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Centre Number

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Student Number

NSW Education Standards Authority

This sample HSC examination paper is designed to show one way the Mathematics Standard 1 11–12 Syllabus (2024) could be examined. It reflects the layout of a formatted HSC examination paper.

Sample

HIGHER SCHOOL CERTIFICATE EXAMINATION

Mathematics Standard 1

General Instructions

- Reading time – 10 minutes
- Working time – 2 hours
- Write using black pen
- Calculators approved by NESA may be used
- A reference sheet is provided at the back of this paper
- For questions in Section II, show relevant mathematical reasoning and/or calculations
- Write your Centre Number and Student Number at the top of this page

Total marks:
80

Section I – 15 marks (pages 3–9)

- Attempt Questions 1–15
- Allow about 25 minutes for this section

Section II – 65 marks (pages 11–32)

- Attempt Questions 16–36
- Allow about 1 hour and 35 minutes for this section

The first HSC examination for the Mathematics Standard 1 11–12 Syllabus (2024) will be held in 2027. The Mathematics Standard 1 examination does not include items that are common with other Mathematics HSC examinations. Where they are still relevant, past HSC questions have been used to illustrate different types of questions and how the syllabus can be examined.

The HSC Mathematics Standard 1 examination specifications can be found in the assessment information for the Mathematics Standard 1 11–12 Syllabus (2024).

This sample examination provides examples of some types of questions that may be found in HSC examinations for Mathematics Standard 1. Each question has been mapped to show how the question relates to syllabus outcomes and content.

Answers for the objective-response questions (Section I) and sample answers and marking guidelines for all other questions (Section II) are provided. The marking guidelines indicate the criteria for each mark.

In the examination, students will record their answers to Section I on a multiple-choice answer sheet and their answers to Section II in the spaces provided on the examination paper.

The sample questions, marking criteria, sample answers and annotations provide teachers and students with guidance as to the types of questions to expect and how they may be marked. They are not meant to be prescriptive. Each year the structure of the examination may differ in the number and types of questions, or focus on different syllabus outcomes and content.

Note:

Comments in coloured boxes are annotations that provide information and guidance.

Section I

15 marks

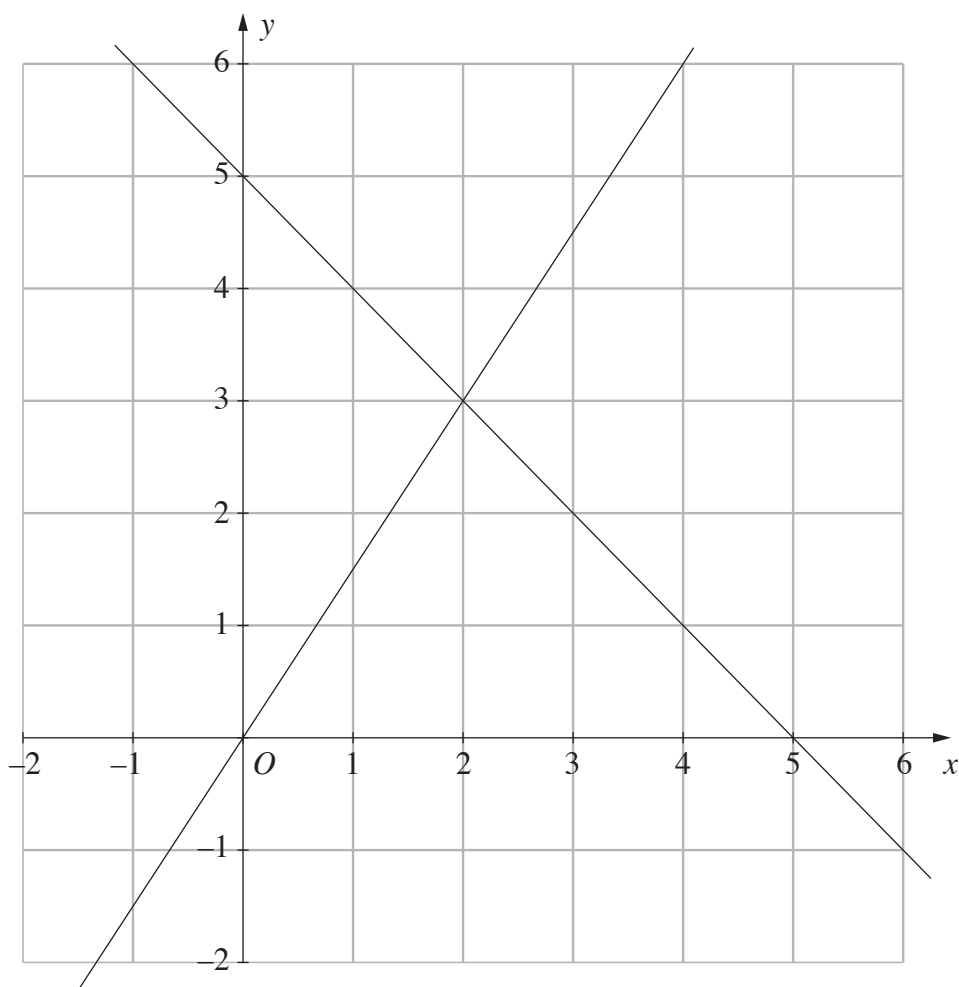
Attempt Questions 1–15

Allow about 25 minutes for this section

Use the multiple-choice answer sheet for Questions 1–15.

Past HSC examinations provide other examples of questions that may be asked in this section.

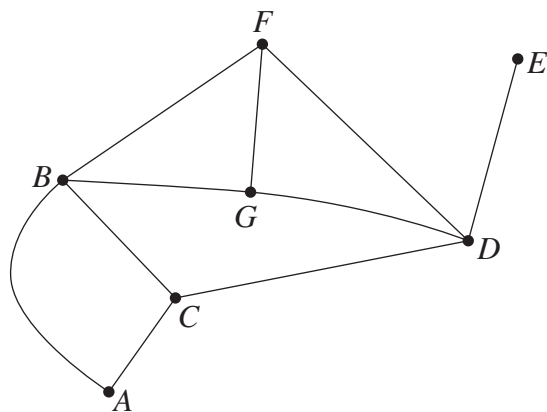
- 1 The graph shows two lines.



Which of the following is the point of intersection of the two lines?

- A. (3, 2)
- B. (5, 0)
- C. (2, 3)
- D. (0, 5)

- 2 A network diagram is shown.



What is the number of edges in this network?

- A. 6
 - B. 7
 - C. 9
 - D. 10
- 3 A jar contains 12 red, 10 black and 13 white lollies.

Alex chooses a lolly at random.

What is the probability that the lolly is NOT white?

- A. $\frac{22}{35}$
- B. $\frac{13}{35}$
- C. $\frac{12}{35}$
- D. $\frac{10}{35}$

- 4 The area (A) of a circle is given by the formula $A = \pi r^2$, where r is the radius.

What is the value of A , correct to three significant figures, if $r = 3.55$?

- A. 39.5
- B. 39.6
- C. 39.591
- D. 39.592

- 5 Pippa wants to explore the strength of the linear relationship between the shoe size, x , and the height, y , of the students in her class.

Which of the following would be suitable to evaluate this relationship?

- A. The means of x and y
- B. A scatter plot showing x and y
- C. The interquartile ranges of x and y
- D. The standard deviations of x and y

- 6 A water tank holds 6000 litres when full.

The tank is full when water starts to flow out of it at a constant rate of 3 litres per minute until the tank is empty.

Which expression represents the volume (V litres) of water in the tank after t minutes?

