

# Mathematics General 2

## General Instructions

- Reading time – 5 minutes
- Working time –  $2\frac{1}{2}$  hours
- Write using black pen
- Board-approved calculators may be used
- A formulae and data sheet is provided at the back of this paper
- In Questions 26–30, show relevant mathematical reasoning and/or calculations

## Total marks – 100

### Section I Pages 2–10

#### 25 marks

- Attempt Questions 1–25
- Allow about 35 minutes for this section

### Section II Pages 13–35

#### 75 marks

- Attempt Questions 26–30
- Allow about 1 hour and 55 minutes for this section

## Section I

**25 marks**

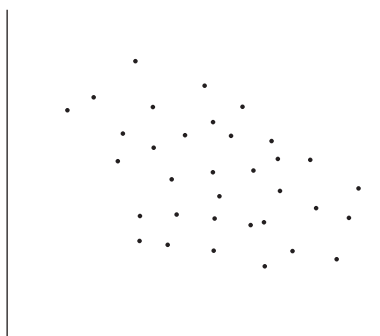
**Attempt Questions 1–25**

**Allow about 35 minutes for this section**

Use the multiple-choice answer sheet for Questions 1–25.

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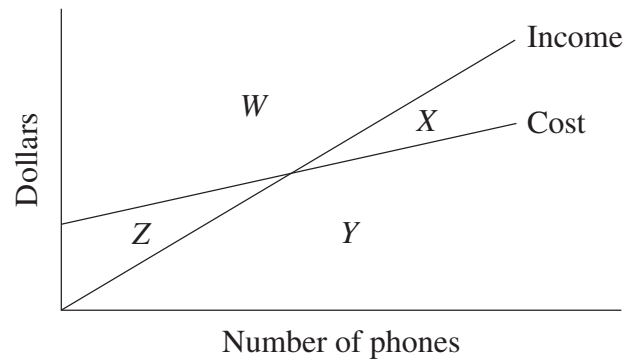
- 1** What is 208.345 correct to two significant figures?
- (A) 208  
(B) 210  
(C) 208.34  
(D) 208.35
- 2** Which of the following equations has  $x = 5$  as the solution?
- (A)  $x - 5 = 10$   
(B)  $5 - x = 10$   
(C)  $\frac{x}{2} = 10$   
(D)  $2x = 10$
- 3** The graph shows a scatterplot for a set of data.



Which of the following is the best approximation for the correlation coefficient of this set of data?

- (A)  $-1$   
(B)  $-0.3$   
(C)  $0.3$   
(D)  $1$

- 4 A company manufactures phones. The company's income equation and cost equation are drawn on the same graph.



Which region of the graph is the profit zone?

- (A)  $W$
  - (B)  $X$
  - (C)  $Y$
  - (D)  $Z$
- 5 Which expression is equivalent to  $2(3x - 4) + 2$ ?
- (A)  $6x - 2$
  - (B)  $6x - 4$
  - (C)  $6x - 6$
  - (D)  $6x - 10$
- 6 Ben has 6 shirts, 4 ties and 2 jackets.

How many different outfits of a shirt, a tie and a jacket can he choose?

- (A) 12
- (B) 16
- (C) 24
- (D) 48

7 Which set of data is classified as categorical and nominal?

- (A) blue, green, yellow
- (B) small, medium, large
- (C) 5.2 cm, 6 cm, 7.21 cm
- (D) 4 people, 5 people, 9 people

8 The table shows the future value of an investment of \$1000, compounding yearly, at varying interest rates for different periods of time.

**Future values of an investment of \$1000**

| <i>Number<br/>of years</i> | <i>Interest rate per annum</i> |         |         |         |         |
|----------------------------|--------------------------------|---------|---------|---------|---------|
|                            | 1%                             | 2%      | 3%      | 4%      | 5%      |
| 1                          | 1010.00                        | 1020.00 | 1030.00 | 1040.00 | 1050.00 |
| 2                          | 1020.10                        | 1040.40 | 1060.90 | 1081.60 | 1102.50 |
| 3                          | 1030.30                        | 1061.21 | 1092.73 | 1124.86 | 1157.63 |
| 4                          | 1040.60                        | 1082.43 | 1125.51 | 1169.86 | 1215.51 |
| 5                          | 1051.01                        | 1104.08 | 1159.27 | 1216.65 | 1276.28 |

Based on the information provided, what is the future value of an investment of \$2500 over 3 years at 4% pa?

- (A) \$1124.86
  - (B) \$2812.15
  - (C) \$3624.86
  - (D) \$5312.15
- 9 An old washing machine uses 130 L of water per load. A new washing machine uses 50 L per load.

How much water is saved each year if two loads of washing are done each week using the new machine?

- (A) 2600 L
- (B) 4160 L
- (C) 5200 L
- (D) 8320 L

- 10** Caroline drinks two small bottles of wine over a three-hour period. Each of these bottles contains 2.3 standard drinks. Caroline weighs 53 kg.

What is her approximate blood alcohol content (BAC) at the end of this period?

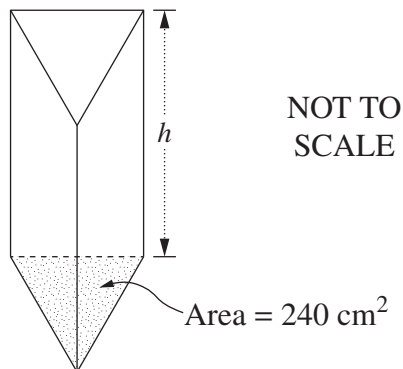
- (A) 0.081
- (B) 0.065
- (C) 0.0017
- (D) 0.0014

- 11** The concentration of a drug in a certain medication is 100 mg/5 mL. A patient is prescribed 2000 mg of the drug.

How much medication should be given to the patient?

- (A) 4 mL
- (B) 25 mL
- (C) 100 mL
- (D) 400 mL

- 12** A container is in the shape of a triangular prism which has a capacity of 12 litres. The area of the base is  $240 \text{ cm}^2$ .



What is the distance,  $h$ , between the two triangular ends of the container?

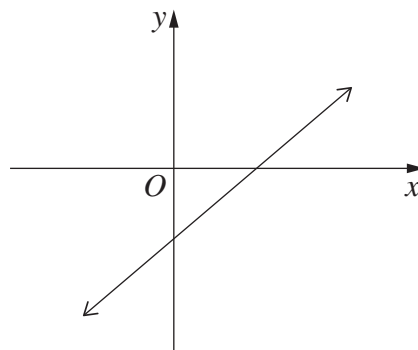
- (A) 5 cm
- (B) 20 cm
- (C) 25 cm
- (D) 50 cm

- 13** The speed limit outside a school is 40 km/h. Year 11 students measured the speed of passing vehicles over a period of time. They found the set of data to be normally distributed with a mean speed of 36 km/h and a standard deviation of 2 km/h.

What percentage of the vehicles passed the school at a speed greater than 40 km/h?

- (A) 2.5%
- (B) 5%
- (C) 47.5%
- (D) 95%

- 14** The graph shows a line which has an equation in the form  $y = mx + b$ .



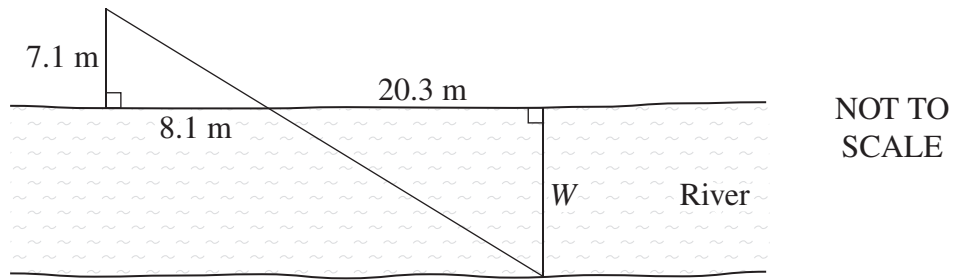
Which of the following statements is true?

- (A)  $m$  is positive and  $b$  is negative
  - (B)  $m$  is negative and  $b$  is positive
  - (C)  $m$  and  $b$  are both positive
  - (D)  $m$  and  $b$  are both negative
- 15** Calls on a mobile phone plan are charged at the rate of 54 cents per 30 seconds, or part thereof.

What is the cost of a call lasting 2 minutes and 15 seconds?

- (A) \$2.16
- (B) \$2.32
- (C) \$2.43
- (D) \$2.70

- 16 The width ( $W$ ) of a river can be calculated using two similar triangles, as shown in the diagram.



- What is the approximate width of the river?
- (A) 17.8 m  
(B) 19.3 m  
(C) 23.2 m  
(D) 24.9 m
- 17 Ariana is charged compound interest at the rate of 0.036% per day on outstanding credit card balances. She has \$780 outstanding for 24 days.

How much compound interest is she charged?

- (A) \$6.74  
(B) \$6.77  
(C) \$786.74  
(D) \$786.77
- 18 The value of  $E$  varies directly with the square of  $S$ .

