

**Victorian Certificate of Education
2023**

Print exam correction: Formula sheet, p. 4,
last item changed from 'revenue – cost'
to 'income – expenditure'

STUDENT NUMBER

Letter

FOUNDATION MATHEMATICS

Written examination

Tuesday 14 November 2023

Reading time: 3.00 pm to 3.15 pm (15 minutes)

Writing time: 3.15 pm to 5.15 pm (2 hours)

QUESTION AND ANSWER BOOK

Structure of book

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
A	20	20	20
B	12	12	60
			Total 80

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers, one bound reference and one scientific calculator. Calculator memory DOES NOT need to be cleared.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or correction fluid/tape.

Materials supplied

- Question and answer book of 42 pages
- Formula sheet
- Answer sheet for multiple-choice questions.

Instructions

- Write your **student number** in the space provided above on this page.
- Check that your **name** and **student number** as printed on your answer sheet for multiple-choice questions are correct, **and** sign your name in the space to verify this.
- Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.
- All written responses must be in English.

At the end of the examination

- Place the answer sheet for the multiple-choice questions inside the front cover of this book.
- You may keep the formula sheet.

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

SECTION A – Multiple-choice questions**Instructions for Section A**

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

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

A bottle of medicine is made up of two parts concentrate and seven parts water.

The volume of water, in mL, needed for a 270 mL bottle is

- A. 30 mL
- B. 60 mL
- C. 77 mL
- D. 210 mL
- E. 240 mL

Question 2

The dimensions of the floor of a rectangular room are length 3.57 m and width 3.32 m.

A carpet layer rounds the dimensions to the nearest whole number to estimate the area of floor.

The percentage error of the carpet layer's estimate for the area of floor compared to the actual area of the floor is closest to

- A. 0.0123%
- B. 0.01245%
- C. 0.123%
- D. 0.1245%
- E. 1.245%

Question 3

Two families purchased tickets to watch a movie.

A family with two adults and two children paid \$33 for their movie tickets.

Another family with one adult and three children paid \$27.50 for their movie tickets.

What was the cost of an adult ticket and a child ticket?

- A. adult \$11 and child \$5.50
- B. adult \$5.50 and child \$11
- C. adult \$12 and child \$4.50
- D. adult \$10 and child \$6.50
- E. adult \$9 and child \$7.50

Question 4

A restaurant bill is shared equally between three people.

A tax invoice, excluding GST, for the restaurant bill is shown below.

Tax invoice	
Meal A	\$25.90
Meal B	\$32.10
Meal C	\$28.50
Drinks	\$33.00
GST	10%

The amount that each person will pay, including GST, is closest to

- A. \$35.83
- B. \$39.83
- C. \$39.93
- D. \$40.23
- E. \$43.82

Question 5

The time, T , in seconds, for a children's swing to swing back to its starting point is given by the formula

$$T = 2\pi\sqrt{\frac{L}{9.8}}$$

where L is the length of the swing, in metres.

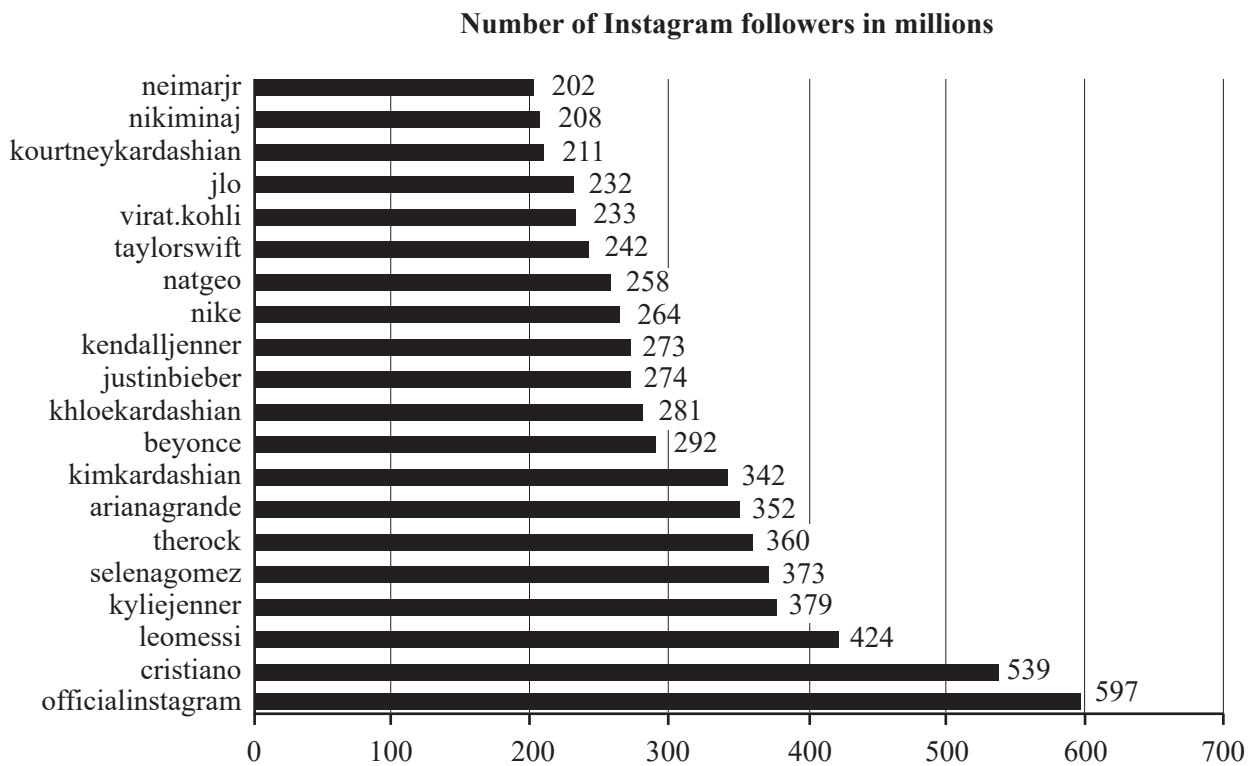
If the swing takes 3.5 seconds to swing back to its starting point, the length of the swing, rounded to the nearest metre, is closest to

- A. 6
- B. 5
- C. 4
- D. 3
- E. 2

Question 6

The graph below shows the 20 most followed accounts on Instagram in January 2023. It is estimated the total number of followed Instagram accounts is 1.386 billion.

1 billion = 1000 million



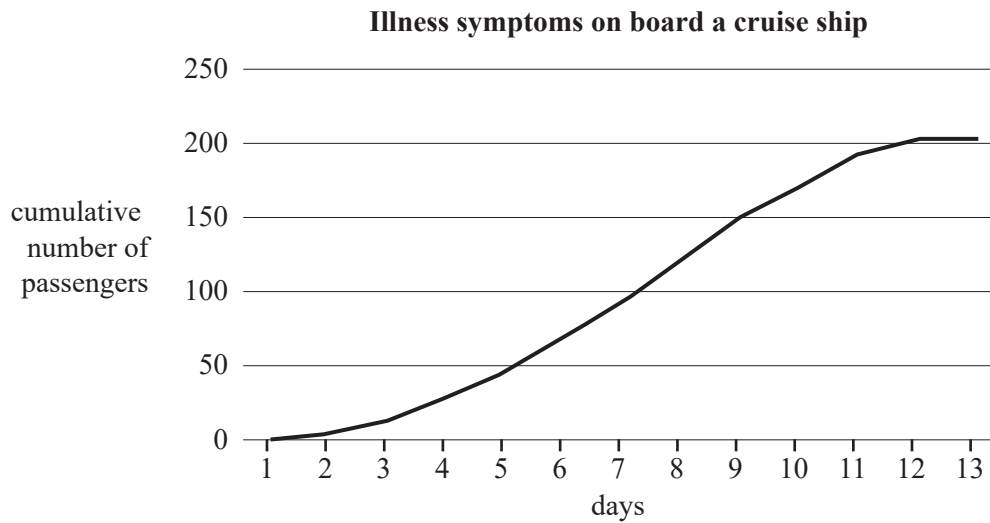
Source: Statista, 'Instagram accounts with the most followers worldwide as of January 2023',
© Statista 2023, <www.statista.com>

The approximate percentage of Instagram accounts following the natgeo account, correct to one decimal place, is

- A. 7.2
- B. 15.8
- C. 18.6
- D. 25.8
- E. 26.4

Question 7

The graph below shows the cumulative number of passengers over 13 consecutive days who had illness symptoms while on board a cruise ship.



