

2021 HSC Mathematics Standard 1 Marking Guidelines

Section I

Multiple-choice Answer Key

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

Section II

Question 11

Criteria	Marks
• Provides correct solution	2
• Attempts to calculate the cost of 100 grams for option 2 or 3, or equivalent merit	1

Sample answer:

Option 1: 100 grams for \$1.50

Option 2: 100 grams for $\frac{\$4.20}{3} = \1.40

Option 3: 100 grams for $\frac{\$7.25}{5} = \1.45

Option 2 gives lowest price per 100 grams.

Question 12

Criteria	Marks
• Provides correct solution	3
• Calculates the costs, or equivalent merit	2
• Calculates the income, or equivalent merit	1

Sample answer:

Cost of teacher = $110 \times 2 \times 5 = \1100

Cost of room = $52 \times 2 \times 5 \times 1.1$
= \$572

Profit = $20 \times 150 - 1100 - 572$
= \$1328

Question 13

Criteria	Marks
• Provides correct solution	2
• Calculates the amount of fuel used, or equivalent merit	1

Sample answer:

Fuel cost = $\frac{1560}{100} \times 6.7 \times 1.45$
= \$151.55

Question 14

Criteria	Marks
• Provides correct solution	2
• Attempts to use future value formula	1

Sample answer:

$$\begin{aligned}\text{Cost} &= 2.45 \times (1.03)^5 \\ &= \$2.84\end{aligned}$$

Question 15

Criteria	Marks
• Provides correct solution	3
• Calculates time difference, or equivalent merit	2
• Calculates longitude difference, or equivalent merit	1

Sample answer:

Both cities have longitude to the East.

$$\begin{aligned}\text{Longitude difference} &= 151^\circ - 16^\circ \\ &= 135^\circ\end{aligned}$$

$$\begin{aligned}\text{Time difference} &= 135 \div 15 \\ &= 9 \text{ hours}\end{aligned}$$

Sydney is 9 hours ahead of City A.

\therefore Time in Sydney is 2 am Friday.

Question 16

Criteria	Marks
• Provides correct solution	2
• Correctly applies one step of a rearrangement	1

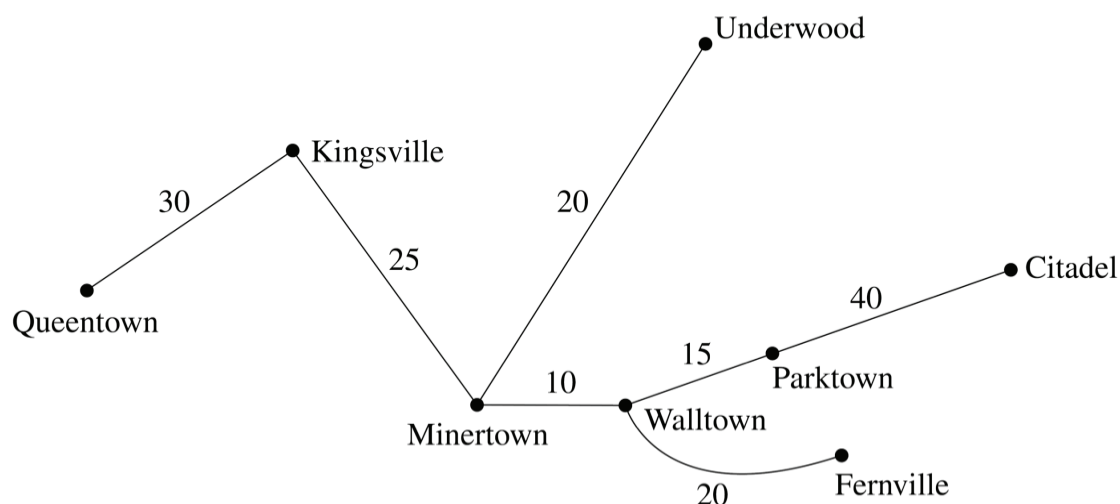
Sample answer:

$$\begin{aligned}P &= 2r + 10 \\ 2r &= P - 10 \\ r &= \frac{P - 10}{2}\end{aligned}$$

Question 17 (a)

Criteria	Marks
• Provides correct solution	3
• Provides a minimum spanning tree or provides a spanning tree (not minimum) and correctly determines its length, or equivalent merit	2
• Provides a spanning tree (not minimum), or equivalent merit	1

