



NSW Education Standards Authority

**2021** HIGHER SCHOOL CERTIFICATE EXAMINATION

# Mathematics Standard 2

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## General Instructions

- Reading time – 10 minutes
- Working time – 2 hours and 30 minutes
- 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

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## Total marks: 100

### Section I – 15 marks (pages 2–9)

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

### Section II – 85 marks (pages 13–44)

- Attempt Questions 16–41
- Allow about 2 hours and 5 minutes for this section

## Section I

15 marks

Attempt Questions 1–15

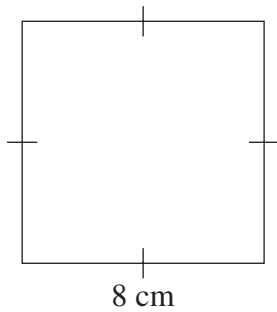
Allow about 25 minutes for this section

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

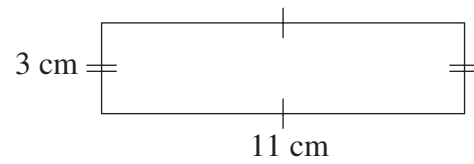
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1 Which of the following shapes has the largest perimeter?

A.

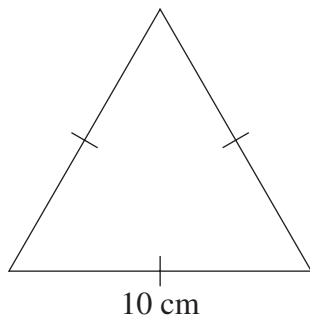


B.

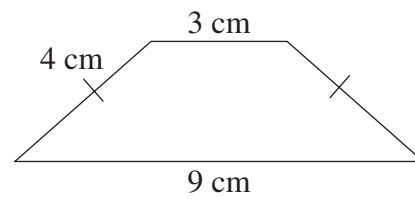


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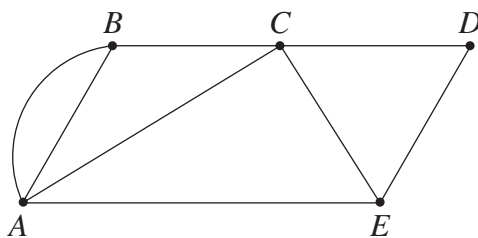
C.



D.



- 2 Consider the network diagram.



What is the sum of the degrees of all the vertices in this network?

- A. 5  
B. 8  
C. 14  
D. 16
- 3 The stem-and-leaf plot shows the number of goals scored by a team in each of ten netball games.

|   |   |   |   |   |
|---|---|---|---|---|
| 0 | 6 | 8 |   |   |
| 1 | 2 | 4 | 5 |   |
| 2 | 1 | 5 | 5 | 9 |
| 3 | 5 |   |   |   |

What is the mode of this dataset?

- A. 5  
B. 18  
C. 25  
D. 29

- 4 Three years ago an appliance was valued at \$2467. Its value has depreciated by 15% each year, based on the declining-balance method.

What is its salvage value today, to the nearest dollar?

- A. \$952
- B. \$1110
- C. \$1357
- D. \$1515

- 5 Peter currently earns \$21.50 per hour. His hourly wage will increase by 2.1% compounded each year for the next four years.

What will his hourly wage be after four years?

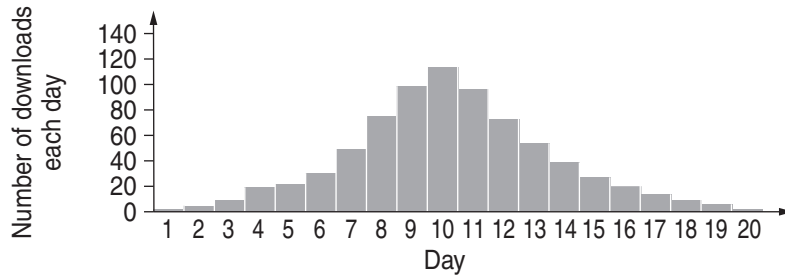
- A.  $21.50(1.21)^4$
- B.  $21.50(1.021)^4$
- C.  $21.50 + 21.50 \times 0.21 \times 4$
- D.  $21.50 + 21.50 \times 0.021 \times 4$

- 6 Suppose  $a = \frac{b}{7}$ , where  $b = 22$ .

What is the value of  $a$ , correct to three significant figures?

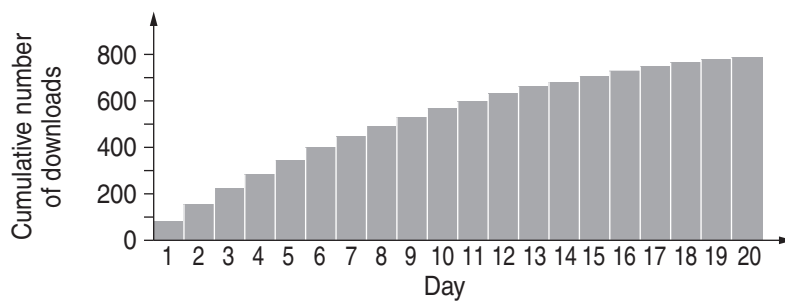
- A. 3.14
- B. 3.15
- C. 3.142
- D. 3.143

- 7 The number of downloads of a song on each of twenty consecutive days is shown in the following graph.

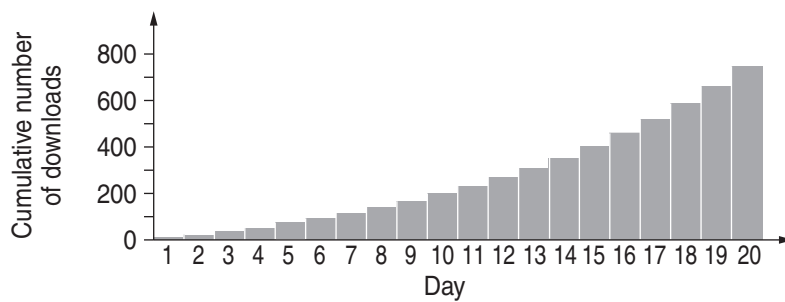


Which of the following graphs best shows the cumulative number of downloads up to and including each day?

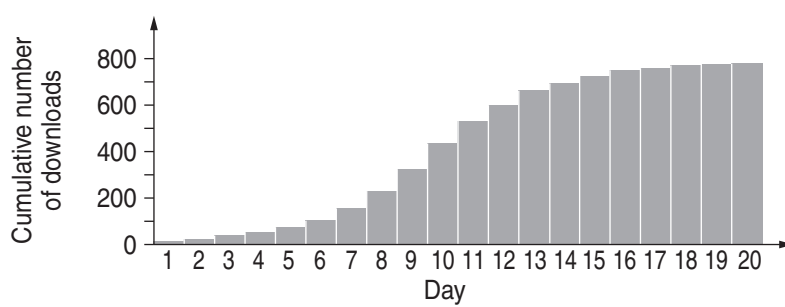
A.



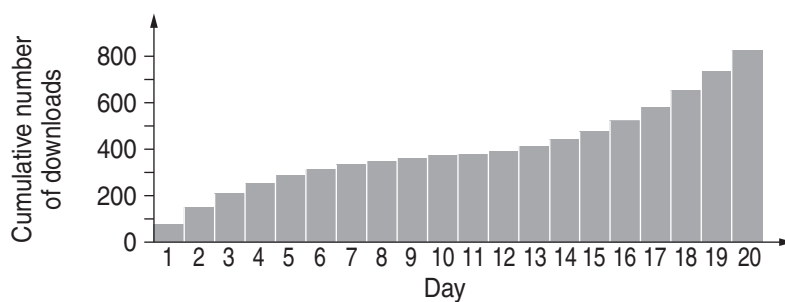
B.



C.



D.



- 8 On a test, Zac's mark corresponded to a  $z$ -score of 2. The test scores had a mean of 63 and a standard deviation of 8.

What was Zac's actual mark on the test?

- A. 65
- B. 67
- C. 73
- D. 79

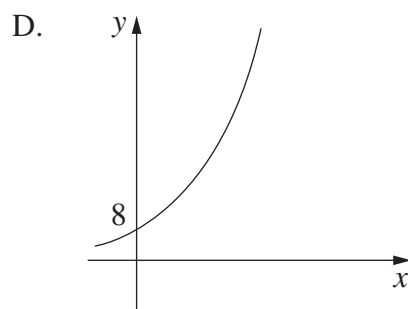
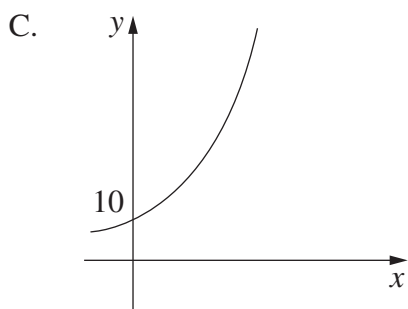
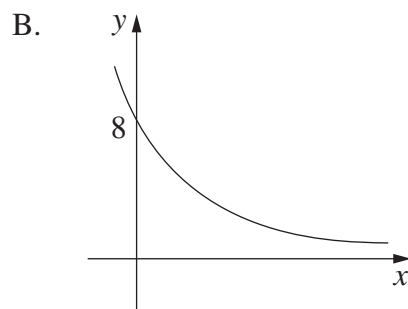
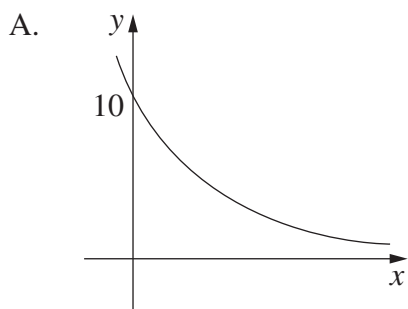
- 9 A student is thinking of a number. Let the number be  $x$ .

When the student subtracts 8 from this number and multiplies the result by 3, the answer is 2 more than  $x$ .

Which equation can be used to find  $x$ ?

- A.  $3(x - 8) = 2x$
- B.  $3x - 8 = 2x$
- C.  $3(x - 8) = x + 2$
- D.  $3x - 8 = x + 2$

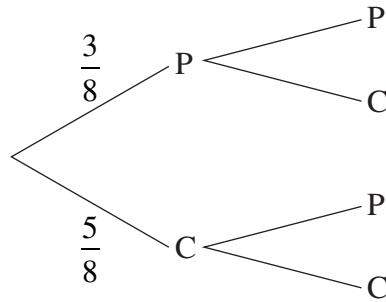
- 10 Which of the following best represents the graph of  $y = 10(0.8)^x$ ?



- 11 There are 8 chocolates in a box. Three have peppermint centres (P) and five have caramel centres (C).

Kim randomly chooses a chocolate from the box and eats it. Sam then randomly chooses and eats one of the remaining chocolates.

