2022 HSC Mathematics Standard 1 Marking Guidelines

Section I

Multiple-choice Answer Key

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

Section II

Question 11 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

5 doors

Question 11 (b)

Criteria	Marks
• Provides correct solution	1

Sample answer:

$55 \text{ } \cancel{\text{mm}} : 5500 \text{ } \cancel{\text{mm}}$

$1 : 100$

Question 11 (c)

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

Sample answer:

$(5.5 \times 5) + (4 \times 7)$

$= 55.5 \text{ m}^2$

Question 12

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

Sample answer:

($210 × 9) + ($0.35 × 2700)

= $2835

Question 13 (a)

Criteria	Marks
• Demonstrates a sound understanding of the options provided	2
• Provides some relevant information	1

Sample answer:

Option A – easy to collate data.

Option B – allows for a range of responses which can be displayed in a graph.

Question 13 (b)

Criteria	Marks
• Comments on two features which are misleading	2
• Comments on one feature which is misleading	1

Sample answer:

The scale on the vertical is not consistent and the width of the first column representing 'too expensive' is larger than the other two columns.

Question 14 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

140 km

Question 14 (b)

Criteria	Marks
• Provides correct answer	1

Sample answer:

10 am

Question 14 (c)

Criteria	Marks
• Provides correct answer	1

Sample answer:

$40 + 40 + 140 = 220$ km

Question 14 (d)

Criteria	Marks
• Provides correct answer and justifies their response	2
• Provides times or justification, or equivalent merit	1

Sample answer:

11–11:30 am, the slope is the steepest.

Question 15 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

Maximum heart rate $= 220 - 25$

$= 195$

Question 15 (b)

Criteria	Marks
• Provides correct answer	2
• Provides a correct percentage	1

Sample answer:

50% of 195 = 97.5 bpm

85% of 195 = 165.75 bpm

Question 16 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

Non-linear

Question 16 (b)

Criteria	Marks
• Provides correct answer	1

Sample answer:

Approximately 6 m (accept between 6–7 m)

Question 17 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

$21, 23, 25, 27, 29$

Question 17 (b)

Criteria	Marks
• Provides correct answer	2
• Provides probability of winning, or equivalent merit	1

Sample answer:

$$\text{Probability of winning} = \frac{5}{30} = \frac{1}{6}$$

$$\text{Probability of not winning} = 1 - \text{Probability of winning}$$

$$= 1 - \frac{1}{6} = \frac{5}{6}$$

Question 18

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

Sample answer:

Time difference = $8 - -5 = 13$ hours

Singapore is 13 hours ahead, so the time is 10 am Tuesday.

Question 19

Criteria	Marks
• Provides correct solution	2
• Substitutes correctly into the formula, or equivalent merit	1

Sample answer:

$$24 = \frac{\text{age} \times 200}{150}$$

$$\frac{24 \times 150}{200} = \text{age}$$

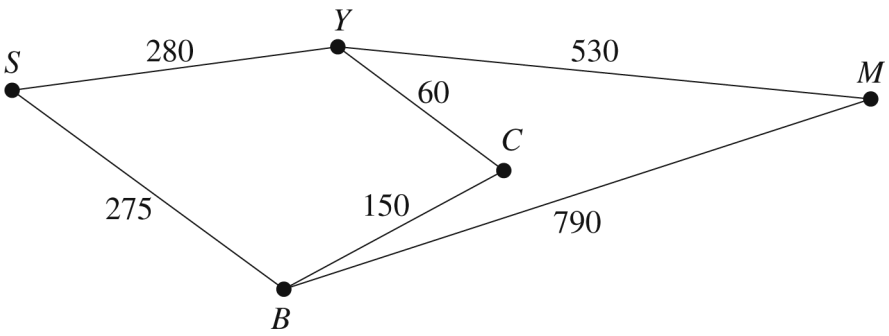
$$18 = \text{age}$$

$\therefore$ 18 months

Question 20 (a)