Consider the following statements.

For these 13 consecutive days:

- I. the cumulative number of passengers who had illness symptoms was approximately 200.
- II. the cumulative number of passengers who had illness symptoms started decreasing after 9 days.
- III. the cumulative number of passengers who had illness symptoms continued to increase after 9 days.
- IV. the cumulative number of passengers who had illness symptoms was greater than 300.

Based on the information in the graph, the correct statements are

- A. II and IV.
- B. I and III.
- C. I.
- D. III.
- E. I and IV.

Question 8

A speed camera records a vehicle's speed if it is travelling above the signed speed limit.

A speed camera is positioned on a section of road with a signed speed limit of 80 km/h.

The speeds of 20 vehicles travelling along this section of road were recorded by the speed camera and are listed below.

82	84	90	93	89	87	95	91	90	97
98	84	91	102	85	90	84	87	85	101

The mean and median speeds for these 20 vehicles were calculated.

The 21st vehicle passing the camera had a speed of 120 km/h.

If mean and median are re-calculated for these 21 vehicles, then compared to the original values, the new values will be

- A. no change in the mean, an increased median.
- B. both increased.
- C. an increased mean, a decreased median.
- D. both decreased.
- E. an increased mean, no change in median.

Question 9

A family is researching the cost of childcare in their local area.

The daily childcare rate of 10 local childcare centres is listed below.

\$134.60	\$149.00	\$152.35	\$120.90	\$159.00
\$152.50	\$162.50	\$157.00	\$129.50	\$126.50

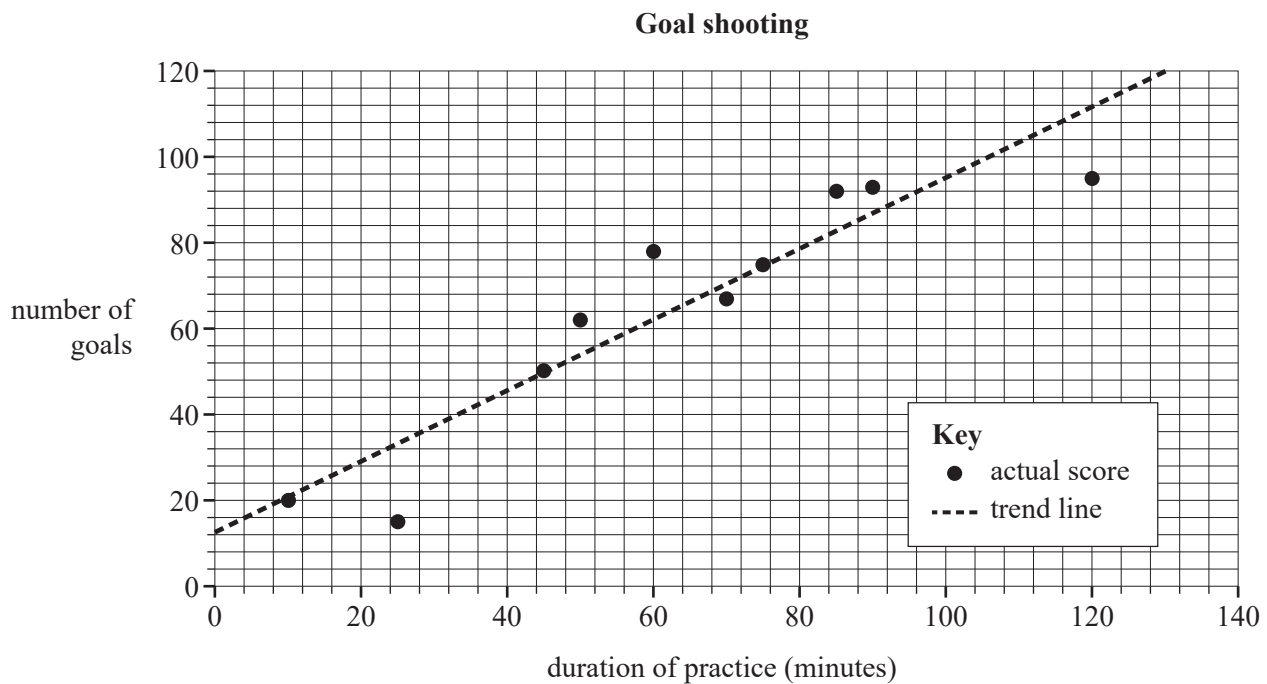
The mean daily childcare rate, rounded to the nearest 5 cents, is

- A. \$144.35
- B. \$144.40
- C. \$148.50
- D. \$152.75
- E. \$154.70

Question 10

A group of 10 students were practising goal shooting.

The graph below shows the number of minutes each student practised, the number of goals they scored and a trend line based on these results.



Using the trend line, the predicted number of goals for a student who practised for 60 minutes is closest to

- A. 50
- B. 54
- C. 58
- D. 60
- E. 62

Question 11

A worker in a cafe is paid an ordinary hourly rate of \$18.80 before tax.

From Monday to Friday they work 20 hours at this rate.

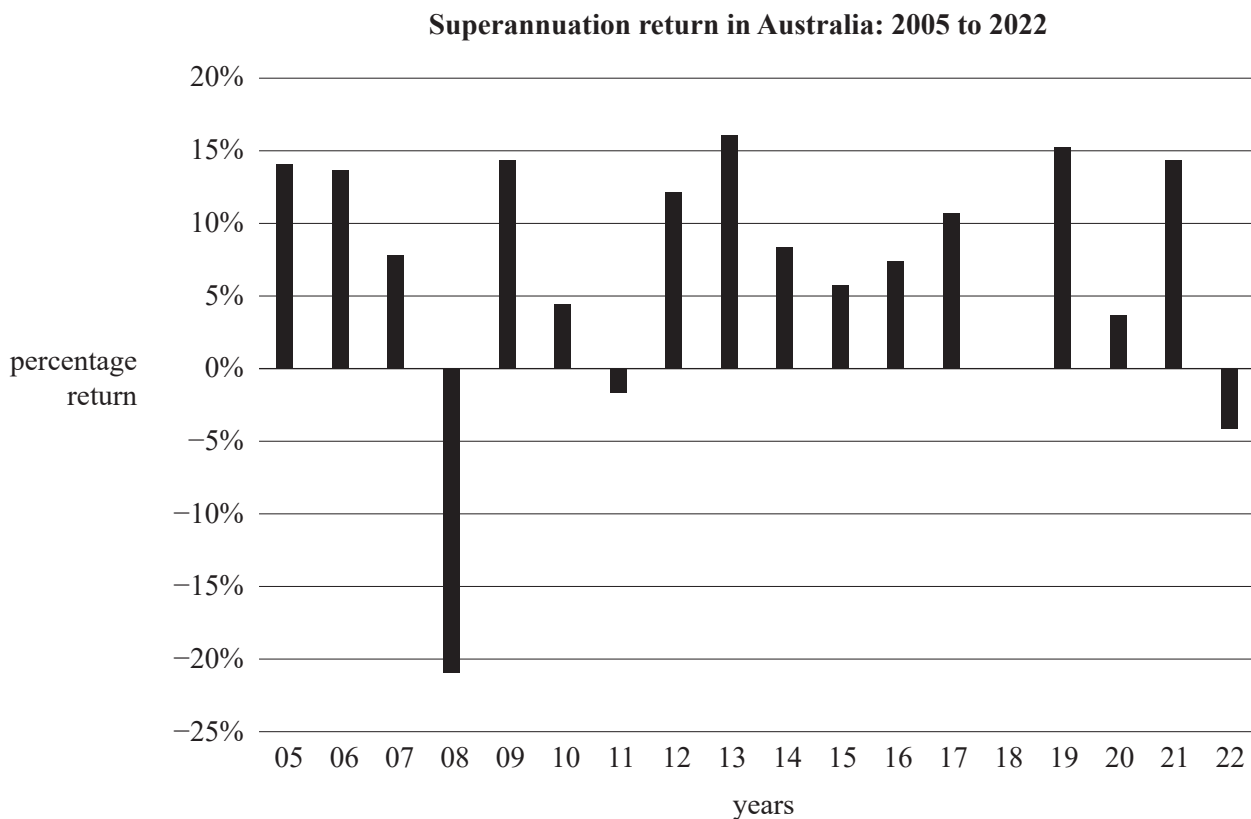
On Saturday they work 6 hours and are paid at one and a half times the ordinary hourly rate.