It is known that  $E = 20$  when  $S = 10$ .

What is the value of  $E$  when  $S = 40$ ?

- (A) 40  
(B) 80  
(C) 320  
(D) 400

- 19** A soccer referee wrote down the number of goals scored in 9 different games during the season.

2, 3, 3, 3, 5, 5, 8, 9,

The last number has been omitted. The range of the data is 10.

What is the five-number summary for this data set?

- (A) 2, 3, 5, 8.5, 12  
(B) 2, 3, 5, 8.5, 10  
(C) 2, 3, 5, 8, 12  
(D) 2, 3, 5, 8, 10

- 20** Isabella works a 35-hour week and is paid at an hourly rate of \$18. Any overtime hours worked are paid at time-and-a-half. In a particular week, she earned \$1008.

How many hours in total did Isabella work in this week to earn this amount?

- (A) 37.3  
(B) 42  
(C) 49  
(D) 56

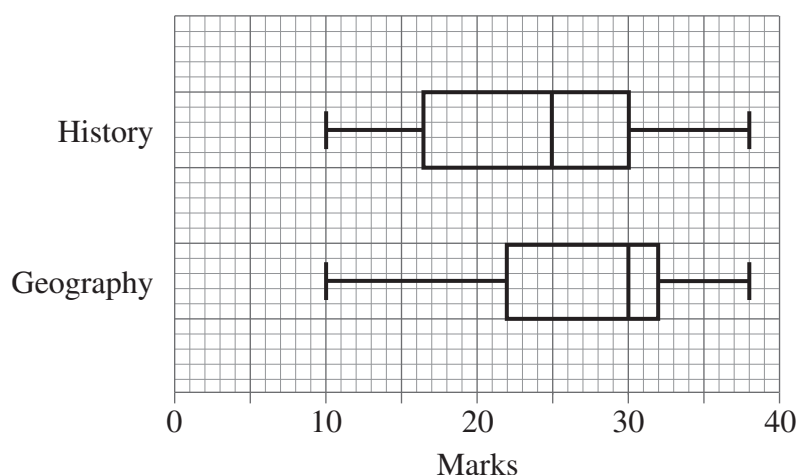
- 21** A grouped data frequency table is shown.

| <i>Class interval</i> | <i>Frequency</i> |
|-----------------------|------------------|
| 1–5                   | 3                |
| 6–10                  | 6                |
| 11–15                 | 8                |
| 16–20                 | 9                |

What is the mean for this set of data?

- (A) 6.5  
(B) 10.5  
(C) 11.9  
(D) 12.4

- 22 The box-and-whisker plots show the results of a History test and a Geography test.



In History, 112 students completed the test. The number of students who scored above 30 marks was the same for the History test and the Geography test.

How many students completed the Geography test?

- (A) 8  
(B) 50  
(C) 56  
(D) 112
- 23 A group of 485 people was surveyed. The people were asked whether or not they smoke. The results are recorded in the table.

|        | <i>Smokers</i> | <i>Non-smokers</i> | <i>Total</i> |
|--------|----------------|--------------------|--------------|
| Male   | 88             | 176                | 264          |
| Female | 68             | 153                | 221          |
|        | 156            | 329                | 485          |

A person is selected at random from the group.

What is the approximate probability that the person selected is a smoker OR is male?

- (A) 33%  
(B) 18%  
(C) 68%  
(D) 87%

24 Which of the following correctly expresses  $Q$  as the subject of  $e = iR + \frac{Q}{C}$ ?

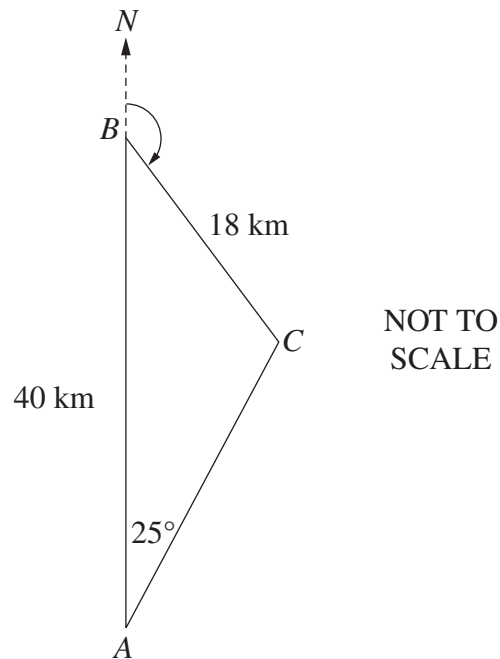
(A)  $Q = Ce + CiR$

(B)  $Q = Ce - CiR$

(C)  $Q = \frac{e + iR}{C}$

(D)  $Q = \frac{e - iR}{C}$

25 The diagram shows towns  $A$ ,  $B$  and  $C$ . Town  $B$  is 40 km due north of town  $A$ . The distance from  $B$  to  $C$  is 18 km and the bearing of  $C$  from  $A$  is  $025^\circ$ . It is known that  $\angle BCA$  is obtuse.



What is the bearing of  $C$  from  $B$ ?

(A)  $070^\circ$

(B)  $095^\circ$

(C)  $110^\circ$

(D)  $135^\circ$

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Centre Number

**Section II****75 marks****Attempt Questions 26–30****Allow about 1 hour and 55 minutes  
for this section**

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Student Number

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 34 and 35. If you use this space, clearly indicate which question you are answering.

Write your Centre Number and Student Number at the top of this page.

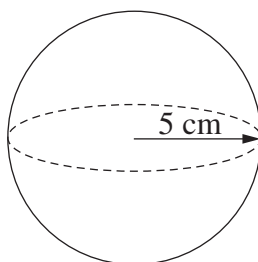
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**Please turn over**

**Question 26** (15 marks)

- (a) Calculate the surface area of a sphere with a radius of 5 cm, correct to the nearest whole number.

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- (b) Simplify  $\frac{8x^4y}{24x^3y^5}$ .

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- (c) Peta's car uses fuel at the rate of 5.9 L/100 km for country driving and 7.3 L/100 km for city driving. On a trip, she drives 170 km in the country and 25 km in the city.

2

Calculate the amount of fuel she used on this trip.

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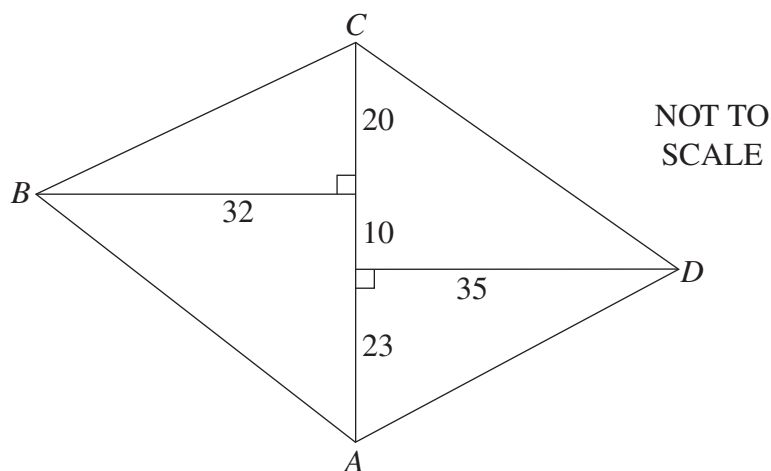
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**Question 26 continues on page 15**

Question 26 (continued)

- (d) The field diagram shows a block of land  $ABCD$  that has been surveyed. All measurements are in metres.

2



Calculate the length of  $AB$ , correct to the nearest metre.

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- (e) Jenny earns a yearly salary of \$63 752. Her annual leave loading is  $17\frac{1}{2}\%$  of four weeks pay.

3

Calculate her total pay for her four weeks of annual leave.

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Question 26 continues on page 16

Question 26 (continued)

- (f) Theo is completing his tax return. He has a gross salary of \$82 521 and income from a rental property totalling \$10 920. He is claiming \$13 420 in allowable deductions.

- (i) Determine Theo's taxable income. 1

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- (ii) Using the tax table below, calculate Theo's tax payable. 2

| <i>Taxable income</i> | <i>Tax on this income</i>                     |
|-----------------------|-----------------------------------------------|
| \$0 – \$18 200        | Nil                                           |
| \$18 201 – \$37 000   | 19c for each \$1 over \$18 200                |
| \$37 001 – \$80 000   | \$3572 plus 32.5c for each \$1 over \$37 000  |
| \$80 001 – \$180 000  | \$17 547 plus 37c for each \$1 over \$80 000  |
| \$180 001 and over    | \$54 547 plus 45c for each \$1 over \$180 000 |

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- (iii) In addition to the above tax, Theo must also pay a Medicare levy of \$1600.42. 2

Theo has already paid \$20 525 as Pay As You Go (PAYG) tax.

Should Theo receive a tax refund or will he owe more tax? Justify your answer with calculations.