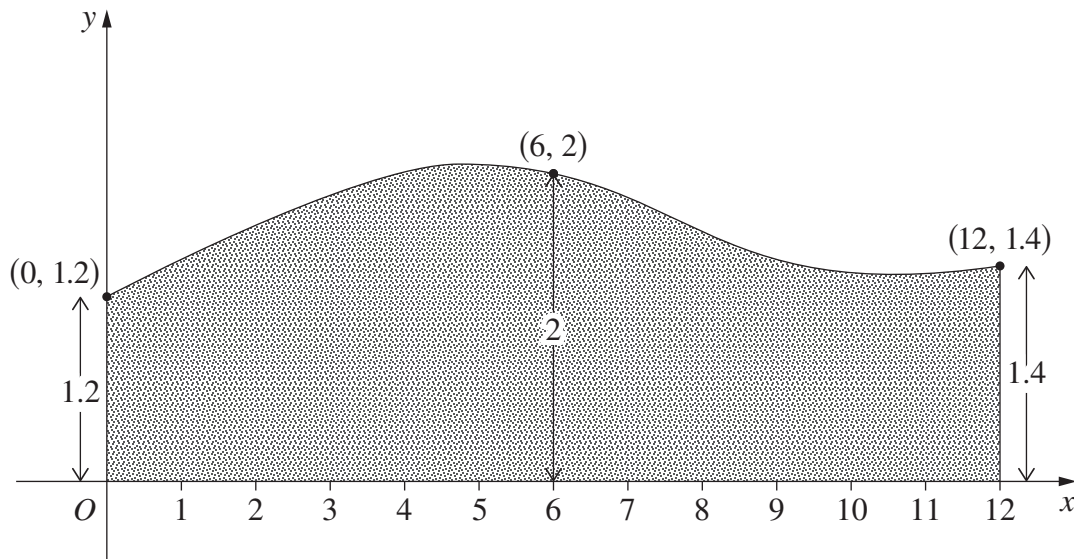
A partially completed probability tree is shown.



What is the probability that Kim and Sam choose chocolates with different centres?

- A.  $\frac{15}{64}$
- B.  $\frac{15}{56}$
- C.  $\frac{15}{32}$
- D.  $\frac{15}{28}$

- 12 A block of land is represented by the shaded region on the number plane. All measurements are in kilometres.



Which of the following is the approximation for the area of this block of land in square kilometres, using two applications of the trapezoidal rule?

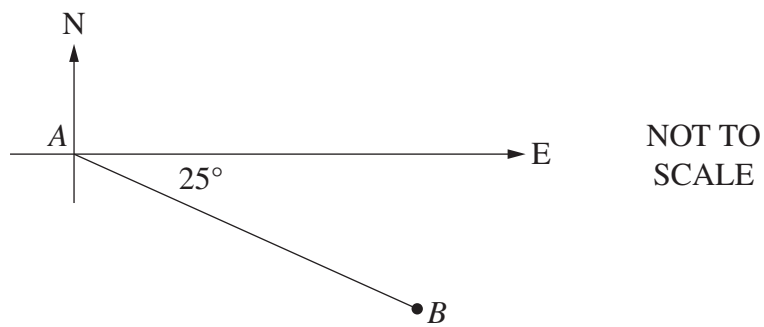
- A. 9.9  
B. 19.8  
C. 39.6  
D. 72
- 13 The time taken to clean a warehouse varies inversely with the number of cleaners employed.

It takes 8 cleaners 60 hours to clean a warehouse.

Working at the same rate, how many hours would it take 10 cleaners to clean the same warehouse?

- A. 45  
B. 48  
C. 62  
D. 75

- 14 Consider the diagram below.



What is the true bearing of  $A$  from  $B$ ?

- A.  $025^\circ$
  - B.  $065^\circ$
  - C.  $115^\circ$
  - D.  $295^\circ$
- 15 A total of 11 400 people entered a running race. The ratio of professional runners to amateurs was  $3:16$ . All the professional runners completed the race while 600 of the amateurs did not complete the race.

For those who completed the race, what is the ratio, in simplest form, of professional runners to amateurs?

- A.  $1:2$
- B.  $1:5$
- C.  $1:8$
- D.  $1:19$

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Centre Number

**Mathematics Standard 2**

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Student Number

**Section II Answer Booklet 1****Section II****85 marks****Attempt Questions 16–41****Allow about 2 hours and 5 minutes for this section****Booklet 1 – Attempt Questions 16–33 (55 marks)****Booklet 2 – Attempt Questions 34–41 (30 marks)****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 on pages 30–32. If you use this space, clearly indicate which question you are answering.

**Please turn over**

**Question 16** (2 marks)

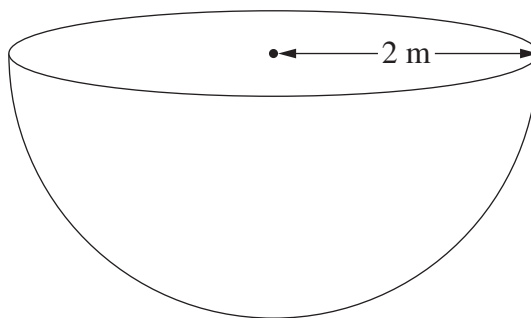
The volume,  $V$ , of a sphere is given by the formula

2

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

where  $r$  is the radius of the sphere.

A tank consists of the bottom half of a sphere of radius 2 metres, as shown.



Find the volume of the tank in cubic metres, correct to one decimal place.

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Do NOT write in this area.

**Question 17** (2 marks)

The five-number summary of a dataset is given.

**2**

Lowest score = 1

Lower quartile ( $Q_1$ ) = 4

Median ( $Q_2$ ) = 7

Upper quartile ( $Q_3$ ) = 10

Highest score = 20

Is 20 an outlier? Justify your answer with calculations.

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**Question 18** (2 marks)

The fuel consumption for a car is 6.7 litres/100 km. On a road trip, the car travels a distance of 1560 km and the fuel cost is \$1.45 per litre.

**2**

What is the total fuel cost for this trip?

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**Question 19** (2 marks)

Adam purchased some office furniture five years ago. It depreciated by \$2300 each year based on the straight-line method of depreciation. The salvage value of the furniture is now \$7500.

2

Find the initial value of the office furniture.

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**Question 20** (3 marks)

City A is in Sweden and is located at (58°N, 16°E). Sydney, in Australia, is located at (33°S, 151°E).

3

Robert lives in Sydney and needs to give an online presentation to his colleagues in City A starting at 5:00 pm Thursday, local time in Sweden.

What time and day, in Sydney, should Robert start his presentation?

It is given that  $15^\circ = 1$  hour time difference. Ignore daylight saving.

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**Question 21** (3 marks)

Julie invests \$12 500 in a savings account. Interest is paid at a fixed monthly rate. At the end of each month, after the monthly interest is added, Julie makes a deposit of \$500.

3

Julie has created a spreadsheet to show the activity in her savings account. The details for the first 6 months are shown.

| <i>Month</i> | <i>Amount in account at beginning of month</i> | <i>Monthly interest</i> | <i>Deposit</i> | <i>Amount in account at end of month</i> |
|--------------|------------------------------------------------|-------------------------|----------------|------------------------------------------|
| 1            | 12 500.00                                      | 18.75                   | 500            | 13 018.75                                |
| 2            | 13 018.75                                      | 19.53                   | 500            | 13 538.28                                |
| 3            | 13 538.28                                      | 20.31                   | 500            | 14 058.59                                |
| 4            | 14 058.59                                      | 21.09                   | 500            | 14 579.68                                |
| 5            | 14 579.68                                      | 21.87                   | 500            | 15 101.55                                |
| 6            | 15 101.55                                      | 22.65                   | 500            | 15 624.20                                |
| 7            |                                                |                         | 500            |                                          |

By finding the monthly rate of interest, complete the final row above for the 7th month.

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**Question 22** (3 marks)

The table shows the income tax rates for the 2020–2021 financial year.

3

| <i>Taxable income</i> | <i>Tax payable on this income</i>                  |
|-----------------------|----------------------------------------------------|
| 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 |

William has a gross annual salary of \$84 000. He has allowable tax deductions of \$900 for home-office equipment and \$474 for union fees. William must also pay a Medicare Levy of 2% of his taxable income.

Calculate the total tax payable by William including the Medicare Levy.

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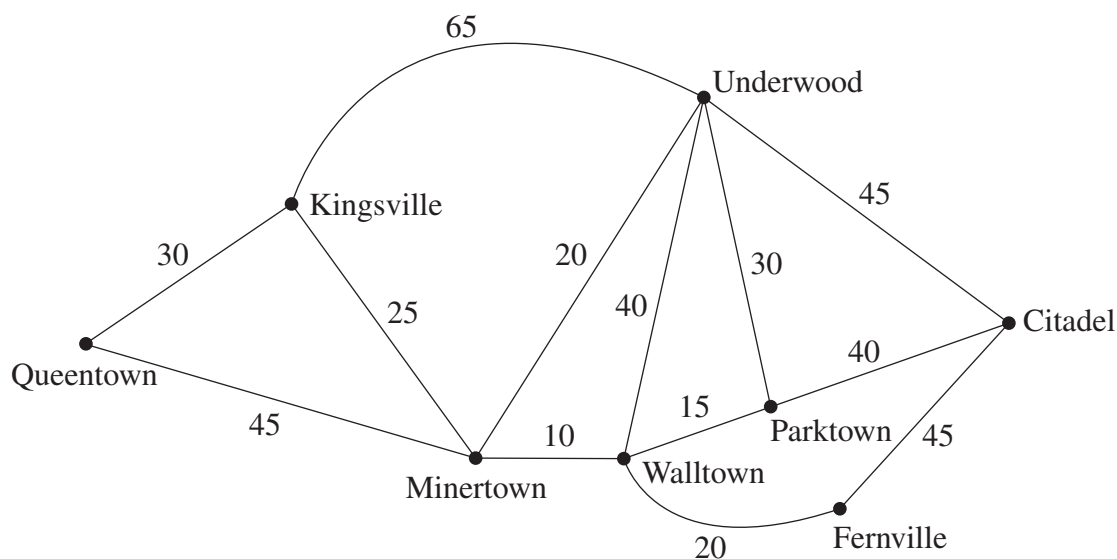
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**Question 23** (4 marks)

The network diagram shows the travel times in minutes along roads connecting a number of different towns.



- (a) Draw a minimum spanning tree for this network and determine its length.

**3**

Length of minimum spanning tree = .....

- (b) How long does it take to travel from Queentown to Underwood using the fastest route?

**1**

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**Question 24** (4 marks)

A population,  $P$ , is to be modelled using the function  $P = 2000(1.2)^t$ , where  $t$  is the time in years.

- (a) What is the initial population?

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- (b) Find the population after 5 years.

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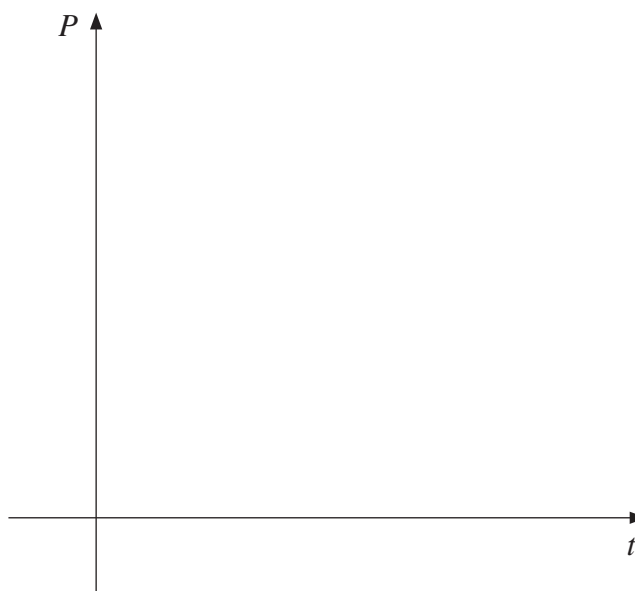
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- (c) On the axes below, draw the graph of the population against time, showing the points at  $t = 0$  and at  $t = 5$ .

