Year to date		\$9,037	Year to date	\$1,130	
<u>Employer superannuation contribution</u>					
RESFund		\$109.89	Year to date	\$999.13	

6.13 Earning an Income

6F Pay slips



1. Use the sample pay slip on p.163 to interpret and communicate 10 clear and concise points of numerical information.



2. Complete a pay slip based on the following information. Make up personal, work-related and other financial information as required.

Employer: Hairex Tensions	Super deducted: na
ABN: 23 456 987 01	Other information:
Pay period: Sunday-Saturday last week	They have been working 3 weeks
Pay date: This Thursday	Week 1: Same ordinary hours, no overtime.
Hourly rate: \$17.50	Week 2: Identical as week 3 just gone.
Hours worked: 20 in total	Tax deducted: 12.5% each week
Overtime rate: +25%	Note: No superannuation contributions required as under the 30-hour cut-off for an employee aged under 18.
Overtime hours: 6	
Tax deducted: 12.5%	

ABN:		Date:	
Employee:		Period:	
<u>Entitlements</u>		<u>Deductions</u>	
Ordinary hourly rate:			
Overtime hourly rate:			
	\$		
Gross entitlement	\$	Tax deducted:	\$
Net entitlement	\$		
Paid into bank account:	BSB:		
Year to date	\$	Year to date	\$
	\$	Year to date	\$

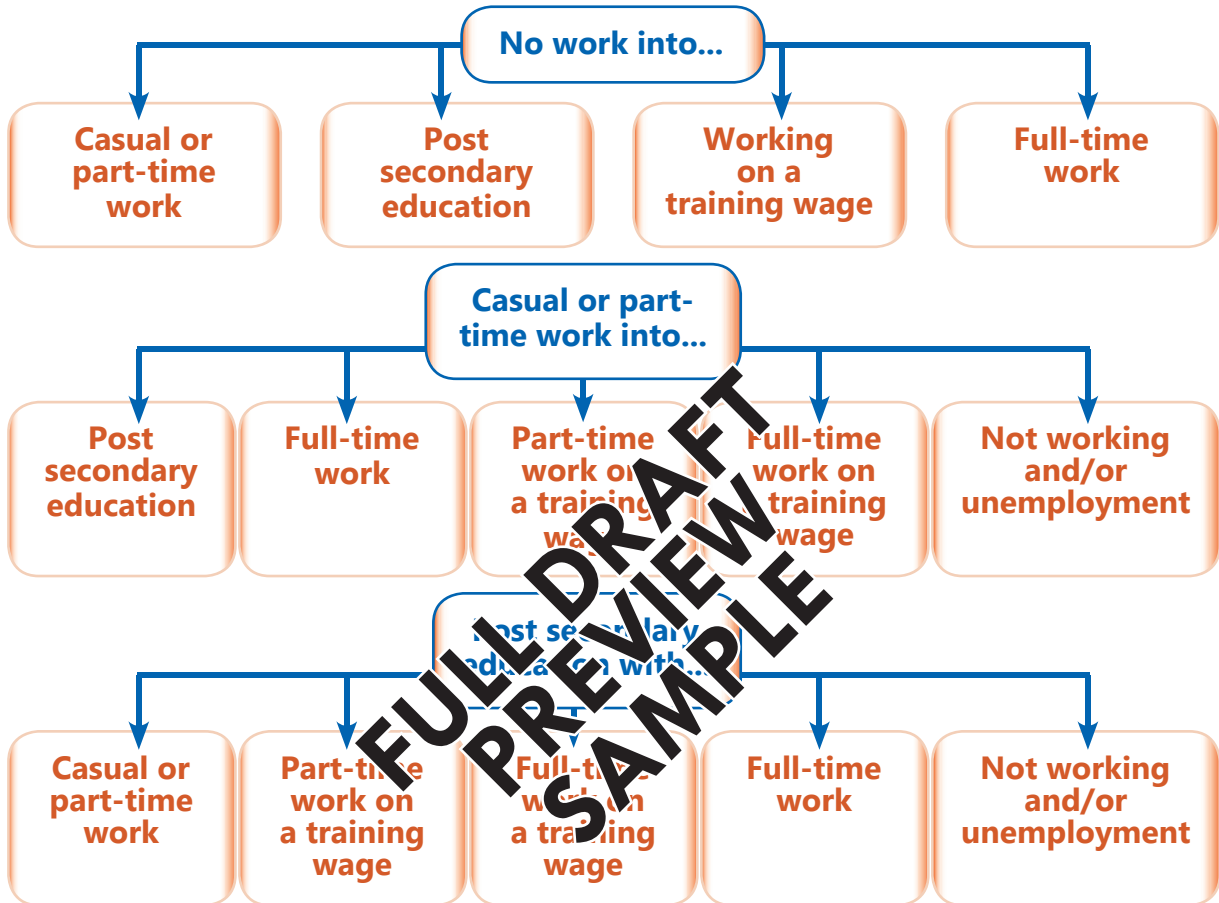
3. Complete a pay slip based on your most likely work situation for next year. (No need to show your true bank account number, just list your bank.)



