SUPERVISOR TO ATTACH
PROCESSING LABEL HERE

Write your **student number** in the boxes above. **Letter**

Foundation Mathematics

Question and Answer Book

VCE Examination – Tuesday 18 November 2025

- Reading time is **15 minutes**: 11.45 am to 12 noon
- Writing time is **2 hours**: 12 noon to 2.00 pm

Approved materials

- One bound reference that may be annotated
- One scientific calculator

Materials supplied

- Question and Answer Book of 40 pages
- Formula Sheet
- Multiple-Choice Answer Sheet

Instructions

- Follow the instructions on your Multiple-Choice Answer Sheet.
- At the end of the examination, place your Multiple-Choice Answer Sheet inside the front cover of this book.

Students are **not** permitted to bring mobile phones and/or any unauthorised electronic devices into the examination room.

Contents

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VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

VICTORIA State Government

Section A – Multiple-choice questions

Instructions

- Answer **all** questions in pencil on your Multiple-Choice Answer Sheet.
- Choose the response that is **correct** for the question.
- A correct answer scores 1; an incorrect answer scores 0.
- Marks will **not** be deducted for incorrect answers.
- No marks will be given if more than one answer is completed for any question.
- Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1

Fuel costs 191.0 cents per litre. A truck uses 35 litres (L) of fuel per 100 kilometres (km) of travel.

The cost of fuel for a 420 km trip in this truck is

A. $21.61

B. $98.27

C. $147.00

D. $280.77

Question 2

A wall is constructed using 420 bricks.

The cost of one building brick is $1.31

An estimate of the total cost for the wall is made using a cost of $1.50 per building brick.

The **floor value** for the percentage error is

A. 12%

B. 12.7%

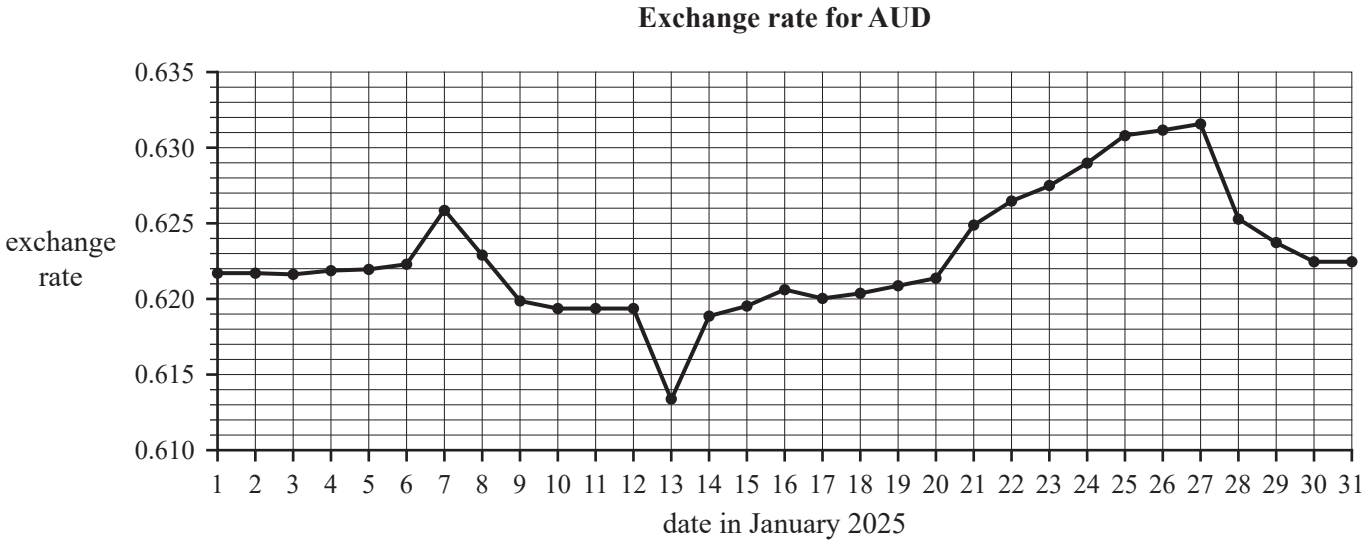
C. 14%

D. 14.5%

Do not write in this area.

Question 3

The graph below shows the recorded daily exchange rate for the Australian dollar (AUD) compared with the United States dollar (USD) for January 2025.



Data: Reserve Bank of Australia 2025

The largest decrease in the exchange rate for January 2025 occurred between

A. 7 and 8 January.

B. 8 and 9 January.

C. 12 and 13 January.

D. 27 and 28 January.

Question 4

In 1901, Australia had a population of 3.8 million people.

In 2023, Australia had a population of 26.8 million people.

The percentage increase in Australia's population between 1901 and 2023 is closest to

A. 705%

B. 605%

C. 496%

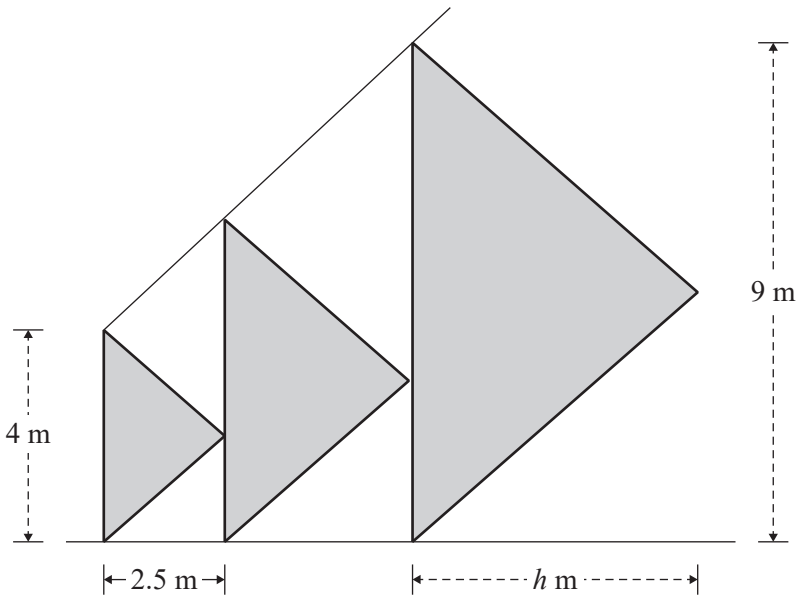
D. 14%

Do not write in this area.

Question 5

A section of the rail of a bridge is shown in the diagram below.

It is constructed using a set of similar triangles, three of which are shaded.



The value of h, in metres (m), is

A. 1.111

B. 2.500

C. 5.625

D. 14.000

Question 6

It is suggested that mortgage payments should be at or below 30% of a person's after-tax income.

For a person earning an annual after-tax income of $74 752, the suggested maximum **monthly** mortgage payment would be

A. $1868.80

B. $6229.33

C. $22 425.60

D. $2 242 560.00

Do not write in this area.

Question 7

A cricketer needs a mean run score of at least 75 from five games to qualify for a competition.

The cricketer's run scores in the first four games were 68, 70, 72 and 82.

The minimum run score needed in the fifth game to qualify is

A. 73

B. 75

C. 77

D. 83

Question 8

The Australian resident tax rates for 2024–2025 are given in the table below.

Annual taxable income	Tax on this income
0–$18 200	nil
$18 201–$45 000	16c for each $1 over $18 200
$45 001–$135 000	$4288 plus 30c for each $1 over $45 000
$135 001–$190 000	$31 288 plus 37c for each $1 over $135 000
$190 001 and over	$51 638 plus 45c for each $1 over $190 000

Source: Adapted from Australian Taxation Office, <www.ato.gov.au>

An experienced worker received an annual taxable income of $146 700.

The tax payable for the year is closest to

A. $4329

B. $35 617

C. $54 279

D. $85 567

Do not write in this area.