2

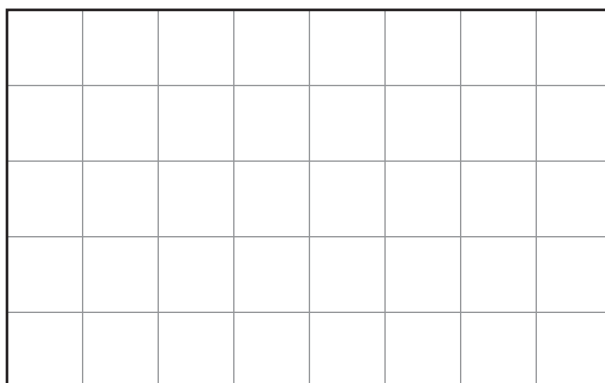


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**Question 25** (4 marks)

A rectangular sportsground has been drawn to scale on a 1-cm grid as shown. The scale used is 1 : 3000.

4



Kerry took 12 minutes to walk around the perimeter of this sportsground.

What was Kerry's average speed in kilometres per hour?

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**Question 26** (4 marks)

Nina plans to invest \$35 000 for 1 year. She is offered two different investment options.

Option A: Interest is paid at 6% per annum compounded monthly.

Option B: Interest is paid at  $r\%$  per annum simple interest.

- (a) Calculate the future value of Nina's investment after 1 year if she chooses Option A. 2

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- (b) Find the value of  $r$  in Option B that would give Nina the same future value after 1 year as for Option A. Give your answer correct to two decimal places. 2

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**Question 27** (4 marks)

The price and the power consumption of two different brands of television are shown.

| <i>Television A</i> | <i>Television B</i> |
|---------------------|---------------------|
| Price: \$900        | Price: \$921.90     |
| Power: 176 W        | Power: 160 W        |

The average cost for electricity is 25c/kWh. A particular family watches an average of 3 hours of television per day.

- (a) The annual cost of electricity for Television A for this family is \$48.18. 2

For this family, what is the difference in the annual cost of electricity between Television A and Television B?

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- (b) For this family, how many years will it take for the total cost of buying and using Television A to be equal to the total cost of buying and using Television B? 2

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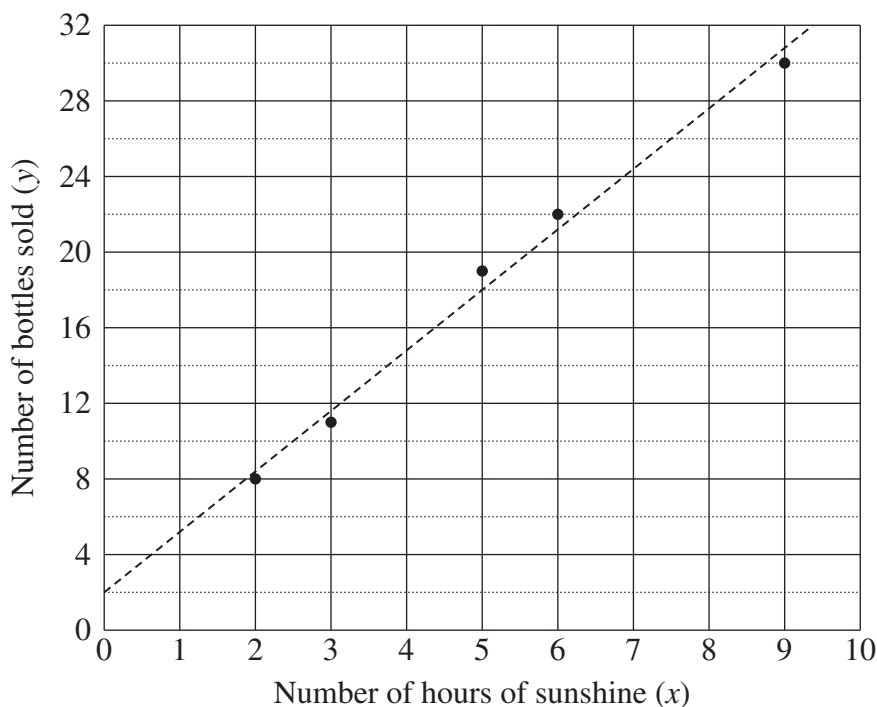
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**Question 28** (3 marks)

A salesperson is interested in the relationship between the number of bottles of lemonade sold per day and the number of hours of sunshine in the day.

The diagram shows the dataset used in the investigation and the least-squares regression line.



- (a) Find the equation of the least-squares regression line relating to the dataset.

2

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- (b) Suppose a sixth data point was collected on a day which had 10 hours of sunshine. On that day 45 bottles of lemonade were sold.

1

What would happen to the gradient found in part (a)?

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**Question 29** (2 marks)

Solve  $x + \frac{x-1}{2} = 9$ .

**2**

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**Question 30** (2 marks)

Ariana owns 1500 shares in a company. The market price for each share is \$27.  
Ariana's total dividend from these shares is \$810.

**2**

Calculate the dividend yield for her shares.

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|----------------------------------------------------|
| <b>Questions 16–30 are worth 44 marks in total</b> |
|----------------------------------------------------|

**Question 31** (2 marks)

Present value interest factors for an annuity of \$1 for various interest rates ( $r$ ) and numbers of periods ( $N$ ) are given in the table.

2

**Table of present value interest factors**

| $N \backslash r$ | <i>Interest rate per period as a decimal</i> |           |           |           |
|------------------|----------------------------------------------|-----------|-----------|-----------|
|                  | 0.001                                        | 0.00125   | 0.0015    | 0.00175   |
| 300              | 259.07072                                    | 250.03980 | 241.43789 | 233.24180 |
| 330              | 280.95771                                    | 270.26900 | 260.13532 | 250.52386 |
| 360              | 302.19816                                    | 289.75411 | 278.01062 | 266.92278 |

A bank lends Martina \$500 000 to purchase a home, with interest charged at 1.5% per annum compounding monthly. She agrees to repay the loan by making equal monthly repayments over a 30-year period.

How much should the monthly payment be in order to pay off the loan in 30 years? Give your answer correct to the nearest cent.

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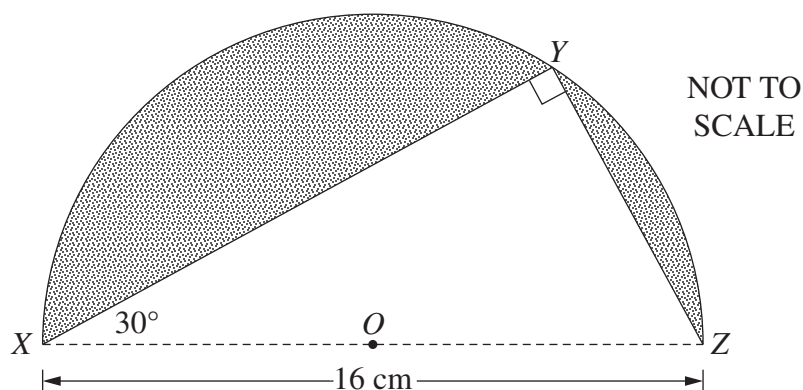
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**Question 32** (5 marks)

A right-angled triangle  $XYZ$  is cut out from a semicircle with centre  $O$ . The length of the diameter  $XZ$  is 16 cm and  $\angle YXZ = 30^\circ$ , as shown on the diagram.



- (a) Find the length of  $XY$  in centimetres, correct to two decimal places.

2

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- (b) Hence, find the area of the shaded region in square centimetres, correct to one decimal place.

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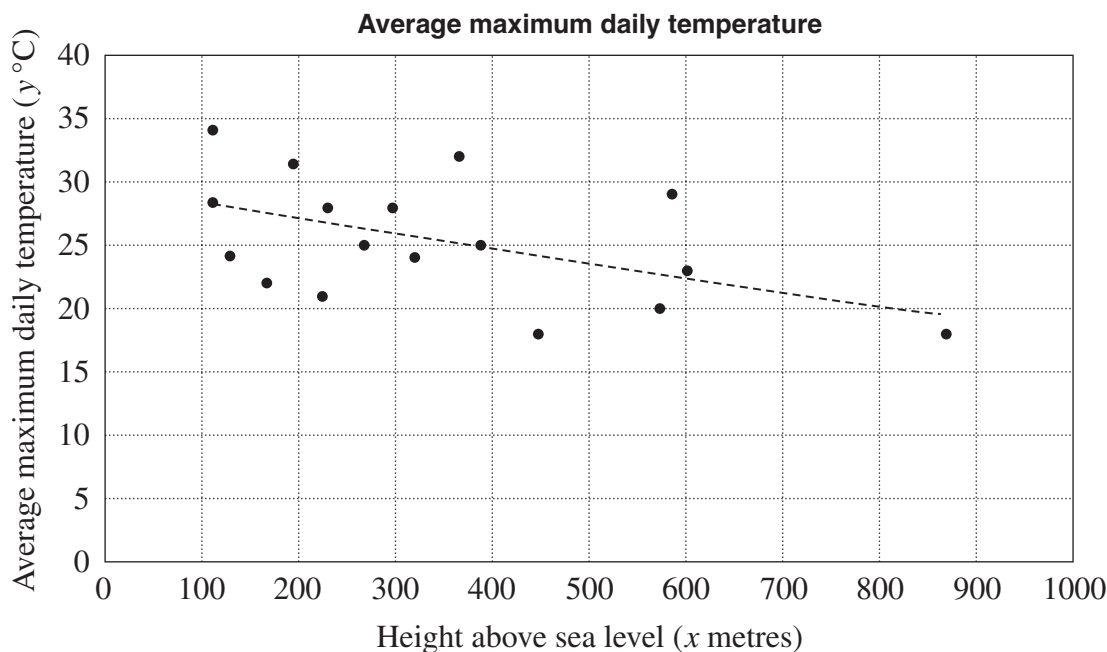
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**Question 33** (4 marks)

For a sample of 17 inland towns in Australia, the height above sea level,  $x$  (metres), and the average maximum daily temperature,  $y$  ( $^{\circ}\text{C}$ ), were recorded.

The graph shows the data as well as a regression line.



The equation of the regression line is  $y = 29.2 - 0.011x$ .

The correlation coefficient is  $r = -0.494$ .

- (a) (i) By using the equation of the regression line, predict the average maximum daily temperature, in degrees Celsius, for a town that is 540 m above sea level. Give your answer correct to one decimal place.

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- (ii) The gradient of the regression line is  $-0.011$ . Interpret the value of this gradient in the given context.