- A. $V = 6000 - 3t$
- B. $V = 6000t - 3$
- C. $V = 3 - 6000t$
- D. $V = 3t - 6000$

- 7 Anthony is paid a base wage of \$20.70 per hour. He is paid penalty rates for time worked on weekends, calculated at time-and-a-half on Saturdays and at double-time on Sundays.

What are Anthony's total earnings each week if he works 9 hours per day on Saturday and Sunday?

- A. \$372.60
 - B. \$558.90
 - C. \$652.05
 - D. \$745.20
- 8 Which compass bearing is the same as a true bearing of 245° ?
- A. $S65^\circ W$
 - B. $S25^\circ W$
 - C. $S65^\circ E$
 - D. $S25^\circ E$
- 9 Simon invests \$150 000 for ten years. The interest rate is 4% per annum, compounded half-yearly.

Which equation will give the future value (FV) of his investment?

- A. $FV = 150\,000(1 + 0.04)^{20}$
- B. $FV = 150\,000(1 + 0.04)^{10}$
- C. $FV = 150\,000(1 + 0.02)^{20}$
- D. $FV = 150\,000(1 + 0.02)^{10}$

Use the following information to answer Questions 10 and 11.

Josh borrowed \$25 000 using a reducing balance loan with monthly repayments and an interest rate of 6% per annum, compounding monthly. Part of the spreadsheet used to model this loan is shown.

	A	B	C	D	E
1	Amount	\$25 000			
2	Annual interest rate	6%			
3	Monthly repayment	\$700			
4					
5	Month	Principal start of the month (\$)	Monthly Interest (\$)	Monthly Repayment (\$)	Balance (\$)
6					
7	1	\$ 25 000.00	\$ 125.00	\$ 700	\$ 24 425.00
8	2	\$ 24 425.00	\$ 122.13	\$ 700	\$ 23 847.13
...					
25	19	\$ 14 198.17	\$ 70.99	\$ 700	\$ 13 569.16
26	20	\$ 13 569.16	\$ 67.85	\$ 700	\$ 12 937.01
27	21	\$ 12 937.01	\$ 64.69	\$ 700	\$ 12 301.69

10 At the end of which month will Josh first owe less than half the amount he borrowed?

- A. The 19th month
- B. The 20th month
- C. The 21st month
- D. The 25th month

11 What is the formula used in cell E7?

- A. = B7 + C7
- B. = B7 – B3
- C. = B7 + C7 + D7
- D. = B7 + C7 – D7

Question 10 and 11 are examples of questions that demonstrate application to technology.

Use the following information to answer Questions 12–14.

The effectiveness of a drug for treating a particular disease is examined. The proportion of patients who recovered after using the drug is shown for male and female patients of different ages.

Patient \ Age	18–25	26–39	40–49
Male	0.91	0.81	0.51
Female	0.92	0.91	0.89

- 12** Suppose 200 male patients aged 18–25 participated in the study.

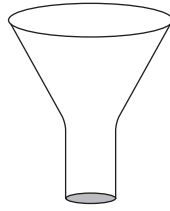
How many recovered after using the drug?

- A. 9
 - B. 18
 - C. 91
 - D. 182
- 13** A total of 4700 females participated in the study. Of these, 2100 were aged 40–49 and 1500 were aged 26–39.

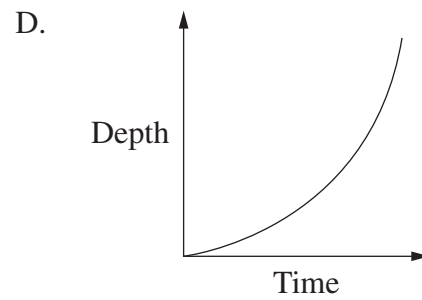
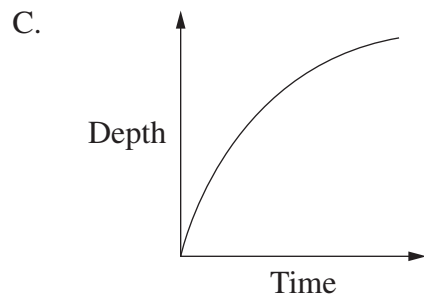
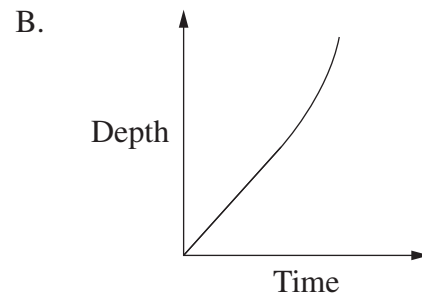
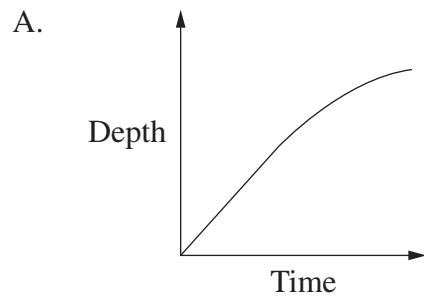
How many of the 4700 females did NOT recover after using the drug?

- A. 366
 - B. 454
 - C. 1378
 - D. 1466
- 14** Based on the data, which of the following is the most appropriate conclusion?
- A. Males respond better to the drug than females.
 - B. The drug should not be used with people over age 50.
 - C. Older males respond better to the drug than younger males.
 - D. Age has a greater impact on the response to the drug for males than for females.

- 15** The diagram shows a container, closed at the base. It is to be filled with water at a constant rate.



Which graph best shows the depth of water in the container as time varies?



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Centre Number

Mathematics Standard 1

Section II Answer Booklet

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Student Number

65 marks**Attempt Questions 16–36****Allow about 1 hour and 35 minutes for this section**

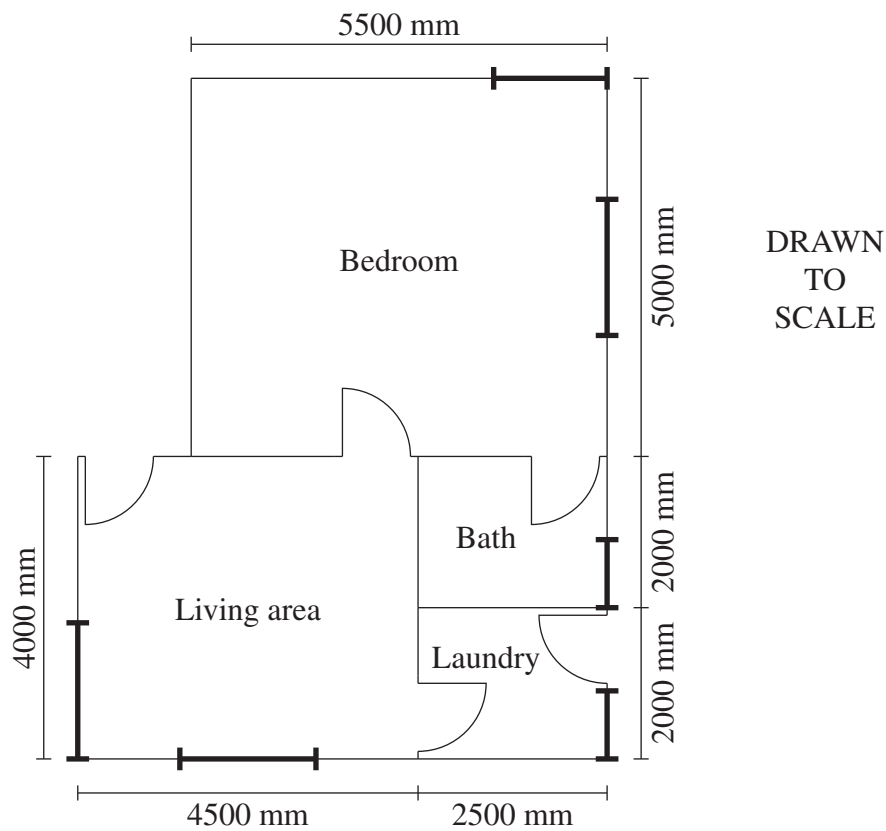
Instructions

- Write your Centre Number and Student Number at the top of this page.
- Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.
- Your responses should include relevant mathematical reasoning and/or calculations.
- Extra writing space is provided at the back of this booklet. If you use this space, clearly indicate which question you are answering.