Question 9

A hospitality employee works 17.5 hours in a given week.

They are paid a gross rate (before tax or deductions) of $25.80 per hour.

The superannuation guarantee rate for this employee is 12%.

The superannuation contribution made by the employer for this employee's week of work is

A. $54.18

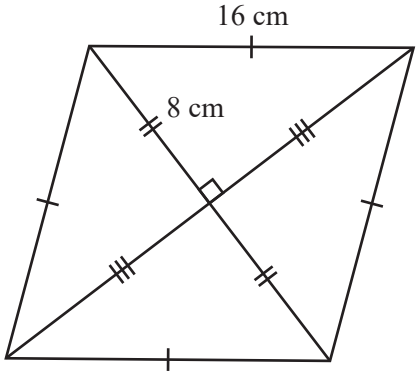
B. $56.44

C. $59.85

D. $5985.00

Question 10

A floor tile is designed in the shape of a rhombus. The diagonals separate the floor tile into four identical right triangles as shown below. The side length of the floor tile is 16 centimetres (cm). The shortest length of each triangle is 8 cm.



The area of the floor tile, in square centimetres (cm^2), is closest to

A. 64.0

B. 221.7

C. 256.0

D. 443.4

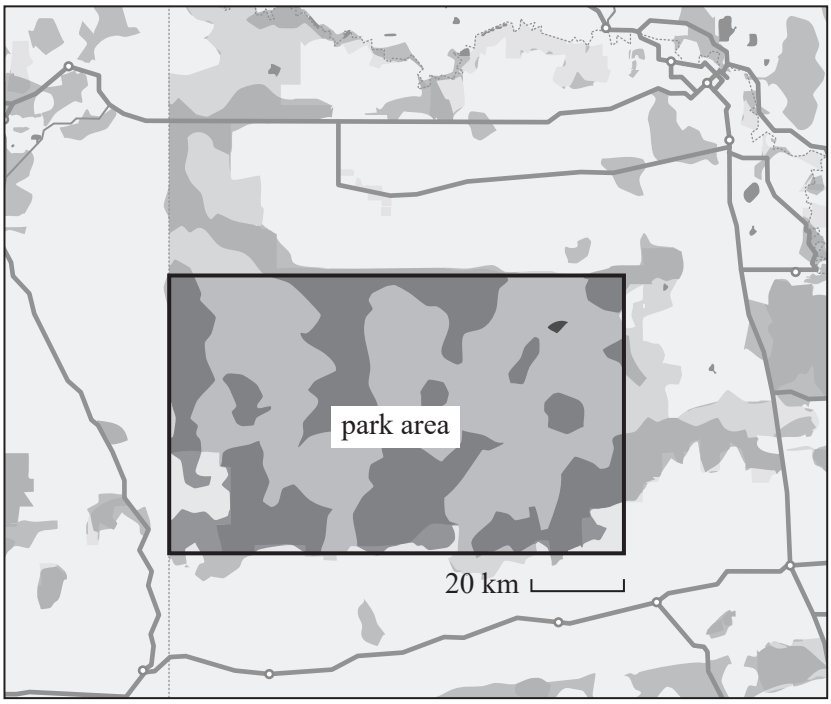
Do not write in this area.

Do not write in this area.

Question 11

The area of a park is approximated using a rectangle, as shown below.

A scale for this map is located below and to the right of the rectangle.



Source: Adapted from Google Maps, <www.google.com.au>

Using the given scale, the approximate area of the park, in square kilometres (km^2), is closest to

A. 180

B. 300

C. 5400

D. 60 000

Question 12

Long-term data trends for the movement of traffic on two major roads were analysed and used to predict the likelihood of heavy traffic.

The data showed that heavy traffic occurred on Road A on four out of any five days and on Road B on three out of any five days.

The flow of traffic on Road A is independent of the flow of traffic on Road B.

The likelihood of a car encountering heavy traffic while travelling on both roads is

A. 0.12

B. 0.48

C. 0.60

D. 0.80

Question 13

Bleach and water are mixed to form a cleaning solution.

The ratio of bleach to water is 2 parts bleach to 13 parts water.

The volume of bleach needed to make 60 L of this cleaning solution is

A. 8 L

B. 9 L

C. 15 L

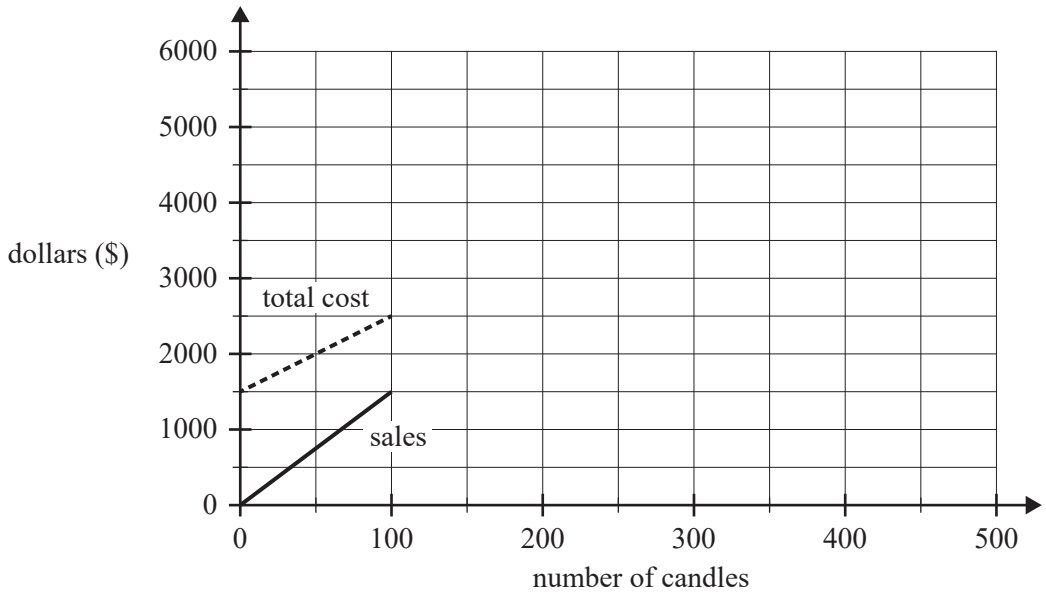
D. 52 L

Question 14

A company sells candles for $15 each.

The total cost of making the candles includes a fixed cost of $1500 plus $10 per candle.

This information is shown in the graph below.



The number of candles that need to be sold to reach the break-even point is

A. 250

B. 300

C. 4000

D. 4500

Do not write in this area.

Question 15

The percentage change in the cost of a selection of food items has a direct variation with reported inflation rates. The following table shows the price of some food items that were purchased in two consecutive years.

Food items	Year A	Year B
bread (1 loaf)	\$4.20	\$4.28
milk (1 litre)	\$2.00	\$2.08
bananas (1 kilogram)	\$3.50	\$3.56
fish (1 kilogram)	\$6.70	\$6.80
pasta (1 kilogram)	\$2.50	\$2.54

The reported inflation rates for a selection of years are given in the table below.

Year	Inflation rate
2018	1.90%
2019	1.61%
2020	0.85%
2021	2.86%
2022	6.59%
2023	5.60%

The percentage increase in the total cost of the purchased food items from Year A to Year B is best reflected in the reported inflation rate for the year

A. 2018

B. 2019

C. 2021

D. 2023

Do not write in this area.