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**End of Question 26**

**Question 27 (15 marks)**

- (a) Alice intends to buy a car and insure it.

**2**

Briefly describe what each of these types of insurance covers:

- Compulsory third-party insurance (CTP)
- Non-compulsory third-party property insurance.

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- (b) A small population consists of three students of heights 153 cm, 168 cm and 174 cm. Samples of varying sizes can be taken from this population.

**2**

What is the mean of the mean heights of all the possible samples? Justify your answer.

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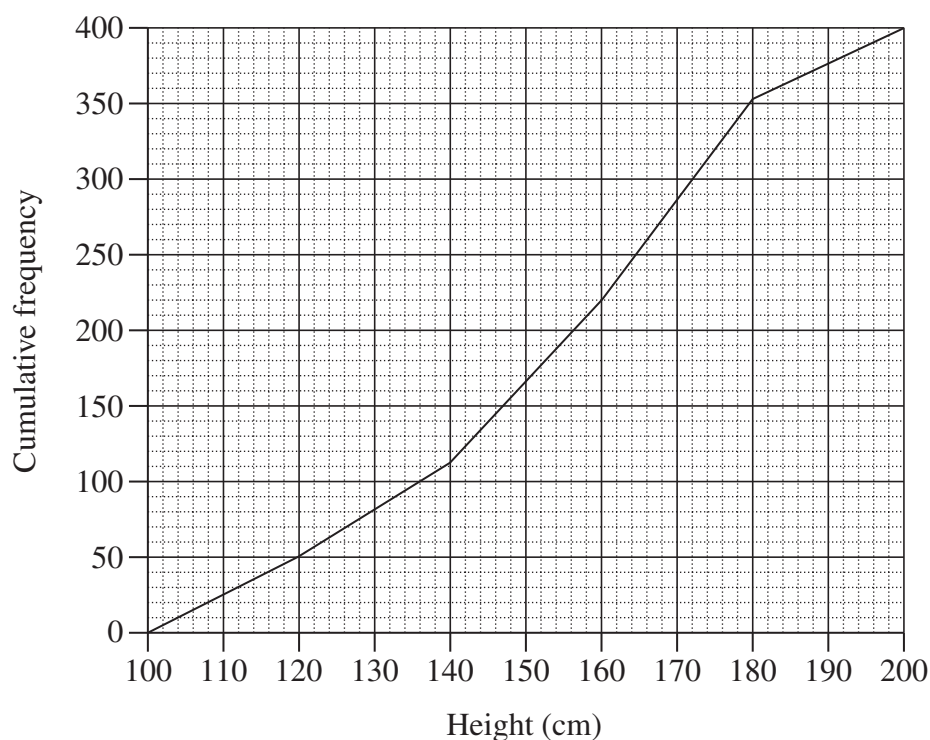
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**Question 27 continues on page 18**

Question 27 (continued)

- (c) The heights of 400 students were measured. The results are displayed in this cumulative frequency polygon.

2



Use the polygon to estimate the interquartile range.

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**Question 27 continues on page 19**

Question 27 (continued)

- (d) Marge borrowed \$19 000 to buy a used car. Interest on the loan was charged at 4.8% pa at the end of each month. She made a repayment of \$436 at the end of every month. The table below sets out her monthly repayment schedule for the first four months of the loan.

| <i>Month</i> | <i>Amount owing<br/>at start of month</i> | <i>Interest<br/>charged</i> | <i>Repayment</i> | <i>Amount owing<br/>at end of month</i> |
|--------------|-------------------------------------------|-----------------------------|------------------|-----------------------------------------|
| 1            | A                                         | \$76.00                     | \$436.00         | \$18 640.00                             |
| 2            | \$18 640.00                               | X                           | \$436.00         | \$18 278.56                             |
| 3            | \$18 278.56                               | \$73.11                     | \$436.00         | \$17 915.67                             |
| 4            | \$17 915.67                               | \$71.66                     | \$436.00         | B                                       |

- (i) Some values in the table are missing. Write down the values for A and B. 2

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- (ii) Calculate the value of X. 2

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- (iii) Marge repaid this loan over four years. 1

What is the total amount that Marge repaid?

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**Question 27 continues on page 20**

Question 27 (continued)

(e) Melbourne is located at (38°S, 145°E) and Dubai is located at (24°N, 55°E).

(i) Calculate the difference in longitude between Melbourne and Dubai. **1**

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(ii) Show that the time difference between Melbourne and Dubai is 6 hours. **1**

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(iii) A plane leaves Melbourne on Friday at 11.30 pm. The flight time to Dubai is 15 hours. **2**

What will be the time and the day in Dubai when the plane is due to land?

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**End of Question 27**

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**Question 28** (15 marks)

(a) Jacob has a large jar of silver coins. He adds 20 gold coins into the jar. He then seals the jar and shakes it to ensure that the gold coins are mixed in thoroughly with the silver coins. Jacob then opens the jar and takes a handful of coins. In his hand he has 33 silver coins and 4 gold coins.

- (i) Based on Jacob’s handful, if a coin is selected at random from the jar, what is the probability that it is a gold coin? **1**

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- (ii) Jacob returns the handful of coins to the jar. Estimate the total number of coins in the jar. **2**

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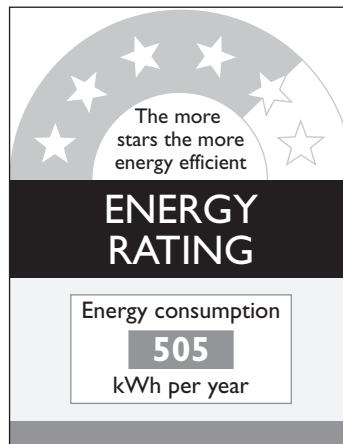
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**Question 28 continues on page 22**

Question 28 (continued)

- (b) The cost of buying a new heater is \$990. It uses energy according to the following energy label.

2



© Department of Environment and Energy

Energy is charged at the rate of \$0.35/kWh.

How much will it cost in total to purchase and then run this heater for five years?

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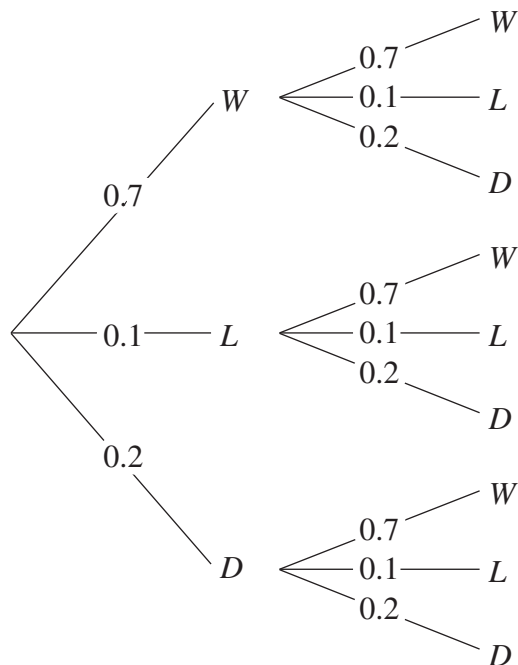
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**Question 28 continues on page 23**

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Question 28 (continued)

- (c) A cricket team is about to play two matches. The probability of the team having a win, a loss or a draw is 0.7, 0.1 and 0.2 respectively in each match. The possible results in the two matches are displayed in the probability tree diagram.



- (i) What is the probability of the team having a win and a draw, in any order? 2

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- (ii) Paul claims that 1.4 is the probability of the team winning both matches. 1

Give one reason why this is NOT correct.

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**Question 28 continues on page 24**

Question 28 (continued)

- (d) The table gives the contribution per period for an annuity with a future value of \$1 at different interest rates and different periods of time.

2

**Contribution per period for an annuity with a future value of \$1**

| <i>Number<br/>of<br/>periods</i> | <i>Interest rate<br/>(% per period)</i> |        |        |        |        |        |
|----------------------------------|-----------------------------------------|--------|--------|--------|--------|--------|
|                                  | 0.25%                                   | 0.5%   | 0.75%  | 1%     | 1.25%  | 1.5%   |
| 6                                | 0.1656                                  | 0.1646 | 0.1636 | 0.1625 | 0.1615 | 0.1605 |
| 12                               | 0.0822                                  | 0.0811 | 0.0800 | 0.0788 | 0.0778 | 0.0767 |
| 18                               | 0.0544                                  | 0.0532 | 0.0521 | 0.0510 | 0.0499 | 0.0488 |
| 24                               | 0.0405                                  | 0.0393 | 0.0382 | 0.0371 | 0.0360 | 0.0349 |
| 30                               | 0.0321                                  | 0.0310 | 0.0298 | 0.0287 | 0.0277 | 0.0266 |
| 36                               | 0.0266                                  | 0.0254 | 0.0243 | 0.0232 | 0.0222 | 0.0212 |

Margaret needs to save \$75 000 over 6 years for a deposit on a new apartment. She makes regular quarterly contributions into an investment account which pays interest at 3% pa.

