2017 HSC Mathematics General 2
Marking Guidelines

IMPORTANT:
This resource was developed to support a previous version of the syllabus.
It may contain content that differs from the current syllabus.

Section I

Multiple-choice Answer Key

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

Section II

Question 26 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

$\$0.27 \times 20$
$= \$5.40$

Question 26 (b)

Criteria	Marks
• Provides correct answer or CNE	2
• Makes progress towards correct answer	1

Sample answer:

Cost $= \$20 + \$0.50 \times 3 + \$0.70 + \$1.40 + \$3.50$
$= \$27.10$

Question 26 (c)

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

Sample answer:

Let N be the number of goats.

$$\frac{16}{45} = \frac{80}{N}$$

$$N = \frac{80 \times 45}{16}$$

$$= 225$$

$\therefore$ The estimated number of goats the farmer has on his property is 225.

Question 26 (d)

Criteria	Marks
• Provides correct solution	2
• Uses correct trig equation or equivalent merit	1

Sample answer:

Let x be the required depth.

$$\sin 2° = \frac{x}{15000}$$

$$= 15000 \sin 2°$$

$$= 523.4\ldots$$

$$= 523 \text{ mm (to the nearest mm)}$$

Question 26 (e)

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

Sample answer:

Share cost	$= 500 \times 3.20$
	$= \$1600$
Brokerage	$= 1.5\% \times 1600$
	$= \$24$
Total cost	$= \$1624$
Share selling price	$= 500 \times 4.80$
	$= \$2400$
Dividend	$= 0.26 \times 500$
	$= \$130$
Total proceeds	$= 2400 + 130$
	$= \$2530$
Total profit	$= 2530 - 1624$
	$= \$906$

Question 26 (f) (i)

Criteria	Marks
• Provides correct answer	1

Sample answer:

4 goals

Question 26 (f) (ii)

Criteria	Marks
• Provides correct answer	1

Sample answer:

Round 3

Question 26 (g)

Criteria	Marks
• Provides correct solution	3
• Makes significant progress towards the correct solution	2
• Uses the simple interest formula correctly, or equivalent merit	1

Sample answer:

Amount borrowed $= 7990 - 500$
$= \$7490$

Interest $= 7490 \times 0.07 \times 2$
$= \$1048.60$

Repayment $= \dfrac{7490 + 1048.60}{2 \times 52}$
$= \$82.10$ per week

Question 27 (a) (i)

Criteria	Marks
• Provides correct answer or CNE	1

Sample answer:

Mean = 200.875 kL

Question 27 (a) (ii)

Criteria	Marks
• Provides correct answer	1

Sample answer:

Standard deviation = 127.35…
= 127.4 kL (1 decimal place)

Question 27 (b)

Criteria	Marks
• Provides correct solution	2
• Calculates a correct conversion of units	1

Sample answer:

3 terabytes $= 3 \times 2^{40}$ bytes

20 megabytes $= 20 \times 2^{20}$ bytes

Number of files $= \dfrac{3 \times 2^{40}}{20 \times 2^{20}}$

$= 157\,286.4$

$\therefore$ 157 286 files can fit.

Question 27 (c) (i)

Criteria	Marks
• Provides correct answer or CNE	1

Sample answer:

Future value $= 12\,000 \times 5.4163$
$= \$64\,995.60$

Question 27 (c) (ii)

Criteria	Marks
• Provides correct answer or CNE	1

Sample answer:

Interest earned $= 64\,995.60 - (5 \times 12\,000)$
$= \$4995.60$

Question 27 (d) (i)

Criteria	Marks
• Provides correct answer	1

Sample answer:

25°W

Question 27 (d) (ii)

Criteria	Marks
• Provides correct answer	1

Sample answer:

Time difference $= \dfrac{30}{15}$
$= 2$ hours
$\therefore$ Time on island B $= 10$ am $- 2$ hours
$= 8$ am

Question 27 (d) (iii)

Criteria	Marks
• Provides correct solution	3
• Provides correct answer in hours, or equivalent merit	2
• Calculates distance, or equivalent merit	1

