

2018 HSC Mathematics General 2 Marking Guidelines

Section I

Multiple-choice Answer Key

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

Section II

Question 26 (a)

Criteria	Marks
• Provides correct answer or correct numerical expression	1

Sample answer:

$$\begin{aligned}\text{Relative frequency} &= \frac{48}{23 + 19 + 48 + 20 + 21 + 19} \\ &= \frac{48}{150}\end{aligned}$$

Question 26 (b)

Criteria	Marks
• Provides correct answer or correct numerical expression	2
• Substitutes correctly into formula, or equivalent merit	1

Sample answer:

Let x be the weight of the child.

$$90 = \frac{x \times 325}{70}$$

$$x = \frac{90 \times 70}{325}$$

$$= 19 \text{ kg}$$

Question 26 (c)

Criteria	Marks
• Provides correct answer	1

Sample answer:

$$\begin{aligned}\text{Amount} &= 12 \times 100 \times 5 \\ &= \$6000\end{aligned}$$

Question 26 (d) (i)

Criteria	Marks
• Provides correct answer	1

Sample answer:

3

Question 26 (d) (ii)

Criteria	Marks
• Identifies correct city and provides correct explanation	1

Sample answer:

Sydney has the smaller standard deviation because it has less variation in mean monthly rainfall than Perth.

Question 26 (e)

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

Sample answer:

Total of 42 scores split into two halves of 21 scores.

We need the 11th and 32nd scores (when arranged in ascending order)

IQ range = $5 - 3 = 2$

Question 26 (f)

Criteria	Marks
• Provides correct answer or correct numerical expression	1

Sample answer:

$6 \times 5 = 30$

Question 26 (g) (i)

Criteria	Marks
• Provides correct solution	1

Sample answer:

The measured length of AG is 8 cm.

Therefore, 8 cm = 24 m.

Dividing by 8, 1 cm = 3 m.

Question 26 (g) (ii)

Criteria	Marks
• Provides correct solution	3
• Calculates correct area, or equivalent merit	2
• Provides a correct relevant length or equivalent merit	1

Sample answer:

AB measures 3 cm and therefore the actual length of AB is 9 m.

BF measures 6 cm and therefore the actual length of BF is 18 m.

$$\text{Area } ABFG = \frac{9}{2}(18 + 24)$$

$$= 189 \text{ m}^2$$

$$\text{Fertiliser needed} = 26.5 \times 189$$

$$= 5008.5 \text{ grams}$$

Question 26 (h)

Criteria	Marks
• Provides correct solution	2
• Substitution into correct formula, or equivalent merit	1

Sample answer:

$$\text{Value after three years} = 23\,900 (1 - 0.115)^3$$

$$= 16\,566.3835\dots$$

$$= \$16\,566.38$$

Question 27 (a)

Criteria	Marks
• Provides correct answer or correct numerical expression	2
• Calculates correct cost of SMS or data, or equivalent merit	1

Sample answer:

$$\begin{aligned}\text{Amount owing} &= 50 + 0.33 \times 120 + 0.26 \times 1400 \\ &= \$453.60\end{aligned}$$

Question 27 (b)

Criteria	Marks
• Provides correct answer	3
• Provides one correct value or equivalent merit	2
• Attempts to substitute for y into second equation, or equivalent merit	1

Sample answer:

$$\begin{aligned}3(x+5) - x &= 7 \\ 3x + 15 - x &= 7 \\ 2x &= -8 \\ x &= -4 \\ \therefore y &= -4 + 5 \\ y &= 1 \\ \therefore \text{Solution is } x &= -4 \text{ and } y = 1\end{aligned}$$

Question 27 (c)

Criteria	Marks
• Provides correct solution or correct numerical expression	2
• Attempts to calculate curved surface area, or equivalent merit	1

Sample answer:

$$\text{The radius is } \frac{3.8}{2} = 1.9 \text{ m}$$

$$\begin{aligned}\text{Area} &= 2\pi rh \div 2 \\ &= 2\pi \times 1.9 \times 10 \div 2 \\ &= 59.69... \\ &= 60 \text{ m}^2\end{aligned}$$