Past HSC examinations provide other examples of questions that may be asked in this section.

Question 16 (4 marks)

The floor plan of a home unit has been drawn to scale.



- (a) How many doors are shown on the plan? **1**

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- (b) Show that the scale of the plan is 1 : 100. **1**

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- (c) What is the total floor area of the home unit in square metres? **2**

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Question 17 (1 mark)

A real estate agent's commission for selling houses is 1.8% of the sale price.

1

Calculate the commission earned when a house is sold for \$900 000.

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Question 18 (2 marks)

Simon sets up a fund to cover some of his expenses in case of an emergency. He wants the fund to cover the expenses listed below for a period of 16 weeks.

2

Weekly rental of \$700

Weekly groceries of \$200

Public transport fares of \$10 per day for 4 days every week

Phone bills of \$70 payable every 4 weeks

Simon can deposit \$766 per month into this emergency fund account.

How long will it take for the account to have the required balance?

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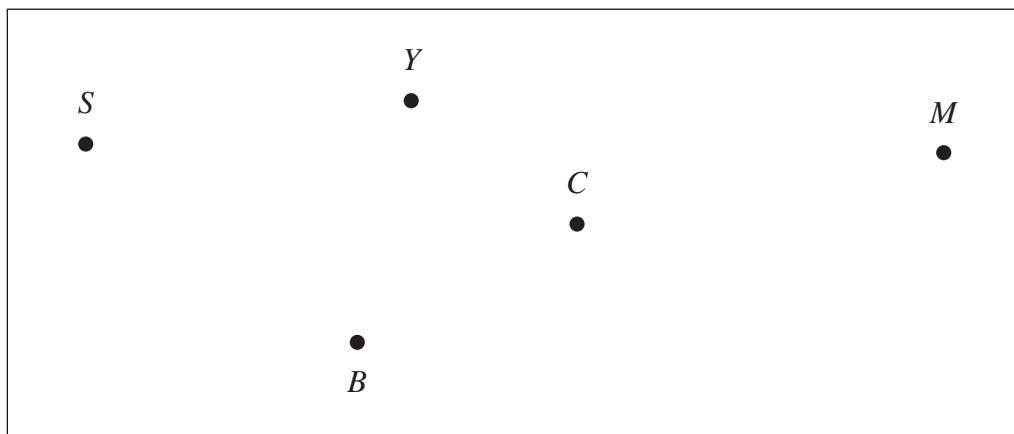
Question 19 (2 marks)

The table below shows the distances, in kilometres, between a number of towns.

2

<i>Towns</i>	Snowcity (<i>S</i>)	Clairville (<i>C</i>)	Yuma (<i>Y</i>)	Bosten (<i>B</i>)	Morrella (<i>M</i>)
(<i>S</i>)	–	–	280	275	–
(<i>C</i>)	–	–	60	150	–
(<i>Y</i>)	280	60	–	–	530
(<i>B</i>)	275	150	–	–	790
(<i>M</i>)	–	–	530	790	–

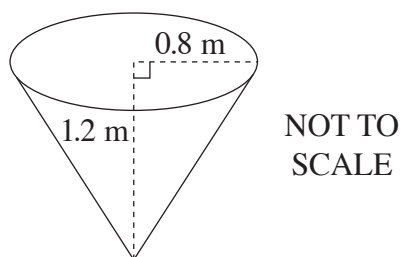
Using the vertices given, draw a weighted network diagram to represent the information shown in the table.



Question 20 (3 marks)

A cone with radius 0.8 m and height 1.2 m is shown.

3



The cone is filled with water.

Find the amount of water in the cone. Give your answer to the nearest litre.

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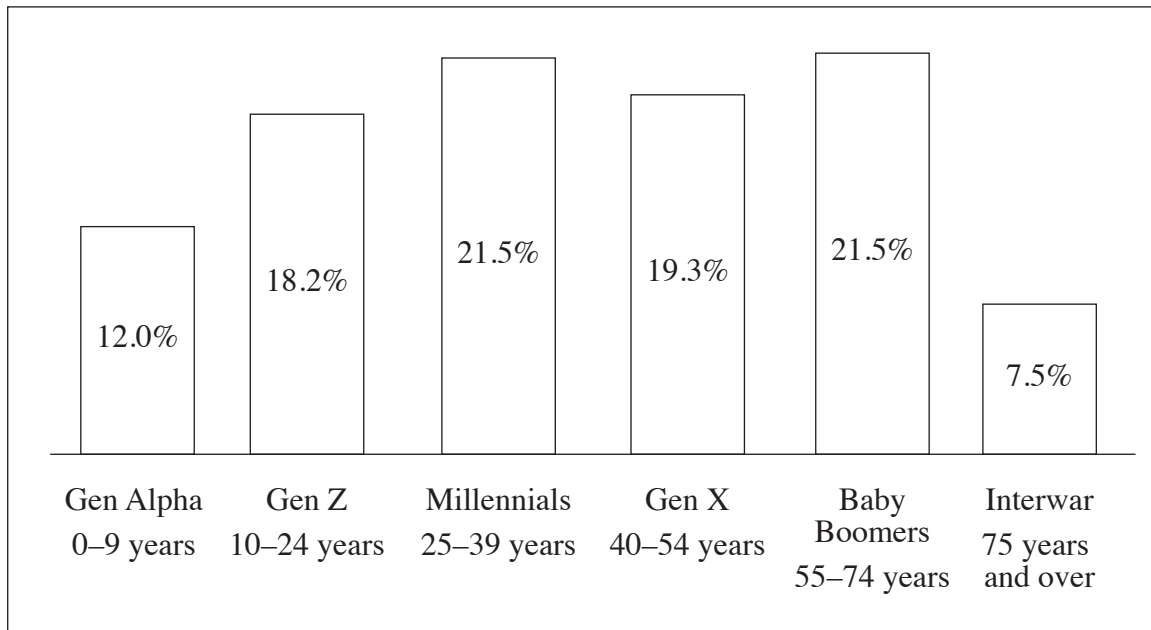
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Question 21 (2 marks)

The image shows the proportion of people in various categories based on the 2021 census of the Australian population.

2



Source: ABS – *Snapshot of Australia*

‘A picture of the economic, social and cultural make-up of Australia on Census Night, 10 August 2021 Census count by generation.’

<https://www.abs.gov.au/statistics/people/people-and-communities/snapshot-australia/latest-release>

The number of people in the 2021 Australian census was 25 418 009.

How many more people were in the Millennials category than in the Gen X category?
Give your answer as a whole number.