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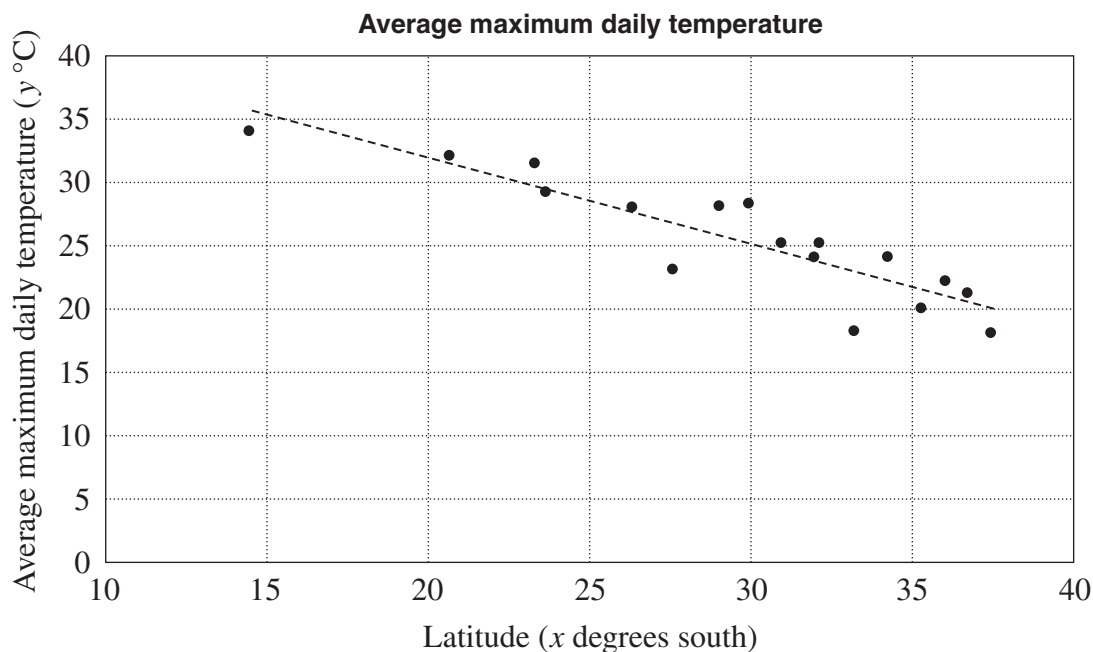
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**Question 33 continues on page 29**

Question 33 (continued)

- (b) The graph below shows the relationship between the latitude,  $x$  (degrees south), and the average maximum daily temperature,  $y$  ( $^{\circ}\text{C}$ ), for the same 17 towns, as well as a regression line.

1



The equation of the regression line is  $y = 45.6 - 0.683x$ .

The correlation coefficient is  $r = -0.897$ .

Another inland town in Australia is 540 m above sea level. Its latitude is 28 degrees south.

Which measurement, height above sea level or latitude, would be better to use to predict this town's average maximum daily temperature? Give a reason for your answer.

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**End of Question 33**

**Proceed to Booklet 2 for Questions 34–41**

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**Section II extra writing space**

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Centre Number

## Mathematics Standard 2

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Student Number

## Section II Answer Booklet 2

### Booklet 2 — Attempt Questions 34–41 (30 marks)

#### 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 on page 44. If you use this space, clearly indicate which question you are answering.

Please turn over

**Question 34** (4 marks)

In a park the only animals are goannas and emus. Let  $x$  be the number of goannas and let  $y$  be the number of emus.

4

The number of goannas plus the number of emus in the park is 31. Hence  $x + y = 31$ .

Each goanna has four legs and each emu has two legs. In total the emus and goannas have 76 legs.

By writing another relevant equation and graphing both equations on the grid on the following page, find the number of goannas and the number of emus in the park.

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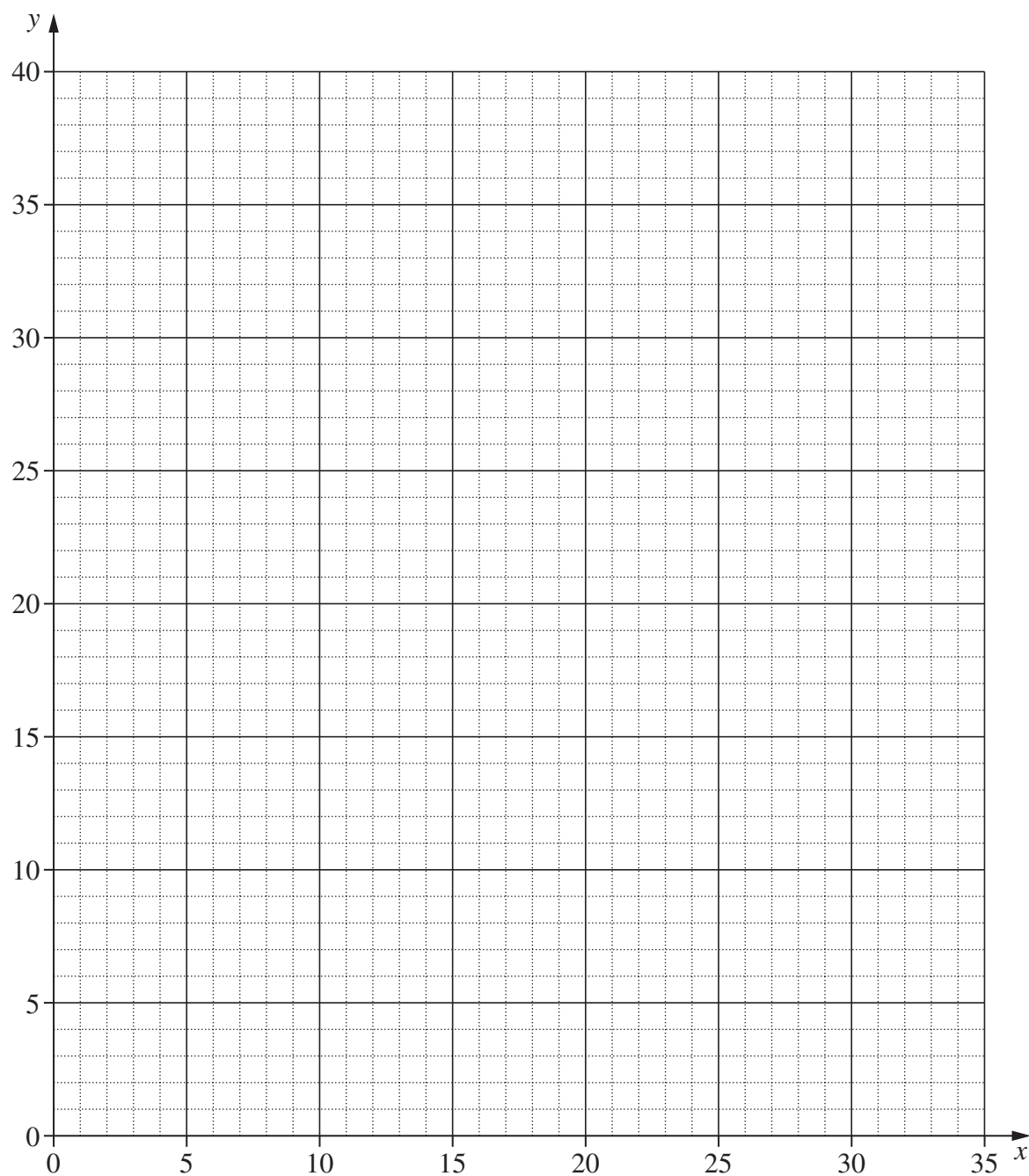
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**Question 34 continues on page 35**

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Question 34 (continued)



Number of goannas = .....

Number of emus = .....

**End of Question 34**

**Question 35** (3 marks)

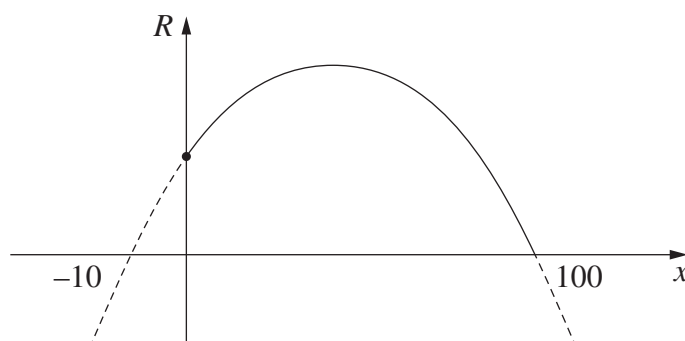
A publisher sells a book for \$10. At this price, 5000 copies of the book will be sold and the revenue raised will be  $5000 \times 10 = \$50\,000$ .

The publisher is considering increasing the price of the book. For every dollar the price of the book is increased, the publisher will sell 50 fewer copies of the book.

If the publisher charges  $(10 + x)$  dollars for each book, a quadratic model for the revenue raised,  $R$ , from selling the books is

$$R = -50x^2 + 4500x + 50\,000.$$

A graph of this quadratic model for revenue is shown. A dashed line is used for values of  $x$  which are not relevant to the practical context of this problem.



- (a) By first finding a suitable value of  $x$ , find the price the publisher should charge for each book to maximise the revenue raised from sales of the book.

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- (b) Find the value of the intercept of the parabola with the vertical axis.

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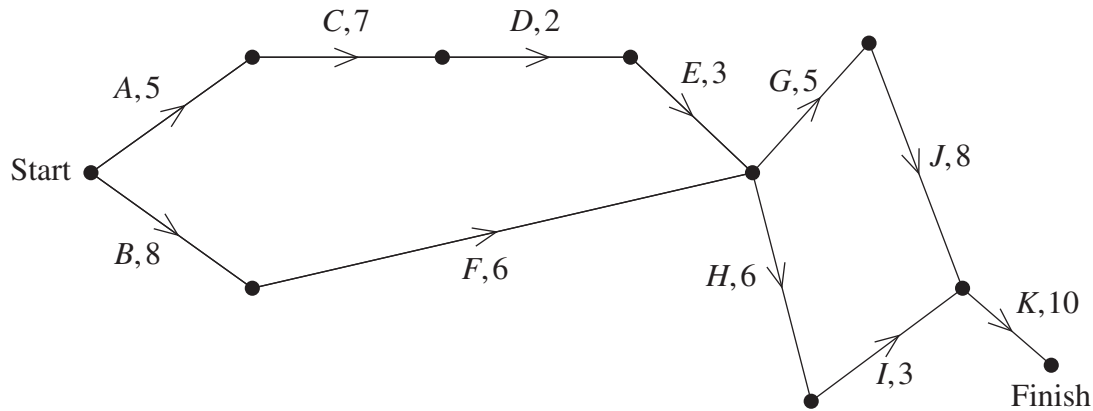
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**Question 36** (4 marks)

A project requires completion of 11 tasks  $A, B, C, \dots, K$ .

A network diagram for the project giving the completion time for each task, in minutes, is shown.



- (a) Find the minimum time to complete the project.

1

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- (b) State the critical path for this project.

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- (c) A new task,  $X$ , is to be added to the project. The earliest starting time for  $X$  is 17 minutes, the latest starting time for  $X$  is 18 minutes and  $X$  has a completion time of 12 minutes.

2

Add task  $X$  to the given network diagram above AND state the float time for this task.