4. Obtain an actual pay slip from a workplace and analyse how it is the same as, and/or different from, the sample on p.163.

Changing you

Very soon you are in for some changes. Big changes. And these changes will impact on your personal financial circumstances. Some of you will transition into the workforce which might see you move from no work into paid work, from casual work into full-time work, or even from higher-paid casual work into lower-paid entry-level career employment (such as a 1st-year Australian Apprentice).



Next year? 6G

Applied investigation

- Find out the pay rates for a job you are interested in for when you finish Year 12.
- Use these rates to prepare a pay slip based on you working 20 hours part-time (on a regular basis). Assume this is your 5th week of work.
- Use these rates to prepare a pay slip based on you working 38 hours full-time (on a regular basis). Assume this is your 10th week of work.

Note: You are going to need to make some assumptions. One of these is the tax rate for income tax deductions. Take off 10% for the part-time work example, and 20% for the full-time work example.

So what other numerical assumptions might/will you need to make? Your teacher will guide you in this.

1
4 PS 2
3



6.15 Expenses

Expenses

As you realise, living your life costs money. And the lifestyle you might **want** to live can be really expensive. 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 'basic' **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**.

Image: Elnur / Depositphotos.com

Expenses and you

Your most common and costly expenses at this stage of your life will be quite different from when you were back in primary school. Next year, as a young adult transitioning from secondary school, you will also find your pattern of expenditure will be different from now.

If you are living independently, you will also have to take on responsibility for a whole new range of adult expenses.



**FULL DRAFT
PREVIEW
SAMPLE**

Common Expenses

Common expenses

- ⇒ mortgage or rent
- ⇒ home insurance
- ⇒ contents insurance
- ⇒ rates
- ⇒ electricity/gas
- ⇒ water
- ⇒ repairs/maintenance
- ⇒ car loan/interest
- ⇒ petrol
- ⇒ insurance
- ⇒ registration
- ⇒ service and tuning
- ⇒ maintenance/repairs
- ⇒ public transport
- ⇒ parking
- ⇒ fines and charges
- ⇒ sporting/club fees
- ⇒ health insurance
- ⇒ gym memberships
- ⇒ groceries
- ⇒ pharmacy
- ⇒ dental
- ⇒ physio
- ⇒ optical
- ⇒ vet and pet-care
- ⇒ other medicals
- ⇒ phone
- ⇒ internet
- ⇒ video/TV subscriptions
- ⇒ music purchases
- ⇒ entertainment
- ⇒ clubs
- ⇒ toiletries, beauty & health
- ⇒ household products
- ⇒ take-away, lunches and meals
- ⇒ haircuts/grooming
- ⇒ clothing - personal
- ⇒ clothing - work
- ⇒ shoes and footwear
- ⇒ union fees
- ⇒ computing and ICT devices
- ⇒ electrical
- ⇒ child-care
- ⇒ school and education fees, books, etc.
- ⇒ books, magazines, subscriptions
- ⇒ holidays
- ⇒ gifts and presents
- ⇒ donations
- ⇒ special treats
- ⇒ credit card repayments
- ⇒ personal loan repayments
- ⇒ others & others
- ⇒ and lots of others!