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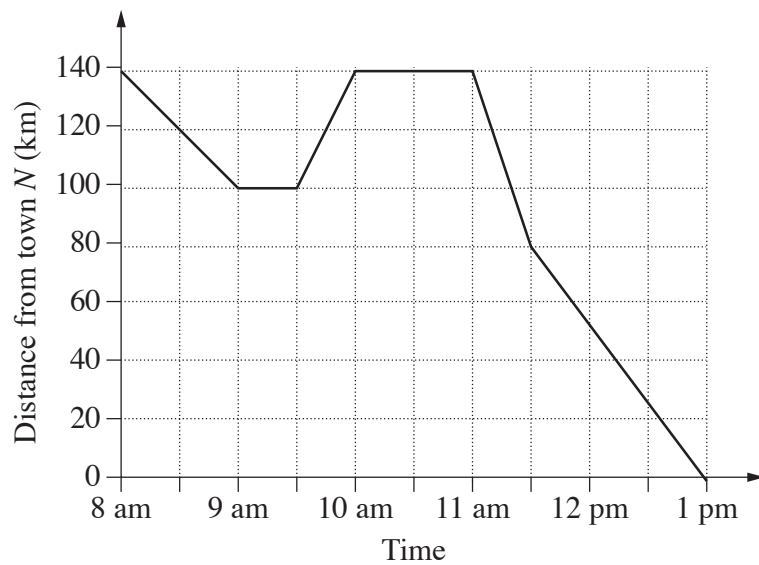
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Question 22 (4 marks)

The travel graph displays Jamie's trip which began in town *M* at 8 am and finished in town *N* at 1 pm.



- (a) What was the total distance that Jamie travelled?

2

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- (b) Between which times in the day was Jamie travelling at the fastest speed?
Justify your answer.

2

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Question 23 (3 marks)

Each whole number from 1 to 30 is written on a separate card. The 30 cards are shuffled. A game is played where one of these cards is selected at random. Each card is equally likely to be selected.

Ezra is playing the game, and wins if the card selected shows an odd number between 20 and 30.

- (a) List the numbers which would result in Ezra winning the game. **1**

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- (b) What is the probability that Ezra does NOT win the game? **2**

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Question 24 (2 marks)

It is known that an increase in the amount of exercise leads to an improvement in physical health.

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Mike claims that there is a positive correlation between the amount of exercise and physical health but that the relationship between them is non-causal.

Is Mike correct? Justify your answer with reference to both correlation and causality.

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Question 25 (4 marks)

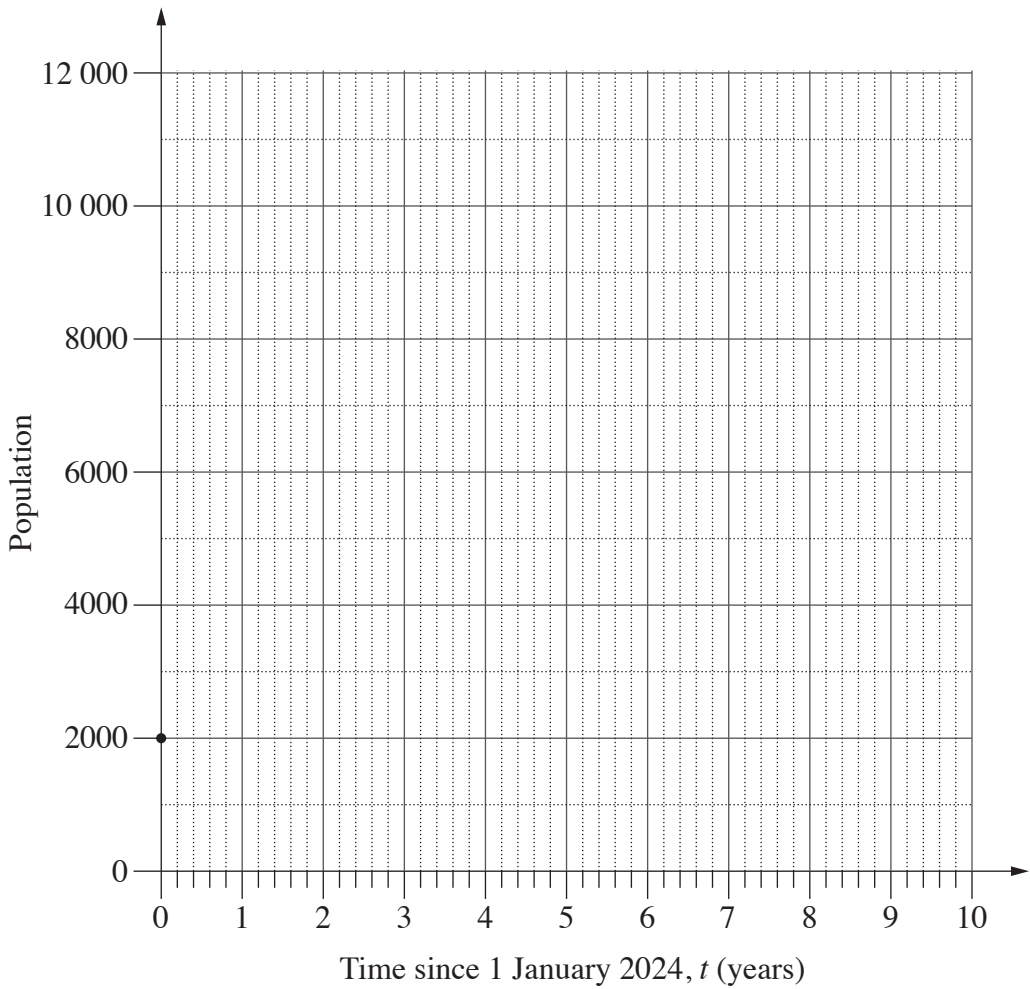
The population of a certain town on 1 January 2024 was 2000 people. **4**

Each year the population of this town is modelled to be 1.18 times the population of the previous year.

Let $t = 0$ be 1 January 2024.

By first completing the table for the indicated years, draw a graph showing how the population is modelled from 1 January 2024 to 1 January 2034.

t (years since 1 January 2024)	0	1	2	5	10
Population	2000				



Question 26 (4 marks)

A car was purchased for \$15 000. The value of the car, \$ V , at time t years since it was purchased, is determined using the spreadsheet shown.

	A	B	C	D
1	INPUT CELLS			
2	Purchase price of car	\$ 15 000		
3				
4	Straight-line annual depreciation amount	\$ 2000		
5				
6	Declining-balance method annual depreciation rate	20%		
7				
8		End of year	Straight-line method depreciated value	Declining-balance method depreciated value
9		0	\$ 15 000	\$ 15 000
10		1	\$ 13 000	
11		2		
12		3		

- (a) Calculate the value in cell C12. 2

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- (b) Write down a formula which could be used in cell D10. Include appropriate cells in your formula. 2

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Question 27 (4 marks)

Sophie is driving a vehicle at 70 km/h. She notices a branch on the road ahead and applies the brakes.

- (a) The following formula can be used to find the braking distance, in metres, of a vehicle when travelling at a speed measured in kilometres per hour. **1**

$$\text{Braking Distance} = 0.01 \times \text{speed}^2$$

What is the braking distance of Sophie's vehicle?

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- (b) The following formula can be used to find the stopping distance, in metres, of a vehicle. **3**

$$\text{Stopping distance} = \text{reaction distance} + \text{braking distance}$$

Sophie's reaction time is 1.5 seconds.

What is the stopping distance of Sophie's vehicle, to the nearest metre?

