BOSTES | BOARD OF STUDIES TEACHING & EDUCATIONAL STANDARDS NSW

2015 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	D
2	A
3	B
4	A
5	B
6	C
7	B
8	C
9	B
10	A
11	D
12	C
13	A
14	C
15	B
16	D
17	C
18	A
19	D
20	A
21	C
22	D
23	D
24	B
25	C

Section II

Question 26 (a)

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

Sample answer:

$$\frac{18 \times 26}{4} = 117$$

Question 26 (b)

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

Sample answer:

$$\text{Dosage} = \frac{35 \times 3150}{70}$$
$$= 1575 \text{ mg}$$

$$\text{Number of tablets} = \frac{1575}{525}$$
$$= 3$$

Question 26 (c)

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

Sample answer:

$$\frac{40}{360} \times 2 \times \pi \times 6400 = 4468.042\ldots$$

distance = 4468 km

Question 26 (d)

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

Sample answer:

$$A = 320\,(1 + 0.029)^5$$

amount = \$369.17

Question 26 (e) (i)

Criteria	Marks
• Provides the correct answer	1

Sample answer:

$1 - 0.83 = 0.17$

Question 26 (e) (ii)

Criteria	Marks
• Provides the correct answer	1

Sample answer:

$1 - 0.14 = 0.86$

Question 26 (f)

Criteria	Marks
• Provides a correct numerical expression for the area	2
• Makes progress towards the correct solution	1

Sample answer:

$$0.71 \times 4 \times \pi \times 6400^2 = 365\,450\,163.7\ldots$$

$$\text{area} = 3.7 \times 10^8 \text{ km}^2$$

Question 26 (g)

Criteria	Marks
• Provides a correct numerical expression of the total	3
• Makes significant progress towards the correct solution	2
• Correctly calculates the cost of the calls or makes progress towards the cost of the data	1

Sample answer:

$\$561 - \$550 = \$11$

$1.7 \text{ GB} = 1.7 \times 1024 \text{ MB}$
$= 1740.8 \text{ MB}$

$(1740.8 - 500) \times \$0.0293 = \$36.36$

$\therefore$ Last month's bill $= \$49 + \$11 + \$36.36$
$= \$96.36$

Question 27 (a)

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

Sample answer:

$$\frac{\text{shadow}}{19.2} = \frac{5}{1.65}$$

$$\text{shadow} = \frac{5}{1.65} \times 19.2$$
$$= 58.18\ldots$$
$$= 58 \text{ m}$$

Question 27 (b)

Criteria	Marks
• Provides a correct numerical expression for the number of drops per minute	2
• Makes progress towards the correct solution	1

Sample answer:

$$\frac{2400 \times 15}{12 \times 60} = 50 \text{ drops/min}$$

Question 27 (c) (i)

Criteria	Marks
• Provides the correct values for x and y	2
• Provides one correct value, or equivalent merit	1

Sample answer:

$$\begin{aligned} x + 18y &= 1510 \\ x + 36y &= 2770 \\ 18y &= 1260 \\ y &= 70 \\ x + 18 \times 70 &= 1510 \\ x &= 1510 - 18 \times 70 \\ &= 250 \end{aligned}$$

Question 27 (c) (ii)

Criteria	Marks
• Provides the correct answer	2
• Attempts to use \$4800 and the solution from (i) to find the number of months or equivalent merit	1

Sample answer:

$(\$4800 - 250) \div 70 = 65$ months

Question 27 (d) (i)

Criteria	Marks
• Determines that it is an outlier, justified with correct calculations	3
• Makes significant progress towards the correct solution	2
• Calculates correctly the IQR, or equivalent merit	1

Sample answer:

\$300 \$490 \$520 \$590 \$660 \$680 \$970
Q_L Median Q_U

IQR = 680 – 490
= \$190

\$680 + 1.5 × \$190 = \$965
∴ Since \$970 > \$965, it is an outlier.

Question 27 (d) (ii)

Criteria	Marks
• Provides the correct answer	1

Sample answer:

The standard deviation is not affected.