Sample answer:

$$\text{Distance} = \frac{30}{360} \times 2\pi \times 6400$$
$$= 3351.0\ldots \text{ km}$$
$$\text{Time} = \frac{3351.0\ldots}{40} \text{ hours}$$
$$= 83.7\ldots \text{ hours}$$
$$= \frac{83.7\ldots}{24} \text{ days}$$
$$= 3.490658504 \text{ days}$$
$$= 3 \text{ days} + (0.490658504 \times 24) \text{ hours}$$
$$= 3 \text{ days} + 11.7\ldots \text{ hours}$$
$$= 3 \text{ days } 12 \text{ hours (nearest hour)}$$

Question 27 (e)

Criteria	Marks
• Provides correct solution	4
• Attempts to determine the maximum number of bottles based on the number of standard drinks (N)	3
• Solves for N, or equivalent merit	2
• Substitutes into correct formula, or equivalent merit	1

Sample answer:

$$BAC_{\text{male}} = \frac{10N - 7.5H}{6.8M}, \qquad BAC_{\text{male}} = 0.05,\ H = 5,\ M = 90$$
$$0.05 = \frac{10N - 7.5 \times 5}{6.8 \times 90}$$
$$6.8 \times 90 \times 0.05 = 10N - 7.5 \times 5$$
$$10N = 7.5 \times 5 + 6.8 \times 90 \times 0.05$$
$$N = 6.81 \quad \text{ie } 6.81 \text{ standard drinks}$$
$$\text{Number of bottles} = \frac{6.81}{0.8}$$
$$= 8.5125$$

$\therefore$ Rhys can drink a maximum of 8 complete bottles.

Question 28 (a) (i)

Criteria	Marks
• Provides correct answer, or CNE	1

Sample answer:

$F = \dfrac{9C}{5} + 32, \ C = -20$

$F = \dfrac{9 \times (-20)}{5} + 32$

Temperature $= -4$ degrees Fahrenheit

Question 28 (a) (ii)

Criteria	Marks
• Provides correct solution for C or F	2
• Makes progress towards correct solution	1

Sample answer:

$$\begin{aligned} C &= \frac{9C}{5} + 32 \\ 5C &= 9C + 160 \\ -160 &= 4C \\ C &= -40 \\ F &= -40 \end{aligned}$$

Question 28 (a) (iii)

Criteria	Marks
• Provides correct explanation	1

Sample answer:

The two lines intersect at $(-40, -40)$.

Question 28 (b) (i)

Criteria	Marks
• Provides correct answer or CNE	1

Sample answer:

$\frac{5 \times 4}{2} = 10$ groups of two

Question 28 (b) (ii)

Criteria	Marks
• Provides correct answer or CNE	1

Sample answer:

Four of the ten possible groups include Mary (ie a group including Mary and one of the other 4 team members).

$$\text{The probability} = \frac{4}{10}$$
$$= 0.4$$

Question 28 (c)

Criteria	Marks
• Provides correct solution	3
• Provides balance after one month, or equivalent merit	2
• Calculates interest, or equivalent merit	1

Sample answer:

$$\text{Amount owing after first month, } A_1 = 100\,000 \times \left(1 + \frac{0.12}{12}\right) - 1029$$
$$= \$99\,971$$
$$\text{Amount owing after second month, } A_2 = 99\,971 \times \left(1 + \frac{0.12}{12}\right) - 1029$$
$$= \$99\,941.71$$

Question 28 (d)

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

Sample answer:

$$x^2 = yp - 1$$
$$x^2 + 1 = yp$$
$$y = \frac{x^2 + 1}{p}$$

Question 28 (e) (i)

Criteria	Marks
• Provides correct answer	1

Sample answer:

From the graph, the income is maximised when the increase in ticket price is \$6.