In one week, the worker's pay, before tax, is

- A. \$376.00
- B. \$488.80
- C. \$545.20
- D. \$714.40
- E. \$733.20

Question 12

The graph below shows the percentage return for specific superannuation accounts from 2005 to 2022.



Source: adapted from Rainmaker Information, <www.rainmaker.com.au>

The graph indicates that

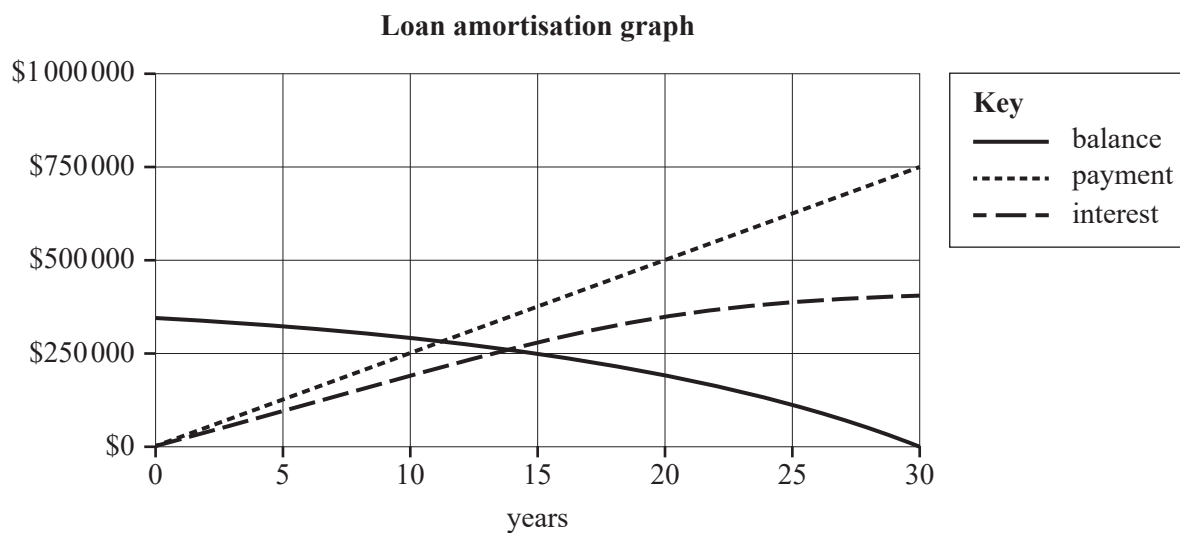
- A. returns for the superannuation accounts showed an overall gain from 2005 to 2022.
- B. the strongest return for the superannuation accounts from 2005 to 2022 occurred in 2008.
- C. returns for the superannuation accounts increased every year from 2005 to 2022.
- D. returns for the superannuation accounts showed an overall loss from 2005 to 2022.
- E. the weakest return for the superannuation accounts from 2005 to 2022 occurred in 2011.

Question 13

A customer takes out a home loan and intends to pay it off over a 30-year period.

The graph below shows the change in payments, interest and balance over this 30-year period for the home loan.

Assume that the customer makes monthly payments to reduce the balance of the loan.



The monthly payment made by the customer for this loan, in dollars, is closest to

- A. \$2 080
- B. \$2 500
- C. \$5 208
- D. \$62 500
- E. \$75 000

Question 14

A car salesperson's before-tax salary is \$3250 per month plus commission on their monthly sales. The salesperson's commission is calculated using the table shown below.

Monthly sales value	Commission rate
\$0 to \$10 000	No commission
\$10 001 to \$20 000	1%
\$20 001 to \$30 000	\$100 + 1.5% for every \$ over \$20 000
\$30 001 to \$40 000	\$250 + 2% for every \$ over \$30 000
\$40 001 to \$50 000	\$450 + 2.5% for every \$ over \$40 000
\$50 001 to \$60 000	\$700 + 3% for every \$ over \$50 000
\$60 001 +	\$1000 + 3.5% for every \$ over \$60 000

The salesperson sells \$42 000 worth of cars in the month of June. Their earnings in this month, before tax, are closest to

- A. \$500
- B. \$1500
- C. \$2000
- D. \$3750
- E. \$4750

Question 15

A popular online game offers 'in game' coins which can be purchased with real money. The game offers the following purchase options:

- I. 550 coins for \$8.00
- II. 1200 coins for \$15.00
- III. 2500 coins for \$30.00
- IV. 5200 coins for \$63.00
- V. 10 000 coins for \$130.00

The best value-for-money option is

- A. Option I.
- B. Option II.
- C. Option III.
- D. Option IV.
- E. Option V.

Question 16

A nail manufacturer sets a machine tolerance for nail length at a minimum of 38.5 mm and a maximum of 38.8 mm.

The machine tolerance for the nail length could best be written as

- A. $38 \text{ mm} \pm 0.5 \text{ mm}$
- B. $38.65 \text{ mm} \pm 0.15 \text{ mm}$
- C. $38.65 \text{ mm} \pm 1.5 \text{ mm}$
- D. $38.0 \text{ mm} \pm 0.1 \text{ mm}$
- E. $38.9 \text{ mm} \pm 38.4 \text{ mm}$

Question 17

The dimensions of a model car compared to the dimensions of a real car are in the ratio of 1:60.

The real car has a length of 3 m.

The length of the model car is

- A. 3 cm
- B. 4 cm
- C. 5 cm
- D. 6 cm
- E. 7 cm

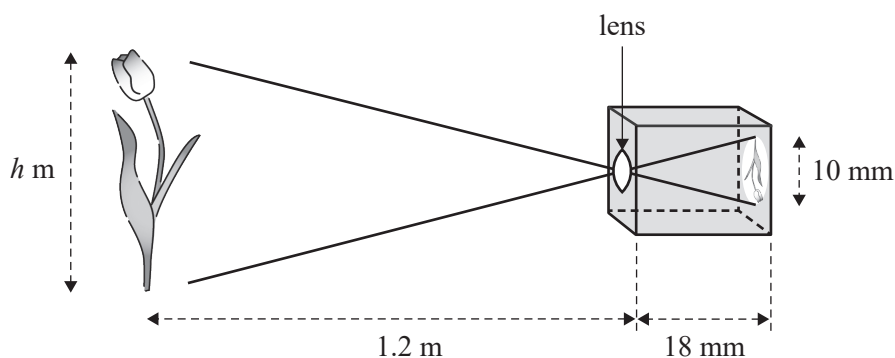
Question 18

A flower and its image in a camera, as shown below, form similar shapes.

The distance from the image to the lens for this camera is 18 mm.

The image height of the flower is 10 mm.

The distance from the flower to the camera is 1.2 m.



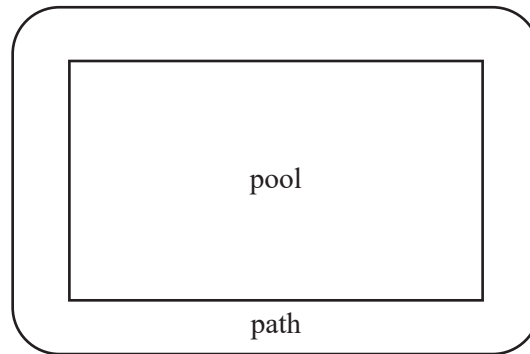
The height, h , of the flower is closest to

- A. 0.3 m
- B. 0.7 m
- C. 1.3 m
- D. 2.2 m
- E. 4.3 m

Question 19

A rectangular backyard pool is 12 m long and 8 m wide.

The owners plan to build a 0.5 m wide path that will surround the pool.