Question 27 (e)

Criteria	Marks
• Provides the correct answer	3
• Makes significant progress towards the correct answer	2
• Provides one correct conversion	1

Sample answer:

$$\begin{aligned} 42 \text{ MB} &= 42 \times 2^{20} \times 8 \\ &= 352\,321\,536 \text{ bits} \\ \text{Time} &= \frac{352\,321\,536}{500 \times 1000} \\ &= 704.643\ldots \text{ seconds} \\ &= 11.744\ldots \text{ minutes} \\ &= 11 \text{ minutes } 45 \text{ seconds} \end{aligned}$$

Question 28 (a)

Criteria	Marks
• Provides a correct numerical expression for the area	1

Sample answer:

$\pi(5^2 - 3^2) = 50.265\ldots$

area $\doteqdot 50.3$ cm^2

Question 28 (b)

Criteria	Marks
• Determines that the claim is correct, justified with correct and appropriate calculations	2
• Correctly calculates one z-score or equivalent merit	1

Sample answer:

Maths z-score: $\dfrac{74 - 70}{6.5} = 0.6153$

English z-score: $\dfrac{80 - 75}{8} = 0.625$

$\therefore$ Kristoff is correct since English z-score is higher than Maths z-score.

Question 28 (c)

Criteria	Marks
• Provides the correct answer	3
• Makes significant progress towards the correct answer	2
• Makes some relevant progress, eg correct value of h or correct conversion to litres	1

Sample answer:

Simpson's Rule:

$$V = \frac{h}{3}\left[A_L + 4A_M + A_R\right]$$

$$= \frac{15}{3}[45 + 4 \times 180 + 35]$$

Volume = 4000 cm^3

Capacity = 4000 mL

= 4 L

Question 28 (d)

Criteria	Marks
• Provides the correct answer	2
• Substitutes correctly into the formula	1

Sample answer:

$$C = \frac{5}{9}(F - 32)$$

$$3 = \frac{5}{9}(F - 32)$$

$$\frac{27}{5} = F - 32$$

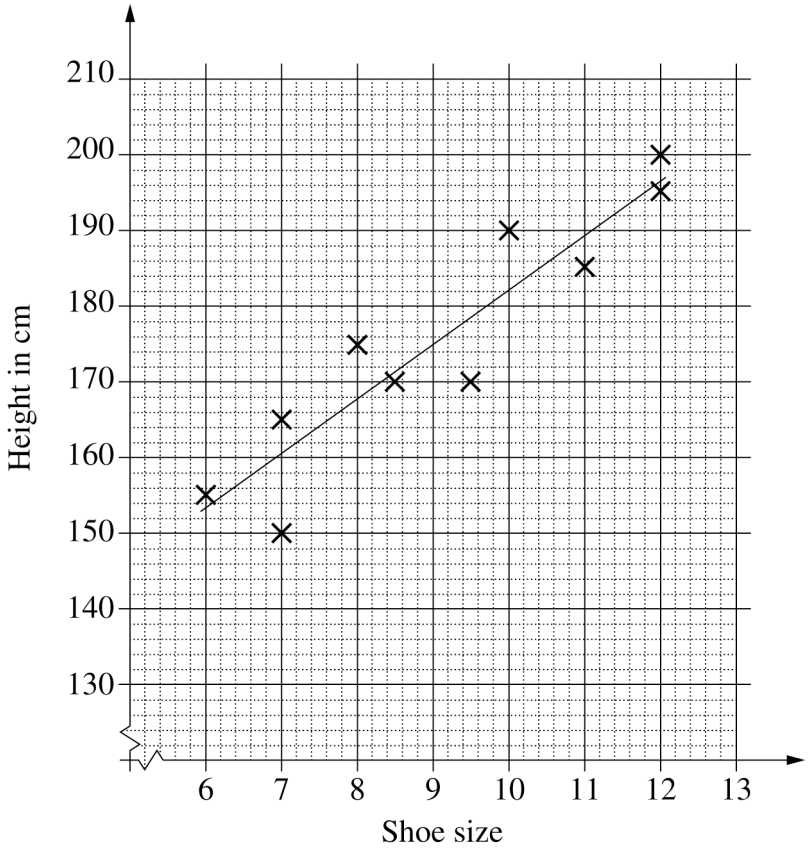
$$F = 32 + \frac{27}{5}$$

$\therefore\ 3°\text{C} = 37.4°\text{F}$

Question 28 (e) (i)