Part A

1. Allocate the expenses on p.166 under these category headings if they are an expense you experience. Of course, add other expenses that reflect your own lifestyle and spending patterns. Add 2 category headings more suitable for you.
2. Next to each one rate them as **H** (high spend) **M** (medium spend) **L** (low spend).

Clothing & footwear	Digital subscriptions
Electronic items	Social outings
Phone & data	Sport & recreation
Hobbies & interests	Transport
Food, snacks, drinks & treats	Gifts & presents

**FULL DRAFT
PREVIEW
SAMPLE**

6.17 Expenses

Part B

1. Estimate and then calculate how much your expenses are per week/or per 4 weeks in these categories.
2. Calculate a total. Calculate their amounts as a percentage of your total.

Clothing & footwear	Digital subscriptions
Electronic items	Social outings
Phone & data	Sport & recreation
Hobbies & interests	Transport
Food, snacks, drinks & treats	Gifts & presents

3. 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?

**Part C**

1. Project ahead to next year post-Year 12. Estimate how much your expenses might be per week/or per 4 weeks, across your top 12 major categories. Calculate an estimated total.
2. Calculate the amounts as a percentage of this total.

Clothing & footwear	Digital subscriptions
Electronic items	Social outings
Phone & data	Sport & recreation
Hobbies & interests	Transport
Food, snacks, drinks & treats	Gifts & presents

3. Comment on why these figures are similar or different from now.
4. What might you have to change in your life to cover these expenses?
5. Will you take the responsibility for some, most, or all of your expenses next year? Or will you need to get help?

Extension: This activity would really suit using a spreadsheet. Have a go!

6.19 Budgeting

Personal budgets

Being able to create and manage a personal budget is an essential skill for your life, especially as you transition beyond school and into your adult lives!

It is vital that you manage your expenditure and minimise the use of credit; especially seemingly easy sources of credit such as buy-now pay-later, credit cards, 'payday' or instant loans, and interest-free purchase contracts.

You also need to explore income sources such as wages and salaries, interest income and government benefits and assistance.

Additionally, you need to balance your expenditure with your income to manage your day-to-day financial obligations, to provide for longer-term spending requirements, to save for assets such as a car, and to save for your future.

Budgeting

A budget is a financial management planning tool that lists all of your forecasted revenue and expenses over a period of time. A budget allows you to see if you expect to have more money coming in (**surplus**) or more money going out (**deficit**).

A budget can help you plan your spending more responsibly and allow you to take control of your finances.

Financial control is about striking a balance between your **needs** (i.e. necessities) and your **wants** (i.e. non-essential and luxury expenses).

When you are budgeting it is important to be as accurate as possible by listing all of the expenditure items that you are likely to encounter. You should also budget for 'other' expenses; some of these items are likely to crop up unexpectedly.

You need to prepare different budgets depending on your personal circumstances and your goals. This means that your budget will be different when you are still at school, compared to when you might be studying in post-secondary education, and also when working.

An important part of budgeting is to compare your forecasted amounts with the actual amounts to see how much **variation** has occurred. This will help you plan more accurately in the future.



Image: Violka08/
iStock/Thinkstock

Revenue

- ⇒ For personal income, revenue might include wages, salaries, interest earned, dividends, gifts, government benefits and other monies coming in.
- ⇒ Revenue can refer to business income from sales, fees, commissions, service provision and any other business income sources such as royalties or interest.
- ⇒ Sometimes revenue might simply be called income or incomings.