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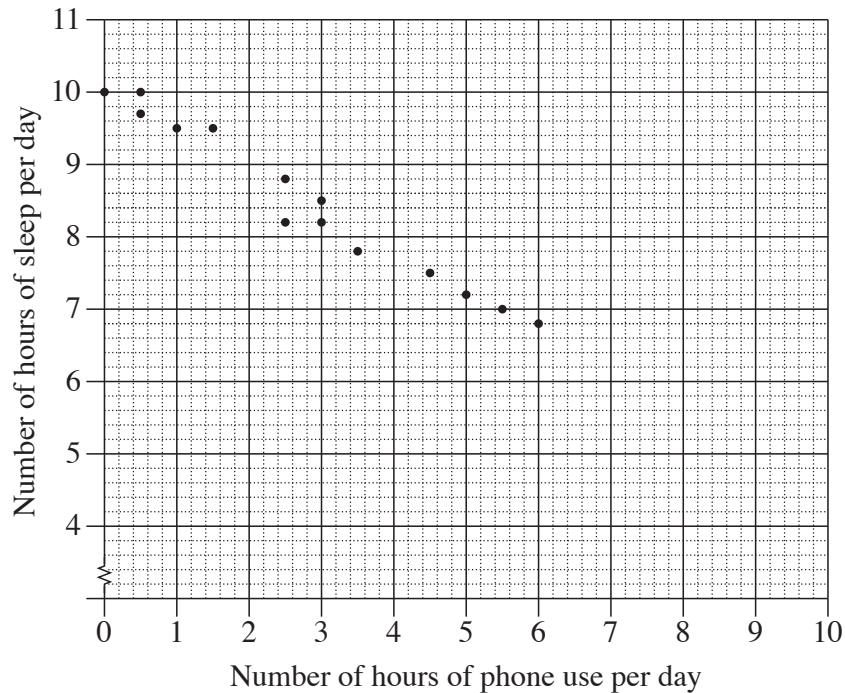
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Questions 16–27 are worth 35 marks in total
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Question 28 (4 marks)

A teacher surveyed the students in her Year 8 class to investigate the relationship between the number of hours of phone use per day and the number of hours of sleep per day.

The results are shown on the scatter plot below.



- (a) The data for two new students, Alinta and Birrani, are shown in the table.

2

	<i>Number of hours of phone use per day</i>	<i>Number of hours of sleep per day</i>
Alinta	4	8
Birrani	0	10.5

Plot their results on the scatter plot.

- (b) By first drawing a line of best fit by eye on the scatter plot, estimate the number of hours of sleep per day for a student who uses the phone for 2 hours per day.

2

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Question 29 (4 marks)

Peta will invest \$1 000 000 for three years. She is considering two options.

4

Option A: Invest at 5.2% per annum simple interest

Option B: Buy a property which is projected to grow at 10% per annum compounding annually

Find the difference in the value of the two options after three years.

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Question 30 (3 marks)

A family uses a credit card to purchase a lounge during the month of November.

3

The credit card has no interest-free period. Interest is charged at a rate of 21% per annum, compounded daily, from and including the date of purchase to the last day of the month.

The table shows the only purchases and payments on the credit card during the month of November.

<i>Date</i>	<i>Details</i>	<i>Amount (\$)</i>
1 November	Opening balance	0
15 November	Lounge	7500
30 November	Interest charged	*
30 November	Payment	–2000
30 November	Closing balance	*

What is the closing balance owing on the credit card on 30 November?

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Question 31 (3 marks)

A cake-shop owner sells muffins for \$2.50 each. It costs \$1 to make each muffin and \$300 for the equipment needed to make the muffins. The owner uses a spreadsheet with formulas to model this situation.

	A	B	C	D	E	F	G	H
1	Break-even Analysis							
2	Number of muffins	Equipment cost	Cost of making muffins	Total cost	Revenue		Cost of making one muffin	\$1.00
3	0	\$300	\$0	\$300	\$0		Selling price	\$2.50
4	50	\$300	\$50	\$350	\$125		Equipment cost	\$300.00
5	100	\$300	\$100	\$400	\$250			
6	150	\$300	\$150	\$450	\$375		Break-even point	= H4/(H3-H2)
7	200	\$300	\$200	\$500	\$500			
8	250	\$300	\$250	\$550	\$625			
9	300	\$300	\$300	\$600	\$750			
10	350	\$300	\$350	\$650	\$875			

- (a) How many muffins need to be sold to ‘break-even’? 1

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- (b) How much profit is made if 400 muffins are sold? 2

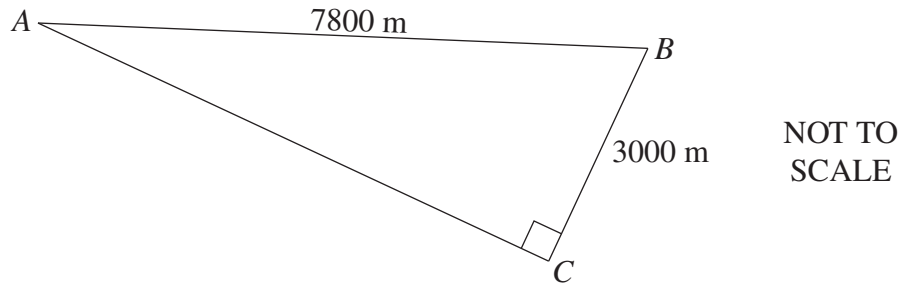
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Question 32 (4 marks)

Shan is interested in buying a block of bushland. The price per hectare is \$500. The land he wishes to purchase is in the shape of a right-angled triangle as shown.

4

The length of side AB is 7800 metres and the length of side BC is 3000 metres. The right angle of the triangle is angle ACB .



Note: 1 hectare = 10 000 m²

What is the cost of the block of bushland?

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Question 33 (3 marks)

Ken tosses a fair coin.

3

He then chooses ONE card at random from four cards numbered 1, 2, 3 and 4.

What is the probability that the coin lands on a head and the card chosen is numbered 3 or 4?

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Question 34 (3 marks)

The ages of the 10 members in a tennis club are

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24 25 27 33 34 34 35 39 47 59.

Is the age 59 considered to be an outlier? Justify your answer with calculations.

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Question 35 (2 marks)

A watch is currently worth \$6100. It has appreciated by 5.8% per annum since purchase.

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What was its value 10 years ago?

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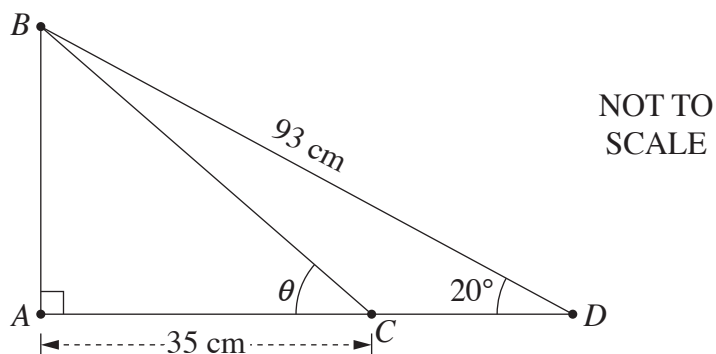
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Question 36 (4 marks)

4

The diagram shows two right-angled triangles, ABC and ABD ,

where $BD = 93$ cm, $AC = 35$ cm, $\angle ADB = 20^\circ$ and $\angle ACB = \theta$.



Find the value of θ , correct to the nearest degree.

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End of paper

Section II extra writing space

If you use this space, clearly indicate which question you are answering.

Section II extra writing space

If you use this space, clearly indicate which question you are answering.

Mathematics Standard 1

Mathematics Standard 2

The reference sheet has been updated. Additions have been highlighted in red boxes below.