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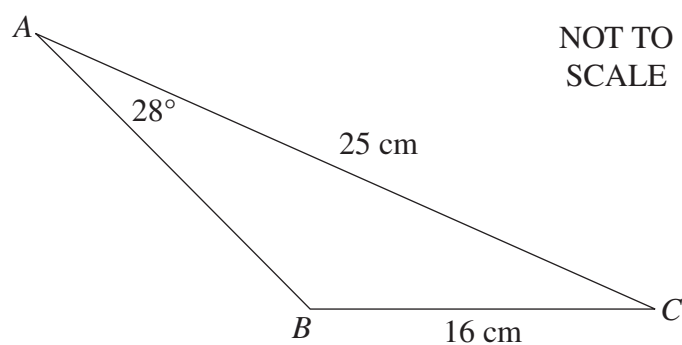
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**Question 37** (3 marks)

The diagram shows a triangle  $ABC$  where  $AC = 25$  cm,  $BC = 16$  cm,  $\angle BAC = 28^\circ$  and angle  $ABC$  is obtuse.

3



Find the size of the obtuse angle  $ABC$  correct to the nearest degree.

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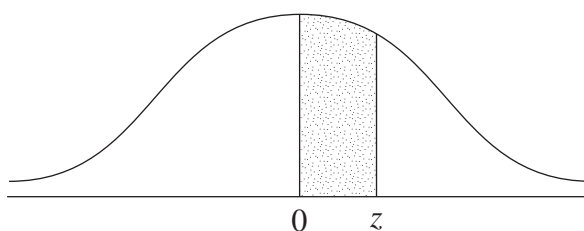
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**Question 38** (4 marks)

A random variable is normally distributed with mean 0 and standard deviation 1. The table gives the probability that this random variable lies between 0 and  $z$  for different values of  $z$ .

| $z$         | 0.1    | 0.2    | 0.3    | 0.4    | 0.5    | 0.6    |
|-------------|--------|--------|--------|--------|--------|--------|
| Probability | 0.0398 | 0.0793 | 0.1179 | 0.1554 | 0.1915 | 0.2257 |

The probability values given in the table for different values of  $z$  are represented by the shaded area in the following diagram.



- (a) Using the table, show that the probability that a value from a random variable that is normally distributed with mean 0 and standard deviation 1 is greater than 0.3 is equal to 0.3821. 1

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- (b) Birth weights are normally distributed with a mean of 3300 grams and a standard deviation of 570 grams. By first calculating a  $z$ -score, find how many babies, out of 1000 born, are expected to have a birth weight greater than 3471 grams. 3

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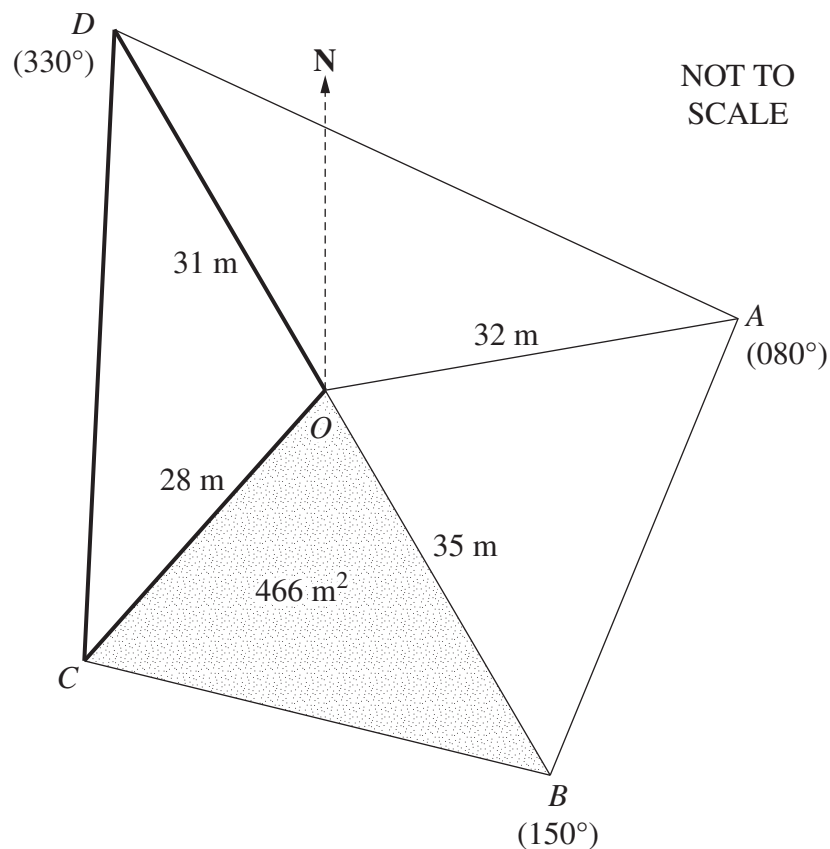
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**Question 39** (5 marks)

The diagram shows a compass radial survey of the field  $ABCD$ .



- (a) Triangle  $COB$  has an area of  $466 \text{ m}^2$ .

2

Find the size of acute angle  $COB$ , correct to the nearest degree.

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**Question 39 continues on page 41**

Question 39 (continued)

- (b) A farmer wants to put a fence around the triangle *DOC*.

3

Find the length of fencing required. Give your answer in metres correct to one decimal place.

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**End of Question 39**

**Question 40** (3 marks)

A table of future value interest factors for an annuity of \$1 is shown.

3

**Table of future value interest factors**

| <i>Number<br/>of<br/>periods</i> | <i>Interest rate per period</i> |         |         |         |         |
|----------------------------------|---------------------------------|---------|---------|---------|---------|
|                                  | 0.25%                           | 0.5%    | 0.75%   | 1%      | 1.25%   |
| 2                                | 2.0025                          | 2.0050  | 2.0075  | 2.0100  | 2.0125  |
| 4                                | 4.0150                          | 4.0301  | 4.0452  | 4.0604  | 4.0756  |
| 6                                | 6.0376                          | 6.0755  | 6.1136  | 6.1520  | 6.1907  |
| 8                                | 8.0704                          | 8.1414  | 8.2132  | 8.2857  | 8.3589  |
| 10                               | 10.1133                         | 10.2280 | 10.3443 | 10.4622 | 10.5817 |

Simone deposits \$1000 into a savings account at the end of each year for 8 years. The interest rate for these 8 years is 0.75% per annum, compounded annually.

After the 8th deposit, Simone stops making deposits but leaves the money in the savings account. The money in her savings account then earns interest at 1.25% per annum, compounded annually, for a further two years.

Find the amount of money in Simone's savings account at the end of ten years.

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**Question 41** (4 marks)

In a particular city, the heights of adult females and the heights of adult males are each normally distributed.

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Information relating to two females from that city is given in Table 1.

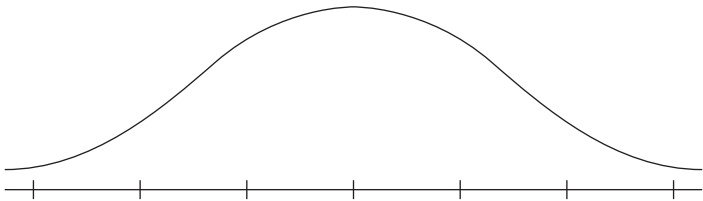
|         |               |               |                                                                    |
|---------|---------------|---------------|--------------------------------------------------------------------|
| Table 1 | <i>Height</i> | <i>Gender</i> | <i>Percentage of females in this city shorter than this person</i> |
|         | 175 cm        | Female        | 97.5%                                                              |
|         | 160.6 cm      | Female        | 16%                                                                |

The means and standard deviations of adult females and males, in centimetres, are given in Table 2.

|         |         |             |                           |
|---------|---------|-------------|---------------------------|
| Table 2 |         | <i>Mean</i> | <i>Standard deviation</i> |
|         | Females | $\mu$       | $\sigma$                  |
|         | Males   | $1.05\mu$   | $1.1\sigma$               |

A selected male is taller than 84% of the population of adult males in this city.

By first labelling the normal distribution curve below with the heights of the two females given in Table 1, calculate the height of the selected male, in centimetres, correct to two decimal places.



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**End of paper**

**Section II extra writing space**

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

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# Mathematics Standard 1

# Mathematics Standard 2

## REFERENCE SHEET

### Measurement

#### Limits of accuracy

$$\text{Absolute error} = \frac{1}{2} \times \text{precision}$$

$$\text{Upper bound} = \text{measurement} + \text{absolute error}$$

$$\text{Lower bound} = \text{measurement} - \text{absolute error}$$

#### 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

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

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

#### 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

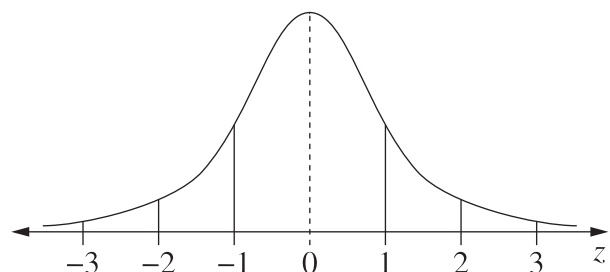
$$\text{less than } Q_1 - 1.5 \times IQR$$

or

$$\text{more than } Q_3 + 1.5 \times IQR$$

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

#### 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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# 2021 HSC Mathematics Standard 2 Marking Guidelines

## Section I

### Multiple-choice Answer Key

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

## Section II

### Question 16

| Criteria                                                         | Marks |
|------------------------------------------------------------------|-------|
| • Provides correct solution                                      | 2     |
| • Attempts to use $V = \frac{4}{3}\pi r^3$ , or equivalent merit | 1     |

**Sample answer:**

$$\begin{aligned}
 V &= \frac{1}{2} \times \frac{4}{3} \times \pi \times 2^3 \\
 &= 16.8 \text{ m}^3 \text{ (one decimal place)}
 \end{aligned}$$

### Question 17

| Criteria                                                                   | Marks |
|----------------------------------------------------------------------------|-------|
| • Provides correct solution                                                | 2     |
| • Attempts to use $Q_3 + 1.5 \times IQR$ or calculates interquartile range | 1     |

**Sample answer:**

$$\begin{aligned}
 \text{Interquartile range (IQR)} &= Q_3 - Q_1 \\
 &= 10 - 4 \\
 &= 6
 \end{aligned}$$

$$\begin{aligned}
 Q_3 + 1.5 \times IQR &= 10 + 1.5 \times 6 \\
 &= 19
 \end{aligned}$$

20 is an outlier as  $20 > 19$ .

## Question 18

| Criteria                                                  | Marks |
|-----------------------------------------------------------|-------|
| • Provides correct solution                               | 2     |
| • Calculates the amount of fuel used, or equivalent merit | 1     |

**Sample answer:**

$$\begin{aligned}\text{Fuel cost} &= \frac{1560}{100} \times 6.7 \times 1.45 \\ &= \$151.55\end{aligned}$$

## Question 19

| Criteria                                                       | Marks |
|----------------------------------------------------------------|-------|
| • Provides correct solution                                    | 2     |
| • Correct substitution into $S = V_0 - Dn$ or equivalent merit | 1     |

**Sample answer:**

$$7500 = V_0 - 5 \times 2300$$

$$\begin{aligned}\therefore \text{Initial value} &= 7500 + 5 \times 2300 \\ &= \$19\,000\end{aligned}$$

## Question 20

| Criteria                                               | Marks |
|--------------------------------------------------------|-------|
| • Provides correct solution                            | 3     |
| • Calculates time difference, or equivalent merit      | 2     |
| • Calculates longitude difference, or equivalent merit | 1     |

**Sample answer:**

Both cities have longitude to the East.

$$\begin{aligned}\text{Longitude difference} &= 151^\circ - 16^\circ \\ &= 135^\circ\end{aligned}$$

$$\begin{aligned}\text{Time difference} &= 135 \div 15 \\ &= 9 \text{ hours}\end{aligned}$$

Sydney is 9 hours ahead of City A.