Expenses

- ⇒ For personal situations, expenses might include mortgage repayments or rent, groceries, utilities, motor vehicle costs, bills, personal items, entertainment and other outlays.
- ⇒ Expenses can refer to the costs incurred by an enterprise such as wages, materials, utilities, stock, inputs, equipment and many other expenses.
- ⇒ Sometimes expenses might simply be called costs or outgoings.

Surplus or Deficit

- ⇒ A surplus exists when anticipated revenues are higher than anticipated expenses. A surplus can lead to savings.
- ⇒ A deficit exists when anticipated expenses are higher than anticipated revenue. A deficit can lead to debt.

FULL DRAFT
PREVIEW
SAMPLE

Surplus or deficit? 61

Calculate the anticipated budget result (surplus or deficit) for each of these.

a. Revenue = \$650 Expenses = \$700	b. Revenue = \$7,500 Expenses = \$600 x 12	b. Revenue = \$1,200 Expenses = \$60 x 20
c. Revenue = \$1,500 + \$3,450 + \$750 Expenses = \$2,000 + \$650 + \$2,134		d. Curly expects to earn \$150/week for 20 weeks and \$300/week for 30 weeks. His expenses are likely to average \$225/week over the year.

6.21 Budgeting

6J Feed the kitty



Consider this budget for D'Jan who lives in a sharehouse. D'Jan works as a regular casual, but D'Jan can't predict their exact work hours for each week.

The expenses in the budget represent the amount that D'Jan has to contribute to the household kitty for the month.

Therefore this budget does not include D'Jan's own personal expenses as part of their normal day-to-day lives.

1. Calculate whether D'Jan is likely to have a surplus or deficit for the month.
2. What would be some other household expenses D'Jan might have to meet?
3. Calculate whether D'Jan had an actual surplus or deficit for the month.
4. Why might this variation have occurred?
5. What is D'Jan going to have to do about their household budgeting and their own financial management?

Cash Budget/Financial Planner					
Name: D'Jan (Sharehouse contribution)					
Situation: Household budget				Date(s): May, 2024	
Income	Forecast \$	Actual \$	Expenditure	Forecast \$	Actual \$
D'Jan's income week 1	500	500	Rent	700	700
D'Jan's income week 2	500	500	Electricity	75	150
D'Jan's income week 3	600	600	Gas	25	50
D'Jan's income week 4	600	450	Food & beverages	300	400
			Internet	30	30
			Household products	35	15
			Insurance	35	0
			Entertaining	75	100
Other:			Other:	40	80
Total Revenue			Total Expenditure		
Forecasted Surplus			Forecasted Deficit		
Actual Surplus (savings)			or	Actual Deficit (debt)	

Personal budget - Basic 6K

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.

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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)		

FULL DRAFT
PREVIEW
SAMPLE

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!)



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6.25 Credit and Loans

Credit and loans

In life we can't always afford what we want to buy right away. So we use credit to buy things. You may see ads saying that "Credit is easy money". Yeah right! Read on!

Credit that is provided to you immediately becomes your debt. You have to pay back debt, plus interest, plus fees, plus charges, plus more interest...and so on.

And many credit and loan providers don't really want you to pay back your debt too quickly. "Take your time, just give us a little bit each fortnight or week - it's fine. We're nice people!" But why do they do that? Are they really being so nice to you?

There are six main types of personal credit finance available in Australia.

1. **Mortgages for housing loans**
2. **Personal loans**
3. **Buy-now pay-later**
4. **Credit cards**
5. **Interest-free purchases**
6. **Payday and instant loans**



Image: Siong Fong Chua, iStock/Thinkstock

Types of Credit and Loans

1. Mortgages

- ⇒ People can take out a long-term credit contract called a mortgage or housing loan to buy a house (and land).
- ⇒ The term mortgage refers to the right of the lender to take possession of the property in the case of default. (Some people say that the 'bank' still 'owns' their home until the entire loan is paid off.)
- ⇒ Home loan mortgages are normally taken out over 25-30 years. Mortgages are a pretty good use of credit because the value of the house and land will usually go up in the long term.
- ⇒ So borrowers are actually gaining utility (by living in the house) while building an investment (the value of the house and land increasing).