Criteria	Marks
• Provides the correct network diagram	2
• Draws a network diagram with vertices shown, or equivalent merit	1

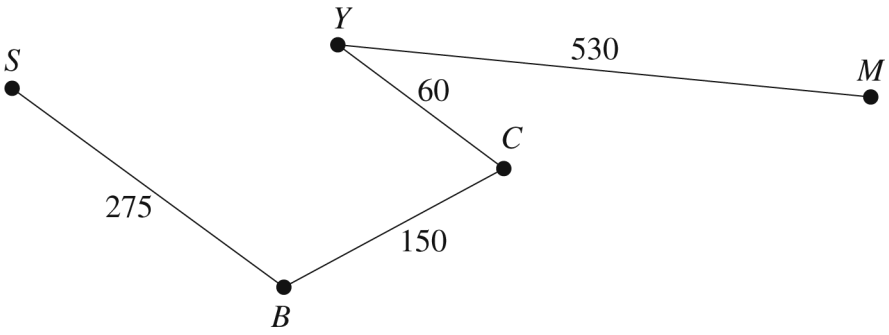
Sample answer:



Question 20 (b)

Criteria	Marks
• Provides correct solution	3
• Draws the minimum spanning tree, or equivalent merit	2
• Draws a spanning tree, or equivalent merit	1

Sample answer:



Length of minimum spanning tree $= 275 + 150 + 60 + 530$

$= 1015$ km

Question 21

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

Sample answer:

2% of $800\,000 + 1.5\%$ of $(1\,500\,000 - 800\,000)$

$= 0.02 \times 800\,000 + 0.015 \times 700\,000$

$= \$26\,500$

Question 22

Criteria	Marks
• Provides correct answer	2
• Converts watts to kilowatts, or equivalent merit	1

Sample answer:

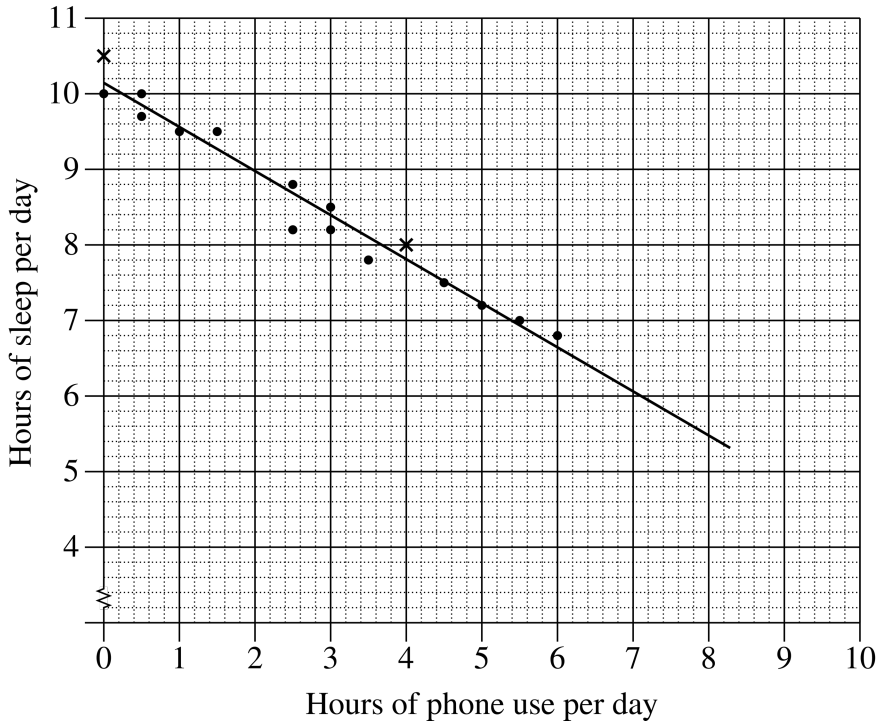
$$\text{Cost} = \frac{2500}{1000} \times (3 \times 7) \times \$0.27$$

$$= \$14.18$$

Question 23 (a)

Criteria	Marks
• Plots both points correctly	2
• Plots one point correctly, or equivalent merit	1

Sample answer:



Question 23 (b)

Criteria	Marks
• Provides correct solution	2
• Estimates the number of hours of sleep using their line of best fit, or equivalent merit	1

Sample answer:

Line added above.