Question 27 (d) (i)

Criteria	Marks
• Provides correct answer or correct numerical expression	1

Sample answer:

$$\begin{aligned}\text{Hourly rate} &= \frac{360}{3} \\ &= \$120\end{aligned}$$

Question 27 (d) (ii)

Criteria	Marks
• Provides correct equation	2
• Calculates correct y-intercept or gradient, or equivalent merit	1

Sample answer:

From the graph, $b = 75$

$$\begin{aligned}\text{Gradient, } m &= \frac{360 - 75}{3} \\ &= 95\end{aligned}$$

Substituting,

$$c = 95x + 75$$

Question 27 (d) (iii)

Criteria	Marks
• Provides correct solution	2
• Calculates one correct cost or equivalent merit	1

Sample answer:

Company A cost is $5 \times 120 = \$600$

Company B cost is $95 \times 5 + 75 = \$550$

\therefore Company B is \$50 cheaper than Company A.

Question 27 (e) (i)

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

Sample answer:

$$\begin{aligned}
 z &= \frac{x - \bar{x}}{s} \\
 &= \frac{70 - 58}{8} \\
 &= 1.5
 \end{aligned}$$

Question 27 (e) (ii)

Criteria	Marks
<ul style="list-style-type: none"> Provides correct answer or correct numerical expression 	2
<ul style="list-style-type: none"> Correctly substitutes into z-score formula, or equivalent merit 	1

Sample answer:

$$\begin{aligned}
 z &= \frac{x - \bar{x}}{s} \\
 1.5 &= \frac{x - 64}{10} \\
 15 &= x - 64 \\
 x &= 79
 \end{aligned}$$

Question 28 (a)

Criteria	Marks
• Provides correct solution or correct numerical expression	3
• Correctly applies Simpson's rule (one application), or equivalent merit	2
• Makes progress towards solution	1

Sample answer:

$$h = 7.5$$

$$\begin{aligned} \text{Approximate area} &= \frac{7.5}{3}(8.8 + 4 \times 7.1 + 9.8) + \frac{7.5}{3}(9.8 + 4 \times 8.5 + 4.9) \\ &= 117.5 + 121.75 \\ &= 239.25 \text{ m}^2 \end{aligned}$$

Question 28 (b)

Criteria	Marks
• Provides correct solution	3
• Makes significant progress towards solution	2
• Demonstrates a correct algebraic step, or equivalent merit	1

Sample answer:

$$\begin{aligned} \frac{2x}{5} + \frac{5}{5} &= \frac{3x+1}{2} \\ 2(2x+5) &= 5(3x+1) \\ 4x+10 &= 15x+5 \\ 5 &= 11x \\ x &= \frac{5}{11} \end{aligned}$$

Question 28 (c)

Criteria	Marks
• Provides correct solution or correct numerical expression	3
• Calculates correct total energy usage (kWh), or equivalent merit	2
• Correctly calculates one conversion, or equivalent merit	1

Sample answer:

$$\begin{aligned}\text{kW} &= 1200 \div 1000 \\ &= 1.2\end{aligned}$$

$$\begin{aligned}\text{kWh per day} &= 1.2 \times \left(\frac{45}{60} \times 0.4 \right) \\ &= 0.36\end{aligned}$$

$$\begin{aligned}\text{kWh for 180 days} &= 180 \times 0.36 \\ &= 64.8\end{aligned}$$

$$\begin{aligned}\text{Running cost} &= 0.25 \times 64.8 \\ &= \$16.20\end{aligned}$$

Question 28 (d) (i)

Criteria	Marks
• Provides correct solution	2
• Makes progress towards solution	1

Sample answer:

$$\begin{aligned}\text{Interest charged} &= \$849 \times 0.123 \times \frac{24}{365} \\ &= \$6.86643\dots \\ &= \$6.87\end{aligned}$$

$$\begin{aligned}\text{Balance owing} &= \$849 + \$6.87 \\ &= \$855.87\end{aligned}$$

Question 28 (d) (ii)