How much will Margaret need to contribute each quarter to reach her savings goal?

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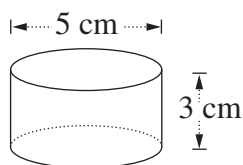
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**Question 28 continues on page 25**

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Question 28 (continued)

- (e) A company makes large marshmallows. They are in the shape of a cylinder with diameter 5 cm and height 3 cm, as shown in the diagram.



- (i) Find the volume of one of these large marshmallows, correct to one decimal place. 2

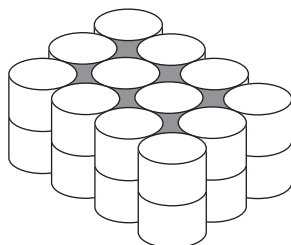
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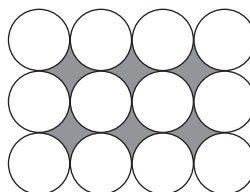
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- (ii) A cake is to be made by stacking 24 of these large marshmallows and filling the gaps between them with chocolate. The diagrams show the cake and its top view. The shading shows the gaps to be filled with chocolate. 3



Cake



Top view

What volume of chocolate will be required? Give your answer correct to the nearest whole number.

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**End of Question 28**

**Question 29** (15 marks)

(a) Two unbiased coins are tossed.

- (i) What is the probability that one coin shows heads and the other shows tails? 1

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- (ii) A game is played in which one player tosses the two coins. The rules are as follows: 2

- If both coins show heads, the player wins \$40
- If both coins show tails, the player wins \$20
- If one coin shows heads and the other shows tails, the player loses \$30.

What is the financial expectation of this game?

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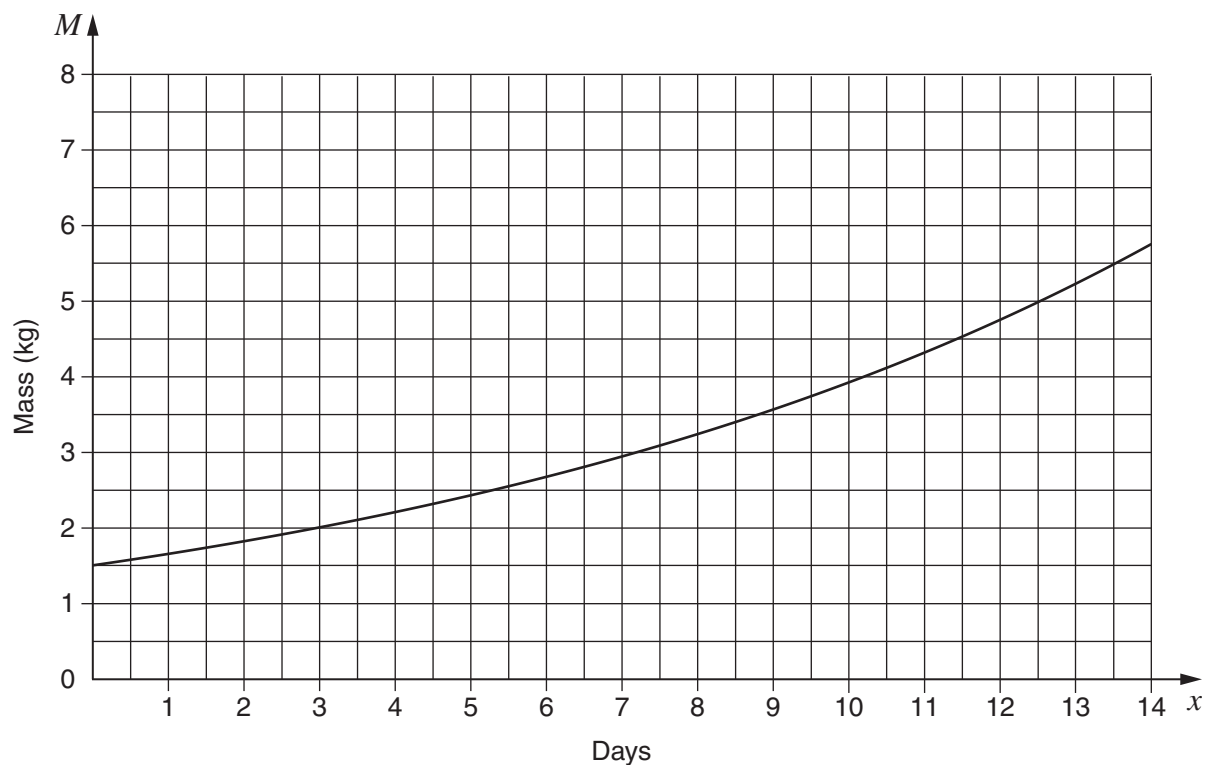
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**Question 29 continues on page 27**

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Question 29 (continued)

- (b) The mass  $M$  kg of a baby pig at age  $x$  days is given by  $M = A(1.1)^x$  where  $A$  is a constant. The graph of this equation is shown.



- (i) What is the value of  $A$ ?

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- (ii) What is the daily growth rate of the pig's mass? Write your answer as a percentage.

1

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Question 29 continues on page 28

Question 29 (continued)

- (c) The ages of members of a dance class are shown in the back-to-back stem-and-leaf plot.

3

| <i>Women</i> |   | <i>Men</i> |
|--------------|---|------------|
| 2            | 3 | 4 6        |
| 4 2          | 4 | 2 2 5 6 8  |
| 8 8 5 4 0 0  | 5 | 3          |
| 9 4 3 3      | 6 | 3          |

Pat claims that the women who attend the dance class are generally older than the men.

Is Pat correct? Justify your answer by referring to the median and skewness of the two sets of data.

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Question 29 continues on page 29

Question 29 (continued)

- (d) Five students sat both a Physics and a Chemistry exam. Their results are shown in the table. The mean and standard deviation of each exam are also shown.

|                   |    |    |    |    |    | <i>Mean</i> | <i>Standard deviation</i> |
|-------------------|----|----|----|----|----|-------------|---------------------------|
| Physics ( $x$ )   | 75 | 55 | 81 | 64 | 72 | 69.4        | 9.05                      |
| Chemistry ( $y$ ) | 84 | 48 | 77 | 53 | 68 | 66          | 13.73                     |

The correlation coefficient for this data set is approximately 0.9.

- (i) Verify the value of the correlation coefficient, using your calculator, and give your value correct to three decimal places.

**1**

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- (ii) By using the appropriate formulae from the Formulae and Data Sheet, and the given information, determine the equation of the least-squares line of best fit.

**3**

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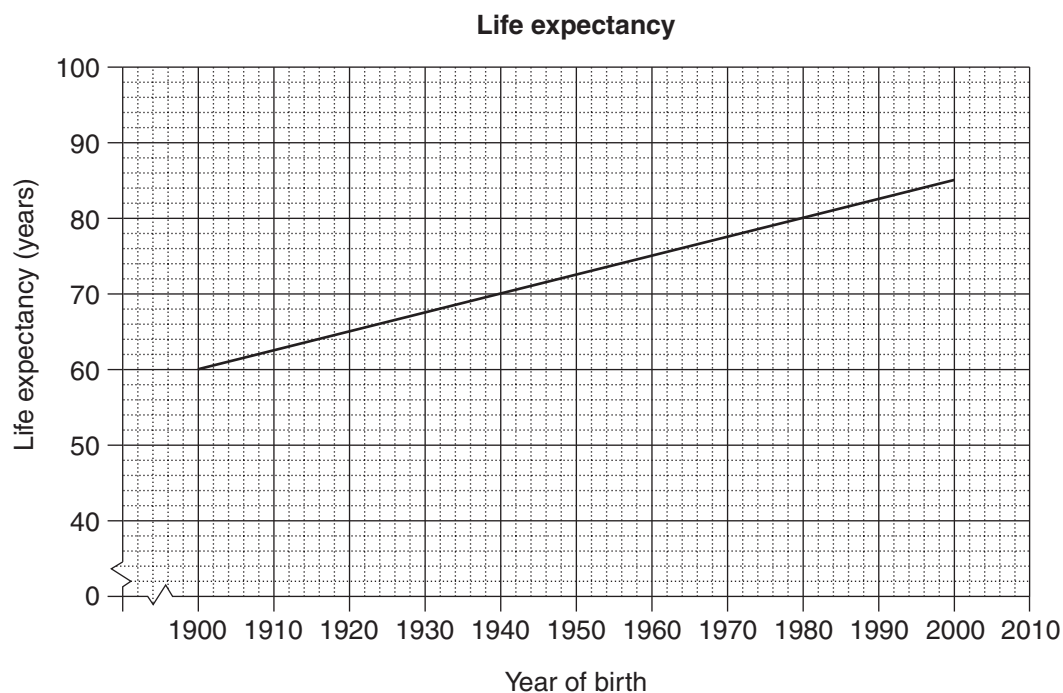
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**Question 29 continues on page 30**

Question 29 (continued)

- (e) The graph shows the life expectancy of people born between 1900 and 2000.