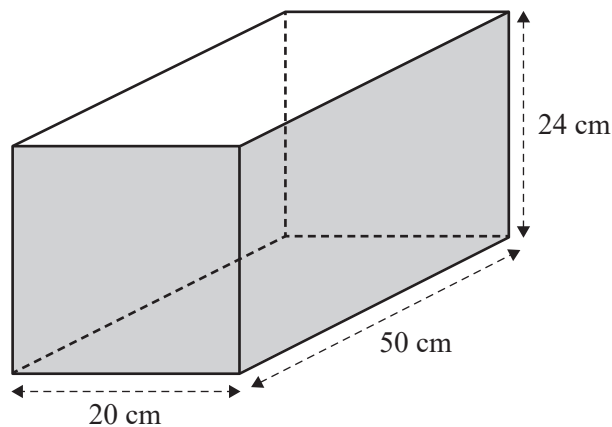


The area of the path will be closest to

- A. 10.25 m^2
- B. 16 m^2
- C. 19 m^2
- D. 21 m^2
- E. 96 m^2

Question 20

An open fish tank in the shape of a rectangular prism has a length of 50 cm, width of 20 cm and height of 24 cm.



Assuming no overlap and that no glass is required for the top of the tank, the area of glass needed to make the fish tank is

- A. 2400 cm^2
- B. 3660 cm^2
- C. 4200 cm^2
- D. 4360 cm^2
- E. 5360 cm^2

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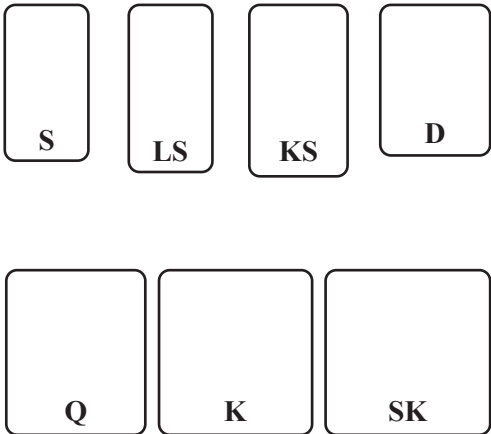
SECTION B

Instructions for Section B

Answer **all** questions in the spaces provided.
In all questions where a numerical answer is required, you should only round your answer when instructed to do so.
Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1 (5 marks)

The mattress size comparison guide below shows the seven most common Australian bed sizes with mattress dimensions (width and length respectively) in both metric units (centimetres) and imperial units (feet and inches).
The thickness of each mattress is not included in this list.
Note that 1 foot (1') = 12 inches (12") and 1 inch (1") = 2.54 cm.



Bed type	Metric	Imperial
S Single	92 × 188 cm	3' 0" × 6' 2"
LS Long single	92 × 203 cm	3' 0" × 6' 8"
KS King single	107 × 203 cm	3' 6" × 6' 8"
D Double	138 × 188 cm	
Q Queen	153 × 203 cm	5' 0" × 6' 8"
K King	183 × 203 cm	6' 0" × 6' 8"
SK Super king	203 × 203 cm	6' 8" × 6' 8"

- a. Calculate the difference in length between a king single and a single size mattress.

Give your answer, using whole numbers, in both metric (centimetres) and imperial (feet and inches) units.

2 marks

Metric

Imperial

- b. Determine the imperial width dimension of a double mattress. Give your answer in feet and inches, rounded to the nearest inch.

1 mark





















- c. Calculate the percentage increase in the area of a queen mattress compared to a double mattress. Round your answer to one decimal place.

2 marks

Question 2 (5 marks)

The data display below lists the number of sports participants aged 15+, arranged by sport and identified gender, in Australia in 2021 and 2022.

Estimated number of participants

Males aged 15+		Females aged 15+	
 Australian football	481 000	 basketball	281 000
 basketball	715 000	 cycling	1 114 000
 cricket	500 000	 equestrian	222 000
 cycling	1 827 000	 football/soccer	313 000
 football/soccer	946 000	 golf	235 000
 golf	991 000	 netball	553 000
 running/athletics	2 150 000	 running/athletics	1 792 000
 surfing	484 000	 surfing	217 000
 swimming	1 539 000	 swimming	2 003 000
 tennis	709 000	 tennis	519 000

Source: adapted from ‘AusPlay: National Sport and Physical Activity Participation Report, November 2022’ p. 10. Australian Government, Australian Sports Commission

- a. State the four sport activities that are **not** shown in both lists. 1 mark

Compare the estimated number of male and female participants aged 15+ in the sports of surfing, swimming and tennis.

- b. State the sport that has the smallest difference in the number of male and female participants. 1 mark

- c. The percentage of all the males aged 15+ who participated in cycling is 23.45678%.

Round this number to four significant figures.

1 mark

A total of 7 249 000 females aged 15+ participated in sport in Australia in 2021 and 2022.

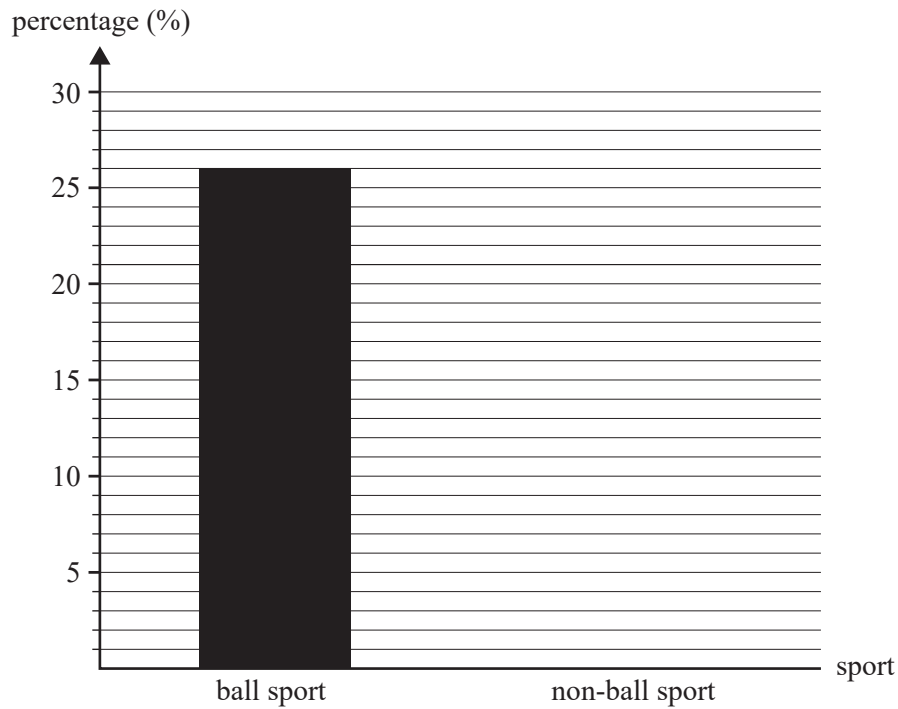
- d. Calculate the difference in the percentage of females aged 15+ who participated in cycling and netball. Give your answer correct to one decimal place.

1 mark

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All females aged 15+ participating in a sport were grouped into the categories of playing a ball sport or a non-ball sport.

The graph below shows the percentage of females aged 15+ playing a ball sport. The bar showing the percentage of females aged 15+ playing a non-ball sport is missing.



- e. Use the graph to calculate the percentage of females aged 15+ who participated in a non-ball sport.

1 mark

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SECTION B – continued
TURN OVER

Question 3 (5 marks)

A nursery worker uses household ingredients to mix a quantity of garden spray. The garden spray includes the following ratio of ingredients:

- 45 mL of liquid soap
- 10 000 mg of garlic
- 90 mL of cooking oil
- 855 mL of water

The conversion from grams to millilitres for garlic in this mixture is

$$1 \text{ gram} = 1 \text{ millilitre}$$

The worker mixes a 5 L quantity of garden spray.

- a. Calculate the amount of garlic, in grams, that will be used in this 5 L quantity of garden spray. 1 mark

Liquid soap for this mixture is available in 30 mL bottles.

- b. Calculate the minimum number of bottles that must be purchased to make a 5 L quantity of garden spray. 1 mark

- c. Calculate the ratio, in simplest whole number form, between the cooking oil and the water. 1 mark

cooking oil		water
	:	

- d. The worker requires 2 L of a custom spray mixture. It is mixed in the ratio

garden spray : water : vinegar
3 : 5 : 2

Calculate the volume of water, in millilitres, needed for this mixture.