Student who uses the phone for 2 hours will get 9 hours of sleep per day based on the line of best fit as shown on the scatterplot.

Question 24

Criteria	Marks
• Provides correct solution	4
• Calculates simple interest and future value correctly, or equivalent merit	3
• Calculates simple interest and attempts to apply the future value formula, or equivalent merit	2
• Calculates simple interest, or equivalent merit	1

Sample answer:

Fund A: $\text{Interest} = 7000 \times 5.2\% \times 3$

$= 7000 \times 0.052 \times 3$

$= 1092$

Fund B: $\text{Future value} = 7000(1 + 5\%)^3$

$= 7000(1 + 0.05)^3$

$= 8103.38$

$\text{Interest on Fund B} = 8103.38 - 7000$

$= 1103.38$

$\therefore \text{difference} = 1103.38 - 1092$

$= \$11.38$

Question 25 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

24 cupcakes

Question 25 (b)

Criteria	Marks
• Provides correct solution	2
• Substitutes 60 into one of the given equations, or equivalent merit	1

Sample answer:

$(4 \times 60) - (1.5 \times 60 + 60) = 240 - 150 = 90$

Alternatively graphically $240 - 150 = 90$

Question 26

Criteria	Marks
• Provides correct solution	3
• Applies the compound interest formula correctly, or equivalent merit	2
• Attempts to apply the compound interest formula, or equivalent merit	1

Sample answer:

16 days

$$\text{Amount} = 7500\left(1+\frac{21\%}{365}\right)^{16}$$

$$= 7500\left(1+\frac{0.21}{365}\right)^{16}$$

$$= 7569.34$$

$$\text{Closing balance} = 7569.34 - 2000$$

$$= 5569.34$$

Question 27

Criteria	Marks
• Provides correct solution	4
• Converts the correct area to hectares, or equivalent merit	3
• Finds the area of the triangle, or equivalent merit	2
• Finds the length of AC, or equivalent merit	1

Sample answer:

$$AC = \sqrt{7800^2 - 3000^2}$$

$$= 7200$$

$$\text{Area} = \frac{1}{2} \times 3000 \times 7200$$

$$= 10\,800\,000 \text{ m}^2$$

$$= 1080 \text{ ha}$$

$$\text{Cost} = 1080 \times 500$$

$$= \$540\,000$$

Question 28

Criteria	Marks
• Provides correct solution	3
• Attempts to calculate the tax payable using the correct tax bracket	2
• Calculates the taxable income, or equivalent merit	1

Sample answer:

Taxable income = 67 000 + 780 – 1000

= 66 780

Tax payable = 5092 + (66 780 – 45 000) × \$0.325

= \$12 170.50

Question 29

Criteria	Marks
• Provides correct solution	3
• Correctly applies the outlier formula	2
• Finds the *IQR*, or equivalent merit	1

Sample answer:

Median = 34 $Q_3 = 39$ $Q_1 = 27$ $IQR = 39 - 27 = 12$

Upper threshold = 39 + 1.5 × 12

= 57

$\therefore$ as $59 > 57$, then 59 is considered an outlier.