$\therefore$  Time in Sydney is 2 am Friday.

## Question 21

| Criteria                                                       | Marks |
|----------------------------------------------------------------|-------|
| • Provides correct solution                                    | 3     |
| • Calculates interest correctly, or equivalent merit           | 2     |
| • Calculates the monthly rate of interest, or equivalent merit | 1     |

**Sample answer:**

$$\begin{aligned}\text{Monthly rate of interest} &= \frac{18.75}{12\,500} \times 100\% \\ &= 0.15\%\end{aligned}$$

$$\text{Interest} = 15\,624.20 \times 0.0015 = \$23.44$$

Final row is

|   |           |       |     |           |
|---|-----------|-------|-----|-----------|
| 7 | 15 624.20 | 23.44 | 500 | 16 147.64 |
|---|-----------|-------|-----|-----------|

## Question 22

| Criteria                                             | Marks |
|------------------------------------------------------|-------|
| • Provides correct solution                          | 3     |
| • Calculates income tax payable, or equivalent merit | 2     |
| • Calculates taxable income, or equivalent merit     | 1     |

**Sample answer:**

$$\begin{aligned}\text{Taxable income} &= 84\,000 - 900 - 474 \\ &= \$82\,626\end{aligned}$$

$$\begin{aligned}\text{Income tax payable} &= 5092 + 0.325 \times (82\,626 - 45\,000) \\ &= \$17\,320.45\end{aligned}$$

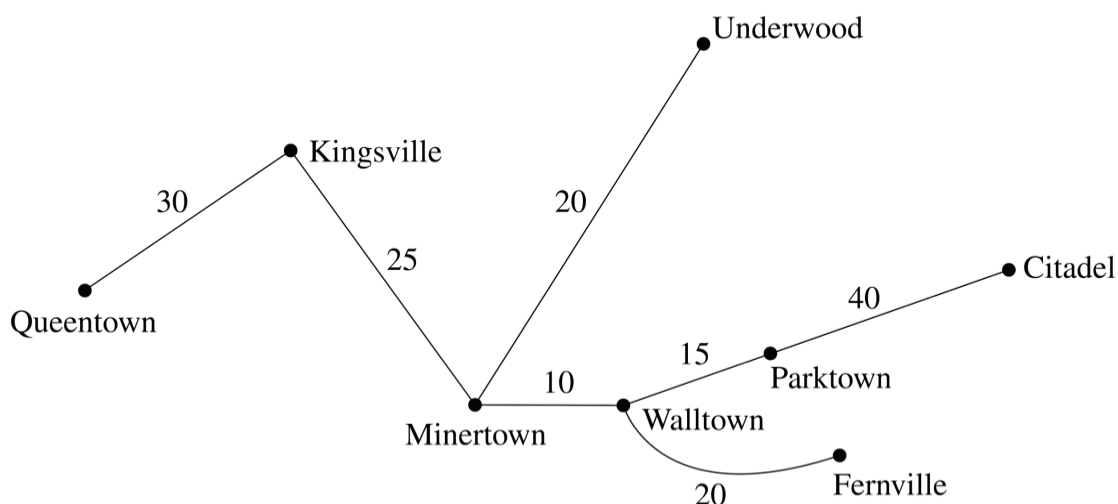
$$\begin{aligned}\text{Medicare levy} &= 0.02 \times 82\,626 \\ &= \$1652.52\end{aligned}$$

$$\begin{aligned}\text{Total to be paid} &= \$17\,320.45 + \$1652.52 \\ &= \$18\,972.97\end{aligned}$$

### Question 23 (a)

| Criteria                                                                                                                              | Marks |
|---------------------------------------------------------------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                                                                           | 3     |
| • Provides a minimum spanning tree or provides a spanning tree (not minimum) and correctly determines its length, or equivalent merit | 2     |
| • Provides a spanning tree (not minimum), or equivalent merit                                                                         | 1     |

**Sample answer:**



Length of minimum spanning tree = 160 minutes

### Question 23 (b)

| Criteria                  | Marks |
|---------------------------|-------|
| • Provides correct answer | 1     |

**Sample answer:**

$$\begin{aligned}
 \text{Time} &= 45 + 20 \\
 &= 65 \text{ minutes}
 \end{aligned}$$

### Question 24 (a)

| Criteria                                                                  | Marks |
|---------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides correct answer</li> </ul> | 1     |

**Sample answer:**

When  $t = 0$

$$\begin{aligned} P &= 2000(1.2)^0 \\ &= 2000 \end{aligned}$$

### Question 24 (b)

| Criteria                                                                  | Marks |
|---------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides correct answer</li> </ul> | 1     |

**Sample answer:**

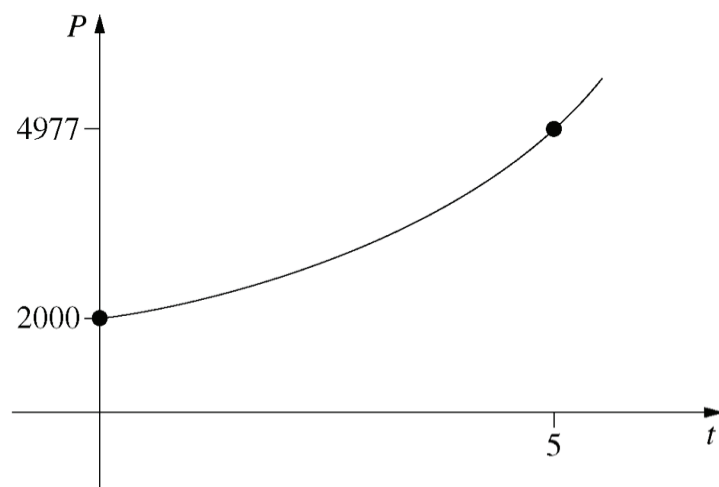
When  $t = 5$

$$\begin{aligned} P &= 2000(1.2)^5 \\ &= 4977 \text{ (nearest integer)} \end{aligned}$$

### Question 24 (c)

| Criteria                                                                                                                 | Marks |
|--------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides correct graph</li> </ul>                                                 | 2     |
| <ul style="list-style-type: none"> <li>Draws an exponential function with positive slope, or equivalent merit</li> </ul> | 1     |

**Sample answer:**



## Question 25

| Criteria                                                                                              | Marks |
|-------------------------------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                                           | 4     |
| • Finds the distance Kerry walked and a correct expression for speed not in km/h, or equivalent merit | 3     |
| • Finds the distance Kerry walked, or equivalent merit                                                | 2     |
| • Calculates the perimeter as 26 (cm), or equivalent merit                                            | 1     |

### **Sample answer:**

$$\begin{aligned}\text{Perimeter of diagram} &= 2 \times (8 + 5) \\ &= 26 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Actual perimeter} &= 26 \times 3000 \text{ cm} \\ &= 78\,000 \text{ cm} \\ &= 780 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{Speed} &= \frac{780}{12} = 65 \text{ m/minute} \\ &= \frac{65 \times 60}{1000} \text{ km/hour} \\ &= 3.9 \text{ km/hour}\end{aligned}$$

### Question 26 (a)

| Criteria                                                                                                                 | Marks |
|--------------------------------------------------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                                                              | 2     |
| • Attempts to use compound interest formula with correct interest rate or correct number of periods, or equivalent merit | 1     |

**Sample answer:**

$$6\% \div 12 = 0.5\% \text{ per month}$$

$$\begin{aligned} \text{Future value of Option A} &= 35\,000(1 + 0.005)^{12} \\ &= \$37\,158.72 \end{aligned}$$

### Question 26 (b)

| Criteria                                                                     | Marks |
|------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                  | 2     |
| • Correct substitution into the simple interest formula, or equivalent merit | 1     |

**Sample answer:**

$$\begin{aligned} \text{Interest in Option A} &= \$37\,158.72 - \$35\,000 \\ &= \$2158.72 \end{aligned}$$

$$2158.72 = 35\,000 \times \frac{r}{100} \times 1$$

$$r = 6.17 \text{ (two decimal places)}$$

### Question 27 (a)

| Criteria                                                                          | Marks |
|-----------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                       | 2     |
| • Finds the power usage for Television <i>B</i> for one year, or equivalent merit | 1     |

**Sample answer:**

$$160 \times 3 \times 365 \div 1000 = 175.2 \text{ kW}$$

$$175.2 \text{ kW} \times 0.25 = \$43.80$$

$$\begin{aligned} \text{Saving in electricity} &= 48.18 - 43.80 \\ &= \$4.38 \end{aligned}$$

### Question 27 (b)

| Criteria                                  | Marks |
|-------------------------------------------|-------|
| • Provides correct solution               | 2     |
| • Calculates \$21.90, or equivalent merit | 1     |

**Sample answer:**

$$\begin{aligned} \text{Saving if Television A is purchased} \\ &= 921.90 - 900 \\ &= \$21.90 \end{aligned}$$

$$\begin{aligned} \text{Number of years} &= 21.90 \div 4.38 \\ &= 5 \text{ years} \end{aligned}$$

### Question 28 (a)

| Criteria                                                                     | Marks |
|------------------------------------------------------------------------------|-------|
| • Provides correct answer                                                    | 2     |
| • Finds the intercept or finds the gradient or writes down a linear equation | 1     |

**Sample answer:**

Using the graph, the least-squares regression line has gradient  $= \frac{18 - 2}{5 - 0}$   
 $= 3.2$

The equation of the least-squares regression line is  $y = 2 + 3.2x$ .

### Question 28 (b)

| Criteria                  | Marks |
|---------------------------|-------|
| • Provides correct answer | 1     |

**Sample answer:**

It would increase.