1 mark

- e. The worker manages their own garden and provides capsicums for a small community of 11 adults and 15 children each day. Each capsicum contains 140 mg of Vitamin C.

The recommended daily intake of Vitamin C is:

adult	90 mg
child	45 mg

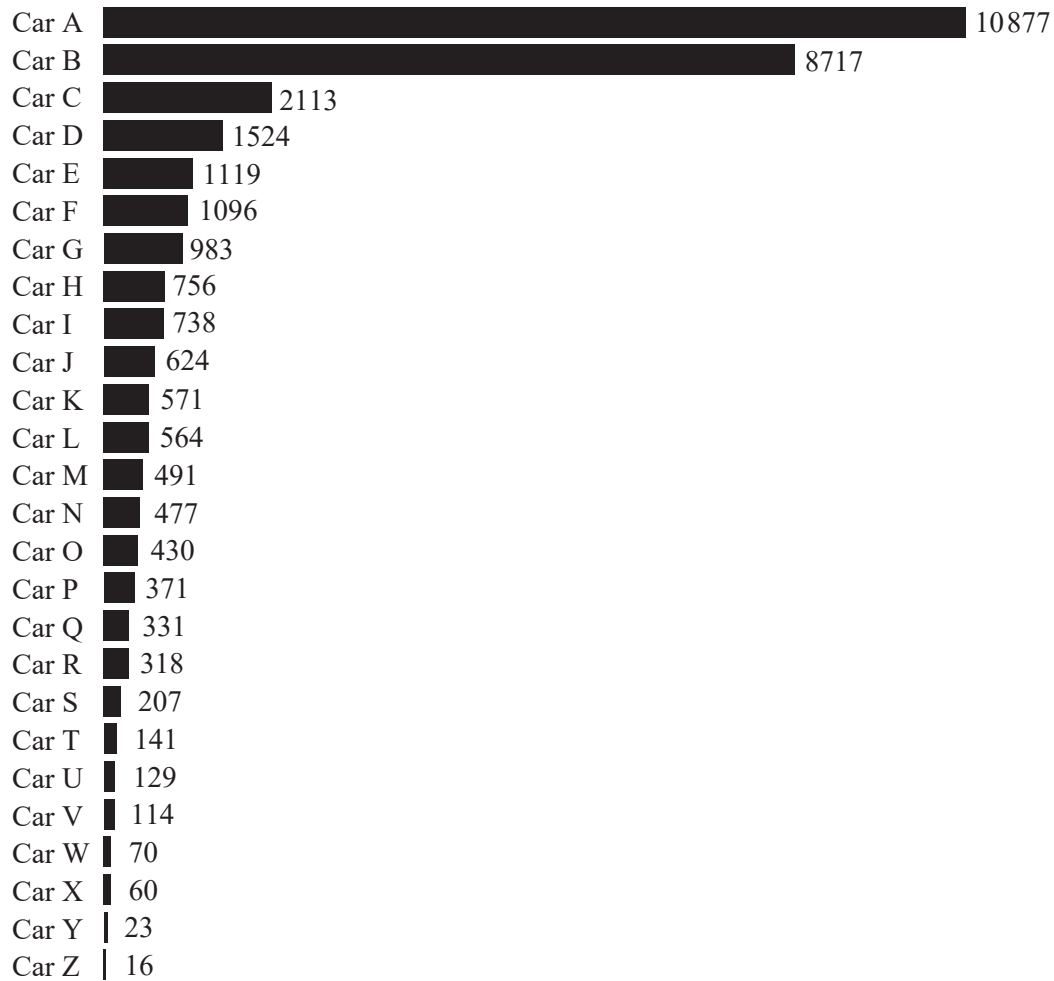
Calculate the minimum number of whole capsicums the worker must provide the small community with each day for them to reach their recommended daily intake of Vitamin C.

1 mark

Question 4 (5 marks)

The table below shows the number of each model of electric vehicle sold in Australia in 2022.

The total number of sales was 32 860.



Source: adapted from 'Australian EV sales data for 2022 by model, with 2023 boom to follow', 11 January 2023, www.thedriven.io

- a. Two models of electric vehicle sold were Car P and Car Q.

Calculate the percentage that these two models together represent of all sales of electric vehicles in 2022. Round your answer to one decimal place.

1 mark

- b. In 2022, Car A sold for \$76 900 and Car B sold for \$69 300.

Calculate the total sales revenue earned for these two cars in 2022.

1 mark

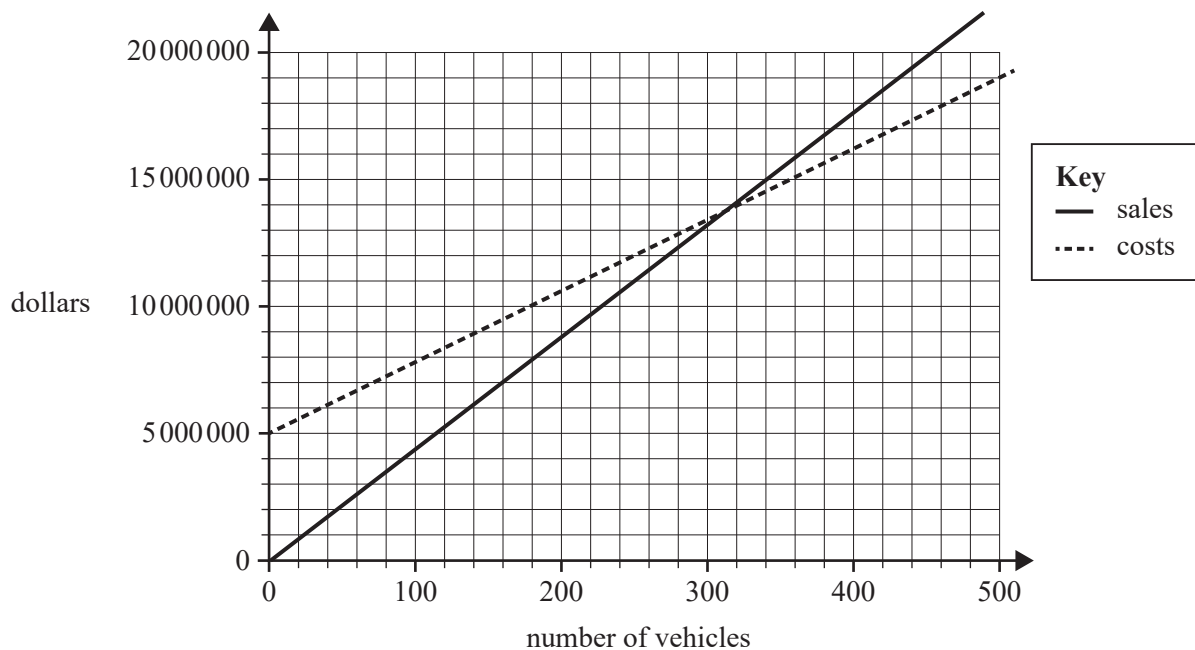
- c. In Victoria, buyers of electric vehicles have to pay a stamp duty based on the purchase price. In 2022, electric vehicle owners paid stamp duty at a flat rate of \$8.40 per \$200 of the sale price.

An electric vehicle is purchased for \$84 990.

Calculate the stamp duty. Round your answer to the nearest dollar.

1 mark

A break-even analysis chart showing the costs and sales of a new-model electric vehicle is given below.



The equation for sales in dollars is

$$\text{sales} = 43\,990 \times \text{number of vehicles}$$

The equation for costs in dollars is

$$\text{costs} = 5\,000\,000 + 28\,000 \times \text{number of vehicles}$$

- d. Use the equations to calculate the minimum number of the new-model electric vehicles that need to be sold to make a profit.

1 mark

- e. The business decides the break-even point should occur at the sale of the 200th new-model electric vehicle. This would require a change in the sale price of the new-model electric vehicle.

Calculate the new sale price of the new-model electric vehicle.

1 mark

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SECTION B – continued
TURN OVER

Question 5 (5 marks)

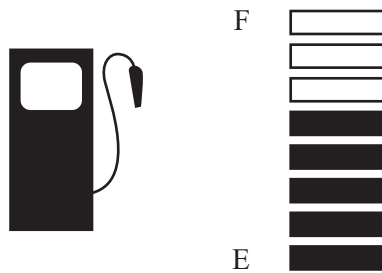
A car was purchased for \$28 000. For taxation purposes, the value of the car is decreased by a flat rate of 8.2% of the initial purchase price for every year the car is owned.

