2023 HSC Mathematics Standard 1 Marking Guidelines

Section I

Multiple-choice Answer Key

Question	Answer
1	C
2	B
3	A
4	D
5	D
6	A
7	C
8	D
9	C
10	B

Section II

Question 11 (a)

Criteria	Marks
• Provides correct answers for A and B	2
• Provides one answer, or equivalent merit	1

Sample answer:

$$\begin{aligned} A &= \$65\,000 \times 15 \\ &= \$975\,000 \end{aligned}$$

$$\begin{aligned} B &= \$540\,000 + \$715\,000 + \$975\,000 + \$525\,000 + \$255\,000 \\ &= \$3\,010\,000 \end{aligned}$$

Question 11 (b)

Criteria	Marks
• Provides correct answer, or equivalent merit	1

Sample answer:

$$\begin{aligned} \bar{x} &= \frac{\$3\,010\,000}{50} \\ &= \$60\,200 \end{aligned}$$

Question 12 (a)

Criteria	Marks
• Provides correct answer	2
• Provides 1 dimension in metres, or equivalent merit	1

Sample answer:

Dimensions are 5.2 m by 5.94 m

Question 12 (b)

Criteria	Marks
• Provides correct answer	2
• Provides the area of the kitchen floor, or equivalent merit	1

Sample answer:

$$\text{Number of tiles} = \frac{3.6\text{ m}}{0.4\text{ m}} = 9 \text{ tiles} \qquad \frac{3.2\text{ m}}{0.4\text{ m}} = 8 \text{ tiles}$$

$$\begin{aligned}\text{Number of tiles} &= 9 \times 8 \\ &= 72 \text{ tiles}\end{aligned}$$

Question 12 (c)

Criteria	Marks
• Provides correct answer, or equivalent merit	1

Sample answer:

$$\begin{aligned}\text{Number of boxes} &= \frac{72}{10} \\ &= 7.2\end{aligned}$$

$\therefore$ 8 boxes are needed.

Question 13 (a)

Criteria	Marks
• Identifies correct mode	1

Sample answer:

The mode is 9.

Question 13 (b)

Criteria	Marks
• Identifies TWO features of the graph	2
• Identifies ONE feature of the graph	1

Sample answer:

- Negatively skewed data.
- An outlier at 1.

Question 14 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$
$$= \frac{150 \text{ km}}{1.5 \text{ h}}$$
$$= 100 \text{ km/h}$$

Question 14 (b)

Criteria	Marks
• Provides correct answer	1

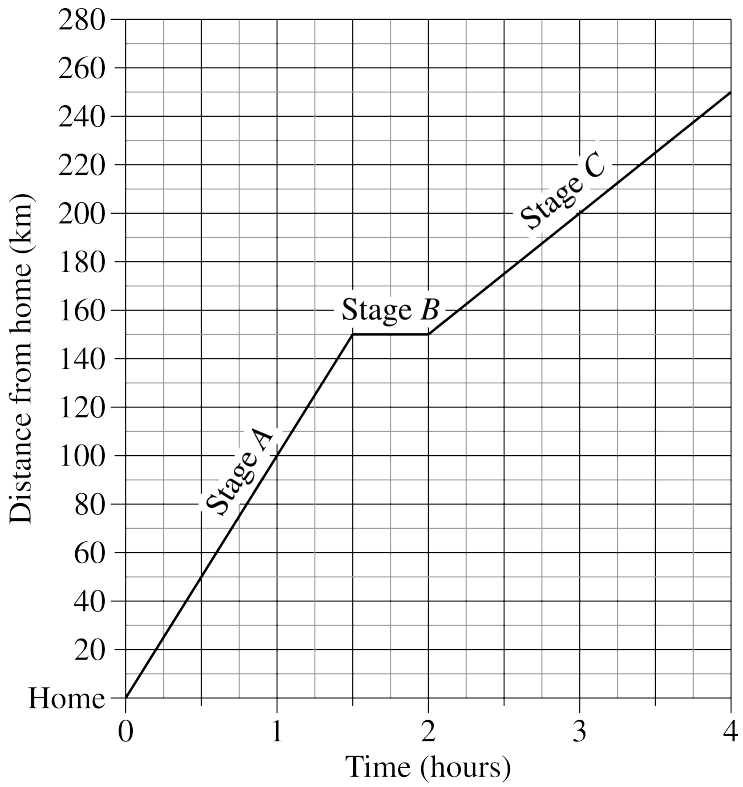
Sample answer:

30 minutes

Question 14 (c)