$\therefore$ the ticket price should be \$8 + \$6 = \$14

Question 28 (e) (ii)

Criteria	Marks
• Provides correct answer	1

Sample answer:

$200 - 10 \times 6 = 140$ tickets

Question 28 (e) (iii)

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

Sample answer:

Income $= 140 \times \$14$
$= \$1960$

Cost $= 140 \times \$2 + \$500$
$= \$780$

Profit $= \$1960 - \$780$
$= \$1180$

Question 29 (a) (i)

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

Sample answer:

$$h = \frac{200}{4}$$
$$= 50$$
$$V \approx \frac{50}{3}(0 + 4 \times 140 + 270) + \frac{50}{3}(270 + 4 \times 300 + 360)$$
$$= 44\,333\frac{1}{3}\ \text{m}^3$$
$$= 44\,333\ \text{m}^3 \text{ (nearest m}^3\text{)}$$

Question 29 (a) (ii)

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

Sample answer:

$$2\ \text{km}^2 = 2 \times 1000 \times 1000$$
$$= 2\,000\,000\ \text{m}^2$$
$$V = Ah$$
$$44\,333 = 2\,000\,000 \times h$$
$$h = \frac{44\,333}{2\,000\,000}$$
$$= 0.0221\ldots\ \text{m}$$
$$= 22\ \text{mm (nearest mm)}$$

Question 29 (b)

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

Sample answer:

Tax payable $= 3572 + 0.325(86\,725 - 37\,000)$
$= \$19\,732.63$

Medicare levy $= 2\% \times 86\,725$
$= \$1734.50$

Total payable $= 19\,732.63 + 1734.50$
$= \$21\,467.13$

$\therefore$ Net income $= 86\,725 - 21\,467.13$
$= \$65\,257.87$

Question 29 (c) (i)

Criteria	Marks
• Provides correct solution	2
• Provides correct numerator or denominator, or equivalent merit	1

Sample answer:

Number of students surveyed = 3520

$$\text{Probability} = \frac{2500}{3520}$$
$$= \frac{125}{176}$$

Question 29 (c) (ii)

Criteria	Marks
• Provides correct justification with calculations	2
• Identifies correct numbers from table, or equivalent merit	1

Sample answer:

Country students who have water skied: $\frac{70}{870} \times 100 = 8.04\ldots\%$

City students who have water skied: $\frac{150}{2650} \times 100 = 5.66\ldots\%$

$\therefore$ The claim in the newspaper article is true.

Question 29 (d) (i)

Criteria	Marks
• Provides correct answer	1

Sample answer:

15th mark is 4.

16th mark is 8.

$$\text{Median} = \frac{4+8}{2}$$

$$= 6$$

Question 29 (d) (ii)

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

Sample answer:

Mean minus standard deviation $= 5.4 - 4.22$

$= 1.18$

Mean plus standard deviation $= 5.4 + 4.22$

$= 9.62$

Percentage of marks between 1.18 and 9.62 $= \frac{2+2+2+1+6}{30}$

$= \frac{13}{30}$

$= 43.3\%$ (1 decimal place)

Question 29 (d) (iii)

Criteria	Marks
• Provides correct explanation	1

Sample answer:

The dot plot does not show a normally distributed data set, so the statement is not relevant.

Question 30 (a)

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

Sample answer:

$$\begin{aligned}
\text{Interquartile range } (IQR) &= Q_U - Q_L \\
&= 16 - 10 \\
&= 6 \\
\text{Lower bound} &= Q_L - 1.5 \times IQR \\
&= 10 - 1.5 \times 6 \\
&= 1 \\
\text{Upper bound} &= Q_U + 1.5 \times IQR \\
&= 16 + 1.5 \times 6 \\
&= 25 \\
\therefore \text{ Range} &= 25 - 1 \\
&= 24
\end{aligned}$$

Question 30 (b)

Criteria	Marks
• Provides correct solution	2
• Writes a correct equation, or equivalent merit	1

Sample answer:

Let C be the cost of the jewellery box.

Let h be the height of the jewellery box.

$$\begin{aligned}
C &= kh^3 \text{ where } k \text{ is a constant.} \\
50 &= k \times 10^3 \\
\therefore k &= 0.05
\end{aligned}$$

When h=12

$$\begin{aligned}
\text{cost, } C &= 0.05 \times 12^3 \\
&= \$86.40
\end{aligned}$$

Question 30 (c) (i)

Criteria	Marks
• Provides correct solution	2
• Substitutes correctly into cosine rule, or equivalent merit	1

Sample answer:

$AC^2 = 13^2 + 5^2 - 2 \times 5 \times 13 \times \cos 135°$

$= 285.92\ldots$

$AC = \sqrt{285.92\ldots}$

$= 16.9\ldots$

$= 17$ km (nearest kilometre)

Question 30 (c) (ii)