- a.** Calculate the value, in dollars, of the car at the end of the first year of ownership. 1 mark

When the car has a value of less than 10% of its initial purchase price, it is no longer considered an asset.

- b.** Calculate the minimum number of years before the car is no longer considered an asset. Round your answer to the nearest year. 2 marks

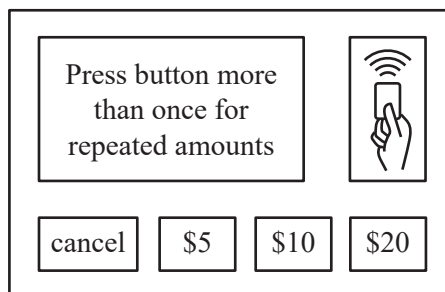
Consider the fuel range image below for this car on a particular journey. This car can travel a further 291 km before it needs to refuel.



- c. Calculate the total number of kilometres that could be travelled if the petrol tank were full. Round your answer to the nearest kilometre.

1 mark

The next available place to purchase fuel is a 24-hour petrol station that only offers a 'pay at the pump' option. The image below shows the display at the petrol pump.



When the car stops at the petrol station, the petrol tank is one quarter full.

The capacity of the car's petrol tank is 80 litres.

The cost of petrol is \$2.10 per litre.

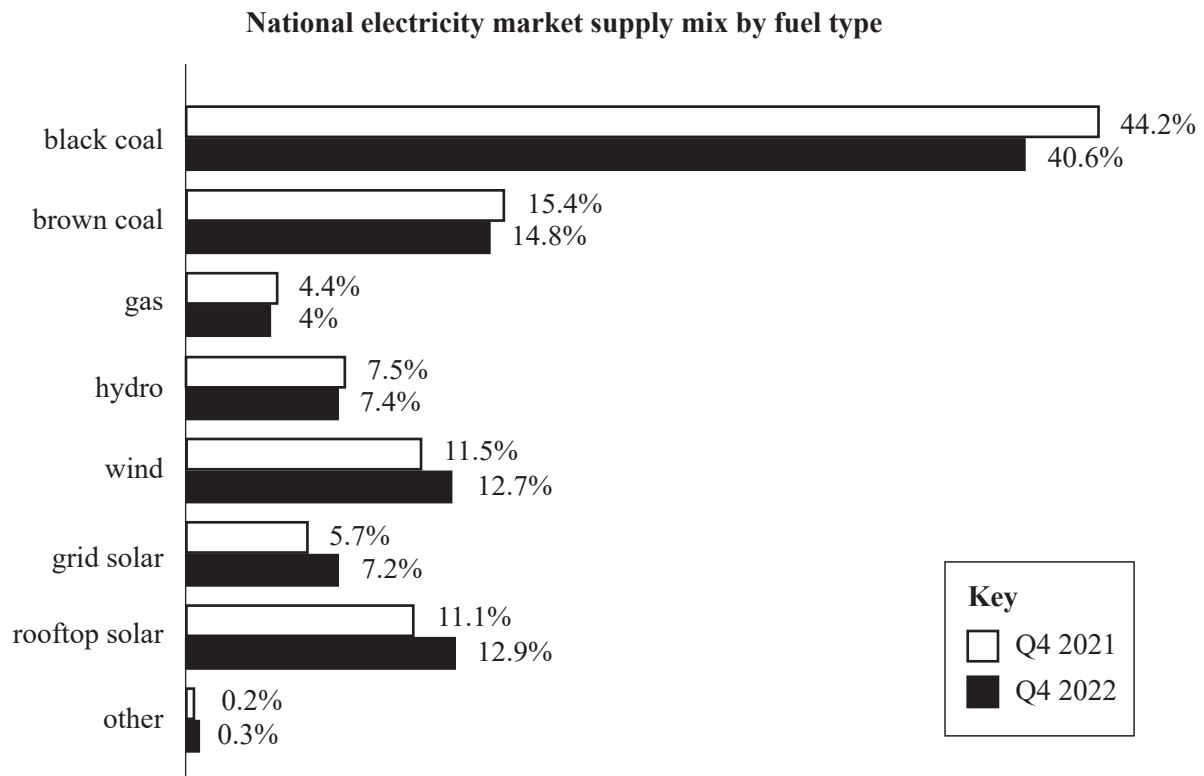
The only options for payment are combinations of \$5, \$10 or \$20 amounts.

- d. Calculate the cost to fill the car as close as possible to 'full', without overfilling, using the pay at the pump option.

1 mark

Question 6 (5 marks)

The graph below shows the percentages of different types of electricity generation for the national electricity market in Quarter 4 (Q4) of 2021 and 2022.



Source: Table 2 NEM supply mix by fuel type, AEMO, *Quarterly Energy Dynamics Q4 2022*, p. 19

- a. 'Renewable energy' includes the fuel types of hydro, wind, grid solar and rooftop solar.

Calculate the total percentage of 'renewable energy' that was produced in Q4 2022.

1 mark

- b. Calculate the total percentage decrease in the use of black and brown coal from Q4 2021 to Q4 2022.

1 mark

- c. Describe the overall trends in the usage of 'non-renewable energy' (black coal, brown coal, gas) compared to 'renewable energy', during the time from Q4 2021 to Q4 2022. 2 marks

- d. After Q4 2022, the use of brown coal energy is expected to consistently decrease by 0.5% each quarter.

Calculate the number of quarters, beginning at Q4 2022, until the use of brown coal energy is 0%. Round your answer to the nearest quarter.

1 mark

Question 7 (5 marks)

The ‘average price’ of unleaded petrol in cents per litre for Victoria was recorded at the beginning of each week from 27 November 2022 until 19 February 2023 on 13 consecutive occasions. The results are given below.

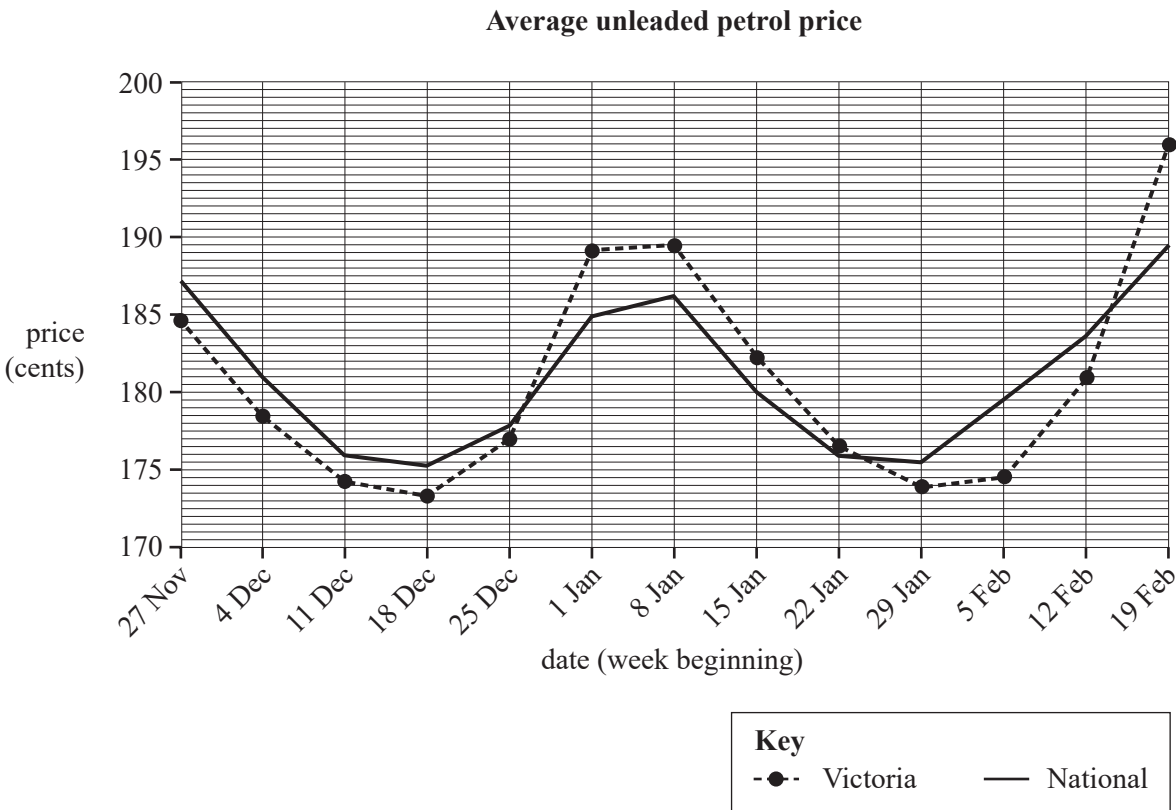
184.5	178.4	174.2	173.3	177.1	189.3	189.5
182.3	176.5	173.9	174.5	181.0	196.0	

- a. State the **median** of the ‘average price’ of unleaded petrol in cents per litre for these recorded results.