Question 16

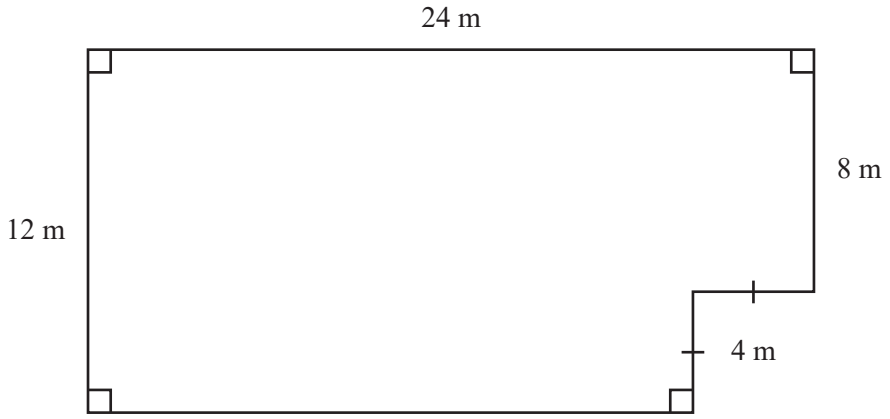
An office floor of 272 square metres (m^2) is to be covered with carpet.

A roll of carpet is 4 m wide.

The cost of the carpet is $89.99 per linear metre.

One linear metre of carpet takes 20 minutes to install.

Installation of the carpet costs $80.50 per hour.



The cost of buying this carpet and installing it over the entire office floor is closest to

A. $4000

B. $6000

C. $8000

D. $22 000

Question 17

The image shown below is viewed in a rear-view mirror.

MA103

The image seen in the rear-view mirror would be

A. 

B. 

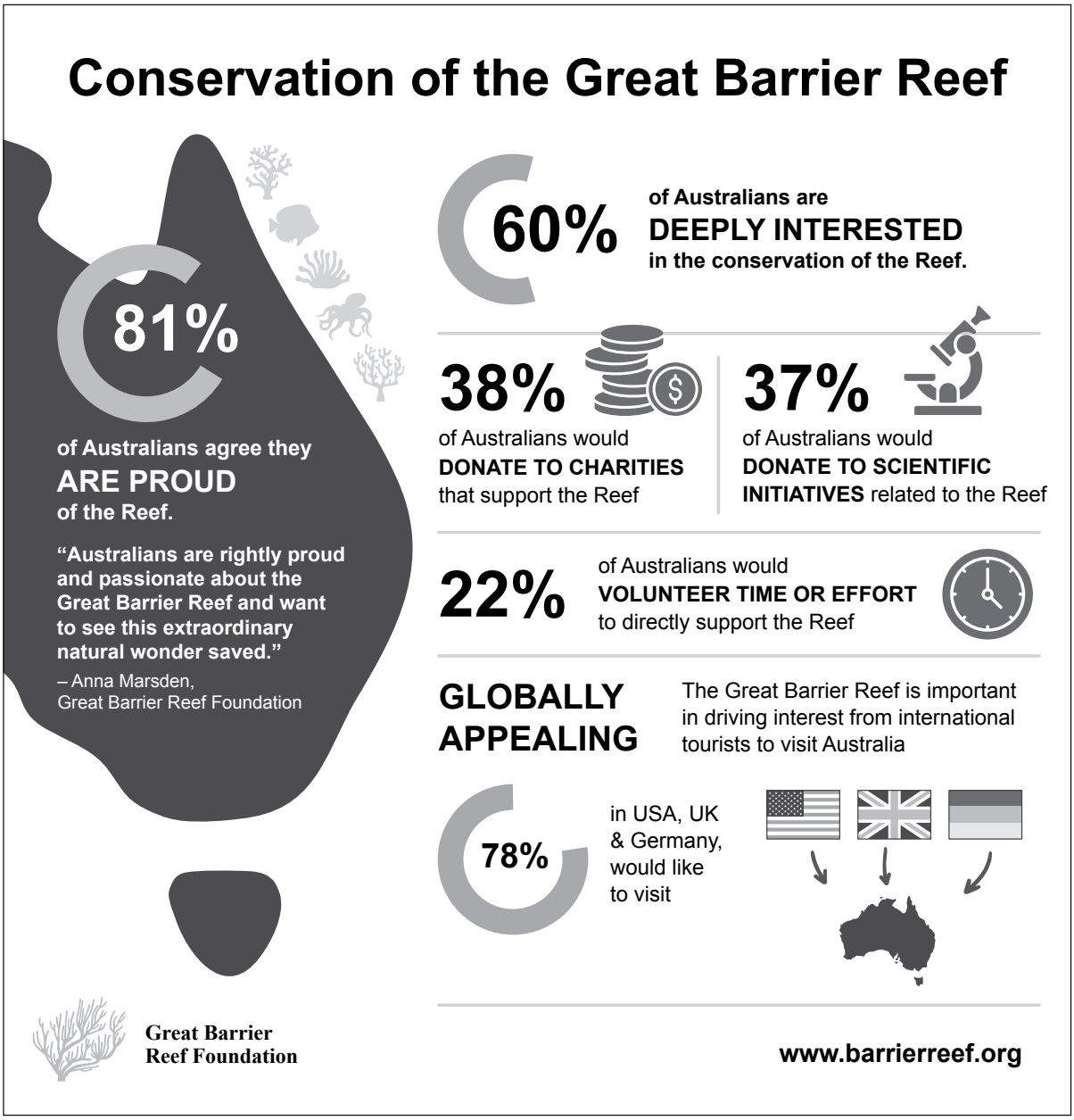
C. MA103

D. 

Do not write in this area.

Question 18

A survey of 1250 Australian residents was conducted to seek their opinions on the conservation of the Great Barrier Reef. The infographic below displays the results.



Source: Reproduced with permission. Adapted from the Great Barrier Reef Foundation's 2018 RTP Communication and Engagement Plan, <www.barrierreef.org>

Of those surveyed, the number who are **deeply interested** in the conservation of the Great Barrier Reef is

A. 60

B. 275

C. 475

D. 750

Do not write in this area.

Question 19

A credit card charges simple interest of 20.99% per annum for overdue account balances.

An account holder's balance at the end of a given statement period is $2750.

The balance attracts 23 days of simple interest after the end of the statement period before the account is settled.

The total balance and interest amount, to the nearest cent, that is fully repaid after the 23 days is

A. $36.37

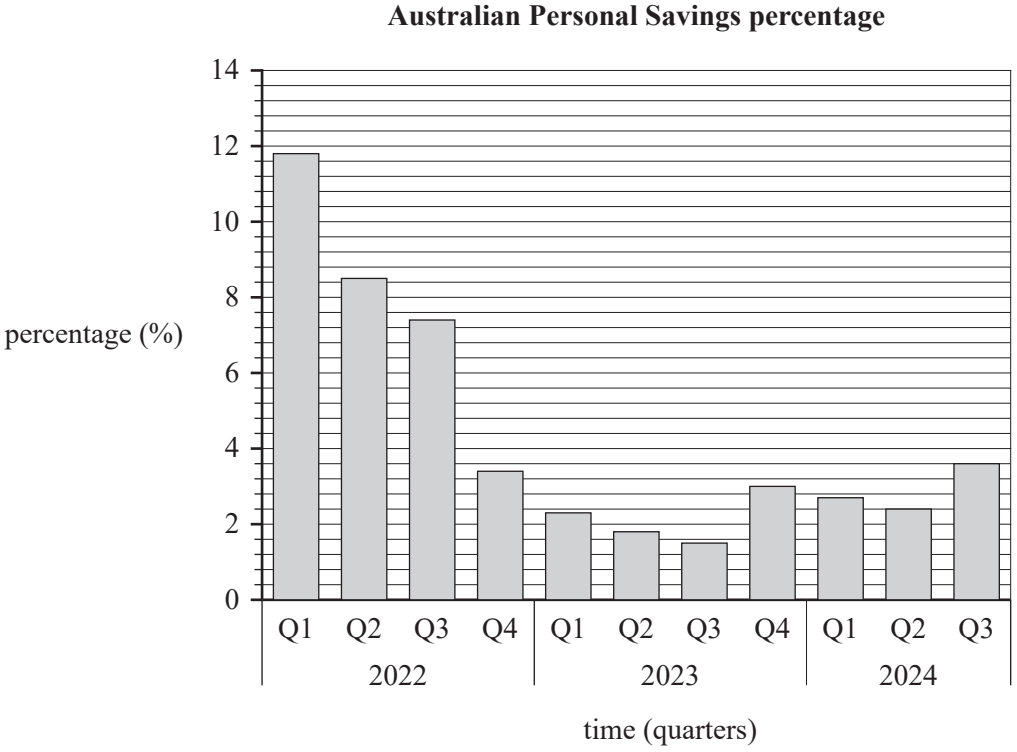
B. $2786.37

C. $13 276.18

D. $16 026.18

Question 20

The graph below shows the Australian Personal Savings percentage from Quarter 1, 2022 to Quarter 3, 2024.