Criteria	Marks
• Provides correct graph	2
• Attempts to complete the graph	1

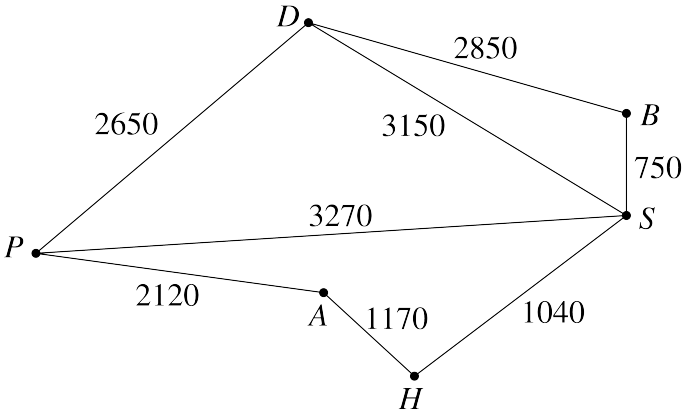
Sample answer:



Question 15 (a)

Criteria	Marks
• Completes the network diagram	2
• Provides a diagram that is substantially correct	1

Sample answer:



Question 15 (b)

Criteria	Marks
• Provides correct answer	1

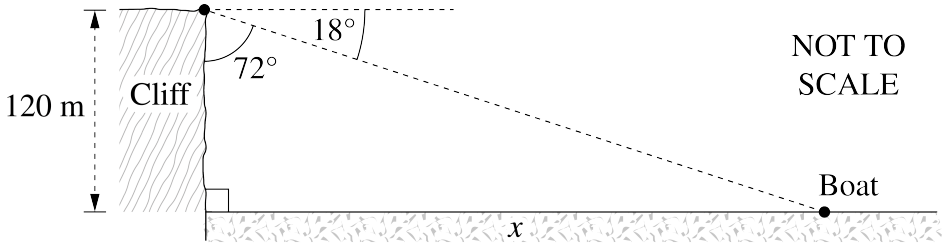
Sample answer:

$$\begin{aligned}\text{Kilometres travelled} &= 1040 \text{ km} + 3150 \text{ km} \\ &= 4190 \text{ km}\end{aligned}$$

Question 16

Criteria	Marks
• Provides correct solution	2
• Attempts to use the tan ratio, or equivalent merit	1

Sample answer:



$\theta = 90° - 18°$

$= 72°$

$$\tan 72° = \frac{x}{120 \text{ m}}$$

$$x = 120 \text{ m} \times \tan 72°$$

$$= 369.322\ldots$$

$$= 369 \text{ m} \qquad \text{(to nearest metre)}$$

Question 17

Criteria	Marks
• Provides correct answer	2
• Attempts to substitute values into equation, or equivalent merit	1

Sample answer:

$$P = \frac{10 \times 6 - 7.5 \times 2}{9}$$

$$= 5$$

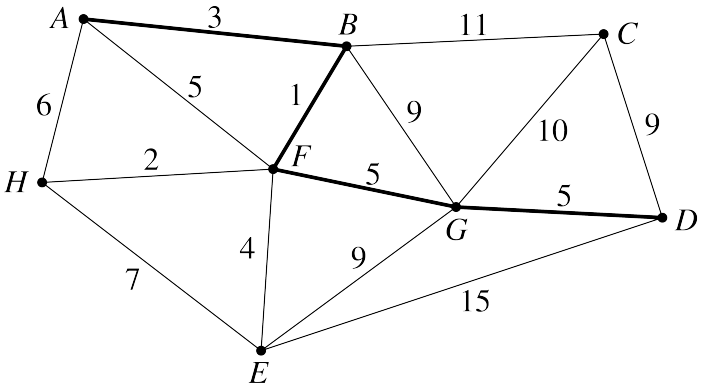
Question 18 (a)

Criteria	Marks
• Provides correct answer	2
• Provides a path from *A* to *D*, or equivalent merit	1

Sample answer:

Path *ABFGD*

Answers could include:



Question 18 (b)

Criteria	Marks
• Provides correct answer with a correct reason	2
• Provides an explanation or spanning tree, or equivalent merit	1

Sample answer:

It is not a minimum spanning tree as *BC* is not the shortest path to join *C* to the tree.

Question 19 (a)

Criteria	Marks
• Provides correct solution	2
• Substitutes 23 into the formula	1

Sample answer:

$$\begin{aligned} y &= 0.936x - 8.929 \\ 23 &= 0.936x - 8.929 \\ x &= \frac{23 + 8.929}{0.936} \\ &= 34.1121 \\ &= 34°\text{C} \qquad \text{(to nearest degree)} \end{aligned}$$

Question 19 (b)

Criteria	Marks
• Provides correct answer and justification	2
• Provides some relevant information	1

Sample answer:

It is an example of extrapolation as 34°C is outside the range of temperature.