2. Personal loans

- ⇒ People often use shorter-term credit contracts such as personal loans.
- ⇒ Personal loans are often used to pay for cars, household items, holidays, weddings and big-ticket items. The loan is repaid with regular repayments, including interest, over a period of perhaps 3-5 years.
- ⇒ However, it can be a mistake to use personal loans to buy luxuries that are consumed immediately such as holidays; and for electricals, that date quickly. e.g. A holiday can = 2 weeks of enjoyment but paid for over 5 years!
- ⇒ It is better to save up for a holiday! (We won't mention about borrowing to buy engagement rings!)

Mortgages and loans 6M

After having a class discussion and doing online research, answer the following.



1
4 PS 2
3

1. Why is a mortgage generally a 'good' type of credit?

2. How much is the average mortgage in Australia, and in your state? By how much has this grown in the last 10 years?

3. Use a mortgage calculator to calculate monthly repayments on an average mortgage, and how much interest (at today's rate) would be paid over 25 years.

4. For which type of purchases would you recommend a personal loan? Why?

5. For which type of purchases would you not recommend a personal loan? Why?

6. Use a personal loan calculator to calculate fortnightly repayments on a 5-year, \$10,000 loan for a car. How much in interest (at today's rate) would be paid over the 5 years?

FULL DRAFT
PREVIEW
SAMPLE

6.27 Credit

3. By-now pay-later

- ⇒ This is one of the fastest growing sources of 'credit' for consumers in Australia.
- ⇒ This 'pay in 4' type of credit is becoming the most easily accessible credit for young people
- ⇒ Key providers include Afterpay, Zip Pay and others.
- ⇒ Technically this is not a form of credit; it is an agreement to pay off an item over a number of instalments. i.e. 'buy-now pay-later'.
- ⇒ You get to use the service, or take the item home straight away. But if you miss your repayments you pay fees!

This source of 'credit' is causing severe financial trouble for people aged 18-35 and for people on low incomes.

4. Credit cards

- ⇒ People use the flexibility offered by credit cards to buy groceries, personal items, devices, entertainment and gifts. Credit cards can also be used to pay for emergencies such as car repairs and medical bills.
- ⇒ But this form of credit can come at a high price. Credit cards are handy as long as you pay off your debt before the interest-free period expires. Otherwise, you could be up for a BIG interest bill!
- ⇒ Look ahead. If you can't afford to pay for an item within one month then you really must reconsider using a credit card to buy. Interest accrues quickly.

Beware. If you are using credit cards to pay bills then you are already sliding into financial trouble. Seek help immediately.

5. Interest-free purchases

- ⇒ Interest-free purchase plans are offered by retailers to purchasers of household goods, electricals and other big ticket items. Some offer up to 5-years' 'interest-free'.
- ⇒ The purchaser usually enters into a finance agreement with a third-party lender and/or receives a 'store credit card'.
- ⇒ If the purchaser pays back the 'loan' within the interest-free period then no interest is charged. But there are likely to be substantial fees.
- ⇒ However, if the 'loan' is not paid off within the specified time then the purchaser is usually up for very high interest charges.

Beware: The recommended minimum monthly repayment amount is not likely to pay off the purchase price within the specified time.

6. 'Payday' or instant loans

- ⇒ This short-term form of credit is basically a cash advance. 'Payday' types of loans are usually from \$300 up to \$2,000.
- ⇒ There are government regulations that cap the fees and charges related to these types of loans, but they are still very high.
- ⇒ Ads for these online and on TV make it seem fun and easy. Need money, just Wallett-Nimble it! But they don't ever talk about paying the loan back!
- ⇒ Some providers now offer 'instant loans' up to \$25,000 - instantly! That's a lot of pain ready to happen right there!