Criteria	Marks
• Correctly completes the scatterplot AND draws line of fit	2
• Plots the points correctly or draws line of fit using plotted points	1

Sample answer:



Question 28 (e) (ii)

Criteria	Marks
• Provides the correct answer from the line of fit drawn	1

Sample answer:

175 cm – 164 cm = 11 cm

Question 28 (e) (iii)

Criteria	Marks
• Provides a correct explanation	1

Sample answer:

All points do not lie on a line.

Question 28 (f) (i)

Criteria	Marks
• Provides the correct equation	1

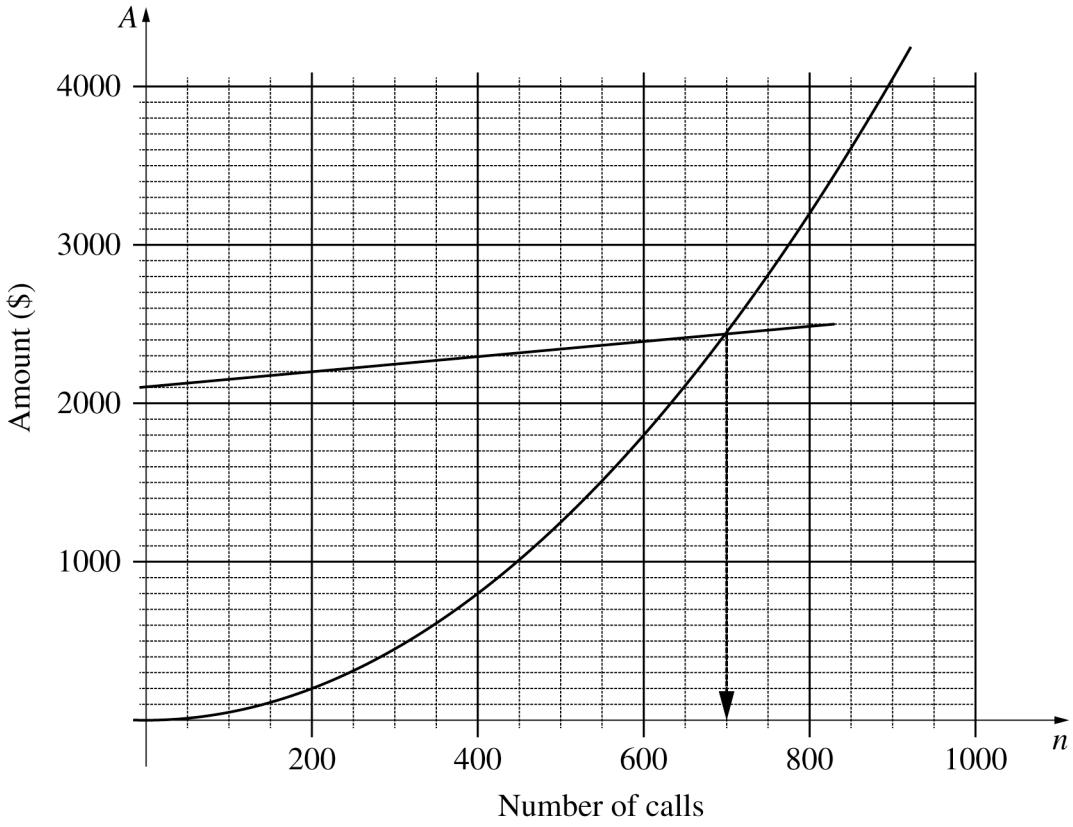
Sample answer:

$C = 2100 + 0.5n$

Question 28 (f) (ii)

Criteria	Marks
• Correctly graphs the equation and determines the correct breakeven point	2
• Makes progress towards the correct solution	1

Sample answer:



The charity needs to make 700 calls.