Criteria	Marks
• Provides correct answer or correct numerical expression	1

Sample answer:

$$\begin{aligned}\text{Balance owing} &= 855.87 - 450 + 3 \\ &= \$408.87\end{aligned}$$

Question 28 (e)

Criteria	Marks
• Provides correct solution	3
• Correctly finds reaction-time distance, or equivalent merit	2
• Correctly finds braking distance, or equivalent merit	1

Sample answer:

$$70 \text{ km/h} = \frac{70 \times 1000}{60 \times 60}$$

$$= 19.4 \text{ m/s}$$

$$\text{Reaction-time distance} = 19.4 \times 1.5$$

$$= 29.16 \text{ m}$$

$$\text{Braking distance} = 0.01 \times 70^2$$

$$= 49 \text{ m}$$

$$\text{Stopping distance} = 29.16 + 49$$

$$= 78.16$$

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

Question 29 (a)

Criteria	Marks
• Provides correct answer	3
• Makes significant progress towards solution	2
• Makes progress towards solution	1

Sample answer:

John leaves New Delhi at 11.30 am (New Delhi time) which is 4 pm Brisbane time.

John arrives in Brisbane at 9 am the following day.

John arrives 17 hours after departing.

$$\begin{aligned}\text{Flying time} &= 17 - 3 \\ &= 14 \text{ hours}\end{aligned}$$

Question 29 (b)

Criteria	Marks
• Provides correct answer or correct numerical expression	2
• Divides their calculated number of megabits by 82.7, or equivalent merit	1

Sample answer:

$$495 \text{ MB} = 495 \times 2^{20} \times 8 \text{ bits}$$

$$\begin{aligned}\text{Time taken} &= \frac{495 \times 2^{20} \times 8}{82.7 \times 1000\,000} \\ &= 50.2... \\ &= 50 \text{ seconds (nearest second)}\end{aligned}$$

Question 29 (c) (i)

Criteria	Marks
• Provides correct equation	2
• Identifies equation as $D = \frac{k}{A}$, or equivalent merit	1

Sample answer:

$$D = \frac{k}{A}$$

Substituting point P , we have

$$15 = \frac{k}{300}$$

$$\therefore k = 4500$$

$$\therefore D = \frac{4500}{A}$$

Question 29 (c) (ii)

Criteria	Marks
• Provides correct answer or correct numerical expression	1

Sample answer:

$$4 = \frac{4500}{A}$$

$$4A = 4500$$

$$A = \frac{4500}{4}$$

$$\text{Area} = 1125 \text{ cm}^2$$

Question 29 (d) (i)

Criteria	Marks
<ul style="list-style-type: none"> Provides correct solution using the formula $y\text{-intercept} = \bar{y} - (\text{gradient} \times \bar{x})$ (from formulae and data sheet) 	1

Sample answer:

$$\begin{aligned}
 b &= \bar{y} - (\text{gradient} \times \bar{x}) \\
 &= 65.01 - (-0.984 \times 20) \\
 &= 84.69
 \end{aligned}$$

Question 29 (d) (ii)

Criteria	Marks
<ul style="list-style-type: none"> Provides correct explanation 	1

Sample answer:

This involves extrapolation beyond the range of the data and therefore does not give a valid estimate.

OR

$$\begin{aligned}
 \text{Substituting } x = 87, \text{ we get } y &= -0.984 \times 87 + 84.69 \\
 &= -0.918
 \end{aligned}$$

A negative life expectancy is not valid.

Question 29 (d) (iii)

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

Sample answer:

$$\begin{aligned}
 \text{Life expectancy} &= -0.984 \times 37 + 84.69 \\
 &= 48.282 \text{ years}
 \end{aligned}$$

Question 29 (d) (iv)

Criteria	Marks
• Provides correct solution	2
• Substitutes their y from part (iii) into the male life expectancy equation, or equivalent merit	1

Sample answer:

$$48.282 = -0.972x + 80.44$$

$$0.972x = 80.44 - 48.282$$

$$x = \frac{32.158}{0.972}$$

$$= 33.08\dots$$

$$= 33 \text{ years}$$

Question 29 (e)

Criteria	Marks
• Provides correct answer or correct numerical expression	2
• Provides a correct repayment amount, or equivalent merit	1

Sample answer:

Based on the original repayments, Andrew has to pay $243 \times 6 \times 12 = \$17\,496$ after the end of year 4.