Criteria	Marks
• Provides correct solution	3
• Calculates an angle in the triangle, or equivalent merit	2
• Substitutes correctly into sine rule or cosine rule, or equivalent merit	1

Sample answer:

$$\frac{\sin A}{13} = \frac{\sin 135°}{17}$$

$$\sin A = \frac{13 \sin 135°}{17}$$

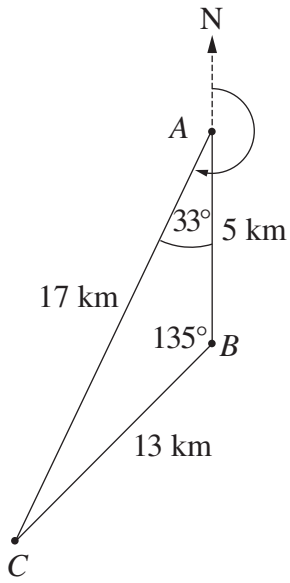
$$= 0.5407$$

$$A = 32.7\ldots°$$

$$= 33° \text{ (nearest degree)}$$

The bearing of school C from school A is

$180° + 33° = 213°$.



Question 30 (d) (i)

Criteria	Marks
• Provides correct answer, or CNE	1

Sample answer:

Speed (y) $= 2.125 \times 5 + 2.0375$
$= 12.6625$ km/h

Question 30 (d) (ii)

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

Sample answer:

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

$$2.125 = r \times \frac{2}{0.8}$$

$$\therefore r = 0.85$$

Question 30 (e)

Criteria	Marks
• Provides correct solution	3
• Makes significant progress towards correct solution	2
• Calculates the height of the cone, or equivalent merit	1

Sample answer:

$$\text{Radius of cone, } r = \sqrt{4^2 - 2^2}$$
$$= \sqrt{12} \text{ cm}$$
$$\text{Height of cone, } h = 15 - (4 + 2)$$
$$= 9 \text{ cm}$$
$$\text{Volume of cone, } V = \frac{1}{3}\pi r^2 h$$
$$= \frac{1}{3}\pi\left(\sqrt{12}\right)^2 \times 9$$
$$= 113.09\ldots$$
$$= 113 \text{ cm}^3 \text{ (to nearest cm}^3\text{)}$$

2017 HSC Mathematics General 2 Mapping Grid

Section I

Question	Marks	Content		Syllabus outcomes
1	1	DS4 (•5)	Find median from a box-and-whisker plot p80	MG2H-2
2	1	FSDr3 (•1)	Calculate distance, given speed and time p68	MGP-5
3	1	FSHe3 (•1)	Life expectancy from a graph p112	MG2H-2
4	1	DS1 (•5)	Distinguish between different sample types p32	MGP-10
5	1	DS6 (•6)	Expected number p84	MG2H-2
6	1	FM1 (•2)	Calculating fortnightly wage p24	MGP-6
7	1	AM1 (•4)	Substitution into a formula to find the subject p52	MGP-3
8	1	MM5 (•2)	Trigonometric ratios to find an angle with rounding p90	MG2H-5
9	1	AM3 (•6)	Solving linear equations p100	MG2H-3
10	1	FM2 (•5)	Using the compound interest formula p26	MGP-6
11	1	FSDr1 (•1)	Percentage decrease in car value p64	MGP-6
12	1	FSHe1 (•7)	Interpret the size of correlation coefficient from a graph p108	MG2H-2
13	1	DS5 (•2)	Calculate z-score p82	MG2H-7
14	1	FSDr2 (•3)	Compare fuel consumption of various vehicles p66	MGP-5
15	1	PB1 (•8)	Determine theoretical probability p48	MGP-8
16	1	FSRe3 (•9)	Reducing energy use p120	MG2H-2
17	1	AM4 (•9)	Identifying point of intersection of graphs p102	MG2H-3
18	1	MM2 (•5)	Volume of a prism p42	MGP-4
19	1	FSHe2 (•5)	Calculate required child dosage p110	MG2H-5
20	1	AM2 (•13)	Generalisation of linear number patterns p54	MGP-3
21	1	MM1 (•2)	Degree of accuracy of a measurement p40	MGP-5
22	1	MM4 (•10)	Volume of an annular cylinder p88	MG2H-4
23	1	FSCo2 (•2)	Convert units of data storage p60	MGP-5
24	1	PB2 (•7)	Calculate multi-stage probability p96	MG2H-8
25	1	MM6 (•1)	Calculate arc length p92	MG2H-4