Source: Adapted from Trading Economics, <https://tradingeconomics.com/australia/personal-savings>; Australian Bureau of Statistics (ABS)

The median Australian Personal Savings percentage occurred in

A. Quarter 1, 2022

B. Quarter 3, 2023

C. Quarter 4, 2023

D. Quarter 3, 2024

End of Section A

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Examination continues on the next page.

Section B

Instructions

- Answer **all** questions in the spaces provided.
- Write your responses in English.
- In all questions where a numerical answer is required, you should only round your answer when instructed to do so.
- In questions where more than one mark is available, appropriate working **must** be shown.
- Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1 (5 marks)

Artificial intelligence (AI) equipment installed in large warehouses can get very hot. Water is used as a coolant.

a. In one warehouse, the heat generated from the AI equipment in responding to 50 AI queries required 500 millilitres (mL) of water.

Calculate the average volume, in millilitres, of water required for each AI query. 1 mark

b. The AI equipment in another warehouse uses between 1.8 litres and 12 litres of water per kilowatt hour (kW h) of heat energy produced.

Calculate the volume range, in litres, needed to cool AI equipment that produces 100 kW h of heat energy.

Record your answers in the boxes below. 2 marks

smallest volume		volume		largest volume
	≤		≤	

Do not write in this area.

c. It is reported that Australia uses around 13 449 gigalitres (GL) of water per year.

Globally, AI equipment is predicted to require 6.6 billion cubic metres (m^3) of water for cooling in 2027.

The conversion from cubic metres to gigalitres is

1 billion cubic metres (m^3) = 1000 gigalitres (GL)

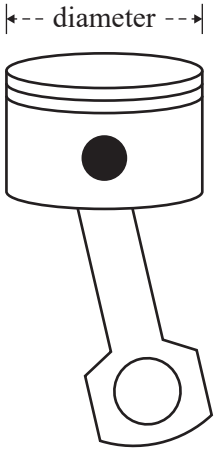
Express the 2027 globally predicted water requirement for AI equipment as a percentage of the annual use of water in Australia. Give your answer to the nearest whole percentage. 2 marks

Do not write in this area.

Question 2 (5 marks)

A machinist is making pistons for an engine. A diagram of a piston is shown below.

The specifications require the diameter of the piston cylinder to be 87.000 millimetres (mm) with a tolerance of ± 0.005 mm.



Five pistons are machined and their diameters measured. The measurements, in millimetres, are

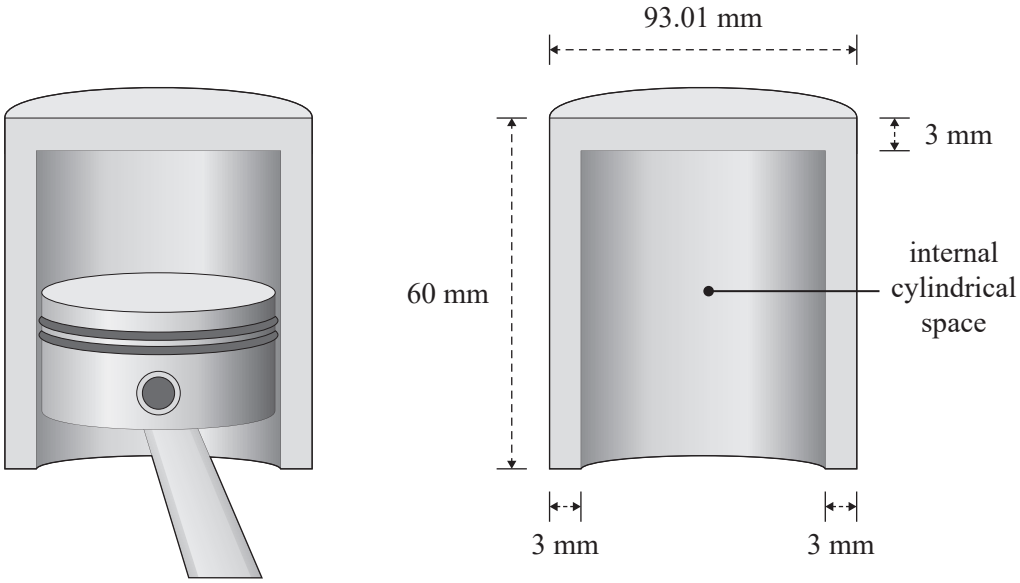
87.003 88.000 86.998 87.004 86.990

a. Calculate the mean diameter of these five pistons. 1 mark

b. From the five piston diameters listed above, write down all the diameters that are within the specified tolerance. 2 marks

Do not write in this area.

c. The piston fits inside a cylindrical space as shown below.



Source: Adapted from Arthit Premprayot/Shutterstock.com

The conversion between cubic millimetres and cubic centimetres is

1000 cubic millimetres (mm^3) = 1 cubic centimetre (cm^3)

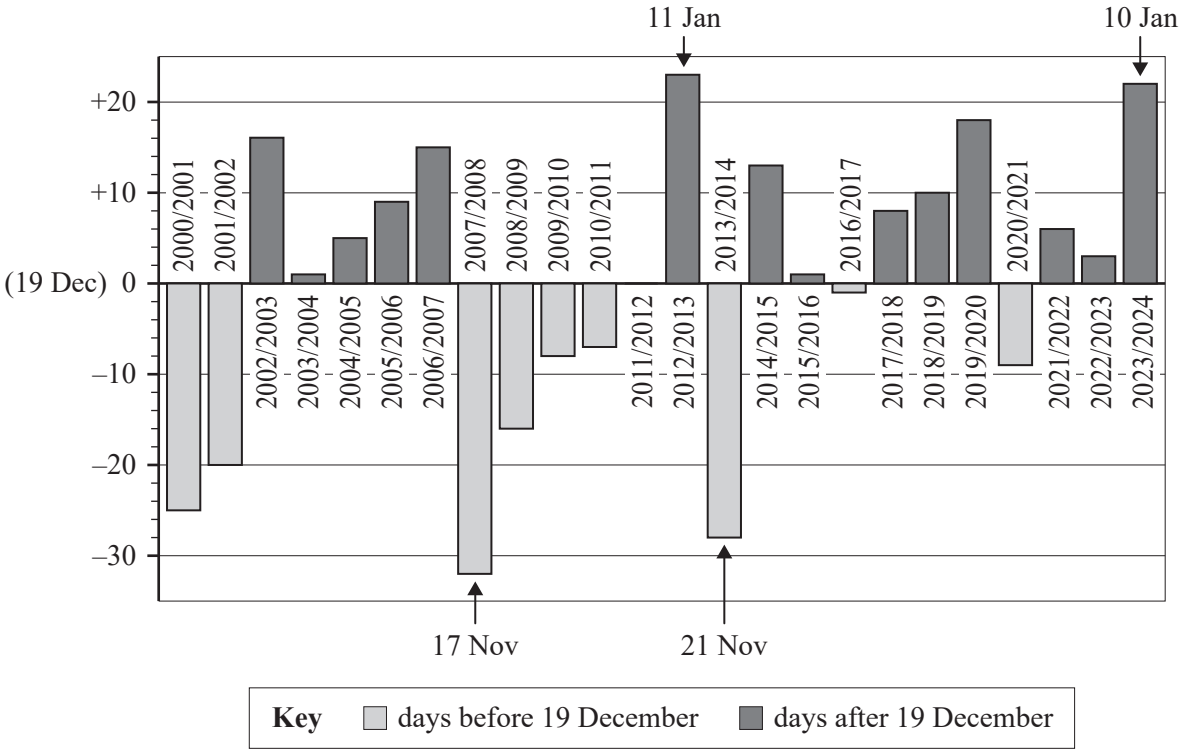
Using the measurements shown above, calculate the volume of the internal cylindrical space. Give your answer in cubic centimetres, rounded to three significant figures. 2 marks

Do not write in this area.