Question 29 (a)

Criteria	Marks
• Provides a correct numerical expression for the amount paid	2
• Makes progress towards the correct solution	1

Sample answer:

$$\left(\frac{18.4}{100}\times 425\right)\times\frac{12}{365} = \$2.57$$

$\therefore$ Total amount paid = \$2.57 + \$425 = \$427.57

Question 29 (b)

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

Sample answer:

$(8 \times 12 \times \$1880) - 80\,000$
$= \$180\,480 - 80\,000$
$= \$100\,480$

Question 29 (c) (i)

Criteria	Marks
• Determines the scale and correctly verifies the area	2
• Makes progress towards verifying the area, eg finds correct scale	1

Sample answer:

1 cm $= 3$ m $(12 \div 4 = 3)$
6 cm $\Rightarrow 18$ m
Area $= 18 \times 12$ m^2
$= 216$ m^2

Question 29 (c) (ii)

Criteria	Marks
• Provides the correct answer	3
• Makes significant progress towards the correct answer	2
• Calculates the volume of water, or equivalent merit	1

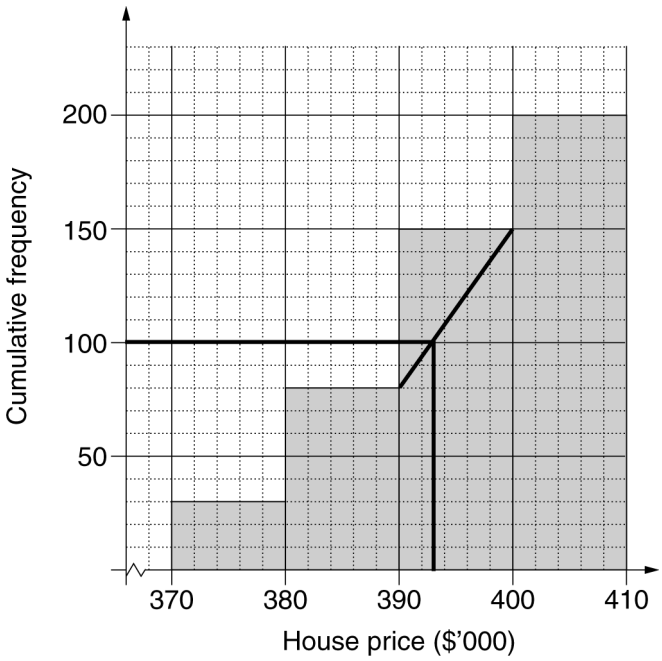
Sample answer:

$V = 216 \times 0.005$ (m^3)
$= 1.08$ (m^3)
$\therefore 1.08 = \pi \times 1.8^2 \times h$
$h = 0.106103\ldots$
$= 0.106\ldots$ m
Increase in depth $\doteqdot 0.106$ m
$\doteqdot 106$ mm

Question 29 (d) (i)

Criteria	Marks
• Provides a correct estimate	1

Sample answer:



Median House Price = $393 000

Question 29 (d) (ii)

Criteria	Marks
• Provides the correct answer	3
• Makes significant progress towards the correct answer	2
• Provides at least 2 correct class centres with correct corresponding frequencies	1

Sample answer:

Class centre ($'000)	*Frequency*
375	30
385	50
395	70
405	50

$$\bar{x} = \frac{(375 \times 30) + (385 \times 50) + (395 \times 70) + (405 \times 50)}{200}$$

$= \$392$

$\therefore$ Mean House Price = $392 000

Question 29 (e)

Criteria	Marks
• Provides a correct explanation	2
• Makes a correct interpretation using the graph	1

Sample answer:

The diving board is 8 m above the water (where the graph cuts the vertical axis). To find how high the diver was above the board, subtract 8 metres from the maximum height of the graph which is approximately 9.2 m (or which occurs at 0.5 on the horizontal axis).