Based on the increased repayment, Andrew has to pay $281 \times 5 \times 12 = \$16\,860$ after the end of year 4.

He pays $17\,496 - 16\,860 = \$636$ less.

Question 30 (a)

Criteria	Marks
• Provides correct solution or correct numerical expression	3
• Calculates h correctly from their volume, or equivalent merit	2
• Converts ML to cubic metres, or equivalent merit	1

Sample answer:

$$\begin{aligned}
 1.26 \text{ megalitres} &= 1.26 \times 1\,000\,000 \\
 &= 1\,260\,000 \text{ litres} \\
 &= \frac{1\,260\,000}{1000} \\
 &= 1260 \text{ m}^3
 \end{aligned}$$

$$1260 = \pi \times 9^2 \times h$$

$$\begin{aligned}
 \therefore h &= \frac{1260}{81 \times \pi} \\
 &= 4.9514... \\
 &= 4.95 \text{ m (two decimal places)}
 \end{aligned}$$

Question 30 (b) (i)

Criteria	Marks
• Provides correct answer, or correct numerical expression	2
• Attempts to use the correct tax bracket for the correct taxable income, or equivalent merit	1

Sample answer:

$$\text{New income} = 87\,000 + 16\,800$$

$$= \$103\,800$$

$$\text{Tax payable} = 19\,822 + 0.37 \times (103\,800 - 87\,000)$$

$$= \$26\,038$$

Question 30 (b) (ii)

Criteria	Marks
• Provides correct answer, or correct numerical expression	2
• Provides one correct net annual pay, or equivalent merit	1

Sample answer:

$$\text{Net annual income before pay rise} = 87\,000 - 19\,822$$

$$= \$67\,178$$

$$\text{Net annual income after pay rise} = 87\,000 + 16\,800 - 26\,038$$

$$= \$77\,762$$

$$\text{Extra money} = 77\,762 - 67\,178$$

$$= \$10\,584$$

Question 30 (c)

Criteria	Marks
• Provides correct solution	3
• Correctly substitutes into $A = \frac{1}{2}ab\sin C$, or equivalent merit	2
• Calculates the length of AC, or equivalent merit	1

Sample answer:

$$\sin 62^\circ = \frac{AC}{13}$$

$$\begin{aligned} AC &= 13 \times \sin 62^\circ \\ &= 11.478... \text{ cm} \end{aligned}$$