### Question 29

| Criteria                                                          | Marks |
|-------------------------------------------------------------------|-------|
| • Provides correct solution                                       | 2     |
| • Writes fraction using a common denominator, or equivalent merit | 1     |

**Sample answer:**

$$x + \frac{x-1}{2} = 9$$

$$2x + x - 1 = 18$$

$$3x = 19$$

$$x = \frac{19}{3}$$

### Question 30

| Criteria                                                                                     | Marks |
|----------------------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                                  | 2     |
| • Calculates total value of shares or calculates the dividend per share, or equivalent merit | 1     |

**Sample answer:**

$$\text{Dividend for 1 share: } \frac{810}{1500} = \$0.54$$

$$\begin{aligned} \therefore \text{Dividend yield} &= \frac{0.54}{27} \times 100\% \\ &= 2\% \end{aligned}$$

### Question 31

| Criteria                                                                               | Marks |
|----------------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                            | 2     |
| • Identifies the correct present value interest factor or divides 500 000 by any value | 1     |

**Sample answer:**

$$\begin{aligned} \text{Monthly rate of interest} &= \frac{0.015}{12} \\ &= 0.00125 \end{aligned}$$

$$\begin{aligned} \text{Monthly payment} &= \frac{500\,000}{289.75411} \\ &= \$1725.60 \text{ (nearest cent)} \end{aligned}$$

### Question 32 (a)

| Criteria                                                | Marks |
|---------------------------------------------------------|-------|
| • Provides correct solution                             | 2     |
| • Uses correct trigonometric ratio, or equivalent merit | 1     |

**Sample answer:**

In  $\triangle XYZ$

$$\cos 30^\circ = \frac{XY}{16}$$

$$XY = 13.86 \text{ cm (two decimal places)}$$

### Question 32 (b)

| Criteria                                                                        | Marks |
|---------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                     | 3     |
| • Calculates the area of $\triangle XYZ$ and the semicircle or equivalent merit | 2     |
| • Calculates the area of a semicircle, or equivalent merit                      | 1     |

**Sample answer:**

$$\text{Shaded area} = \frac{1}{2}\pi(8)^2 - \frac{1}{2} \times 13.86 \times 16 \times \sin 30^\circ$$

$$= 45.1 \text{ cm}^2 \text{ (one decimal place)}$$

### Question 33 (a) (i)

| Criteria                                                                  | Marks |
|---------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides correct answer</li> </ul> | 1     |

**Sample answer:**

$$\begin{aligned}
 y &= 29.2 - 0.011 \times 540 \\
 &= 23.3^{\circ}\text{C}
 \end{aligned}$$

### Question 33 (a) (ii)

| Criteria                                                                                                                                                   | Marks |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides correct solution</li> </ul>                                                                                | 2     |
| <ul style="list-style-type: none"> <li>Provides a correct relevant statement relating temperature to height above sea level or equivalent merit</li> </ul> | 1     |

**Sample answer:**

For a one metre increase in the height above sea level, we expect a  $0.011^{\circ}\text{C}$  drop in average maximum daily temperature.

### Question 33 (b)

| Criteria                                                                    | Marks |
|-----------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides correct solution</li> </ul> | 1     |

**Sample answer:**

It would be better to use the latitude. From the information given, the average maximum daily temperature has a stronger correlation with latitude than with height above sea level.

## Question 34

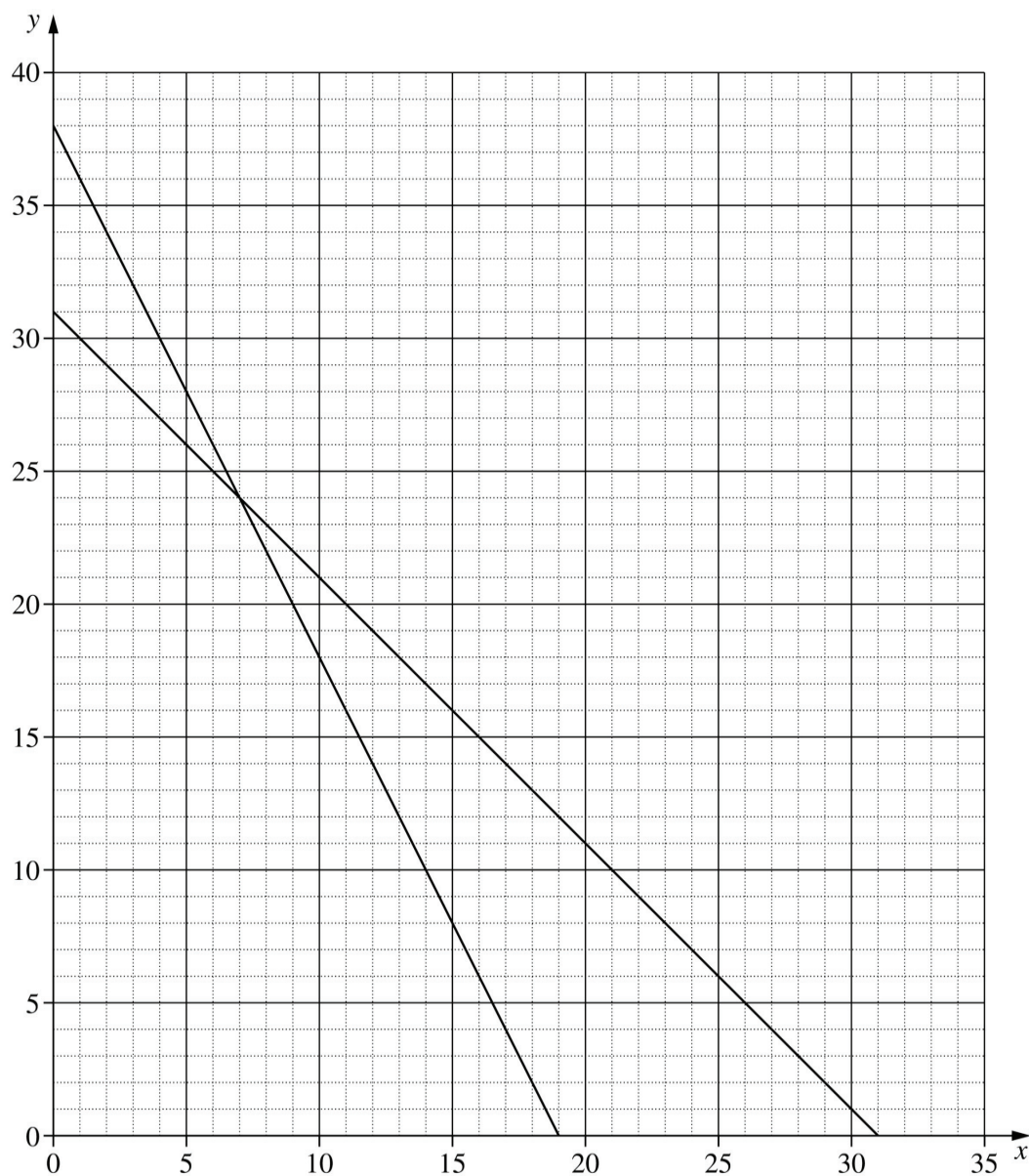
| Criteria                                                                                             | Marks |
|------------------------------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                                          | 4     |
| • States the other relevant correct equation and graphs two equations correctly, or equivalent merit | 3     |
| • States the other relevant correct equation and graphs one equation correctly, or equivalent merit  | 2     |
| • States the other relevant correct equation, or equivalent merit                                    | 1     |

**Sample answer:**

$$4x + 2y = 76$$

$$\therefore 2x + y = 38$$

$\therefore$  7 goannas and 24 emus



### Question 35 (a)

| Criteria                               | Marks |
|----------------------------------------|-------|
| • Provides correct solution            | 2     |
| • Finds $x = 45$ , or equivalent merit | 1     |

**Sample answer:**

By symmetry, to maximise revenue, choose  $x = 45$ .

$$45 + 10 = 55$$

Then, price is \$55 in order to maximise the revenue.

### Question 35 (b)

| Criteria                  | Marks |
|---------------------------|-------|
| • Provides correct answer | 1     |

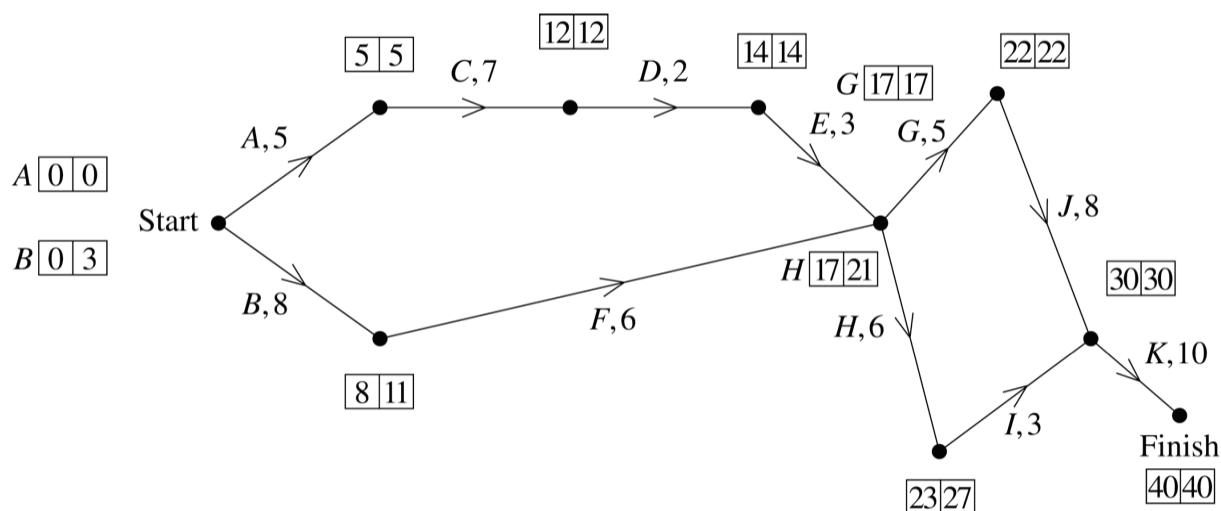
**Sample answer:**

Intercept is 50 000.

### Question 36 (a)

| Criteria                  | Marks |
|---------------------------|-------|
| • Provides correct answer | 1     |

**Sample answer:**



40 minutes

### Question 36 (b)

| Criteria                  | Marks |
|---------------------------|-------|
| • Provides correct answer | 1     |

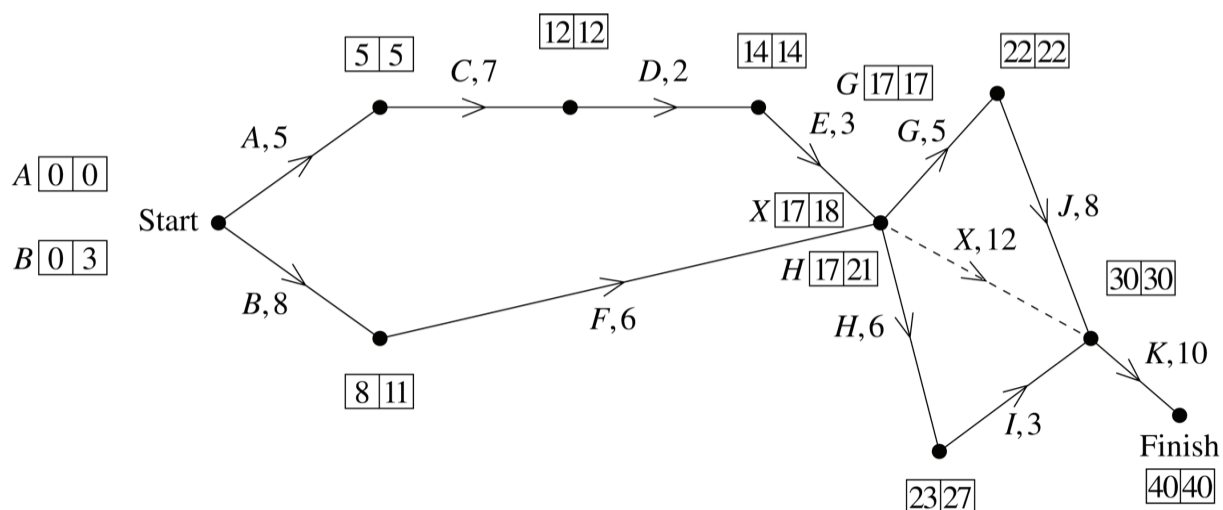
**Sample answer:**

$A - C - D - E - G - J - K$

### Question 36 (c)

| Criteria                                                   | Marks |
|------------------------------------------------------------|-------|
| • Provides correct solution                                | 2     |
| • States the float time or adds $X$ to the network diagram | 1     |

**Sample answer:**



Task  $X$  is labelled on the diagram as above.