Question 20

Criteria	Marks
• Provides correct solution	3
• Applies $1.5 \times IQR$	2
• Finds the IQR, or equivalent merit	1

Sample answer:

$$\begin{aligned} Q_1 &= 29 \\ Q_3 &= 45 \end{aligned}$$

$$\begin{aligned} IQR &= 45 - 29 \\ &= 16 \end{aligned}$$

$$1.5 \times IQR = 24$$

$$\begin{aligned} Q_3 + 24 &= 45 + 24 \\ &= 69 \end{aligned}$$

$58 < 69$
So 58 is NOT an outlier.

Question 21

Criteria	Marks
• Provides correct solution	3
• Uses the compound interest formula with either n or r correct	2
• Attempts to use the compound interest formula, or equivalent merit	1

Sample answer:

$$\begin{aligned} FV &= PV(1 + r)^n \\ &= \$12\,000(1 + 1\%)^{5 \times 4} \\ &= \$12\,000(1.01)^{20} \\ &= \$14\,642.280\ldots \\ &= \$14\,642.28 \end{aligned}$$

Question 22

Criteria	Marks
• Provides correct solution	4
• Calculates the pay for Monday to Saturday, or equivalent merit	3
• Calculates the pay for Monday to Friday, or equivalent merit	2
• Calculates the pay for one week-day, or equivalent merit	1

Sample answer:

Earnings (Monday to Friday) $= \$24.05 \times 4 \times 5$
$= \$481$

Earnings on Saturday $= \$24.05 \times 1.5 \times 2.5$
$= \$90.19$

Earnings on Sunday $= \$24.05 \times 2 \times 3$
$= \$144.30$

Total earnings for the week $= \$481 + \$90.19 + \$144.30$
$= \$715.49$

Question 23

Criteria	Marks
• Provides correct solution	3
• Calculates the fuel cost for one of the cars, or equivalent merit	2
• Calculates the number of litres used by the petrol car, or equivalent merit	1

Sample answer:

Petrol car $= (35\,000 \div 100) \times 8.6 \times \$1.87$
$= \$5628.70$

Electric car $= (35\,000 \div 100) \times 18 \times \$0.25$
$= \$1575$

Savings $= \$5628.70 - \$1575$
$= \$4053.70$

Question 24 (a)

Criteria	Marks
• Provides the correct values of A and B	2
• Provides one value, or equivalent merit	1

Sample answer:

$$A = \$5090.54 \times 0.6\%$$
$$= \$30.54$$

$$B = \$5090.54 + \$30.54$$
$$= \$5121.08$$

Question 24 (b)

Criteria	Marks
• Provides correct solution	2
• Attempts to apply the simple interest formula	1

Sample answer:

$$\text{Simple interest} = \$5000 \times 0.62\% \times 4$$
$$= \$124$$

Question 25

Criteria	Marks
• Provides correct solution	2
• Attempts to use the compound interest formula	1

Sample answer:

$$\text{Value in 8 years' time} = \$15\,000(1 + 5.3\%)^8$$
$$= \$15\,000(1 + 0.053)^8$$
$$= \$22673.482\ldots$$
$$= \$22673.48$$

Question 26 (a)

Criteria	Marks
• Completes the table correctly	1

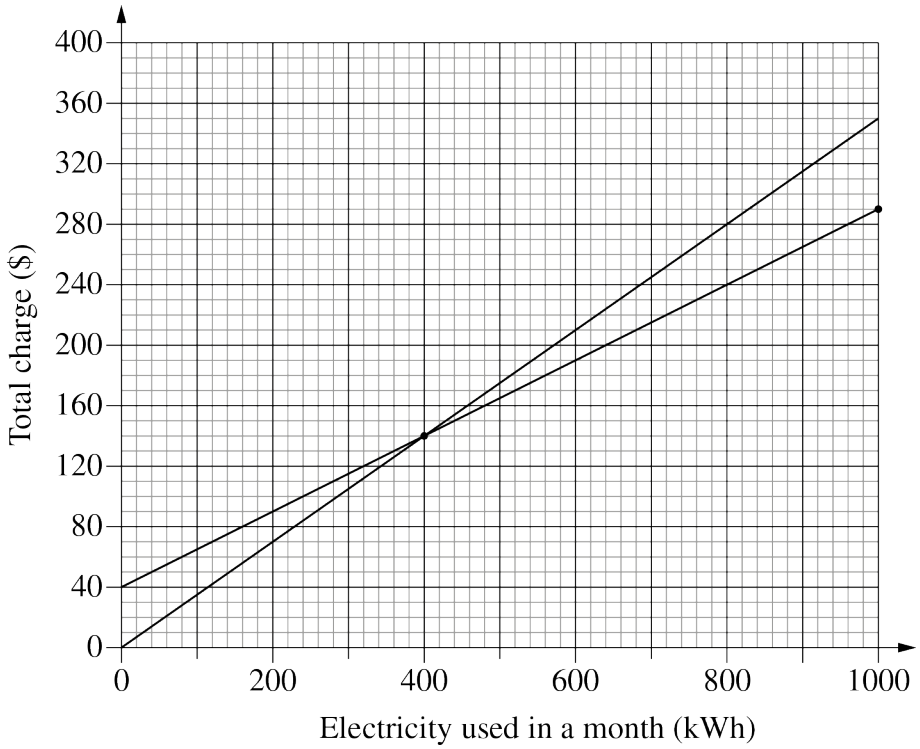
Sample answer:

Electricity used in a month (kWh)	0	400	1000
Monthly charge ($)	40	**140**	290

Question 26 (b)

Criteria	Marks
• Graphs Provider A's charges	1

Sample answer:



Question 26 (c)

Criteria	Marks
• Provides correct answer	1

Sample answer:

They charge the same amount at 400 kWh.

Question 26 (d)

Criteria	Marks
• Provides correct solution	2
• Demonstrates some progress towards identifying the cheaper option, or equivalent merit	1

Sample answer:

Provider *B* at 800 kWh charges \$280

Provider *A* at 800 kWh charges \$240

$\therefore$ Provider *A* would be the cheaper option by \$40.

Question 27

Criteria	Marks
• Provides correct answer	2
• Calculates the time difference, or equivalent merit	1

Sample answer:

Time difference is 4 hours.

$\therefore$ 11:30 am + 2 hours – 4 hours = 9:30 am

Question 28

Criteria	Marks
• Provides correct solution	2
• Identifies the necessary information from the table	1

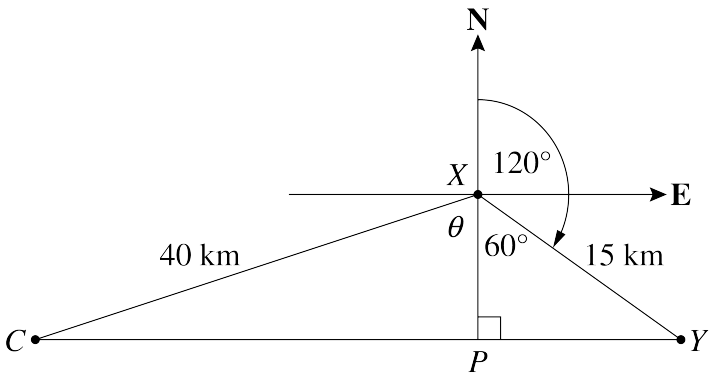
Sample answer:

$$\begin{aligned} 6\% \times \text{daily intake} &= 19.1 \text{ g} \\ \text{Daily intake} &= 19.1 \text{ g} \div 6\% \\ &= 318.333\ldots \text{ g} \\ &= 318 \text{ g} \end{aligned}$$

Question 29 (a)

Criteria	Marks
• Provides the correct solution	2
• Identifies an angle in triangle *PXY*, or equivalent merit	1

Sample answer:



NOT TO SCALE

$\angle PXY = 180° - 120°$

$= 60°$

$XP = 15 \text{ km} \times \cos 60°$

$= 7.5 \text{ km}$

Question 29 (b)

Criteria	Marks
• Provides the correct solution	2
• Calculates one of the acute angles in the triangle *CXP*, or equivalent merit	1

Sample answer:

Let $\theta = \angle CXP$

$$\cos\theta = \frac{7.5}{40}$$

$\theta = 79°12'$

$\therefore$ Bearing of $C = 180° + 79°12'$

$= 259°12'$

$= 259°$ (to the nearest degree)

Question 30

Criteria	Marks
• Provides the correct solution	3
• Calculates the salvage value using the declining-balance method, or equivalent merit	2
• Attempts to calculate the salvage value using the declining-balance method, or equivalent merit	1

Sample answer:

Straight-line method:
$$\begin{aligned} S &= V_0 - D_n \\ &= \$60\,000 - \$3500 \times 3 \\ &= \$49\,500 \end{aligned}$$

Declining-balance method:
$$\begin{aligned} S &= V_0 (1 - r)^n \\ &= \$60\,000 (1 - 12\%)^3 \\ &= \$60\,000 (0.88)^3 \\ &= \$40\,888.32 \end{aligned}$$

$\therefore$ Declining-balance method would provide a lower salvage value.