REFERENCE SHEET

Measurement

Time and location

$15^\circ = 1$ hour time difference

Length

$$l = \frac{\theta}{360} \times 2\pi r$$

Area

$$A = \frac{\theta}{360} \times \pi r^2$$

$$A = \frac{h}{2}(a + b)$$

$$A \approx \frac{h}{2}(d_f + d_l)$$

Surface area

$$A = 2\pi r^2 + 2\pi rh$$

$$A = 4\pi r^2$$

Volume and capacity

$$V = \frac{1}{3}Ah$$

$$V = \frac{4}{3}\pi r^3$$

$$1 \text{ cm}^3 = 1 \text{ mL}$$

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

Trigonometry

$$\sin A = \frac{\text{opp}}{\text{hyp}}, \quad \cos A = \frac{\text{adj}}{\text{hyp}}, \quad \tan A = \frac{\text{opp}}{\text{adj}}$$

$$A = \frac{1}{2}ab \sin C$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

Financial Mathematics

$$FV = PV(1 + r)^n$$

Straight-line method of depreciation

$$S = V_0 - Dn$$

Declining-balance method of depreciation

$$S = V_0(1 - r)^n$$

Statistical Analysis

An outlier is a score

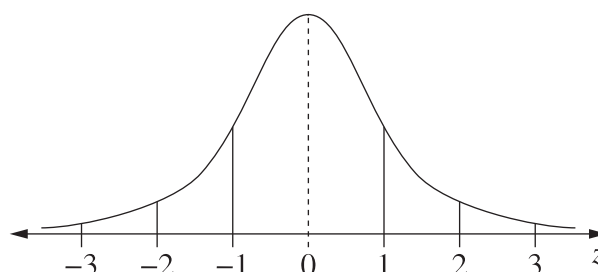
less than $Q_1 - 1.5 \times IQR$

or

more than $Q_3 + 1.5 \times IQR$

$$z = \frac{x - \mu}{\sigma}$$

Normal distribution



- approximately 68% of scores have z -scores between -1 and 1
- approximately 95% of scores have z -scores between -2 and 2
- approximately 99.7% of scores have z -scores between -3 and 3

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HSC Mathematics Standard 1 Sample Examination

Marking Guidelines

Section I

Multiple-choice Answer Key

Question	Answer
1	C
2	D
3	A
4	B
5	B
6	A
7	C
8	A
9	C
10	C
11	D
12	D
13	B
14	D
15	A

Section II

Question 16 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

5 doors

Question 16 (b)

Criteria	Marks
• Provides correct answer	1

Sample answer:

55 : 5500

1 : 100

Question 16 (c)

Criteria	Marks
• Provides correct solution	2
• Calculates an area, or equivalent merit	1

Sample answer:

$$(5.5 \times 5) + (4 \times 7)$$

$$= 55.5 \text{ m}^2$$

Question 17

Criteria	Marks
• Provides correct answer	1

Sample answer:

$$1.8\% \times 900\,000$$

$$= 0.018 \times 900\,000$$

$$= \$16\,200$$

Question 18

Criteria	Marks
• Provides correct solution	2
• Calculates cost of rental for 16 weeks, or equivalent merit	1

Sample answer:

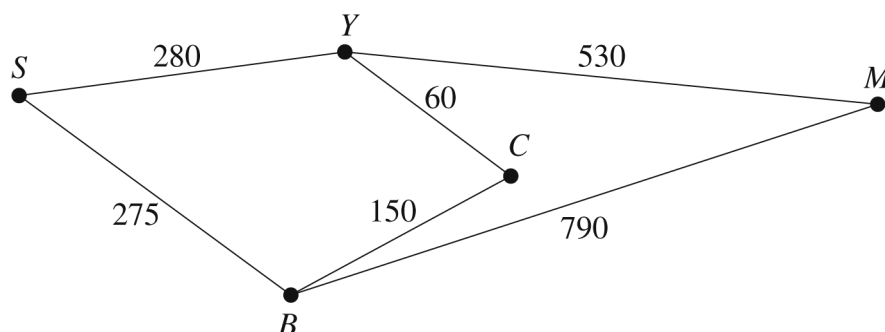
Required emergency fund balance is $700 \times 16 + 200 \times 16 + 10 \times 4 \times 16 + 70 \times 4 = \$15\,320$

Number of months required is $\frac{15\,320}{766} = 20$ months.

Question 19

Criteria	Marks
• Provides the correct weighted network diagram	2
• Draws a network diagram using vertices given, or equivalent merit	1

Sample answer:



Question 20

Criteria	Marks
• Provides correct solution	3
• Finds the volume of the cone in cubic metres, or equivalent merit	2
• Writes a correct expression for volume, or equivalent merit	1

Sample answer:

$$V = \frac{1}{3} \pi (0.8)^2 (1.2)$$

$$= 0.804... \text{ m}^3$$

$$= 804 \text{ L (nearest litre)}$$

Question 21

Criteria	Marks
• Provides correct solution	2
• Calculates the number of people in either category, or equivalent merit	1

Sample answer:

Number of people in the Millennials category was $25\,418\,009 \times 0.215 = 5\,464\,872$

Number of people in the Gen X category was $25\,418\,009 \times 0.193 = 4\,905\,676$

The difference in the number of people in these categories
 $5\,464\,872 - 4\,905\,676 = 559\,196$ (as a whole number).

Question 22 (a)

Criteria	Marks
• Provides correct answer	2
• Calculates one correct distance, or equivalent merit	1

Sample answer:

$40 + 40 + 140 = 220$ km

Question 22 (b)

Criteria	Marks
• Provides correct solution	2
• Provides times or justification, or equivalent merit	1

Sample answer:

11–11:30 am, the slope is the steepest.

Question 23 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

21, 23, 25, 27, 29

Question 23 (b)

Criteria	Marks
• Provides correct answer	2
• Provides probability of winning, or equivalent merit	1

Sample answer:

$$\text{Probability of winning} = \frac{5}{30} = \frac{1}{6}$$

$$\text{Probability of not winning} = 1 - \text{Probability of winning}$$

$$= 1 - \frac{1}{6}$$

$$= \frac{5}{6}$$

Question 24

Criteria	Marks
• Provides correct solution	2
• Provides one correct justification, or equivalent merit	1

Sample answer:

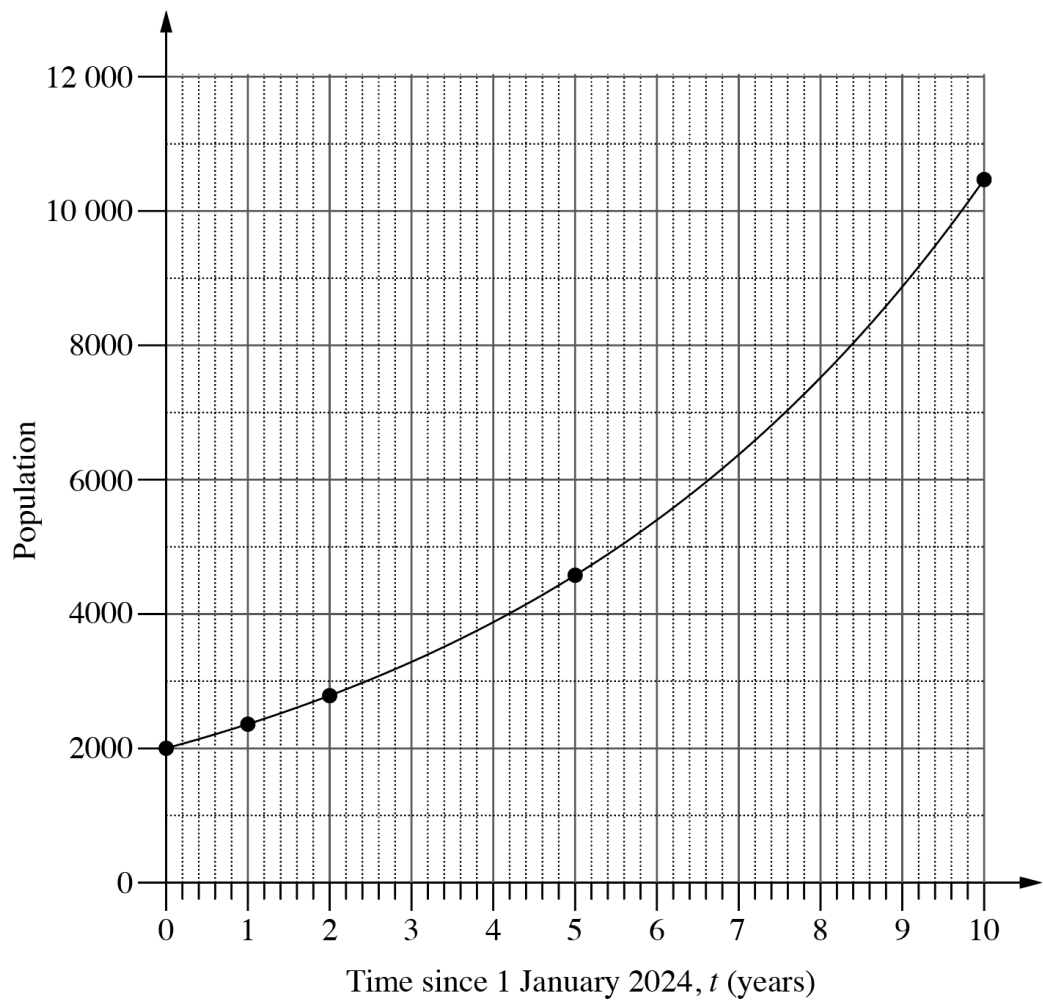
Mike is correct about the correlation since as exercise increases so too does physical health. He is incorrect about the causal relationship. It has been stated that an increase in the amount of exercise leads to improved health, therefore there is a causal relationship.

Question 25

Criteria	Marks
• Provides correct solution	4
• Plots all points correctly, or equivalent merit	3
• Provides all correct values in the table, or equivalent merit	2
• Provides one correct value in the table, or equivalent merit	1

Sample answer:

t (years since 1 January 2024)	0	1	2	5	10
Population	2000	2360	2785	4576	10468



Question 26 (a)

Criteria	Marks
• Provides correct solution	2
• Uses a straight line method formula, or equivalent merit	1

Sample answer:

The value in Cell C12 = $13\,000 - 2 \times 2000$
 = \$9000

Question 26 (b)

Criteria	Marks
• Provides correct solution	2
• Provides a formula referencing 20%, or equivalent merit	1

Sample answer:

= (1-B6)*D9

Question 27 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

0.01×70^2
 = 49 m

Question 27 (b)

Criteria	Marks
• Provides correct solution	3
• Calculates reaction distance, or equivalent merit	2
• Calculates speed in metres per second, or equivalent merit	1

Sample answer:

$$70 \times 1000 \div 60 \div 60 = 19.444...$$

$$\text{Reaction distance} = 19.444... \times 1.5$$

$$= 29.1666... \text{ m}$$

$$\text{Stopping distance} = 29.1666... + 49$$

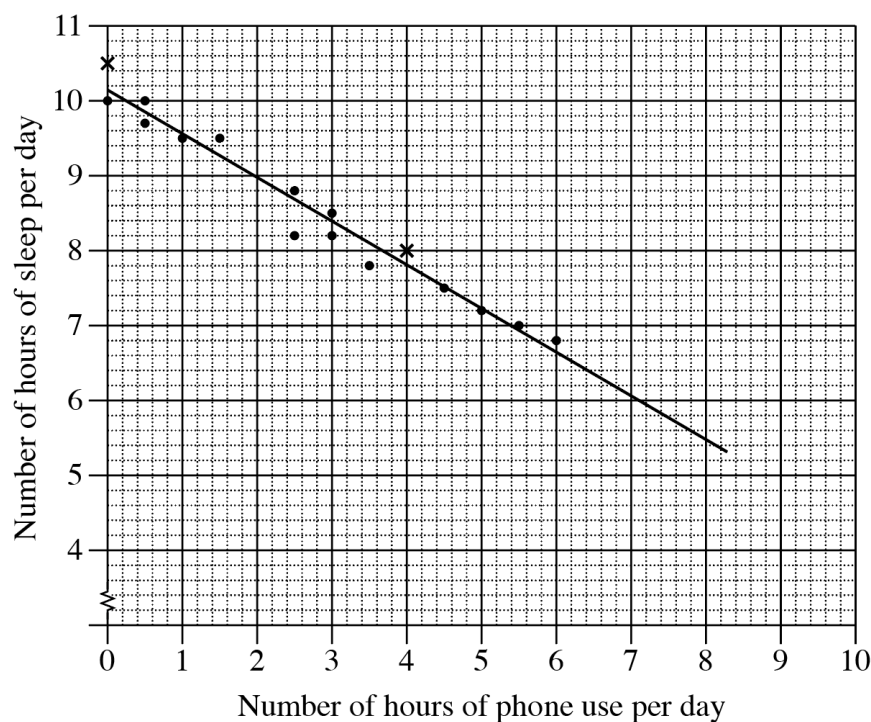
$$= 78.1666...$$

$$\approx 78 \text{ m (nearest metre)}$$

Question 28 (a)

Criteria	Marks
• Plots both points correctly	2
• Plots one point correctly, or equivalent merit	1

Sample answer:



Question 28 (b)

Criteria	Marks
• Provides correct solution	2
• Estimates the number of hours of sleep using their line of best fit, or equivalent merit	1

Sample answer:

(Line added on diagram in part (a)).

Student who uses the phone for 2 hours will get 9 hours of sleep per day based on the line of best fit.

Question 29

Criteria	Marks
• Provides correct solution	4
• Calculates both future values correctly, or equivalent merit	3
• Calculates one future value, or equivalent merit	2
• Uses simple interest formula, or equivalent merit	1

Sample answer:

Option A:

$$1\,000\,000 + 1\,000\,000 \times 0.052 \times 3 \\ = 1\,156\,000$$

Option B:

$$1\,000\,000 (1.1)^3 = 1\,331\,000 \\ \text{Difference} = 1\,331\,000 - 1\,156\,000 \\ = \$175\,000$$

Question 30

Criteria	Marks
• Provides correct solution	3
• Applies the compound interest formula correctly, or equivalent merit	2
• Attempts to apply the compound interest formula, or equivalent merit	1

Sample answer:

Interest is charged for 16 days

$$\begin{aligned}
 \text{Amount owing before payment} &= 7500 \left(1 + \frac{21\%}{365} \right)^{16} \\
 &= 7500 \left(1 + \frac{0.21}{365} \right)^{16} \\
 &= \$7569.34
 \end{aligned}$$

$$\begin{aligned}
 \text{Closing balance} &= 7569.34 - 2000 \\
 &= \$5569.34
 \end{aligned}$$

Question 31 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

200 muffins

Question 31 (b)

Criteria	Marks
• Provides correct solution	2
• Identifies either revenue or cost, or equivalent merit	1

Sample answer:

Revenue:

$$400 \times \$2.50 = \$1\,000$$

Cost:

$$400 \times \$1 + \$300 = \$700$$

Profit:

$$\$1\,000 - \$700 = \$300$$

Question 32

Criteria	Marks
• Provides correct solution	4
• Converts the correct area to hectares, or equivalent merit	3
• Finds the area of the triangle, or equivalent merit	2
• Finds the length of AC , or equivalent merit	1