- (i) According to the graph, what is the life expectancy of a person born in 1932? **1**

.....

- (ii) With reference to the value of the gradient, explain the meaning of the gradient in this context. **2**

.....

.....

.....

.....

**End of Question 29**

**Question 30** (15 marks)

- (a) The area of a roof is  $30 \text{ m}^2$ . Any rain that falls on the roof flows directly onto a garden. **2**

Calculate how many litres of water flow onto the garden when 20 mm of rain falls on the roof.

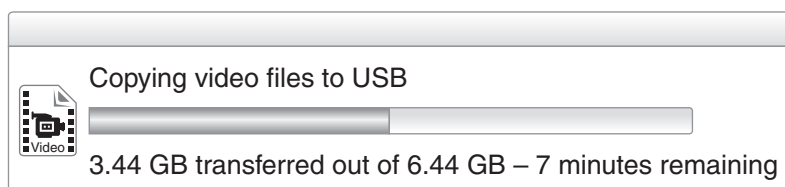
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- (b) Michael was transferring some video files from his computer onto a USB stick. At some point during the transfer, he observed the information shown below.



- (i) Show that, at that time, approximately 3072 MB of data remained to be transferred. **1**

.....

.....

- (ii) Calculate the speed required to transfer 3072 MB in 7 minutes. Give your answer in megabits per second (Mbps), correct to the nearest whole number. (Note that 1 megabit = 1 000 000 bits.) **3**

.....

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**Question 30 continues on page 32**

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Question 30 (continued)

- (d) The formula to calculate  $z$ -scores can be rearranged to give

$$\bar{x} = x - sz$$

where  $\bar{x}$  is the mean

$x$  is the score

$s$  is the standard deviation

$z$  is the  $z$ -score.

- (i) In an examination, Aaron achieved a score of 88, which corresponds to a  $z$ -score of 2.4. 1

Substitute these values into the rearranged formula above to form an equation.

.....

.....

- (ii) In the same examination, Brock achieved a score of 52, which corresponds to a  $z$ -score of  $-1.2$ . 3

Using this information, form another equation and solve it simultaneously with the equation from part (i) to find the values of  $\bar{x}$  and  $s$ .

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**End of paper**

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## Mathematics General 2

## FORMULAE AND DATA SHEET

## Financial Mathematics

## Simple interest

$$I = Prn$$

$P$  is initial amount

$r$  is interest rate per period, expressed as a decimal

$n$  is number of periods

## Compound interest

$$A = P(1 + r)^n$$

$A$  is final amount

$P$  is initial amount

$r$  is interest rate per period, expressed as a decimal

$n$  is number of compounding periods

## Present value and future value

$$PV = \frac{FV}{(1 + r)^n}, \quad FV = PV(1 + r)^n$$

$r$  is interest rate per period, expressed as a decimal

$n$  is number of compounding periods

## Straight-line method of depreciation

$$S = V_0 - Dn$$

$S$  is salvage value of asset after  $n$  periods

$V_0$  is initial value of asset

$D$  is amount of depreciation per period

$n$  is number of periods

## Declining-balance method of depreciation

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

$S$  is salvage value of asset after  $n$  periods

$V_0$  is initial value of asset

$r$  is depreciation rate per period, expressed as a decimal

$n$  is number of periods

## Data Analysis

## Mean of a sample

$$\bar{x} = \frac{\text{sum of scores}}{\text{number of scores}}$$

## z-score

For any score  $x$ ,

$$z = \frac{x - \bar{x}}{s}$$

$\bar{x}$  is mean

$s$  is standard deviation

## Outlier(s)

score(s) less than  $Q_L - 1.5 \times IQR$

or

score(s) more than  $Q_U + 1.5 \times IQR$

$Q_L$  is lower quartile

$Q_U$  is upper quartile

$IQR$  is interquartile range

## Least-squares line of best fit

$$y = \text{gradient} \times x + y\text{-intercept}$$

$$\text{gradient} = r \times \frac{\text{standard deviation of } y \text{ scores}}{\text{standard deviation of } x \text{ scores}}$$

$$y\text{-intercept} = \bar{y} - (\text{gradient} \times \bar{x})$$

$r$  is correlation coefficient

$\bar{x}$  is mean of  $x$  scores

$\bar{y}$  is mean of  $y$  scores

## 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  $3$

## Spherical Geometry

### Circumference of a circle

$$C = 2\pi r \quad \text{or} \quad C = \pi D$$

$r$  is radius

$D$  is diameter

### Arc length of a circle

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

$r$  is radius

$\theta$  is number of degrees in central angle

### Radius of Earth

(taken as) 6400 km

### Time differences

For calculation of time differences using longitude:

$15^\circ = 1$  hour time difference

## Area

### Circle

$$A = \pi r^2$$

$r$  is radius

### Sector

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

$r$  is radius

$\theta$  is number of degrees in central angle

### Annulus

$$A = \pi(R^2 - r^2)$$

$R$  is radius of outer circle

$r$  is radius of inner circle

### Trapezium

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

$h$  is perpendicular height

$a$  and  $b$  are the lengths of the parallel sides

### Area of land and catchment areas

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

## Surface Area

### Sphere

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

$r$  is radius

### Closed cylinder

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

$r$  is radius

$h$  is perpendicular height

## Volume

### Prism or cylinder

$$V = Ah$$

$A$  is area of base

$h$  is perpendicular height

### Pyramid or cone

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

$A$  is area of base

$h$  is perpendicular height

### Volume and capacity

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

## Approximation Using Simpson's Rule

### Area

$$A \approx \frac{h}{3}(d_f + 4d_m + d_l)$$

$h$  is distance between successive measurements

$d_f$  is first measurement

$d_m$  is middle measurement

$d_l$  is last measurement

### Volume

$$V \approx \frac{h}{3}\{A_L + 4A_M + A_R\}$$

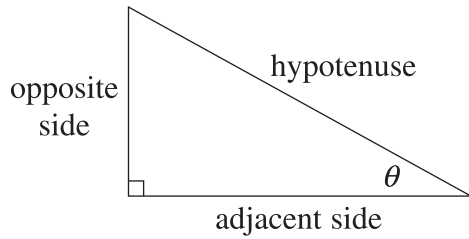
$h$  is distance between successive measurements

$A_L$  is area of left end

$A_M$  is area of middle

$A_R$  is area of right end

## Trigonometric Ratios



$$\sin \theta = \frac{\text{opposite side}}{\text{hypotenuse}}$$

$$\cos \theta = \frac{\text{adjacent side}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{opposite side}}{\text{adjacent side}}$$

### Sine rule

In  $\triangle ABC$ ,

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

### Area of a triangle

In  $\triangle ABC$ ,

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

### Cosine rule

In  $\triangle ABC$ ,

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

or

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

## Units of Memory and File Size

$$1 \text{ byte} = 8 \text{ bits}$$

$$1 \text{ kilobyte} = 2^{10} \text{ bytes} = 1024 \text{ bytes}$$

$$1 \text{ megabyte} = 2^{20} \text{ bytes} = 1024 \text{ kilobytes}$$

$$1 \text{ gigabyte} = 2^{30} \text{ bytes} = 1024 \text{ megabytes}$$

$$1 \text{ terabyte} = 2^{40} \text{ bytes} = 1024 \text{ gigabytes}$$

## Blood Alcohol Content Estimates

$$BAC_{\text{male}} = \frac{10N - 7.5H}{6.8M}$$

or

$$BAC_{\text{female}} = \frac{10N - 7.5H}{5.5M}$$

$N$  is number of standard drinks consumed

$H$  is number of hours of drinking

$M$  is person's mass in kilograms

## Distance, Speed and Time

$$D = ST, \quad S = \frac{D}{T}, \quad T = \frac{D}{S}$$

$$\text{average speed} = \frac{\text{total distance travelled}}{\text{total time taken}}$$

$$\text{stopping distance} = \left\{ \begin{array}{c} \text{reaction-time} \\ \text{distance} \end{array} \right\} + \left\{ \begin{array}{c} \text{braking} \\ \text{distance} \end{array} \right\}$$

## Probability of an Event

The probability of an event where outcomes are equally likely is given by:

$$P(\text{event}) = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$$

## Straight Lines

### Gradient

$$m = \frac{\text{vertical change in position}}{\text{horizontal change in position}}$$

### Gradient-intercept form

$$y = mx + b$$

$m$  is gradient

$b$  is y-intercept

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## 2016 HSC Mathematics General 2 Marking Guidelines

### Section I

#### Multiple-choice Answer Key

| Question | Answer |
|----------|--------|
| 1        | B      |
| 2        | D      |
| 3        | B      |
| 4        | B      |
| 5        | C      |
| 6        | D      |
| 7        | A      |
| 8        | B      |
| 9        | D      |
| 10       | A      |
| 11       | C      |
| 12       | D      |
| 13       | A      |
| 14       | A      |
| 15       | D      |
| 16       | A      |
| 17       | B      |
| 18       | C      |
| 19       | A      |
| 20       | C      |
| 21       | D      |
| 22       | C      |
| 23       | C      |
| 24       | B      |
| 25       | D      |