Beware: If you are considering this type of credit then the best advice is: DON'T. You are already experiencing financial difficulties. Financial help is available free. Cash advances are not!

'Easy' money, hard debt 6N

Work through the case studies below using the online calculators available at ASIC's: www.moneysmart.gov.au



1
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1. Jumbuk turns 18 and gets a credit card with a \$2,000 limit (and 20% interest rate). He goes out that day and buys a new phone and accessories for \$1,500. He has a job and plans to pay this off over time.

On his first statement he receives a notice of his balance, \$1,500 and a request to make a minimum payment of \$37.50 which he pays within the time period specified.

Jumbuk is quite financially disciplined and he doesn't use his card again. On his next statement he receives a notice:

Opening balance:	\$ 1,462.60
Add purchases:	\$ 0
Add interest charges:	\$ 29.20
Closing balance:	\$ 1,491.80
Minimum payment due:	\$ 37.29

a. What will happen if Jumbuk continues to only pay the minimum monthly payment due? Use the credit card calculator.

b. What happens if he increases his minimum monthly payment to \$50?

c. What about \$75?

d. What about \$100?

e. What would you recommend?

2. Jolie 18, drives 45 minutes to and from her job as a pharmacy assistant. Her car blows a head gasket and she is quoted \$1,000 to repair the engine.

Jolie approaches a 'Payday lender' and borrows \$1,000 over 12 months.

The establishment fee for the loan is \$200 (this is set at 20% of the loan amount).

She will pay monthly 'interest' fees (they are set at 4% of the total loan amount).

a. What is the total of Jolie's loan amount?

b. How much will her fortnightly payments be?

c. Calculate the total 'interest' and fee amounts that Jolie will repay over the life of the loan.

d. Calculate the % in 'interest' and fees on the loan. (Total interest and fees/total loan amount) x 100%.

e. Find out what happens if Jolie defaults on her loan.

f. Do some research and find alternative sources of finance for Jolie.

FULL DRAFT
PREVIEW
SAMPLE

6.29 Assessment Task

AT6a 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:

Investigate different types of credit and loans.

- Explain how credit and loans can be used in a positive way.
- Explain how credit and loans might be used in a negative way.
- Use an ASIC tool to calculate the true cost of a 'payday' or instant loan.
- Develop cautions for young people about using 'easy' credit and loans.

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.

Assessment Task 6.30

Name(s):	Key dates:	Financial Numeracy U3: Module 2 Number/Change			
Tasks - AT6a: Applied Financial Numeracy		Must Do?	Due by	Done	Level
Negotiate the task details with my teacher.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Part A: My budget					
1. Estimate weekly income.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2. Estimate weekly expenses.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3. Prepare a weekly budget.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
4. Prepare a monthly (or 4-weekly) budget.		<input type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
5. Comment on the implications of the budget.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Part B: Pay slip					
1. Source a suitable pay slip.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2. Identify and understand key financial information.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3. Describe what information should be on a pay slip.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Part C: Investigate different types of credit and loans.					
1. Explain positive uses of credit and loans.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
2. Explain negative uses of credit and loans.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
3. Use ASIC tool to calculate cost of a 'payday'/instant loan.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
4. Develop credit and loans cautions for young people.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Task completion and reporting					
Use and apply appropriate digital tools and apps.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Use and apply appropriate analogue tools.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
⇒ Use appropriate numerical language.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
1 4 PS 2 3 Describe applied use of the problem-solving cycle.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report		
Develop & apply mathematical tools and techniques.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Prepare and discuss my findings with my teacher.		<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>
Present a report to the class (if required).		<input type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>

6.31 Assessment Task

AT6b Researching Wage Rates Financial Numeracy: Number & Change

1
4 PS 2
3

For this assessment task you are required to complete a number of tasks related to pay and income. You will present your findings in a summary report.