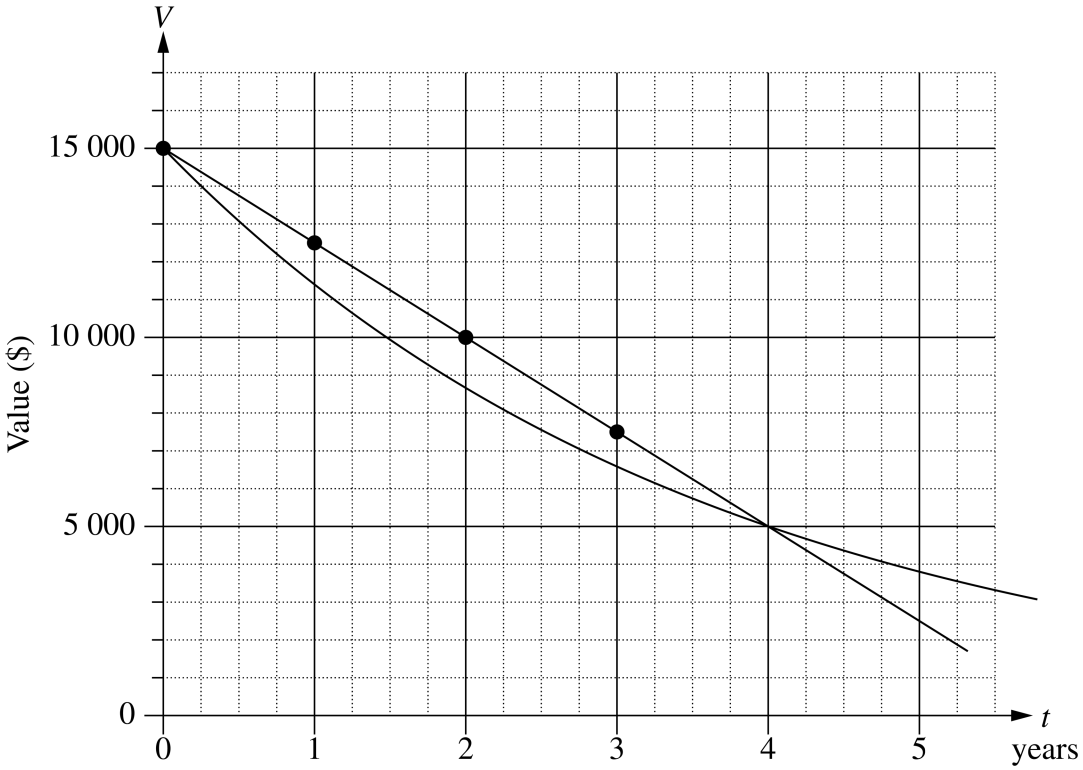
Question 30 (a)

Criteria	Marks
• Provides the correct solution	2
• Provides some correct values on the table, or equivalent merit	1

Sample answer:

End of year	*Straight-line depreciated value* ($)
0	15 000
1	12 500
2	10 000
3	7 500

[Points required for part (a).]



[The line is part of the solution for part (b).]

Question 30 (b)

Criteria	Marks
• Provides correct solution	2
• Attempts to use their points from part (a) to draw a line, or equivalent merit	1

Sample answer:

4 years (see above for straight line used to determine the answer)

Question 31

Criteria	Marks
• Provides correct solution	2
• Attempts to substitute values into the compound interest formula	1

Sample answer:

$$6100 = P(1 + 5.8\%)^{10}$$

$$6100 = P(1 + 0.058)^{10}$$

$$\frac{6100}{(1+0.058)^{10}} = P$$

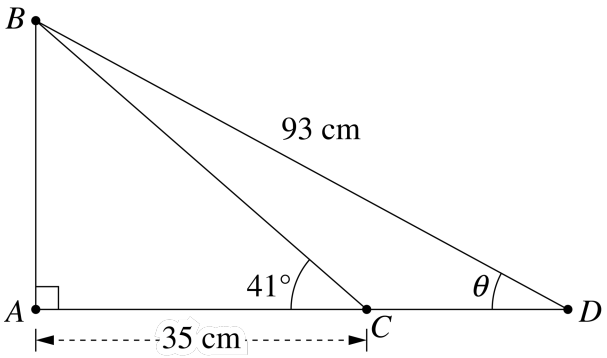
$$\$3471.15 = P$$

$\therefore$ Value ten years ago = \$3471.15

Question 32

Criteria	Marks
• Provides correct solution	4
• Finds the value of $\sin\theta$, or equivalent merit	3
• Finds the length of AB, or equivalent merit	2
• Provides a correct trigonometric ratio related to one of the triangles, or equivalent merit	1