1 mark

The ‘average price’ of unleaded petrol observed nationally was also recorded over the same 13 consecutive occasions.

The graph below shows the price of unleaded petrol in Victoria and nationally for the 13 dates.



Source: adapted from Australian Institute of Petroleum (AIP),
<www.aip.com.au/pricing>

- b. Compare the difference in recorded unleaded petrol prices in Victoria and nationally. Write down the date (week beginning) that shows the greatest difference. 1 mark

- c. At what date (week beginning) in 2023 does the recorded unleaded petrol price begin to increase, both nationally and in Victoria? 1 mark

Summary statistics for the 13 recorded values of the 'average price' of unleaded petrol are given below.

Summary statistic	Victoria	National
mean	180.8	181.0
range	22.7	15.0
standard deviation	7.19	5.02

- d. Using the summary statistics for unleaded petrol listed in the table, compare the Victorian unleaded petrol prices to the national unleaded petrol prices for the period from 27 November 2022 to 19 February 2023. Use the words 'average' and 'variable/variation' in the comparison. 2 marks

Question 8 (5 marks)

An employee at a bookstore works the same number of hours each week. They receive weekly pay slips. The employee’s most recent pay slip shows a gross pay of \$703 and a year-to-date gross pay of \$18 278.00

- a. Calculate the total number of weeks the employee has worked in this financial year.1 mark

Each week the employee should be paid for 20 hours and 15 minutes at the casual ordinary hourly rate, and 10 hours at the casual time-and-a-half rate. Their employer should contribute 11% of the employee’s pre-tax earnings into a superannuation account.

An audit of the bookstore’s financial department identified two errors in the employee’s pay slips as shown below.

PAY SLIP (weekly)

Salary & Wages	Time (hours)	Rate	This Pay
Ordinary hours – casual	20.15	\$20.00	\$403.00
Time-and-a-half – casual	10	\$30.00	\$300.00
Total			\$703.00
Tax			\$133.57
Superannuation			\$70.65
Net Pay			\$569.43

Error 1: Ordinary hours amount is incorrect

Error 2: Superannuation amount is incorrect

These errors have occurred on each pay slip issued for the current financial year.

Note: 1 financial year = 52 weeks.

- b. i.** Show that the correct weekly pre-tax total for salary and wages is \$705. 1 mark

- ii.** Show that the correct weekly superannuation contribution amount is \$77.55 1 mark

- iii.** Calculate the total amount of superannuation the employee should receive for the current full financial year. Round your answer to the nearest dollar. 1 mark

The employee would like to increase their weekly net pay to \$650 by working more ordinary hours. Assume their current weekly pay, before tax, is \$705 and they are taxed 19 cents for each dollar earned.

- c.** Calculate the extra number of ordinary hours the employee would need to work. Round your answer to the nearest hour. 1 mark

Question 9 (5 marks)

The information below shows the different options and prices for zoo membership and a single-entry ticket to the local zoo.

Membership option:

Zoo membership: \$10.50 a month over 12 months

Single-entry option:

adult	\$40.00
child (0–15 years)	\$12.50
concession	\$30.50
senior	\$34.00

- a. On a particular day, 2053 concession single-entry tickets were purchased.

Calculate the total entry fee collected for these tickets.

1 mark

- b. Show that the total single-entry cost of tickets for two adults, one senior, two concessions and three children is \$212.50

1 mark

- c. Calculate the percentage discount given to a senior single-entry ticket compared to an adult single-entry ticket.

1 mark

- d. GST of 10% is included in the single-entry ticket fee.

Calculate the adult single-entry ticket fee, excluding the GST component.

1 mark

- e. An adult visits the zoo on six separate occasions during a year. Compare the options for single-entry adult tickets and zoo membership.

Calculate which option is cheaper and state how much money would be saved using the cheaper option.

1 mark

DO NOT WRITE IN THIS AREA

Question 10 (5 marks)

A builder is employed full-time and earns a taxable income of \$1833.30 per week. Over the course of this financial year, the builder has accumulated \$2000 in allowable deductions.

The builder is not eligible for any tax offsets, levy exemptions or reductions.

- a. Show that the builder's taxable income for this financial year is \$93 331.60. Assume there are exactly 52 weeks in a financial year.

1 mark

The table below shows the calculations needed for different taxable incomes.

Taxable income	Tax on this income
\$0–\$18 200	Nil
\$18 201–\$45 000	19 cents for each \$1 over \$18 200
\$45 001–\$120 000	\$5092 plus 32.5 cents for each \$1 over \$45 000
\$120 001–\$180 000	\$29 467 plus 37 cents for each \$1 over \$120 000
\$180 001 and over	\$51 667 plus 45 cents for each \$1 over \$180 000

Source: <<https://www.ato.gov.au>>

- b. Using the information in the table, calculate the tax payable on the builder's taxable income for this financial year.

1 mark

The builder purchased a laptop to help with the organisation of his business transactions.

The laptop was purchased for \$4000 on a hire-purchase plan. The payment plan is:

- deposit of 15% of the purchase price
- interest calculated at 8.5% per annum flat rate on the outstanding amount
- equal monthly repayments for 2 years

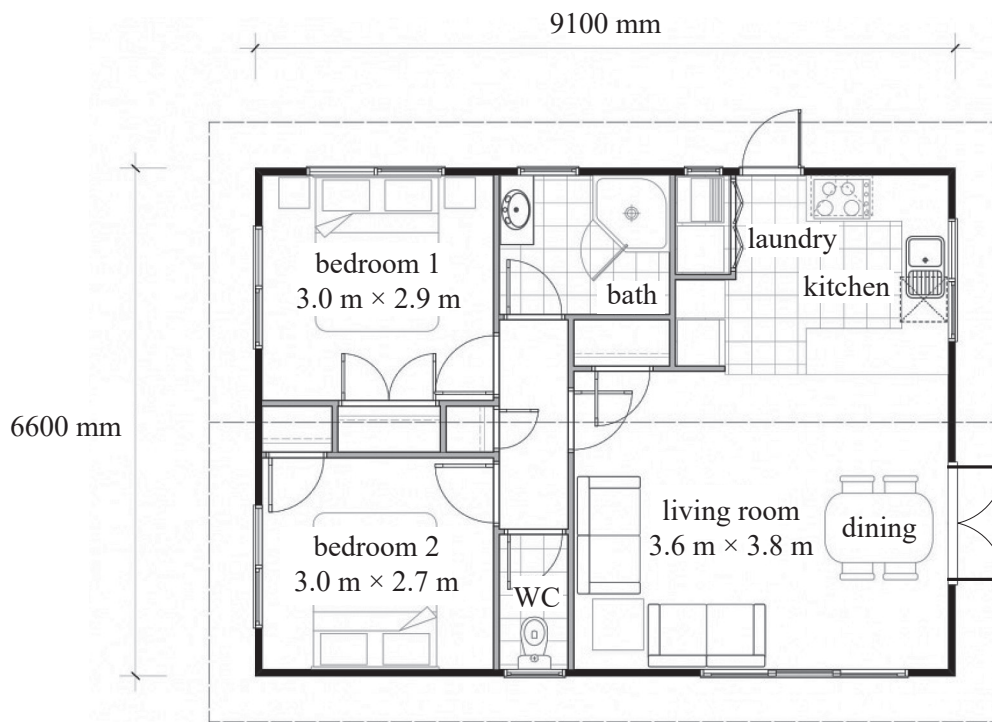
- c. Calculate the total amount of interest that will be paid on this payment plan. 1 mark

- d. i. Show that the total amount paid for the laptop will be \$4578. 1 mark

- ii. Calculate the monthly repayments that will be made for this payment plan. 1 mark

Question 11 (5 marks)

Below is a floor plan for a house showing how the rooms will fit on top of a concrete slab that will be poured before the house is built.