## Section II

### Question 26 (a)

| Criteria                                                  | Marks |
|-----------------------------------------------------------|-------|
| • Provides correct answer or correct numerical expression | 1     |

*Sample answer:*

$$\begin{aligned}
 \text{Surface area} &= 4\pi r^2 \\
 &= 4 \times \pi \times 5^2 \\
 &= 314.1592 \\
 &= 314 \text{ cm}^2
 \end{aligned}$$

### Question 26 (b)

| Criteria                                             | Marks |
|------------------------------------------------------|-------|
| • Provides correctly simplified algebraic expression | 2     |
| • Provides one correctly simplified variable         | 1     |

*Sample answer:*

$$\frac{8x^4y}{24x^3y^5} = \frac{x}{3y^4}$$

### Question 26 (c)

| Criteria                              | Marks |
|---------------------------------------|-------|
| • Provides correct solution           | 2     |
| • Makes progress towards the solution | 1     |

*Sample answer:*

$$\text{Country driving: } \frac{170}{100} \times 5.9 = 10.03 \text{ L}$$

$$\text{City driving: } \frac{25}{100} \times 7.3 = 1.825 \text{ L}$$

$$\begin{aligned}
 \text{Total fuel used} &= 10.03 + 1.825 \\
 &= 11.855 \text{ L}
 \end{aligned}$$

**Question 26 (d)**

| Criteria                              | Marks |
|---------------------------------------|-------|
| • Provides correct answer             | 2     |
| • Attempts to use Pythagoras' Theorem | 1     |

*Sample answer:*

$$\begin{aligned}
 AB &= \sqrt{32^2 + 33^2} \\
 &= 45.9673... \\
 &\doteq 46 \text{ m}
 \end{aligned}$$

**Question 26 (e)**

| Criteria                                           | Marks |
|----------------------------------------------------|-------|
| • Provides correct answer                          | 3     |
| • Makes significant progress towards the answer    | 2     |
| • Provides correct weekly pay, or equivalent merit | 1     |

*Sample answer:*

$$\begin{aligned}
 \text{Holiday loading} &= 0.175 \times (\$63\,752 \div 52) \times 4 \\
 &= \$858.20 \\
 \text{Holiday pay} &= (\$63\,752 \div 52) \times 4 + 858.20 \\
 &= \$4904 + \$858.20 \\
 &= \$5762.20
 \end{aligned}$$

**Question 26 (f) (i)**

| Criteria                                                  | Marks |
|-----------------------------------------------------------|-------|
| • Provides correct answer or correct numerical expression | 1     |

*Sample answer:*

$$\begin{aligned}\text{Taxable income} &= \$82\,521 + \$10\,920 - \$13\,420 \\ &= \$80\,021\end{aligned}$$

**Question 26 (f) (ii)**

| Criteria                                                   | Marks |
|------------------------------------------------------------|-------|
| • Provides correct answer                                  | 2     |
| • Attempts to use correct tax bracket, or equivalent merit | 1     |

*Sample answer:*

$$\begin{aligned}\text{Tax payable} &= \$17\,547 + 0.37(80\,021 - 80\,000) \\ &= \$17\,547 + 0.37 \times 21 \\ &= \$17\,547 + \$7.77 \\ &= \$17\,554.77\end{aligned}$$

**Question 26 (f) (iii)**

| Criteria                                                                  | Marks |
|---------------------------------------------------------------------------|-------|
| • Provides correct solution with conclusion                               | 2     |
| • Calculates the tax payable including Medicare levy, or equivalent merit | 1     |

*Sample answer:*

$$\begin{aligned}\text{Total tax payable} &= \$1600.42 + \$17\,554.77 \\ &= \$19\,155.19 \\ \text{Tax refund} &= \$20\,525 - \$19\,155.19 \\ &= \$1369.81\end{aligned}$$

$\therefore$  Theo will receive a tax refund of \$1369.81

**Question 27 (a)**

| Criteria                                                | Marks |
|---------------------------------------------------------|-------|
| • Provides correct solution                             | 2     |
| • Provides one correct description, or equivalent merit | 1     |

**Sample answer:**

If Alice is responsible for a car accident, then Compulsory Third Party Insurance covers injury to people, while Third Party Property Insurance covers damage to other people's property.

**Question 27 (b)**

| Criteria                                                   | Marks |
|------------------------------------------------------------|-------|
| • Provides correct answer with justification               | 2     |
| • Identifies that there are 7 samples, or equivalent merit | 1     |

**Sample answer:**

$$\begin{aligned}\text{Mean of mean heights} &= \frac{153 + 168 + 174}{3} \\ &= 165 \text{ cm}\end{aligned}$$

The mean of all possible sample means is equal to the population mean.

**Question 27 (c)**

| Criteria                                             | Marks |
|------------------------------------------------------|-------|
| • Provides correct answer                            | 2     |
| • Provides one correct quartile, or equivalent merit | 1     |

**Sample answer:**

$$\begin{aligned}Q_3 &= 172 \text{ cm} \\ Q_1 &= 136 \text{ cm} \\ IQR &= 172 - 136 \\ &= 36 \text{ cm}\end{aligned}$$

**Question 27 (d) (i)**

| Criteria                                  | Marks |
|-------------------------------------------|-------|
| • Provides correct values for $A$ and $B$ | 2     |
| • Provides one correct value              | 1     |

*Sample answer:*

$$A = \$19\,000$$

$$\begin{aligned} B &= 17\,915.67 + 71.66 - 436 \\ &= \$17\,551.33 \end{aligned}$$

**Question 27 (d) (ii)**

| Criteria                                | Marks |
|-----------------------------------------|-------|
| • Provides correct answer               | 2     |
| • Makes progress towards correct answer | 1     |

*Sample answer:*

$$\begin{aligned} X &= Prn \\ &= 18\,640 \times 0.004 \times 1 \\ &= \$74.56 \end{aligned}$$

OR

$$\begin{aligned} X &= 18\,278.56 + 436 - 18\,640 \\ &= \$74.56 \end{aligned}$$

**Question 27 (d) (iii)**

| Criteria                                                  | Marks |
|-----------------------------------------------------------|-------|
| • Provides correct answer or correct numerical expression | 1     |

*Sample answer:*

$$\begin{aligned} \text{Total amount} &= \$436 \times 48 \\ &= \$20\,928 \end{aligned}$$

**Question 27 (e) (i)**

| Criteria                                                  | Marks |
|-----------------------------------------------------------|-------|
| • Provides correct answer or correct numerical expression | 1     |

*Sample answer:*

$$\begin{aligned}\text{Difference} &= 145^\circ - 55^\circ \\ &= 90^\circ\end{aligned}$$

**Question 27 (e) (ii)**

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

*Sample answer:*

$$\begin{aligned}\text{Time difference} &= \frac{90}{15} \\ &= 6 \text{ hours}\end{aligned}$$

**Question 27 (e) (iii)**

| Criteria                              | Marks |
|---------------------------------------|-------|
| • Provides correct answer             | 2     |
| • Makes progress towards the solution | 1     |

*Sample answer:*

$$\begin{aligned}\text{Time of departure in Melbourne} &= 11:30 \text{ pm Friday} \\ &= 23:30\end{aligned}$$

$$\begin{aligned}\text{Time of arrival (Melbourne time)} &= 23:30 + 15 \text{ h} \\ &= 14:30 \text{ Saturday}\end{aligned}$$

$$\begin{aligned}\text{Time of arrival in Dubai} &= 14:30 - 6 \text{ h} \\ &= 8 \text{ h } 30 \text{ min} \\ &= 8:30 \text{ am on Saturday}\end{aligned}$$

**Question 28 (a) (i)**

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

*Sample answer:*

$$P(\text{gold coin}) = \frac{4}{37}$$

**Question 28 (a) (ii)**

| Criteria                              | Marks |
|---------------------------------------|-------|
| • Provides correct answer             | 2     |
| • Makes progress towards the solution | 1     |

*Sample answer:*

$$\frac{4}{37} \times \text{Total} = 20$$

$$\begin{aligned} \text{Total} &= 20 \times \frac{37}{4} \\ &= 185 \end{aligned}$$

OR

$$\frac{x}{33} = \frac{20}{4}$$

$$x = 33 \times 5$$

$$= 165 \text{ silver coins}$$

165 silver coins and 20 gold coins = 185

 $\therefore$  Total number of coins is 185.**Question 28 (b)**

| Criteria                            | Marks |
|-------------------------------------|-------|
| • Provides correct answer           | 2     |
| • Makes progress towards the answer | 1     |

*Sample answer:*

$$\text{Total cost: } \$990 + 505 \times \$0.35 \times 5$$

$$\$990 + \$883.75$$

$$\$1873.75$$

**Question 28 (c) (i)**

| Criteria                         | Marks |
|----------------------------------|-------|
| • Provides correct answer        | 2     |
| • Provides a correct probability | 1     |

*Sample answer:*

$$\begin{aligned}
 P(\text{Win and Draw in any order}) &= P(WD) + P(DW) \\
 &= 0.7 \times 0.2 + 0.2 \times 0.7 \\
 &= 0.28
 \end{aligned}$$

**Question 28 (c) (ii)**

| Criteria                         | Marks |
|----------------------------------|-------|
| • Provides a correct explanation | 1     |

*Sample answer:*

Paul is not correct because the probability of an event occurring cannot be greater than 1.