Question 3 (5 marks)

The graph below shows the start date of the monsoon season (rainy season) on Australia's mainland over 24 financial years. The start dates are measured in days before or after 19 December.

Start date of the monsoon season on Australia's mainland over 24 financial years



Source: Adapted from T Saunders, ABC News, 4 January 2025, <www.abc.net.au>

a. Using the graph above, consider the first monsoon season that started after 19 December.

- Identify the financial year in which it occurred, and
- find the start date of this monsoon season.

Record your answers in the boxes below. 2 marks

Financial year

Start date

Do not write in this area.

b. State the number of times the start date for the monsoon season in Australia was more than 10 days from 19 December. 1 mark

c. Using the graph, interpret the data for the 2011/2012 monsoon season. 1 mark

d. Write down the number of times the difference between any two consecutive start dates of a monsoon season was more than one year. 1 mark

Do not write in this area.

Question 4 (5 marks)

A tax invoice from a photographer hired for a celebration is shown below.

The invoice is partially complete.

The unit prices listed do not include GST.

Tax invoice

Celebration Photographs
201 Big Day Street
Melbourne VIC 3998

ABN: 123 456 789 10

Bill to Happy Client
15 New Street
Photoville VIC 3999

Invoice number: 001027
Date: 28 October 2025

Description	Unit	Unit price	Amount
location and preparation	1	$300.00	
photographer (cost per hour)	5	$180.00	
equipment hire	1	$750.00	
photo editing (cost per hour)	3	$120.00	
digital images	1	$190.00	
		Total	
		GST	
		Amount owing	$2750.00

a. Complete the invoice by filling in all the blank boxes in the 'Amount' column. 3 marks

(*Answer on the invoice above.*)

Do not write in this area.

b. Two venues, A and B, are being considered for the celebration. The costs for each venue are as follows:

- Venue A – $135 per person, all inclusive
- Venue B – $75 per person plus a fixed cost of $3200

Find the minimum number of guests required to guarantee Venue B is the cheaper option. 2 marks

Do not write in this area.

Question 5 (5 marks)

A farmer is preparing an area of land to plant a crop of wheat.

To prepare the land for planting, the farmer will spray the land with a fertiliser to help increase the soil's nutrients.

The conversion between square metres and hectares is

$$10\,000 \text{ square metres } (m^2) = 1 \text{ hectare (ha)}$$

The land being used to plant the crop is 1200 m long and 800 m wide.

a. Show that the area of this land is 96 ha. 1 mark

b. The fertiliser being used on the land contains two active ingredients, A and B.

The ratio of ingredients is 1 part ingredient A to 3 parts ingredient B.

It is known that

- a 25 kg bag of ingredient A costs $35
- a 25 kg bag of ingredient B costs $46
- 200 kg of fertiliser will cover 1 hectare.

Calculate the cost of the fertiliser required for the land. 2 marks

Do not write in this area.

c. The farmer sprays the fertiliser using a boom-sprayer attached to a tractor.

Source: Seahorse Vector/Shutterstock.com

The boom-sprayer covers a land width of 20 metres (m).

The tractor moves at a speed of 16 kilometres per hour.

An extra 20 minutes of time is taken for the tractor to make all its turns.

Calculate the total time, in minutes, the farmer will take to spray the fertiliser on the land.

2 marks

Do not write in this area.

Question 6 (5 marks)

Two tenants renting a house in 2025 use some of their after-tax incomes to cover essential expenses.

Assume that there are exactly 52 weeks or 26 fortnights in a year.

The essential expenses that need to be covered by the tenants are given in the table below.

Expense	Frequency	Cost
food	weekly	$250
internet	monthly	$80
rent	monthly	$2500
subscriptions	monthly	$50
utilities (water, gas and electricity)	monthly	$650

a. Show that the annual cost of the essential expenses for these tenants is $52 360. 2 marks

Do not write in this area.

b. The two tenants contribute equally to the cost of the essential expenses.

One tenant earns an after-tax income of $5000 per month.

Calculate the maximum monthly savings this tenant can make after they have paid their share of the essential expenses. Round your answer to the nearest cent. 1 mark

c. The other tenant earns an after-tax income of $2800 per fortnight.

The **annual** before-tax income can be determined using the rule

annual after-tax income = 9212 + 0.7 × annual before-tax income

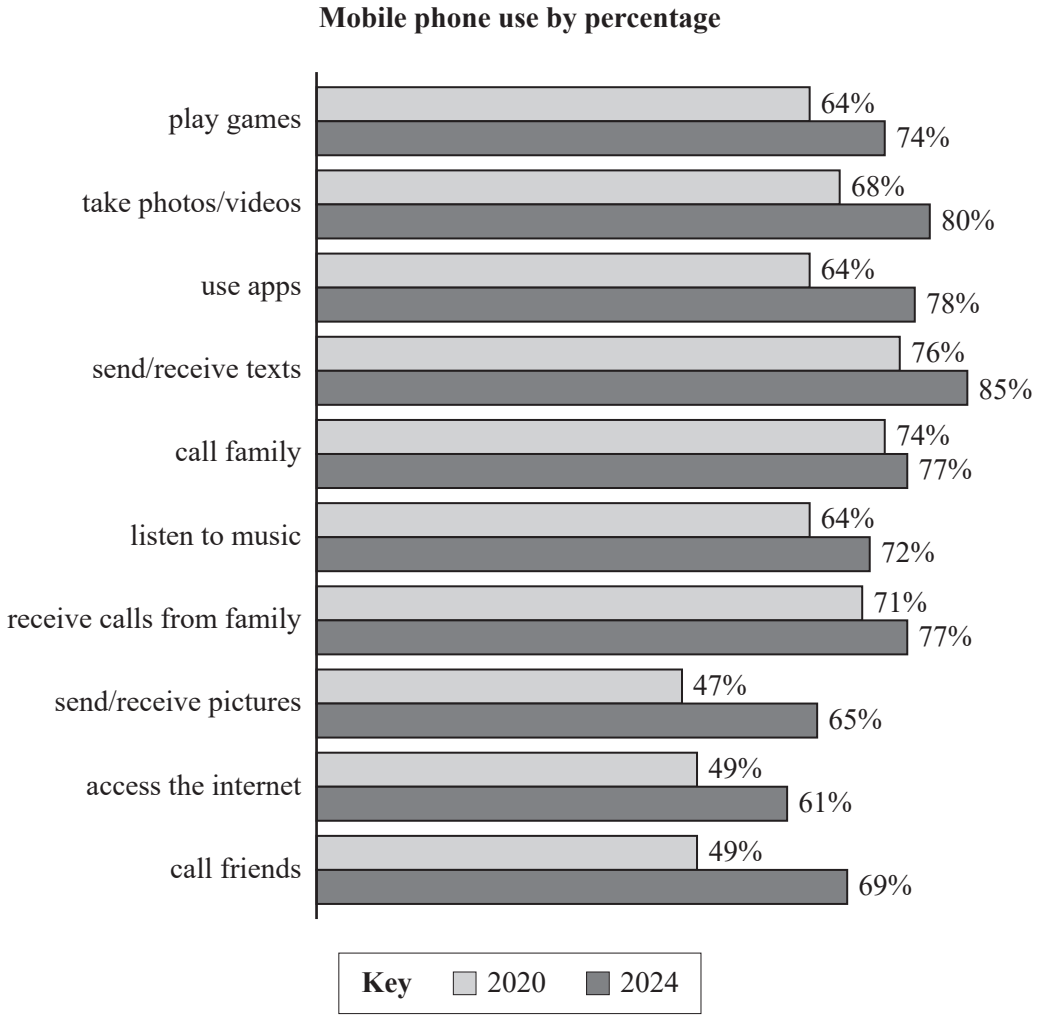
Find the annual before-tax income for this tenant. 2 marks

Do not write in this area.