Section II

Question	Marks	Content		Syllabus outcomes
26 (a)	1	FSRe3 (•4)	Electricity cost p120	MG2H-5
26 (b)	2	FSCo1 (•3)	Cost of a phone bill p58	MGP-6
26 (c)	2	DS6 (•4)	Capture–recapture p84	MG2H-3
26 (d)	2	MM3 (•6)	Angle of depression p44	MGP-4
26 (e)	3	FM2 (•10)	Shares p26	MGP-6
26 (f) (i)	1	DS4 (•15)	Area chart p80	MG2H-7
26 (f) (ii)	1	DS4 (•15)	Area chart p80	MG2H-7
26 (g)	3	FM4 (•2)	Flat-rate loan p74	MG2H-6
27 (a) (i)	1	FSRel (•2)	Mean of water use p116	MGP-1
27 (a) (ii)	1	FSRel (•2)	Standard deviation of water use p116	MG2H-7
27 (b)	2	FSCo2 (•3)	Number of files on a disc p60	MGP-5
27 (c) (i)	1	FM5 (•2)	FV annuity p76	MG2H-6
27 (c) (ii)	1	FM5 (•6)	Interest on an annuity p76	MG2H-6
27 (d) (i)	1	MM6 (•4)	Longitude value p92	MG2H-4
27 (d) (ii)	1	MM6 (•7)	Time calculation p92	MG2H-4
27 (d) (iii)	3	MM6 (•5)	Using speed to calculate time	MG2H-5
27 (e)	4	FSDr3 (•4)	Male BAC, number of drinks in given time p68	MGP-3
28 (a) (i)	1	AM1 (•4)	Substitution to convert from C to F p52	MGP-3
28 (a) (ii)	2	AM4 (•10)	Solving simultaneous equations p102	MG2H-3
28 (a) (iii)	1	AM4 (•9)	Interpreting a solution p102	MG2H-3
28 (b) (i)	1	PB2 (•5)	Combinations p96	MG2H-8
28 (b) (ii)	1	PB2 (•7)	Probability p96	MG2H-8
28 (c)	3	FM4 (•3)	Reducible loan without repayment table p74	MG2H-6
28 (d)	2	AM3 (•8)	Change the subject of equation p100	MG2H-3
28 (e) (i)	1	AM5 (•1)	Location of maximum value from quadratic graph p104	MG2H-3
28 (e) (ii)	1	AM5 (•1)	Interpreting written information p104	MG2H-3
28 (e) (iii)	2	AM5 (•1)	Calculating profit p104	MG2H-3
29 (a) (i)	2	FSRe2 (•7)	Simpson’s rule (volume) p118	MG2H-4
29 (a) (ii)	2	FSRe2 (•6)	Catchment area p118	MG2H-4

Question	Marks	Content		Syllabus outcomes
29 (b)	3	FM3 (•4)	Tax table calculation p28	MG2H-6
29 (c) (i)	2	DS4 (•18)	Probability with two-way table p80	MG2H-2
29 (c) (ii)	2	DS4 (•18)	Justifying opinion with calculations p80	MG2H-2
29 (d) (i)	1	DS3 (•1)	Median p36	MGP-7
29 (d) (ii)	2	DS5 (•2)	Using mean and standard deviation p82	MG2H-7
29 (d) (iii)	1	DS5 (•4)	Normal distribution explanation p82	MG2H-7
30 (a)	2	DS4 (•5)	Outliers p80	MG2H-7
30 (b)	2	AM5 (•6)	Variation p104	MG2H-3
30 (c) (i)	2	MM5 (•7)	Cosine rule p90	MG2H-4
30 (c) (ii)	3	MM5 (•11)	Calculate bearing p90	MG2H-4
30 (d) (i)	1	AM1 (•4)	Substitution p52	MGP-3
30 (d) (ii)	2	FSHe1 (•5)	Correlation from least–squares equation p108	MG2H-7
30 (e)	3	MM4 (•8)	Volume of a cone p88	MG2H-4