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

$$30 = \frac{1}{2} \times 11.478... \times x \sin 40$$

$$30 = 3.689... x$$

$$x = \frac{30}{3.689...}$$

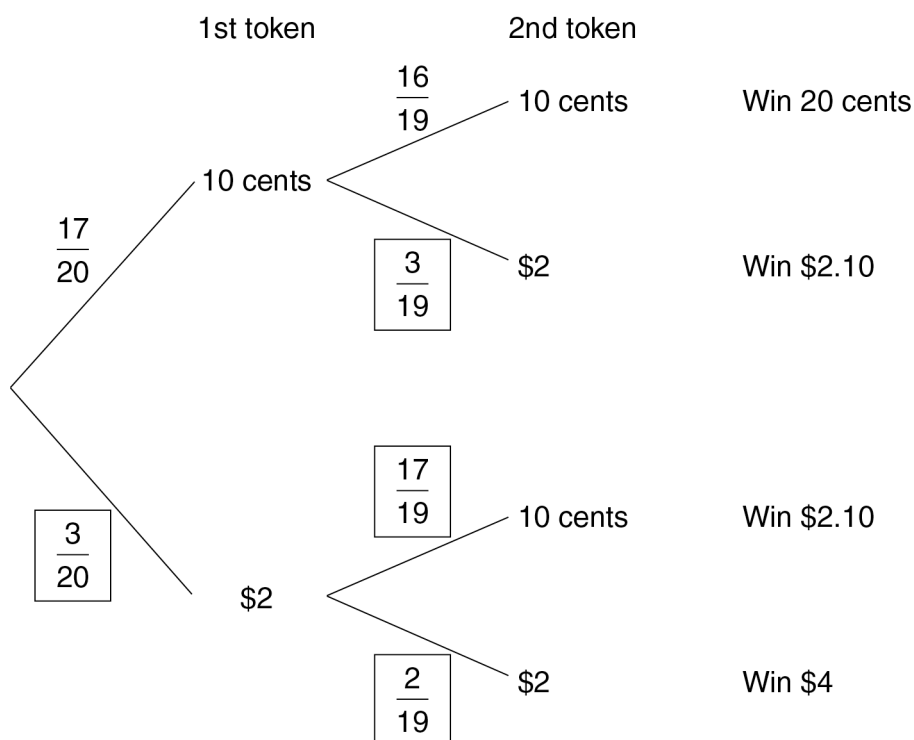
$$= 8.132...$$

$$= 8.1 \text{ (one decimal place)}$$

Question 30 (d) (i)

Criteria	Marks
• Provides all correct probabilities	2
• Provides two correct probabilities	1

Sample answer:



Question 30 (d) (ii)

Criteria	Marks
• Provides correct solution, or equivalent merit	3
• Makes significant progress towards solution	2
• Makes progress towards solution	1

Sample answer:

Financial expectation

$$= \frac{17}{20} \times \frac{16}{19} \times 0.2 + \frac{17}{20} \times \frac{3}{19} \times 2.1 + \frac{3}{20} \times \frac{17}{19} \times 2.1 + \frac{3}{20} \times \frac{2}{19} \times 4 - 1$$

$$= -\$0.23$$

∴ The financial expectation is a loss of 23 cents

2018 HSC Mathematics General 2 Mapping Grid

Section I

Question	Marks	Content	Syllabus outcomes
1	1	DS2 Displaying and interpreting single data sets (p34, ●8)	MGP-7
2	1	AM3 Further algebraic skills and techniques (p100, ●4)	MG2H-3
3	1	DS1 Statistics and society, data collection and sampling (p32, ●4)	MGP-7
4	1	AM5 Modelling non-linear relationships (p104, ●2)	MG2H-3
5	1	FSDr2 Running costs and depreciation (p66, ●1, ●2)	MGP-5
6	1	DS4 Interpreting sets of data (p80, ●8)	MG2H-2
7	1	MM5 Applications of trigonometry (p90, ●10)	MG2H-4
8	1	FM1 Earning and managing money (p24, ●1)	MGP-6
9	1	PB2 Multistage events and applications of probability (p96, ●8)	MG2H-8
10	1	DS6 Sampling and populations (p84, ●4)	MG2H-2, MG2H-7
11	1	DS4 Interpreting sets of data (p80, ●3)	MG2H-2
12	1	MM5 Applications of trigonometry (p90, ●7)	MG2H-4
13	1	MM4 Further applications of area and volume (p88, ●8)	MG2H-4
14	1	MM1 Units of measurement and applications (p40, ●10)	MGP-3
15	1	FSDr1 Costs of purchase and insurance (p64, ●2)	MGP-1
16	1	AM1 Algebraic manipulation (p52, ●2)	MGP-3
17	1	DS4 Interpreting sets of data (p80, ●15)	MG2H-2
18	1	MM4 Further applications of area and volume (p88, ●1)	MG2H-5
19	1	FM2 Investing money (p26, ●6)	MGP-6
20	1	PB1 Relative frequency and probability (p48, ●6)	MGP-2
21	1	FM1 Earning and managing money (p24, ●11)	MGP-6
22	1	MM2 Applications of perimeter, area and volume (p42, ●3)	MGP-4
23	1	DS5 The normal distribution (p82, ●5)	MG2H-7
24	1	MM6 Spherical geometry (p92, ●4)	MG2H-4
25	1	AM3 Further algebraic skills and techniques (p100, ●8)	MG2H-3