Question 7 (5 marks)

Seven hundred Australian children aged 12 were surveyed about their mobile phone use in both 2020 and 2024.

The graph below displays the survey results.



a. State the most common mobile phone use in 2020. 1 mark

b. State the mobile phone use that showed the largest increase in percentage between 2020 and 2024. 1 mark

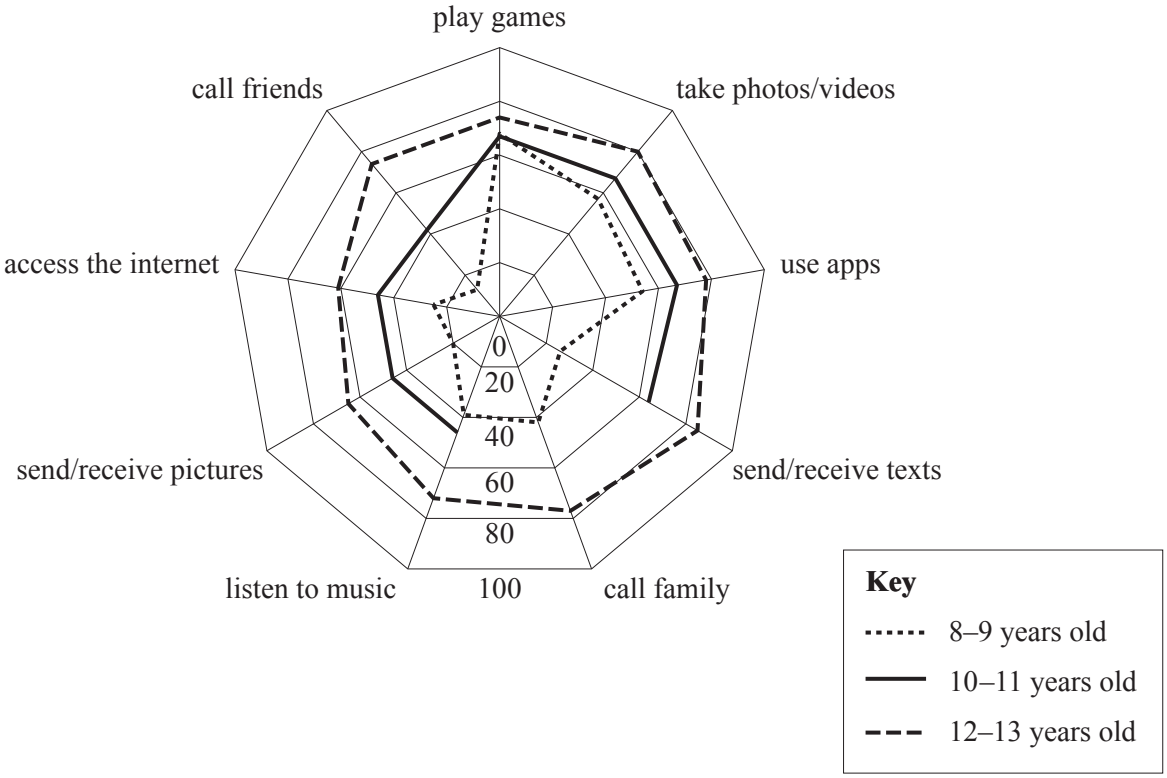
Do not write in this area.

c. For the Australian children surveyed in 2024, calculate the difference between the number of children who indicated they take photos/videos and those who access the internet.

2 marks

d. A survey with a broader age range was conducted for children aged 8–13 years old about their mobile phone use. The results are presented in the radar graph below.

Comparison of mobile phone use for different age ranges



The following data is missing from the radar graph:
60% of the 10–11 years old children call family on their mobile phones.

Using this information, complete the radar graph above.

1 mark

(*Answer on the radar graph above.*)

Do not write in this area.

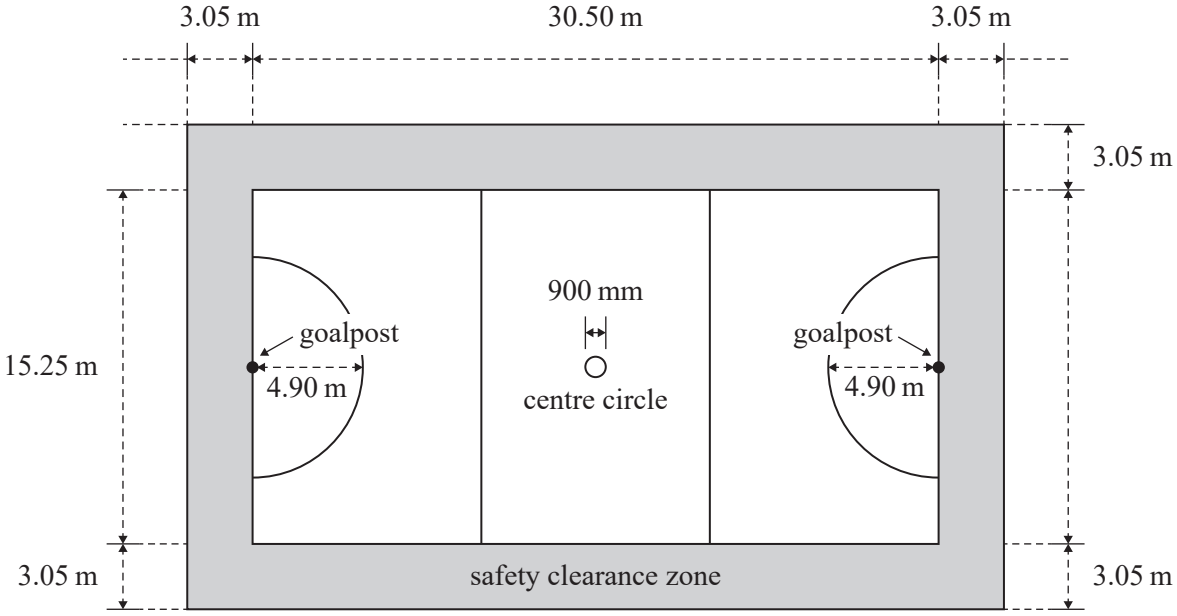
Question 8 (5 marks)

The playing area of a standard netball court is a rectangle 30.50 m long and 15.25 m wide.

The playing area is divided into thirds, with a centre circle that has a diameter of 900 mm.

There is a semicircle at each end of the playing area with a radius of 4.90 m around each goalpost.