Float time for task  $X$  is 1 minute.

### Question 37

| Criteria                                                        | Marks |
|-----------------------------------------------------------------|-------|
| • Provides correct solution                                     | 3     |
| • Calculates $47.18^\circ$ , or equivalent merit                | 2     |
| • Substitutes into the sine rule correctly, or equivalent merit | 1     |

**Sample answer:**

$$\frac{\sin \hat{A}BC}{25} = \frac{\sin 28^\circ}{16}$$

$$\therefore \sin \hat{A}BC = 0.733\dots$$

$$\begin{aligned}\therefore \hat{A}BC &= 180^\circ - 47.18\dots^\circ \\ &= 133^\circ \text{ (nearest degree)}\end{aligned}$$

### Question 38 (a)

| Criteria                    | Marks |
|-----------------------------|-------|
| • Provides correct solution | 1     |

**Sample answer:**

$$\begin{aligned}\text{Probability} &= 0.5 - 0.1179 \\ &= 0.3821\end{aligned}$$

### Question 38 (b)

| Criteria                                                                  | Marks |
|---------------------------------------------------------------------------|-------|
| • Provides correct solution                                               | 3     |
| • Calculates z-score and uses associated probability, or equivalent merit | 2     |
| • Calculates z-score, or equivalent merit                                 | 1     |

**Sample answer:**

$$\begin{aligned}z &= \frac{3471 - 3300}{570} \\ &= 0.3\end{aligned}$$

From part (a),  $P(Z > 0.3) = 0.3821$

$\therefore$  Expect  $1000 \times 0.3821 = 382.1$  babies born to have a birth weight greater than 3471 grams.

### Question 39 (a)

| Criteria                                                                               | Marks |
|----------------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                            | 2     |
| • Substitutes correctly into $\text{Area} = \frac{1}{2}ab\sin C$ , or equivalent merit | 1     |

**Sample answer:**

$$466 = \frac{1}{2} \times 28 \times 35 \times \sin \hat{C}OB$$

$$\therefore \sin \hat{C}OB = 0.95102\dots$$

$$\therefore \hat{C}OB = 72^\circ \text{ (nearest degree)}$$

### Question 39 (b)

| Criteria                                         | Marks |
|--------------------------------------------------|-------|
| • Provides correct solution                      | 3     |
| • Finds the length of $CD$ , or equivalent merit | 2     |
| • Finds angle $DOC$ , or equivalent merit        | 1     |

**Sample answer:**

$$\begin{aligned} \hat{D}OC &= 330^\circ - 150^\circ - 72^\circ \\ &= 108^\circ \end{aligned}$$

$$\begin{aligned} CD^2 &= 31^2 + 28^2 - 2 \times 31 \times 28 \times \cos 108^\circ \\ &= 2281.45\dots \end{aligned}$$

$$\therefore CD = 47.76$$

$$\begin{aligned} \therefore \text{Fencing required} &= 31 + 28 + 47.76\dots \\ &= 106.8 \text{ m (one decimal place)} \end{aligned}$$

**Question 40**

| Criteria                                                                                                                 | Marks |
|--------------------------------------------------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                                                              | 3     |
| • Finds the correct future value of the annuity and attempts to apply the compound interest formula, or equivalent merit | 2     |
| • Identifies the correct interest factor from the table, or equivalent merit                                             | 1     |

**Sample answer:**

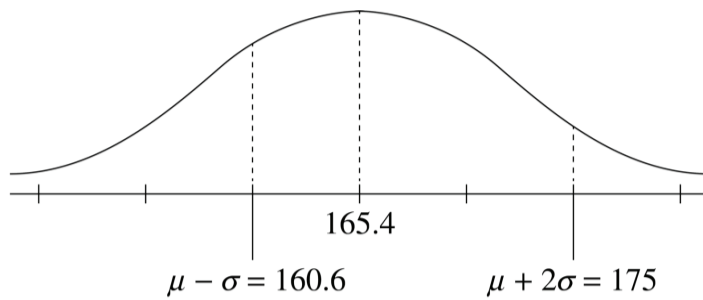
$$\begin{aligned}\text{Money in account after 8 years} &= 1000 \times 8.2132 \\ &= \$8213.20\end{aligned}$$

$$\begin{aligned}\text{Amount after 2 more years} &= 8213.20 (1.0125)^2 \\ &= \$8419.81\end{aligned}$$

## Question 41

| Criteria                                                                                    | Marks |
|---------------------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                                 | 4     |
| • Finds the mean and standard deviation for the heights of adult males, or equivalent merit | 3     |
| • Finds $\sigma$ , or equivalent merit                                                      | 2     |
| • Labels the diagram, or equivalent merit                                                   | 1     |

**Sample answer:**



$$\sigma = \frac{175 - 160.6}{3}$$

$$= 4.8$$

$$\mu = 160.6 + 4.8$$

$$= 165.4$$

Selected male is taller than 84% of population

$\therefore$  Selected male is 1 standard deviation above mean.

$$\text{Mean height for males} = 1.05 \times 165.4 = 173.67$$

$$\text{Standard deviation of height for males} = 4.8 \times 1.1 = 5.28$$

$$\therefore \text{Height} = 1.05\mu + 1.1\sigma$$

$$= 173.67 + 5.28$$

$$= 178.95 \text{ cm}$$

# 2021 HSC Mathematics Standard 2 Mapping Grid

## Section I

| Question | Marks | Content                                  | Syllabus outcomes |
|----------|-------|------------------------------------------|-------------------|
| 1        | 1     | MS-M1 Applications of Measurement        | MS11-4            |
| 2        | 1     | MS-N2 Network Concepts                   | MS2-12-8          |
| 3        | 1     | MS-S1 Data Analysis                      | MS11-7            |
| 4        | 1     | MS-F4 Investments and Loans              | MS2-12-5          |
| 5        | 1     | MS-F4 Investments and Loans              | MS2-12-5          |
| 6        | 1     | MS-A1 Formulae and Equations             | MS11-1            |
| 7        | 1     | MS-S1 Data Analysis                      | MS11-2            |
| 8        | 1     | MS-S5 The Normal Distribution            | MS2-12-7          |
| 9        | 1     | MS-A1 Formulae and Equations             | MS11-1            |
| 10       | 1     | MS-A4 Types of Relationships             | MS2-12-6          |
| 11       | 1     | MS-S2 Relative Frequency and Probability | MS11-8            |
| 12       | 1     | MS-M1 Applications of Measurement        | MS11-4            |
| 13       | 1     | MS-A4 Types of Relationships             | MS2-12-6          |
| 14       | 1     | MS-M6 Non-right-angled Trigonometry      | MS2-12-4          |
| 15       | 1     | MS-M7 Rates and Ratios                   | MS2-12-10         |

## Section II

| Question | Marks | Content                           | Syllabus outcomes |
|----------|-------|-----------------------------------|-------------------|
| 16       | 2     | MS-M1 Applications of Measurement | MS11-4            |
| 17       | 2     | MS-S1 Data Analysis               | MS11-7            |
| 18       | 2     | MS-M7 Rates and Ratios            | MS2-12-3          |
| 19       | 2     | MS-F1 Money Matters               | MS11-5            |
| 20       | 3     | MS-M2 Working with Time           | MS11-3            |
| 21       | 3     | MS-F5 Annuities                   | MS2-12-9          |
| 22       | 3     | MS-F1 Money Matters               | MS11-10           |
| 23 (a)   | 3     | MS-N2 Network Concepts            | MS2-12-8          |
| 23 (b)   | 1     | MS-N2 Network Concepts            | MS2-12-8          |
| 24 (a)   | 1     | MS-A4 Types of Relationships      | MS2-12-1          |
| 24 (b)   | 1     | MS-A4 Types of Relationships      | MS2-12-1          |

| Question    | Marks | Content                                        | Syllabus outcomes  |
|-------------|-------|------------------------------------------------|--------------------|
| 24 (c)      | 2     | MS-A4 Types of Relationships                   | MS2-12-6           |
| 25          | 4     | MS-M1 Applications of Measurement              | MS2-12-3           |
| 26 (a)      | 2     | MS-F4 Investments and Loans                    | MS2-12-5           |
| 26 (b)      | 2     | MS-F4 Investments and Loans                    | MS2-12-5           |
| 27 (a)      | 2     | MS-M7 Rates and Ratios                         | MS2-12-3           |
| 27 (b)      | 2     | MS-A1 Formulae and Equations                   | MS11-6             |
| 28 (a)      | 2     | MS-S4 Bivariate Data Analysis                  | MS2-12-9           |
| 28 (b)      | 1     | MS-S4 Bivariate Data Analysis                  | MS2-12-7           |
| 29          | 2     | MS-A1 Formulae and Equations                   | MS11-1             |
| 30          | 2     | MS-F4 Investments and Loans                    | MS2-12-5           |
| 31          | 2     | MS-F5 Annuities                                | MS2-12-5           |
| 32 (a)      | 2     | MS-M6 Non-right-angled Trigonometry            | MS2-12-4           |
| 32 (b)      | 3     | MS-M6 Non-right-angled Trigonometry            | MS2-12-4           |
| 33 (a) (i)  | 1     | MS-S4 Bivariate Data Analysis                  | MS2-12-2           |
| 33 (a) (ii) | 2     | MS-S4 Bivariate Data Analysis                  | MS2-12-2           |
| 33 (b)      | 1     | MS-S4 Bivariate Data Analysis                  | MS2-12-2           |
| 34          | 4     | MS-A4 Types of Relationships                   | MS2-12-6           |
| 35 (a)      | 2     | MS-A4 Types of Relationships                   | MS2-12-6           |
| 35 (b)      | 1     | MS-A4 Types of Relationships                   | MS2-12-1           |
| 36 (a)      | 1     | MS-N3 Critical Path Analysis                   | MS2-12-8           |
| 36 (b)      | 1     | MS-N3 Critical Path Analysis                   | MS2-12-8           |
| 36 (c)      | 2     | MS-N3 Critical Path Analysis                   | MS2-12-8           |
| 37          | 3     | MS-M6 Non-right-angled Trigonometry            | MS2-12-3; MS2-12-4 |
| 38 (a)      | 1     | MS-S5 The Normal Distribution                  | MS2-12-7           |
| 38 (b)      | 3     | MS-S5 The Normal Distribution                  | MS2-12-7           |
| 39 (a)      | 2     | MS-M6 Non-right-angled Trigonometry            | MS2-12-4           |
| 39 (b)      | 3     | MS-M6 Non-right-angled Trigonometry            | MS2-12-4           |
| 40          | 3     | MS-F5 Annuities<br>MS-F4 Investments and Loans | MS2-12-5           |
| 41          | 4     | MS-S5 The Normal Distribution                  | MS2-12-7           |