Part A: Apprenticeship wage

1. Find out the current adult minimum pay rate.
2. Estimate the apprenticeship wage for 1st, 2nd, 3rd and 4th year.
Choose an Australian Apprenticeship that you might be interested in.
3. Find out the exact pay rates for that Apprenticeship.
4. Calculate the weekly and annual wage.
5. Find out about penalty rates, allowances and other pay data.

Resources and websites to use:



Part B: Traineeship wage

1. Estimate the current National Training Wage.
Choose a traineeship that you might be interested in.
2. Find out the exact pay rates for that traineeship.
3. Calculate the weekly and annual wage.
4. Find out about penalty rates, allowances and other pay data.

Resources and websites to use:



Part C: Casual employment wages

Choose 2 different employers that young people commonly work for such as supermarkets, retailers, take-away food, hospitality, etc..

1. Estimate the current hourly wage rates for each (based on your age).
2. Find out the exact pay rates for each employer.
3. Calculate a weekly and annual wage (based on a 'normal' casual week).
4. Find out about penalty rates, allowances and other pay data.

Resources and websites to use:



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.

Assessment Task 6.32

Name(s):	Key dates:	Financial Numeracy U3: Module 2 Number/Change			
Tasks - AT6b: Researching Wage Rates		Must do?	Due by	Done	Level
Part A: Apprenticeship wage					
1. Current adult minimum pay rate.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
2. Estimate the apprenticeship wage.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
3. Exact pay rates for that apprenticeship.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
4. Calculate the weekly and annual wage.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
5. Penalty rates, allowances and other pay data.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
Part B: Traineeship wage					
1. Estimate the current National Training wage.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
2. Exact pay rates for that traineeship.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
3. Calculate the weekly and annual wage.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
4. Penalty rates, allowances and other pay data.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
Part C: Casual employment wages					
1. Estimate current hourly wage in your area.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
2. Find out the exact pay rates for each employee.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
3. Calculate a weekly and annual wage for each.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
4. Penalty rates, allowances and other pay data.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
Appropriate use of online resources and tools.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
Task completion					
Submit draft for feedback.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
Describe applied use of the problem-solving cycle.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
Identify the maths	Act on & use maths	Evaluate & reflect	Communicate & report		
Develop and apply mathematical tools and techniques.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
⇒ Prepare and submit your final report.	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	
Present a report to the class (if required).	<input type="checkbox"/>	<input type="text"/>	<input type="radio"/>	<input type="text"/>	

6.33 // Problem-Solving Cycle // Maths Toolkit

1
4 PS 2
3

Task:		Names/Dates:			
AT6a -					
1. Identify the maths					
Identify problem(s)	Done: <input type="radio"/> Level: <input type="text"/>	Recognise maths	Done: <input type="radio"/> Level: <input type="text"/>	Select information	Done: <input type="radio"/> Level: <input type="text"/>
Interpret information	Done: <input type="radio"/> Level: <input type="text"/>	Choose processes	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>
2. Act on and use maths					
Perform estimations	Done: <input type="radio"/> Level: <input type="text"/>	Decide techniques	Done: <input type="radio"/> Level: <input type="text"/>	Choose maths tools	Done: <input type="radio"/> Level: <input type="text"/>
Select technologies	Done: <input type="radio"/> Level: <input type="text"/>	Perform calculations	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>
3. Evaluate and reflect					
Check Estimations	Done: <input type="radio"/> Level: <input type="text"/>	Compare results	Done: <input type="radio"/> Level: <input type="text"/>	Check processes	Done: <input type="radio"/> Level: <input type="text"/>
Review actions	Done: <input type="radio"/> Level: <input type="text"/>	Check conclusions	Done: <input type="radio"/> Level: <input type="text"/>	Assess conclusions	Done: <input type="radio"/> Level: <input type="text"/>
Communicate a report					
Written processes	Done: <input type="radio"/> Level: <input type="text"/>	Written results	Done: <input type="radio"/> Level: <input type="text"/>	Oral processes	Done: <input type="radio"/> Level: <input type="text"/>
Oral results	Done: <input type="radio"/> Level: <input type="text"/>	Digital processes	Done: <input type="radio"/> Level: <input type="text"/>	Digital results	Done: <input type="radio"/> Level: <input type="text"/>