Sample answer:

$$AC = \sqrt{7800^2 - 3000^2}$$

$$= 7200$$

$$\text{Area} = \frac{1}{2} \times 3000 \times 7200$$

$$= 10\,800\,000 \text{ m}^2$$

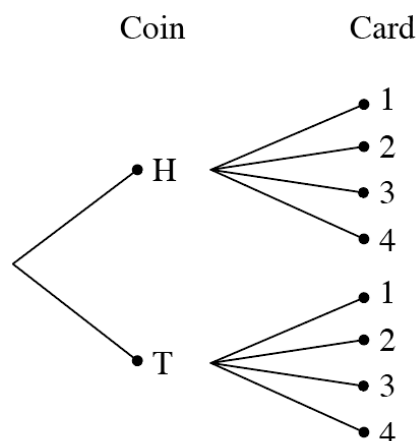
$$= 1080 \text{ ha}$$

$$\text{Cost} = 1080 \times 500$$

$$= \$540\,000$$

Question 33

Criteria	Marks
• Provides correct solution	3
• Draws the correct tree diagram, or equivalent merit	2
• Draws a tree diagram, or equivalent merit	1

Sample answer:

The required probability is $\frac{2}{8} = \frac{1}{4}$.

Question 34

Criteria	Marks
• Provides correct solution	3
• Correctly applies the outlier formula	2
• Finds the IQR , or equivalent merit	1

Sample answer:

$$\text{Median} = 34 \quad Q_3 = 39 \quad Q_1 = 27 \quad IQR = 39 - 27 = 12$$

$$\begin{aligned} \text{Upper threshold} &= 39 + 1.5 \times 12 \\ &= 57 \end{aligned}$$

$\therefore$ as $59 > 57$, then 59 is considered an outlier.

Question 35

Criteria	Marks
• Provides correct solution	2
• Attempts to substitute values into the compound interest formula	1

Sample answer:

$$6100 = P(1 + 5.8\%)^{10}$$

$$6100 = P(1 + 0.058)^{10}$$

$$P = \frac{6100}{(1 + 0.058)^{10}}$$

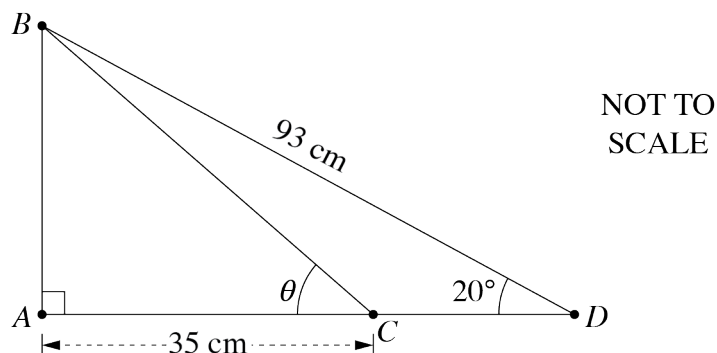
$$P = 3471.15$$

$\therefore$ Value ten years ago = \$3471.15

Question 36

Criteria	Marks
• Provides correct solution	4
• Finds an expression for $\tan \theta$, or equivalent merit	3
• Finds the length of AB , or equivalent merit	2
• Provides a correct trigonometric ratio related to one of the triangles, or equivalent merit	1

Sample answer:



Using $\triangle ABD$,

$$\sin 20^\circ = \frac{AB}{93}$$

$$AB = 93 \sin 20^\circ$$

Using $\triangle ABC$,

$$\tan \theta = \frac{AB}{35}$$

$$\text{ie } \tan \theta = \frac{93 \sin 20^\circ}{35}$$

$$\theta = 42^\circ \text{ (nearest degree)}$$

HSC Mathematics Standard 1 Sample Examination

Mapping Grid

Section I

Question	Marks	Content	Syllabus outcomes	Targeted performance bands
1	1	Algebraic relationships – Simultaneous equations	MST-12-S1-01	2–3
2	1	Networks, paths and trees – Network concepts	MST-11-07	2–3
3	1	Relative frequency and probability	MST-12-S1-07	2–3
4	1	Applications of measurement – Perimeter, area and volume	MST-11-05	3–4
5	1	Bivariate data analysis – Scatter plots and lines of best fit	MST-12-S1-06	3–4
6	1	Linear relationships – Linear modelling	MST-11-02	3–4
7	1	Earning money – Ways of earning	MST-11-03	3–4
8	1	Right-angled triangles	MST-12-S1-04	4–5
9	1	Investment	MST-12-S1-02	4–5
10	1	Depreciation and loans – Loans	MST-12-S1-03	4–5
11	1	Depreciation and loans – Loans	MST-12-S1-03	4–5
12	1	Relative frequency and probability	MST-12-S1-07	4–5
13	1	Relative frequency and probability	MST-12-S1-07	5–6
14	1	Relative frequency and probability	MST-12-S1-07	5–6
15	1	Algebraic relationships – Graphs of practical situations	MST-12-S1-01	5–6

Section II

Question	Marks	Content	Syllabus outcomes	Targeted performance bands
16 (a)	1	Ratios and rates – Ratios	MST-12-S1-05	2–3
16 (b)	1	Ratios and rates – Ratios	MST-12-S1-05	2–3
16 (c)	2	Ratios and rates – Ratios	MST-12-S1-05	2–4
17	1	Earning money – Ways of earning	MST-11-03	3–4
18	2	Managing money – Budgeting	MST-11-04	2–4
19	2	Networks, paths and trees – Network concepts	MST-11-07	3–5
20	3	Applications of measurement – Perimeter, area and volume	MST-11-05	2–4
21	2	Data analysis – Display and interpret grouped and ungrouped data	MST-11-08	2–4
22 (a)	2	Ratios and rates – Rates	MST-12-S1-05	3–4
22 (b)	2	Ratios and rates – Rates	MST-12-S1-05	3–4

Question	Marks	Content	Syllabus outcomes	Targeted performance bands
23 (a)	1	Relative frequency and probability	MST-12-S1-07	3–4
23 (b)	2	Relative frequency and probability	MST-12-S1-07	3–5
24	2	Bivariate data analysis – Bivariate data sets	MST-12-S1-06	3–5
25	4	Algebraic relationships – Graphs of practical situations	MST-12-S1-01	2–5
26 (a)	2	Depreciation and loans – Depreciation	MST-12-S1-03	3–5
26 (b)	2	Depreciation and loans – Depreciation	MST-12-S1-03	4–6
27 (a)	1	Formulas and equations	MST-11-01	2–3
27 (b)	3	Formulas and equations	MST-11-01	3–5
28 (a)	2	Bivariate data analysis – Scatter plots and lines of best fit	MST-12-S1-06	2–4
28 (b)	2	Bivariate data analysis – Scatter plots and lines of best fit	MST-12-S1-06	3–5
29	4	Investment	MST-12-S1-02	2–5
30	3	Depreciation and loans – Credit cards	MST-12-S1-03	3–5
31 (a)	1	Algebraic relationships – Simultaneous linear equations	MST-12-S1-01	2–3
31 (b)	2	Algebraic relationships – Simultaneous linear equations	MST-12-S1-01	3–5
32	4	Right-angled triangles	MST-12-S1-04	3–6
33	3	Relative frequency and probability	MST-12-S1-07	4–6
34	3	Data analysis – Clusters and outliers	MST-11-08	3–6
35	2	Investment	MST-12-S1-02	4–6
36	4	Right-angled triangles	MST-12-S1-04	3–6