Around the perimeter of the playing area is a safety clearance zone that is 3.05 m wide.



a. Calculate the radius of the centre circle in metres. 1 mark

Do not write in this area.

b. Calculate the area, in square metres, of the safety clearance zone shaded in the diagram on page 28. Give your answer rounded to the nearest whole number. 2 marks

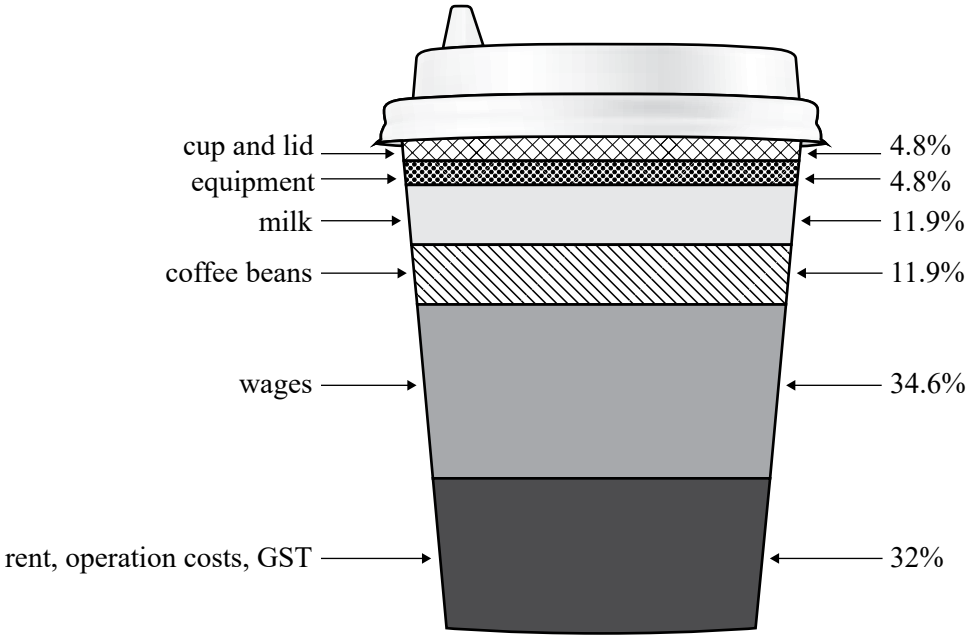
c. All the line markings on the **playing area** are painted.

Calculate the total length, in metres, of these line markings, including the two semicircles and the centre circle. Do not consider the width of the lines in the calculation. Give your answer rounded to one decimal place. 2 marks

Do not write in this area.

Question 9 (5 marks)

The cost breakdown of a takeaway cup of coffee is shown in the infographic below.



Source: E Felton, 'Think …', The Conversation Australia, 28 March 2024, <https://theconversation.com/au>; Pablo & Rusty's Coffee Roasters, <https://pabloandrustys.com.au> (data). Licensed CC-BY-SA 4.0

The cost of a takeaway cup of coffee is $5.50

a. Using the information above, show that the cost of the cup and lid is 26 cents, rounded to the nearest cent. 1 mark

Do not write in this area.

b. The volume of the takeaway cup is 236 mL.

Assuming a direct variation between cost and volume, calculate the volume of milk, in millilitres, used in this cup of coffee. Round your answer using a leading digit approximation. 2 marks

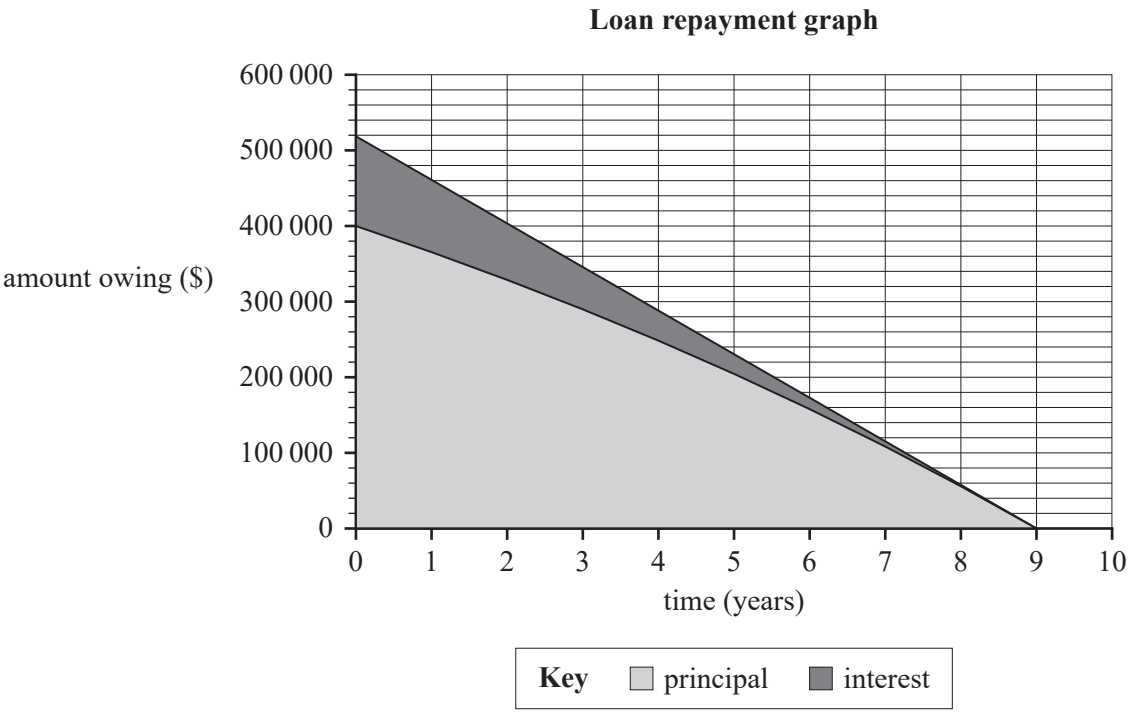
c. The coffee is made by a barista who earns a wage of $26 per hour.

If the barista works an eight-hour shift, calculate the minimum number of cups of coffee the barista would need to make to cover the cost of this wage. 2 marks

Do not write in this area.

Question 10 (5 marks)

The stacked area chart below shows the amount of principal and interest owing on a $400 000 loan over nine years. Repayments are made monthly.



The interest rate on this loan is 0.5% per month. The interest is added at the end of each month.

Repayments are $4803 per month, rounded up to the nearest dollar.

a. Calculate the reduction in the amount of principal after the first repayment is made. 2 marks

Do not write in this area.

b. Calculate the total number of repayments needed to fully repay this loan. 1 mark

c. The total amount that will be repaid for this loan is $518 724.

Calculate the average amount of interest that will be repaid each year over the life of the loan. Round your answer to the nearest 10 dollars. 2 marks

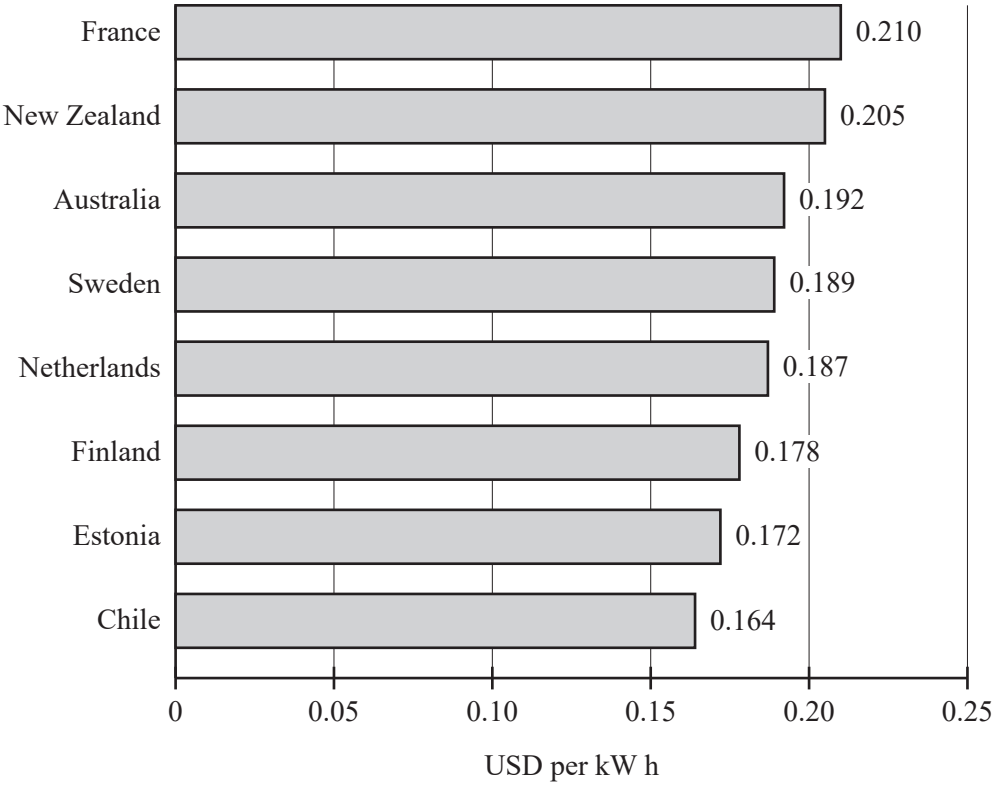
Do not write in this area.