FULL DRAFT
PREVIEW
SAMPLE



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
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

// Problem-Solving Cycle // Maths Toolkit 6.34

1
4 PS 2
3

Task: _____ **Names/Dates:** _____

AT6b -

1. Identify the maths

Identify problem(s)	Done: <input type="radio"/> Level: <input type="text"/>	Recognise maths	Done: <input type="radio"/> Level: <input type="text"/>	Select information	Done: <input type="radio"/> Level: <input type="text"/>
Interpret information	Done: <input type="radio"/> Level: <input type="text"/>	Choose processes	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>

2. Act on and use maths

Perform estimations	Done: <input type="radio"/> Level: <input type="text"/>	Decide techniques	Done: <input type="radio"/> Level: <input type="text"/>	Choose maths tools	Done: <input type="radio"/> Level: <input type="text"/>
Select technologies	Done: <input type="radio"/> Level: <input type="text"/>	Perform calculations	Done: <input type="radio"/> Level: <input type="text"/>		Done: <input type="radio"/> Level: <input type="text"/>

3. Evaluate and reflect

Check Estimations	Done: <input type="radio"/> Level: <input type="text"/>	Compare results	Done: <input type="radio"/> Level: <input type="text"/>	Check processes	Done: <input type="radio"/> Level: <input type="text"/>
Review actions	Done: <input type="radio"/> Level: <input type="text"/>	Check oral processes	Done: <input type="radio"/> Level: <input type="text"/>	Assess conclusions	Done: <input type="radio"/> Level: <input type="text"/>

4. Communicate report

Written processes	Done: <input type="radio"/> Level: <input type="text"/>	Written results	Done: <input type="radio"/> Level: <input type="text"/>	Oral processes	Done: <input type="radio"/> Level: <input type="text"/>
Oral results	Done: <input type="radio"/> Level: <input type="text"/>	Digital processes	Done: <input type="radio"/> Level: <input type="text"/>	Digital results	Done: <input type="radio"/> Level: <input type="text"/>

FULL DRAFT
PREVIEW
SAMPLE

Mathematical Toolkit

Analogue tools - What & how?	Digital Devices - What & how?	Software & Apps - What & how?
Choice & Range <input type="text"/>	Skill & Accuracy <input type="text"/>	Choice & Range <input type="text"/>
Choice & Range <input type="text"/>	Skill & Accuracy <input type="text"/>	Choice & Range <input type="text"/>
Choice & Range <input type="text"/>	Skill & Accuracy <input type="text"/>	Choice & Range <input type="text"/>

6.35 Review and Reflection

Unit Review and Reflection

Which Numeracy skills did I develop during this entire unit?

→ _____

→ _____

→ _____

How have the skills of Numeracy helped to improve my personal life?

→ _____

→ _____

→ _____

How have Numeracy skills helped to improve my work-related skills?

→ _____

→ _____

→ _____

**FULL DRAFT
PREVIEW
SAMPLE**

My performance in developing my Numeracy skills this entire unit was:

0 not shown	1 low	2 reasonable	3 good	4 very good	5 excellent
-----------------------	-----------------	------------------------	------------------	-----------------------	-----------------------

What were my strongest areas of performance? What should I work on improving?

My strongest topics/skills were:	But I need to improve my skills in:

Signed: _____ Date: _____