Question 30 (a)

Criteria	Marks
• Provides a correct numerical expression for the saving	2
• Makes progress towards the correct solution	1

Sample answer:

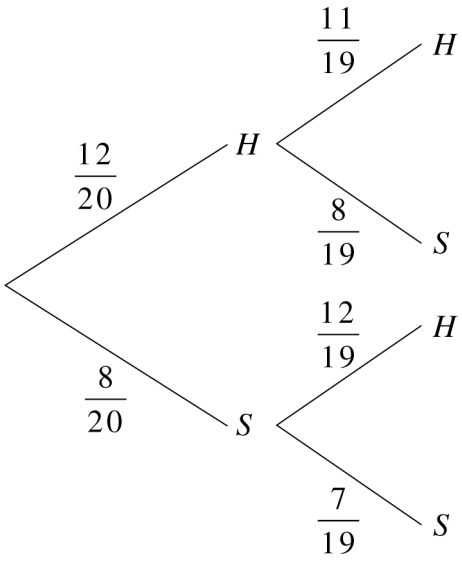
$$20 \times \frac{21}{1000} \times 0.31 \times 11 \times 7 \times 24 = \$240.61$$

$\therefore$ The school saves \$240.61

Question 30 (b)

Criteria	Marks
• Provides the correct probability	3
• Makes significant progress towards the correct answer	2
• Correctly completes the probability tree, or equivalent merit	1

Sample answer:



$$P(\text{one of each type}) = P(HS) + P(SH)$$

$$= \frac{12}{20} \times \frac{8}{19} + \frac{8}{20} \times \frac{12}{19}$$

$$= \frac{48}{95}$$

OR 0.505 or 50.5%

Question 30 (c) (i)

Criteria	Marks
• Provides a correct numerical expression for the value	1

Sample answer:

Value = $\$200 \times 55.68446$
= \$11 136.89

Question 30 (c) (ii)

Criteria	Marks
• Provides a correct numerical expression for the monthly repayment	2
• Makes progress towards the correct solution	1

Sample answer:

10.8% p.a. = (10.8 ÷ 12)% per/month
= 0.9%
= 0.009
6 years = 72 months

Monthly repayment = \$21 500 ÷ 52.82118
= \$407.03
= \$407

Question 30 (d)

Criteria	Marks
• Provides a correct numerical expression for the stopping distance	2
• Makes progress towards the correct solution	1

Sample answer:

Reaction – time distance $= s \times t$

$$= \frac{110\,000}{3600} \times 2$$

$$= 61.11\ldots$$

Stopping distance $= 61.11\ldots + 59.2$
$= 120.311\ldots$
= 120 m

Question 30 (e) (i)

Criteria	Marks
• Correctly substitutes into the cosine rule to give a correct numerical expression for PC	1

Sample answer:

$$PC = \sqrt{5.4^2 + 1.8^2 - 2(5.4)(1.8)\cos 108°}$$

$$= \sqrt{38.407\ldots}$$

$$\therefore PC = 6.1973\ldots$$

Question 30 (e) (ii)

Criteria	Marks
• Provides the correct answer	4
• Makes significant progress towards finding PE, or equivalent merit	3
• Correctly calculates an angle in $\triangle PSC$, or equivalent merit	2
• Makes some progress towards the correct solution, eg attempts to find an angle in $\triangle PSC$ OR writes a correct trig equation involving h	1

Sample answer:

$$\frac{\sin C}{5.4} = \frac{\sin 108°}{6.197}$$

$$\sin C = 0.8287\ldots$$

$$\therefore C = 55.969\ldots°$$

$$= 55°58'$$

In $\triangle PCE$, $\cos 55°58' = \dfrac{PE}{6.197}$

$$\therefore PE = 6.197 \times \cos 55°58'$$

$$= 3.468\ldots$$

$$\therefore h = 3.468 - 2.1$$

$$= 1.3680\ldots$$

height $\doteqdot$ 1.37 m

2015 HSC Mathematics General 2
Mapping Grid

Section I

Question	Marks	Content		Syllabus outcomes
1	1	MMI	Sig fig, sci notation	MGP-2
2	1	AM3	Simple Algebra (Adding like terms)	MG2H-3
3	1	FMI	Net pay	MGP-6
4	1	DSI	Classify Data	MGP-7
5	1	AM5	Identify Non-linear graphs	MG2H-3
6	1	DS4	Interpreting box and whisker plot	MG2H-1, 7
7	1	MM5	Radial Survey	MG2H-4
8	1	MM4	Volume of a cone/pyramid	MG2H-4
9	1	MM5	Right Angled Trigonometry	MG2H-4
10	1	FsDr2	Depreciation	MGP-6
11	1	AM3	Index Laws	MG2H-3
12	1	MM4	Percentage Error	MG2H-5
13	1	AM2	$y = mx + b$	MGP-2
14	1	MM6	Time Differences	MG2H-4
15	1	FM3	Tax	MGP-6
16	1	PB2	Probability	MG2H-8
17	1	FM4	PV of annuity (Compound interest)	MG2H-6
18	1	PB2	Counting Techniques	MG2H-8
19	1	FsHe3	Life Expectancy	MG2H-2
20	1	DS5	Normal Distribution	MG2H-7
21	1	PB2	Counting Techniques	MG2H-8
22	1	MM5	Area of a triangle	MG2H-4
23	1	FsDr3	BAC	MGP-3
24	1	AM3	Linear Equation	MG2H-3, 9
25	1	FsDr1	Car Insurance	MGP-6

Section II

Question	Marks	Content	Syllabus outcomes
26 (a)	2	DS6 Capture recapture	MG2H-2
26 (b)	2	FSHe2 Medication	MG2H-5
26 (c)	2	MM6 Simple Distance	MG2H-4
26 (d)	2	FM2 Appreciation	MGP-6
26 (e) (i)	1	PB1 Relative frequencies	MGP-8
26 (e) (ii)	1	PB1 Relative frequencies	MGP-8
26 (f)	2	MM4 SA Sphere	MG2H-4
26 (g)	3	FsCo1 Mobile Phone	MGP-6
27 (a)	2	MM3 Similar Triangles	MGP-4
27 (b)	2	FsHe2 Medication	MG2H-5
27 (c) (i)	2	AM4 Simultaneous equations	MG2H-3
27 (c) (ii)	2	AM4 Simultaneous equations	MG2H-3
27 (d) (i)	3	DS4 Outliers	MG2H-2 MG2H-7
27 (d) (ii)	1	DS4 Standard Deviation	MGP-10
27 (e)	3	FsCo2 Rates (File downloads)	MGP-5
28 (a)	1	MM4 Annulus Area	MG2H-4
28 (b)	2	DS5 z-scores	MG2H-2 MG2H-7
28 (c)	3	FSRe2 Simpson's rule – Volume	MG2H-4
28 (d)	2	AM3 Sub in and solve (Temp.)	MG2H-3
28 (e) (i)	2	FsHe1 Scatterplot and line of best fit	MG2H-7
28 (e) (ii)	1	FsHe1 Scatterplot and line of best fit	MG2H-2
28 (e) (iii)	1	FsHe1 Correlation	MG2H-7
28 (f) (i)	1	AM4 Breakeven using Quadratic	MG2H-3
28 (f) (ii)	2	AM4 Breakeven using Quadratic	MG2H-3
29 (a)	2	FM4 Credit Card	MG2H-6
29 (b)	2	FM5 Home loan graphs	MG2H-6
29 (c) (i)	2	MM2, FsRe2 Scale Drawing roof area	MG2H-9 MG2H-4
29 (c) (ii)	3	MM2, FsRe2 Volume	MG2H-4
29 (d) (i)	1	DS4 Grouped data	MG2H-2 MG2H-10
29 (d) (ii)	3	DS4 Grouped data	MG2H-2 MG2H-10

Question	Marks	Content	Syllabus outcomes
29 (e)	2	AM5 Non Linear Modelling	MG2H-3
30 (a)	2	FsRe3 Energy Use	MG2H-5
30 (b)	3	PB2 Probability Tree	MG2H-8
30 (c) (i)	1	FM5 Present Value Table	MG2H-6
30 (c) (ii)	2	FM5 Present Value Table	MG2H-6
30 (d)	2	FsDR3 Stopping Distances	MGP-5
30 (e) (i)	1	MM5 Trig, diagram given	MG2H-4
30 (e) (ii)	4	MM5 Trig, diagram given	MG2H-4