The foundation of the house will be a 100 mm deep concrete slab.

- a. Calculate the volume of concrete required for the slab of this house. Round your answer to the nearest cubic metre.

1 mark

Concrete is sold in cubic metres. The concrete costs \$280 per cubic metre.

- b. Calculate the cost of the concrete for the slab. Round your answer to two significant figures.

1 mark

The house has a cylindrical water tank, with a diameter of 1300 mm and a height of 1560 mm.

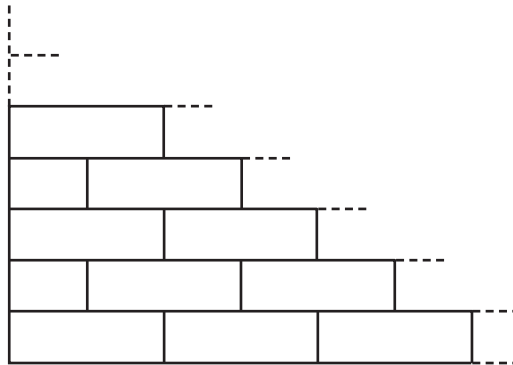
The conversion of capacity from cubic centimetres to litres is

$$1000 \text{ cm}^3 = 1 \text{ L}$$

- c. Calculate the capacity of the tank. Give your answer in litres rounded to the nearest whole number.

1 mark

The tiles for a feature wall in the bathroom will be laid in a brick bond pattern. Part of the pattern starting from a corner is shown below.



The size of the tiles being laid is 100 mm × 300 mm.

The dimensions of the wall are 2.4 m high and 3 m long.

Some of the tiles will be cut in half to be used in the wall.

- d. Calculate the minimum number of tiles required to cover the wall, including those that will be cut in half.

1 mark

The tiles are only sold in full boxes containing 25 tiles. Each box will cost \$32.

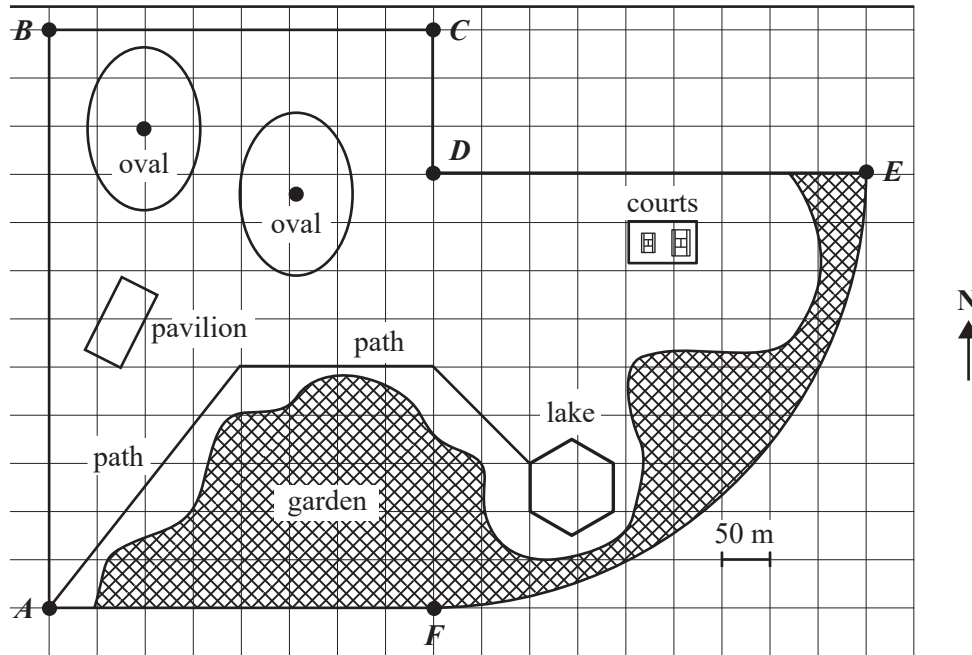
- e. Calculate the total cost of the boxes of tiles required for this feature bathroom wall.

1 mark

DO NOT WRITE IN THIS AREA

Question 12 (5 marks)

The map of a park is shown below.



A pathway beginning at point *A* and leading to the lake is shown on the map above.

- a. Using the scale provided on the map, calculate the length of this path. Round your answer to the nearest metre.

2 marks

The boundary of the park follows the points labelled *ABCDEFA*, and outlines a composite shape made up of a rectangle and part of a circle. The arc *EF* is part of a circle with centre point at *D*.

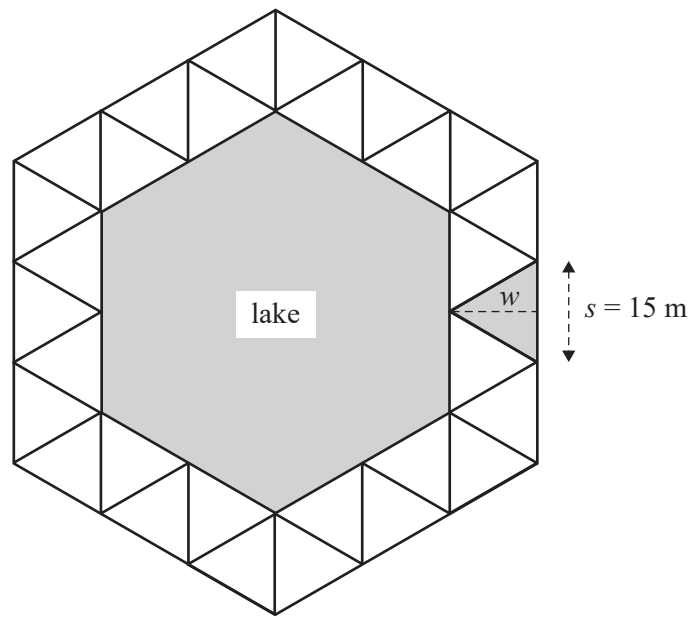
The conversion of area from square metres to hectares is

$$10\,000 \text{ m}^2 = 1 \text{ ha}$$

- b. Using the scale provided on the map, calculate the area contained by the boundary of the park. Round your answer to the nearest hectare.

1 mark

The hexagonal shaped lake is surrounded by a tessellated path made of 30 triangle sections. The triangles are to be equilateral triangles and one is shaded for reference in the diagram below.



The formula $w = \frac{\sqrt{3}}{2} \times s$ can be used to find the width, w , of the path for the shaded triangle using the side length, s , of the section.

- c. Calculate the width, w , of the path for the triangular sections shown above. Round your answer to the nearest metre.

1 mark

- d. The surface of the tessellated path surrounding the lake is to be covered with a non-slip resin. The depth of the resin will be 15 mm.

Calculate the volume of resin that will be needed to cover the path. Round your answer to the nearest cubic metre.

1 mark

Victorian Certificate of Education
2023

FOUNDATION MATHEMATICS

Written examination

FORMULA SHEET

Instructions

This formula sheet is provided for your reference.
A question and answer book is provided with this formula sheet.

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

Foundation Mathematics formulas

Algebra, number and structure

distributive law	$a(b + c) = ab + ac$
square roots and squares	$a = b^2 \Rightarrow b = \sqrt{a}$
ratios	$a : b = c : d \Leftrightarrow \frac{a}{b} = \frac{c}{d}$
percentage error	$\frac{ \text{measured} - \text{actual} }{\text{actual}} \times 100\%$
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	$\text{IQR} = Q3 - Q1$
percentage relative frequency formula		$\frac{\text{frequency of an event occurring}}{\text{total number of trials}} \times 100\%$
long term data trends		experimental probability \approx theoretical probability
probability for a large number of trials of event A		$\text{Pr}(A) \approx \frac{\text{number of times event } A \text{ occurs}}{\text{total number of trials}}$

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	$I = \frac{Pr t}{100}$
compound interest	$A = PR^n$, where $R = 1 + \frac{r}{100}$
GST	10%
Medicare levy	2%
superannuation guarantee	11%
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