**Question 28 (d)**

| Criteria                                                                                                                | Marks |
|-------------------------------------------------------------------------------------------------------------------------|-------|
| • Provides correct answer or correct numerical expression                                                               | 2     |
| • Provides correct value from the table or multiplies \$75 000 with a value from the correct row or column in the table | 1     |

*Sample answer:*

$$\begin{aligned}
 r &= 3\% \text{ pa} = 0.75\% \text{ pq} \\
 n &= 6 \text{ years} = 24 \text{ quarters} \\
 \therefore \text{payment} &= 0.0382 \times \$75\,000 \\
 &= \$2865
 \end{aligned}$$

**Question 28 (e) (i)**

| Criteria                            | Marks |
|-------------------------------------|-------|
| • Provides correct volume           | 2     |
| • Makes progress towards the volume | 1     |

*Sample answer:*

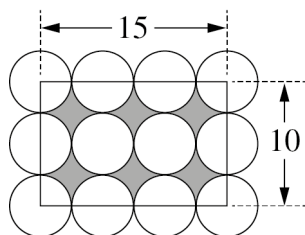
$$\begin{aligned}
 \text{Volume} &= \pi r^2 h \\
 &= \pi (2.5)^2 \times 3 \\
 &= 58.904\dots \\
 &\doteq 58.9 \text{ cm}^3
 \end{aligned}$$

**Question 28 (e) (ii)**

| Criteria                                          | Marks |
|---------------------------------------------------|-------|
| • Correct solution                                | 3     |
| • Makes significant progress towards the solution | 2     |
| • Makes some progress towards the solution        | 1     |

*Sample answer:*

$$\begin{aligned}
 \text{Volume of chocolate} &= (15 \times 10 \times 6) - (6 \times 2 \times 58.904\dots) \\
 &= 193.1416\dots \\
 &= 193 \text{ cm}^3 \text{ (nearest cm}^3\text{)}
 \end{aligned}$$



**Question 29 (a) (i)**

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

*Sample answer:*

$$P(\text{heads and tails}) = \frac{1}{2}$$

**Question 29 (a) (ii)**

| Criteria                                                    | Marks |
|-------------------------------------------------------------|-------|
| • Provides correct solution or correct numerical expression | 2     |
| • Makes progress towards the solution                       | 1     |

*Sample answer:*

| Outcome         | $P$           | \$    | Exp         |
|-----------------|---------------|-------|-------------|
| 2 heads         | $\frac{1}{4}$ | +\$40 | +\$10       |
| 2 tails         | $\frac{1}{4}$ | +\$20 | <u>+\$5</u> |
|                 |               |       | \$0         |
| Heads and tails | $\frac{1}{2}$ | -\$30 | -\$15       |

$\therefore$  Financial expectation is \$0.

**Question 29 (b) (i)**

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

*Sample answer:*

$$A = 1.5$$

**Question 29 (b) (ii)**

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

*Sample answer:*

10%

**Question 29 (c)**

| Criteria                                           | Marks |
|----------------------------------------------------|-------|
| • Provides correct solution                        | 3     |
| • Makes significant progress towards the solution  | 2     |
| • Provides one correct median, or equivalent merit | 1     |

*Sample answer:*

Women  
Median = 55  
Negatively skewed

Men  
Median = 45  
Positively skewed

Pat is correct since the women's median age (55) is higher than the men's median age (45) and there are more women in the older age group (negatively skewed).

**Question 29 (d) (i)**

| Criteria         | Marks |
|------------------|-------|
| • Correct answer | 1     |

*Sample answer:*

From calculator  $r = 0.90680755$   
 $\doteq 0.907$  (3 decimal places)

**Question 29 (d) (ii)**

| Criteria                                                                                      | Marks |
|-----------------------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                                   | 3     |
| • Makes significant progress towards the solution                                             | 2     |
| • Provides correct gradient or correct numerical expression for gradient, or equivalent merit | 1     |

*Sample answer:*

$$\text{gradient} = r \times \frac{\text{standard deviation of } y \text{ scores}}{\text{standard deviation of } x \text{ scores}}$$

$$\begin{aligned}\text{Gradient} &= 0.9 \times \frac{13.73}{9.05} \\ &= 1.365414\dots\end{aligned}$$

$$y\text{-intercept} = \bar{y} - (\text{gradient} \times \bar{x})$$

$$\begin{aligned}y\text{-int} &= 66 - (1.365414\dots \times 69.4) \\ &= 66 - 94.75973\dots \\ &= -28.75973\dots\end{aligned}$$

$$\therefore y = 1.37x - 28.76$$

Note: If  $r = 0.907$  is used then  $m = 1.3760\dots$

$$y = 1.38x - 29.5$$

**Question 29 (e) (i)**

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

*Sample answer:*

68 years

**Question 29 (e) (ii)**

| Criteria                                                          | Marks |
|-------------------------------------------------------------------|-------|
| • Provides correct explanation with reference to the value of $m$ | 2     |
| • Makes progress towards the correct explanation                  | 1     |

*Sample answer:*

Gradient = 0.25 (using two points on the graph).

Life expectancy increases by 0.25 years (3 months) for each year later that a person is born.

**Question 30 (a)**

| Criteria                                                  | Marks |
|-----------------------------------------------------------|-------|
| • Provides correct solution                               | 2     |
| • Correctly converts one measurement, or equivalent merit | 1     |

*Sample answer:*

$$V = Ah$$

$$= 30 \times 0.02$$

$$\text{Volume} = 0.6 \text{ m}^3$$

$$\text{Volume} = 600 \text{ L}$$

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

**Question 30 (b) (i)**

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

*Sample answer:*

$$(6.44 - 3.44) \times 1024 = 3072 \text{ MB}$$

**Question 30 (b) (ii)**

| Criteria                                             | Marks |
|------------------------------------------------------|-------|
| • Provides correct solution                          | 3     |
| • Makes significant progress towards the solution    | 2     |
| • Provides a correct conversion, or equivalent merit | 1     |

*Sample answer:*

$$\text{Speed} = \frac{3072 \times 1024 \times 1024 \times 8}{1\,000\,000} \div (7 \times 60)$$

$$= 61.3566$$

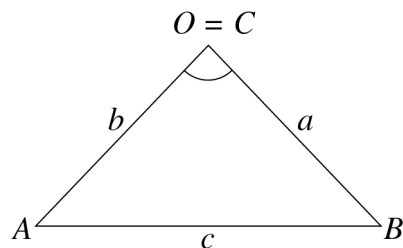
$$\doteq 61 \text{ Mbps}$$

**Question 30 (c)**

| Criteria                                                                                             | Marks |
|------------------------------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                                          | 5     |
| • Makes significant progress towards the solution                                                    | 4     |
| • Correctly calculates area of rectangle AND attempts to calculate another area, or equivalent merit | 3     |
| • Correctly finds the length of $AB$ , or equivalent merit                                           | 2     |
| • Attempts to find $AB$ , or equivalent merit                                                        | 1     |

**Sample answer:**

$$\begin{aligned}
 c^2 &= a^2 + b^2 - 2ab\cos C \\
 (AB)^2 &= 45^2 + 45^2 - 2(45)(45)\cos 100^\circ \\
 &= 4753.275\dots \\
 AB &= 68.9439
 \end{aligned}$$



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

$$\begin{aligned}
 \text{Area of rectangle} &= AB \times 20 \\
 &= 1378.879\dots
 \end{aligned}$$

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

$$\begin{aligned}
 \text{Area of } \triangle AOB &= \frac{1}{2} \times 45 \times 45 \times \sin 100^\circ \\
 &= 997.11784\dots
 \end{aligned}$$

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

$$\begin{aligned}
 \text{Area of major sector} &= \frac{260}{360} \times \pi \times 45^2 \\
 &= 4594.5792\dots
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Total area} &= 1378.879\dots + 997.11784\dots + 4594.5792\dots \\
 &= 6970.5760\dots \\
 &= 6971 \text{ m}^2
 \end{aligned}$$

**Question 30 (d) (i)**

| Criteria                | Marks |
|-------------------------|-------|
| • Substitutes correctly | 1     |

*Sample answer:*

$$\bar{x} = 88 - 2.4s$$

**Question 30 (d) (ii)**

| Criteria                                                                       | Marks |
|--------------------------------------------------------------------------------|-------|
| • Provides correct solution                                                    | 3     |
| • Makes significant progress towards the solution                              | 2     |
| • Provides a pair of equations and attempts to solve them, or equivalent merit | 1     |

*Sample answer:*

$$\bar{x} = 88 - 2.4s \quad \textcircled{1}$$

$$\bar{x} = 52 + 1.2s \quad \textcircled{2}$$

$$\textcircled{1} - \textcircled{2} \quad 0 = 36 - 3.6s$$

$$3.6s = 36$$

$$s = \frac{36}{3.6} = 10$$

$$\bar{x} = 52 + 1.2 \times 10$$

$$= 64$$

$\therefore$  The value of  $\bar{x}$  is 64 and  $s$  is 10.