Question 11 (5 marks)

The graph below shows the average household electricity prices in selected countries from the Organisation for Economic Co-operation and Development (OECD) in 2024.

The electricity prices are given in United States dollars (USD) per kilowatt hour (kW h).

Household electricity prices in selected OECD countries (USD)



Source: Adapted from Australian Energy Council, <www.energycouncil.com.au/news/international-electricity-price-comparisons>

a. Find the simplest ratio for the average household electricity price in New Zealand compared with the average household electricity price in Chile. 1 mark

Do not write in this area.

A dishwasher in Australia uses 1.8 kW h of electricity each hour.

The dishwasher runs for 35 hours each month.

Assume that the conversion rate between Australian dollars (AUD) and United States dollars (USD) is

$$1 \text{ AUD} = 0.64 \text{ USD}$$

b. Using the average household electricity price in Australia from the graph on page 34, calculate the cost, in Australian dollars, of running the dishwasher for one year.
Round your answer to the nearest dollar. 2 marks

c. A website rates dishwashers based on selected criteria, with each criterion given an importance weighting based on user feedback. The following results were recorded from a sample of 50 users for a selected dishwasher.

In this table, *AR* is defined as the average rating out of 10.

Criterion	***weighting***	***AR***
cleaning performance	0.4	8.5
energy efficiency	0.2	8.0
water usage	0.2	6.0
noise level	0.1	7.5
build quality	0.1	9.0
Total	1.0	

A **weighted score** can be calculated using the rule

$$\text{weighted score} = \text{sum of } (\textit{weighting} \times \textit{AR})$$

Calculate the weighted score for this dishwasher based on the sample data.
Round your answer correct to one decimal place. 2 marks

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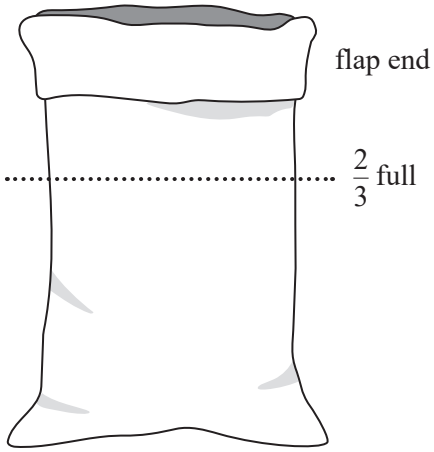
Question 12 (5 marks)

Sandbags are used to deflect the flow of water from a burst water main. The sandbags are stacked to form a wall with bags overlapping.

Each sandbag is filled with dry sand to only $\frac{2}{3}$ full so that it can be carried.



A rule that combines density, weight and volume is given by

$$\text{density} = \frac{\text{weight}}{\text{volume}}$$

Dry sand has a density of 1600 kilograms per cubic metre.

The conversion from cubic metres to litres is

1 cubic metre (m^3) = 1000 litres (L)

a. Using the rule above, calculate the volume, in litres, of 20 kg of dry sand. 2 marks

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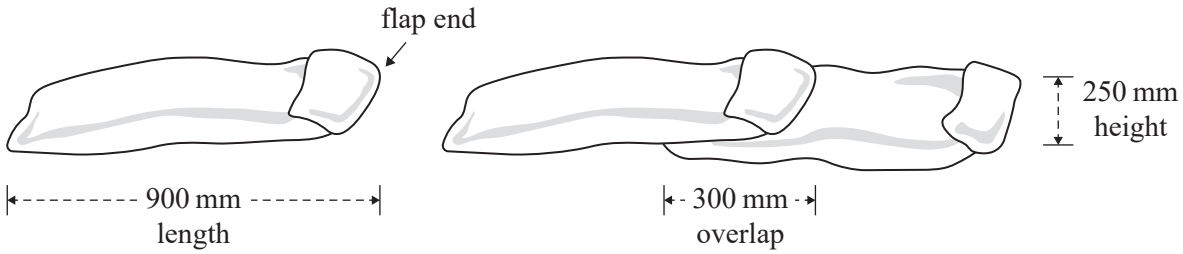
b. A sandbag that is $\frac{2}{3}$ full contains 20 kg of dry sand.

Calculate the volume, in litres, of dry sand in a sandbag that is completely full. 1 mark

c. The length of a filled sandbag is 900 mm. The height of the filled sandbag when stacked is 250 mm. Assume that the bags overlap by 300 mm on the flap end when the filled sandbags are used to build a wall.



A wall that is 18.3 m long and 1.5 m high is being built in front of a property.

Calculate the number of filled sandbags that will be needed to build this wall. 2 marks

End of examination questions

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Foundation Mathematics

2025 Formula Sheet

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Algebra, number and structure

distributive law	$a(b+c)=ab+ac$
square roots and squares	$b=\sqrt{a} \Rightarrow a=b^2$
ratios	$a:b=c:d \rightleftharpoons \frac{a}{b}=\frac{c}{d}$
percentage error	$\frac{\lvert\text{measured}-\text{actual}\rvert}{\text{actual}}\times 100\%$
a varies directly with b, where k is a constant	$a=kb$
a varies inversely with b, where k is a constant	$a=\frac{k}{b}$

Data analysis, probability and statistics

measures of centre	mean	$\frac{\text{sum of data values}}{\text{number of data values}}$
	median position in an ordered set of sample size n	$\frac{n+1}{2}$
measures of spread	range	$\max - \min$
	interquartile range	$\text{IQR} = Q_3 - Q_1$
percentage relative frequency formula		$\frac{\text{frequency of an event occurring}}{\text{total number of trials}}\times 100\%$
long term data trends		experimental probability ≈ theoretical probability
probability for a large number of trials of event A		$\Pr(A) \approx \frac{\text{number of times event } A \text{ occurs}}{\text{total number of trials}}$

Space and measurement

Pythagoras' theorem	$c^2 = a^2 + b^2$
area of a triangle	$\frac{1}{2}bh$
area of a trapezium	$\frac{1}{2}(a+b)h$
Heron's formula	$\sqrt{s(s-a)(s-b)(s-c)}$, where $s = \frac{a+b+c}{2}$
circumference of a circle	$\pi d = 2\pi r$
length of an arc	$\pi d \times \frac{\theta^\circ}{360}$
area of a circle	πr^2
area of a sector	$\pi r^2 \times \frac{\theta^\circ}{360}$
volume of a sphere	$\frac{4}{3}\pi r^3$
surface area of a sphere	$4\pi r^2$
volume of a cone	$\frac{1}{3}\pi r^2 h$
volume of a prism	area of base $\times$ height
volume of a pyramid	$\frac{1}{3} \times$ area of base $\times$ height

Financial and consumer mathematics

simple interest	$I = \frac{Prt}{100}$
compound interest	$A = PR^n$, where $R = 1 + \frac{r}{100}$
GST	10%
Medicare levy	2%
percentage increase	$\frac{\text{final} - \text{initial}}{\text{initial}} \times 100\%$
percentage decrease	$\frac{\text{initial} - \text{final}}{\text{initial}} \times 100\%$
profit	income − expenditure

End of Formula Sheet

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