Sample answer:



Using $\triangle ABC$,

$$\tan 41° = \frac{AB}{35}$$

so $AB = 35\tan 41°$

Using $\triangle ABD$,

$$\sin\theta = \frac{AB}{93}$$

ie $$\sin\theta = \frac{35\tan 41°}{93}$$

$$\theta = 19.0959\ldots$$

$$\div 19°6' \text{ (to the nearest minute)}$$

2022 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-N1 Networks and Paths	MS1-12-8
3	1	MS-S2 Relative Frequency and Probability	MS11-8
4	1	MS-M1 Applications of Measurement	MS11-3
5	1	MS-M5 Scale Drawings	MS1-12-4
6	1	MS-A1 Formulae and Equations	MS11-6
7	1	MS-F1 Money Matters	MS11-10
8	1	MS-M3 Right-angled Triangles	MS1-12-4
9	1	MS-F2 Investment	MS1-12-5
10	1	MS-A3 Types of Relationships	MS1-12-6

Section II

Question	Marks	Content	Syllabus outcomes
11 (a)	1	MS-M5 Scale Drawings	MS1-12-3
11 (b)	1	MS-M5 Scale Drawings	MS1-12-3
11 (c)	2	MS-M5 Scale Drawings	MS1-12-3
12	2	MS-M4 Rates	MS1-12-3
13 (a)	2	MS-S3 Further Statistical Analysis	MS1-12-7
13 (b)	2	MS-S3 Further Statistical Analysis	MS1-12-2
14 (a)	1	MS-M4 Rates	MS1-12-3
14 (b)	1	MS-M4 Rates	MS1-12-3
14 (c)	1	MS-M4 Rates	MS1-12-3
14 (d)	2	MS-M4 Rates	MS1-12-3
15 (a)	1	MS-M4 Rates	MS1-12-3
15 (b)	2	MS-M4 Rates	MS1-12-3
16 (a)	1	MS-S3 Further Statistical Analysis	MS1-12-2
16 (b)	1	MS-S3 Further Statistical Analysis	MS1-12-2
17 (a)	1	MS-S2 Relative Frequency and Probability	MS11-8

Question	Marks	Content	Syllabus outcomes
17 (b)	2	MS-S2 Relative Frequency and Probability	MS11-8
18	2	MS-M2 Working with Time	MS11-3
19	2	MS-A1 Formulae and Equations	MS11-10
20 (a)	2	MS-N1 Networks and Paths	MS1-12-8
20 (b)	3	MS-N1 Networks and Paths	MS1-12-8
21	2	MS-F1 Money Matters	MS11-10
22	2	MS-M1 Applications of Measurement	MS11-3
23 (a)	2	MS-S3 Further Statistical Analysis	MS1-12-7
23 (b)	2	MS-S3 Further Statistical Analysis	MS1-12-2
24	4	MS-F2 Investment	MS1-12-10
25 (a)	1	MS-A3 Types of Relationships	MS1-12-1
25 (b)	2	MS-A3 Types of Relationships	MS1-12-1
26	3	MS-F3 Depreciation and Loans	MS1-12-10
27	4	MS-M3 Right-angled Triangles	MS1-12-3
28	3	MS-F1 Money Matters	MS11-5
29	3	MS-S1 Data Analysis	MS11-7
30 (a)	2	MS-F3 Depreciation and Loans	MS1-12-5
30 (b)	2	MS-F3 Depreciation and Loans	MS1-12-5
31	2	MS-F2 Investment	MS1-12-10
32	4	MS-M3 Right-angled Triangles	MS1-12-4