Question 31

Criteria	Marks
• Provides correct solution	5
• Finds the area of the garden in square metres, or equivalent merit	4
• Finds the area of two sections in square metres, or equivalent merit	3
• Finds one area in square metres, or equivalent merit	2
• Applies the scale, or equivalent merit	1

Sample answer:

1 cm = 2 m

$\therefore$ Dimensions of triangle: 4 m by 8 m

$$\text{Area} = \frac{1}{2} \times 4 \times 8$$
$$= 16 \text{ m}^2$$

For L shape:

Each square is 4 m^2

$$\text{Area of all squares} = 15 \times 4$$
$$= 60 \text{ m}^2$$

$\frac{1}{2}$ Circle has radius 4 m

$$\text{Area} = \frac{1}{2} \times \pi \times 4^2$$
$$= 8\pi \div 25.13 \text{ m}^2$$

$$\text{Total area} = 16 + 60 + 25.13$$
$$= 101.13 \text{ m}^2$$

$$\text{Volume} = 101.13 \times 0.1$$
$$= 10.113 \text{ m}^3$$

2023 HSC Mathematics Standard 1 Mapping Grid

Section I

Question	Marks	Content	Syllabus outcomes
1	1	MS-M1 Applications of Measurement	MS11-3
2	1	MS-F1 Money Matters	MS11-5
3	1	MS-M5 Scale Drawings	MS1-12-3
4	1	MS-A3 Types of Relationships	MS1-12-6
5	1	MS-F3 Depreciation and Loans	MS1-12-5
6	1	MS-F1 Money Matters	MS11-5
7	1	MS-F1 Money Matters	MS11-5
8	1	MS-S2 Relative Frequency and Probability	MS11-9
9	1	MS-M5 Scale Drawings	MS1-12-3
10	1	MS-M4 Rates	MS1-12-3

Section II

Question	Marks	Content	Syllabus outcomes
11 (a)	2	MS-S1 Data Analysis	MS11-2
11 (b)	1	MS-S1 Data Analysis	MS11-7
12 (a)	2	MS-M5 Scale Drawings	MS1-12-3
12 (b)	2	MS-M5 Scale Drawings	MS1-12-4
12 (c)	1	MS-M5 Scale Drawings	MS1-12-10
13 (a)	1	MS-S1 Data Analysis	MS11-10
13 (b)	2	MS-S1 Data Analysis	MS11-10
14 (a)	1	MS-M4 Rates	MS1-12-3
14 (b)	1	MS-M4 Rates	MS1-12-3
14 (c)	2	MS-M4 Rates	MS1-12-3
15 (a)	2	MS-N1 Networks and Paths	MS1-12-8
15 (b)	1	MS-N1 Networks and Paths	MS1-12-10
16	2	MS-M3 Right-angled Triangles	MS1-12-4
17	2	MS-A1 Formulae and Equations	MS11-10
18 (a)	2	MS-N1 Networks and Paths	MS1-12-8
18 (b)	2	MS-N1 Networks and Paths	MS1-12-10
19 (a)	2	MS-S3 Further Statistical Analysis	MS1-12-7
19 (b)	2	MS-S3 Further Statistical Analysis	MS1-12-10
20	3	MS-S1 Data Analysis	MS11-10
21	3	MS-F2 Investment	MS1-12-10
22	4	MS-F1 Money Matters	MS11-10
23	3	MS-M4 Rates	MS1-12-10

24 (a)	2	MS-F2 Investment	MS1-12-5
24 (b)	2	MS-F1 Money Matters	MS11-10
25	2	MS-F2 Investment	MS1-12-5
26 (a)	1	MS-A3 Types of Relationships	MS1-12-6
26 (b)	1	MS-A3 Types of Relationships	MS1-12-6
26 (c)	1	MS-A3 Types of Relationships	MS1-12-1
26 (d)	2	MS-A3 Types of Relationships	MS1-12-1
27	2	MS-M2 Working with Time	MS11-3
28	2	MS-M1 Applications of Measurements	MS11-3
29 (a)	2	MS-M3 Right-angled Triangles	MS1-12-4
29 (b)	2	MS-M3 Right-angled Triangles	MS1-12-4
30	3	MS-F3 Depreciation and Loans	MS1-12-10
31	5	MS-M5 Scale Drawings	MS1-12-4