# 2016 HSC Mathematics General 2

## Mapping Grid

### Section I

| Question | Marks | Content                                                             | Syllabus outcomes |
|----------|-------|---------------------------------------------------------------------|-------------------|
| 1        | 1     | MM1 (*2) Units of measurement – p40                                 | MGP-5             |
| 2        | 1     | AM1 (*6) Algebraic manipulation – p52                               | MGP-3             |
| 3        | 1     | FSHe1 (*7) Body measurements – p108                                 | MG2H-7            |
| 4        | 1     | AM4 (*13) Modelling linear relationships – p102                     | MG2H-6, MG2H-10   |
| 5        | 1     | AM1 (*3) Algebraic manipulation – p52                               | MGP-3             |
| 6        | 1     | PB2 (*1) Multistage events – p96                                    | MGH-8             |
| 7        | 1     | DS1 (*4) Statistics and society, data collection and sampling – p32 | MGP-10            |
| 8        | 1     | FM2 (*6) Investing money – p26                                      | MGP-2, MGP-6      |
| 9        | 1     | FSRe1 (*3) Water availability and usage – p116                      | MG2H-10, MG2H-1   |
| 10       | 1     | FSDr3 (*4) Safety – p68                                             | MGP-5             |
| 11       | 1     | FSHe2 (*3) Medication – p110                                        | MG2H-5            |
| 12       | 1     | MM2 (*5) Applications of perimeter, area and volume – p42           | MGP-5             |
| 13       | 1     | DS5 (*5) The normal distribution – p82                              | MG2H-2, MG2H-7    |
| 14       | 1     | AM2 (*3, *4) Interpreting linear relationships – p54                | MGP-3             |
| 15       | 1     | FSCo1 (*3) Mobile phone plans – p58                                 | MGP-6             |
| 16       | 1     | MM3 (*3) Similarity of two-dimensional figures – p44                | MGP-4, MGP-5      |
| 17       | 1     | FM4 (*1) Credit and borrowing – p74                                 | MG2H-6            |
| 18       | 1     | AM5 (*6) Modelling non-linear relationships – p104                  | MG2H-3            |
| 19       | 1     | DS2 (*8) Displaying and interpreting single data sets – p34         | MG2H-7            |
| 20       | 1     | FM1 (*2) Earning and managing money – p24                           | MGP-6             |
| 21       | 1     | DS4 (*4) Interpreting sets of data – p80                            | MG2H-7            |
| 22       | 1     | DS4 (*14) Interpreting sets of data – p80                           | MG2H-2            |
| 23       | 1     | DS4 (*18) Interpreting sets of data – p80                           | MG2H-2            |
| 24       | 1     | AM3 (*8) Further algebraic skills and techniques – p100             | MG2H-3            |
| 25       | 1     | MM5 (*6, 7) Applications of trigonometry – p90                      | MG2H-4, MG2H-5    |

**Section II**

| <b>Question</b> | <b>Marks</b> | <b>Content</b>                                                       | <b>Syllabus outcomes</b> |
|-----------------|--------------|----------------------------------------------------------------------|--------------------------|
| 26 (a)          | 1            | MM4 (*7) Further applications of area and volume – p88               | MG2H-4                   |
| 26 (b)          | 2            | AM1 (*2) Algebraic manipulations – p52                               | MGP-3                    |
| 26 (c)          | 2            | FSDr2 (*2) Fuel consumption – p66                                    | MGP-1                    |
| 26 (d)          | 2            | MM2 (*3) Applications of perimeter, area and volume – p42            | MGP-4                    |
| 26 (e)          | 3            | FM1 (*5) Earning and managing money – p24                            | MGP-6                    |
| 26 (f) (i)      | 1            | FM3 (*2) Taxation – p28                                              | MGP-6                    |
| 26 (f) (ii)     | 2            | FM3 (*4) Taxation – p28                                              | MGP-6                    |
| 26 (f) (iii)    | 2            | FM3 (*4) Taxation – p28                                              | MGP-6                    |
| 27 (a)          | 2            | FSDr1 (*2) – p64                                                     | MGP-6                    |
| 27 (b)          | 2            | DS6 (*2) Sampling and populations – p84                              | MG2H-2, MG2H-8           |
| 27 (c)          | 2            | DS4 (*3, *5) Interpreting sets of data – p80                         | MG2H-2                   |
| 27 (d) (i)      | 2            | FM4 (*3) Credit and borrowing – p74                                  | MG2H-6                   |
| 27 (d) (ii)     | 2            | FM4 (*3) Credit and borrowing – p74                                  | MG2H-6                   |
| 27 (d) (iii)    | 1            | FM4 (*3) Credit and borrowing – p74                                  | MG2H-1, MG2H-6           |
| 27 (e) (i)      | 1            | MM6 (*4) Spherical geometry – p92                                    | MG2H-4, MG2H-5           |
| 27 (e) (ii)     | 1            | MM6 (*7) Spherical geometry – p92                                    | MG2H-4, MG2H-5           |
| 27 (e) (iii)    | 2            | MM6 (*8) Spherical geometry – p92                                    | MG2H-4, MG2H-5           |
| 28 (a) (i)      | 1            | PB1 (*8) Relative frequency and probability – p48                    | MGP-2, MGP-8             |
| 28 (a) (ii)     | 2            | DS6 (*4) Sampling and populations – p84                              | MG2H-1, MG2H-2, MG2H-9   |
| 28 (b)          | 2            | FSRe3 (*6) Energy and sustainability – p120                          | MG2H-9                   |
| 28 (c) (i)      | 2            | PB2 (*3, *7) Multistage events and applications of probability – p96 | MG2H-8                   |
| 28 (c) (ii)     | 1            | PB2 (*7) Multistage events and applications of probability – p96     | MG2H-8, MG2H-10          |
| 28 (d)          | 2            | FM5 (*2) Annuities and loan repayments – p76                         | MG2H-1, MG2H-6           |
| 28 (e) (i)      | 2            | MM4 (*9) Further applications of perimeter, area and volume – p88    | MGP-4                    |
| 28 (e) (ii)     | 3            | MM2 (*5) Further applications of area and volume – p42               | MG2H-4                   |

| Question    | Marks | Content                                                                                                      | Syllabus outcomes               |
|-------------|-------|--------------------------------------------------------------------------------------------------------------|---------------------------------|
| 29 (a) (i)  | 1     | PB2 (*3) Multistage events and applications of probability – p96                                             | MG2H-8                          |
| 29 (a) (ii) | 2     | PB2 (*10) Multistage events and applications of probability – p96                                            | MG2H-8                          |
| 29 (b) (i)  | 1     | AM5 (*3) Modelling non-linear relationship – p104                                                            | MG2H-3                          |
| 29 (b) (ii) | 1     | AM5 (*3) Modelling non-linear relationship – p104                                                            | MG2H-3                          |
| 29 (c)      | 3     | DS4 (*10, *17) Interpreting sets of data – p80                                                               | MG2H-1, MG2H-2, MG2H-10         |
| 29 (d) (i)  | 1     | FSHe1 (*5) Body measurements – p108                                                                          | MG2H-2, MG2H-7                  |
| 29 (d) (ii) | 3     | FSHe1 (*9) Body measurements – p108                                                                          | MG2H-2, MG2H-7                  |
| 29 (e) (i)  | 1     | FSHe3 (*1) Life expectancy – p112                                                                            | MG2H-2                          |
| 29 (e) (ii) | 2     | AM4 (*4, *6) Modelling linear relationships – p102                                                           | MG2H-3                          |
| 30 (a)      | 2     | FSRe2 (*6) Dams, land and catchment areas – p118                                                             | MG2H-5                          |
| 30 (b) (i)  | 1     | FSCo2 (*2) Digital download and file storage – p60                                                           | MGP-2, MGP-5, MGP-9             |
| 30 (b) (ii) | 3     | FSCo2 (*4) Digital download and file storage – p60                                                           | MGP-2, MGP-5, MGP-9             |
| 30 (c)      | 5     | MM4 (*2, *3) Further application of area and volume – p88<br>MM5 (*7, *8) Applications of trigonometry – p90 | MG2H-4, MG2H-5                  |
| 30 (d) (i)  | 1     | AM1 (*5) Algebraic manipulation – p52                                                                        | MGP-2                           |
| 30 (d) (ii) | 3     | AM3 (*9) Further algebraic skills and techniques – p100                                                      | MG2H-2, MG2H-7, MG2H-9, MG2H-10 |