Section II

Question	Marks	Content	Syllabus outcomes
26 (a)	1	PB1 Relative frequency and probability (p48, ●5)	MGP-8
26 (b)	2	FSHe2 Medication (p110, ●5)	MG2H-5
26 (c)	1	FM5 Annuities and loan repayments (p76, ●1)	MG2H-6
26 (d) (i)	1	DS2 Displaying and interpreting single data sets (p34, ●12)	MGP-7
26 (d) (ii)	1	DS3 Summary statistics (p36, ●8)	MGP-7
26 (e)	2	DS4 Interpreting sets of data (p80, ●3)	MG2H-2
26 (f)	1	PB2 Multistage events and applications of probability (p96, ●1)	MG2H-8
26 (g) (i)	1	MM3 Similarity of two-dimensional figures, right-angled triangles (p44, ●1)	MGP-4
26 (g) (ii)	3	FSRe2 Dams, land and catchment areas (p118, ●4)	MG2H-4
26 (h)	2	FSDr2 Running costs and depreciation (p66, ●6)	MGP-6
27 (a)	2	FSCo1 Mobile phone plans (p58, ●4, ●5)	MGP-6
27 (b)	3	AM3 Further algebraic skills and techniques (p100, ●9)	MG2H-3, MH2H-10
27 (c)	2	MM4 Further applications of area and volume (p88, ●6)	MG2H-4
27 (d) (i)	1	AM4 Modelling linear relationships (p102, ●5)	MG2H-3
27 (d) (ii)	2	AM2 Interpreting linear relationships (p54, ●13) AM4 Modelling linear relationships (p102, ●5)	MGP-3, MG2H-3
27 (d) (iii)	2	AM4 Modelling linear relationships (p102, ●5)	MG2H-10
27 (e) (i)	1	DS5 The normal distribution (p82, ●3)	MG2H-7
27 (e) (ii)	2	DS5 The normal distribution (p82, ●3)	MG2H-7
28 (a)	3	MM4 Further applications of area and volume (p88, ●4)	MG2H-4
28 (b)	3	AM3 Further algebraic skills and techniques (p100, ●6)	MG2H-3
28 (c)	3	FSRe3 Energy and sustainability (p120, ●4)	MG2H-5
28 (d) (i)	2	FM4 Credit and borrowing (p74, ●1)	MG2H-1, MG2H-6, MG2H-10
28 (d) (ii)	1	FM4 Credit and borrowing (p74, ●1)	MG2H-1, MG2H-6, MG2H-10
28 (e)	3	FSDr3 Safety (p68, ●2)	MGP-3, MGP-5
29 (a)	3	MM6 Spherical geometry (p92, ●6)	MG2H-5
29 (b)	2	FSCo2 Digital download and file storage (p60, ●4)	MGP-5
29 (c) (i)	2	AM5 Modelling non-linear relationships (p104, ●8)	MG2H-3
29 (c) (ii)	1	AM5 Modelling non-linear relationships (p104, ●8)	MG2H-3
29 (d) (i)	1	FSHe1 Body measurements (p108, ●9)	MG2H-7

Question	Marks	Content	Syllabus outcomes
29 (d) (ii)	1	FSHe1 Body measurements (p108, ●4) FSHe3 Life expectancy (p112, ●1) AM4 Modelling linear relationships (p102, ●12)	MG2H-3
29 (d) (iii)	1	FSHe1 Body measurements (p108, ●10)	MG2H-3
29 (d) (iv)	2	FSHe1 Body measurements (p108, ●10) FSHe3 Life expectancy (p112, ●1)	MG2H-7
29 (e)	2	FM5 Annuities and loan repayments (p76, ●7)	MG2H-6
30 (a)	3	FSRe1 Water availability and usage (p116, ●8)	MG2H-4
30 (b) (i)	2	FM3 Taxation (p28, ●4)	MGP-6
30 (b) (ii)	2	FM3 Taxation (p28, ●4)	MGP-6
30 (c)	3	MM5 Applications of trigonometry (p90, ●11)	MG2H-4
30 (d) (i)	2	PB2 Multistage events and applications of probability (p96, ●3, ●7)	MG2H-8
30 (d) (ii)	3	PB2 Multistage events and applications of probability (p96, ●10)	MG2H-8