Sample answer:



Length of minimum spanning tree = 160 minutes

Question 17 (b)

Criteria	Marks
• Provides correct answer	1

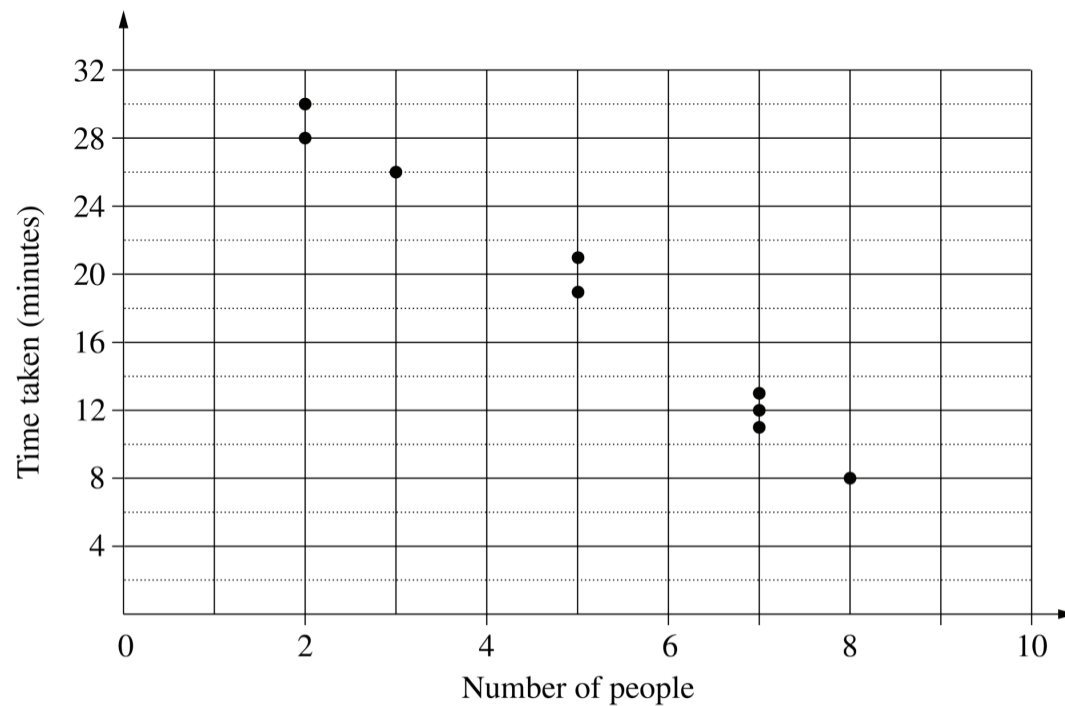
Sample answer:

$$\begin{aligned}
 \text{Time} &= 45 + 20 \\
 &= 65 \text{ minutes}
 \end{aligned}$$

Question 18 (a)

Criteria	Marks
• Provides correct solution	2
• Plots one point correctly	1

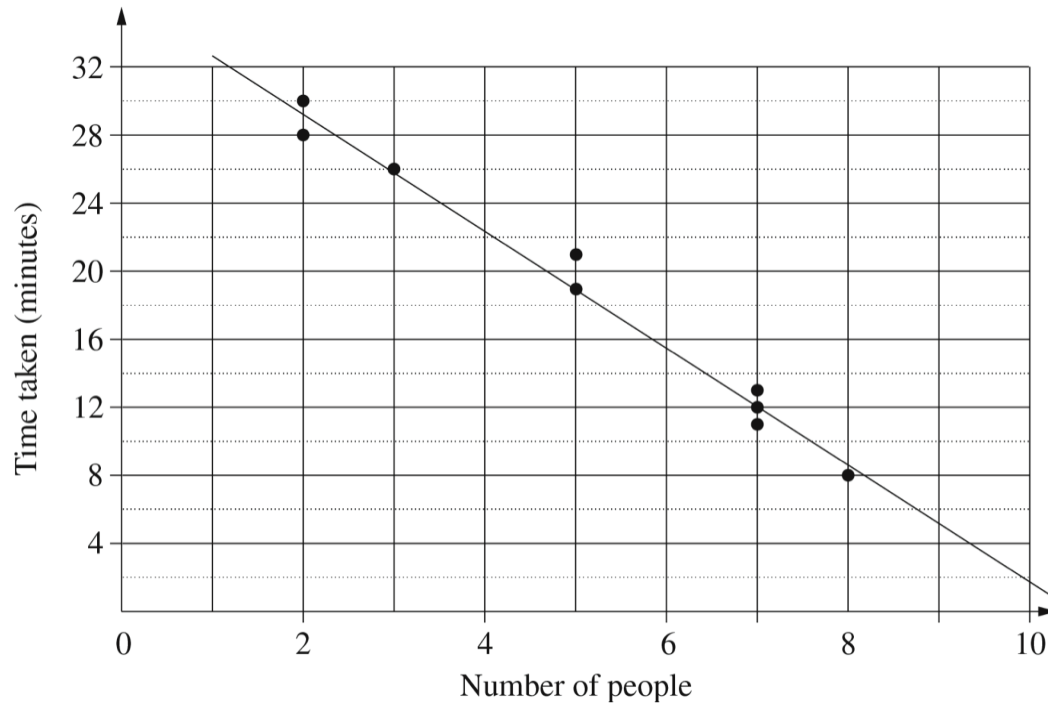
Sample answer:



Question 18 (b)

Criteria	Marks
• Draws an appropriate line of best fit	1

Sample answer:



Question 18 (c)

Criteria	Marks
• Provides correct solution	3
• Identifies that the relationship is negative and linear, or equivalent merit	2
• Identifies that the relationship is negative, or equivalent merit	1

Sample answer:

The relationship is linear in the negative direction. The association is strong.

Question 18 (d)

Criteria	Marks
• Provides correct answer	1

Sample answer:

$$\text{Mean} = \frac{12 + 13 + 11}{3} = 12$$

Question 19 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

\$2000

Question 19 (b)

Criteria	Marks
• Provides correct answer	1

Sample answer:

$5 \times 12 = 60$ months

Value = \$8000

Question 19 (c)

Criteria	Marks
• Identifies one limitation of the linear model applied to this context	1

Sample answer:

The value of the car would be negative after 100 months.

Question 20 (a)

Criteria	Marks
• Provides correct answer	1

Sample answer:

$$\begin{aligned}\text{Probability} &= \frac{9}{15} \\ &= \frac{3}{5}\end{aligned}$$

Question 20 (b)

Criteria	Marks
• Provides correct answer	1

Sample answer:

$$\begin{aligned}\text{Probability} &= \frac{6}{15} \\ &= \frac{2}{5}\end{aligned}$$

Question 21

Criteria	Marks
• Provides correct solution	4
• Finds the distance Kerry walked and a correct expression for speed not in km/h, or equivalent merit	3
• Finds the distance Kerry walked, or equivalent merit	2
• Calculates the perimeter as 26 (cm), or equivalent merit	1

Sample answer:

$$\begin{aligned}\text{Perimeter of diagram} &= 2 \times (8 + 5) \\ &= 26 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Actual perimeter} &= 26 \times 3000 \text{ cm} \\ &= 78\,000 \text{ cm} \\ &= 780 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{Speed} &= \frac{780}{12} = 65 \text{ m/minute} \\ &= \frac{65 \times 60}{1000} \text{ km/hour} \\ &= 3.9 \text{ km/hour}\end{aligned}$$

Question 22 (a)

Criteria	Marks
• Provides correct solution	3
• Calculates millilitres per minute, or equivalent merit	2
• Calculates the drops per minute, or equivalent merit	1

Sample answer:

1 drop in 4 seconds

∴ 15 drops in 1 minute

∴ 1 mL in 1 minute

$$\begin{aligned}
 \text{Amount in 24 hours} &= (1 \times 60 \times 24) \text{ mL} \\
 &= 1440 \text{ mL} \\
 &= 1.44 \text{ L}
 \end{aligned}$$

Question 22 (b)

Criteria	Marks
• Provides a correct solution	1

Sample answer:

$$\begin{aligned}
 \text{Time to fill the 9-litre bucket} &= \frac{9}{1.44} \\
 &= 6\frac{1}{4} \text{ days}
 \end{aligned}$$

Question 23 (a)

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

Sample answer:

B and E

Question 23 (b)

Criteria	Marks
<ul style="list-style-type: none"> Provides correct solution 	2
<ul style="list-style-type: none"> States the correct section 	1

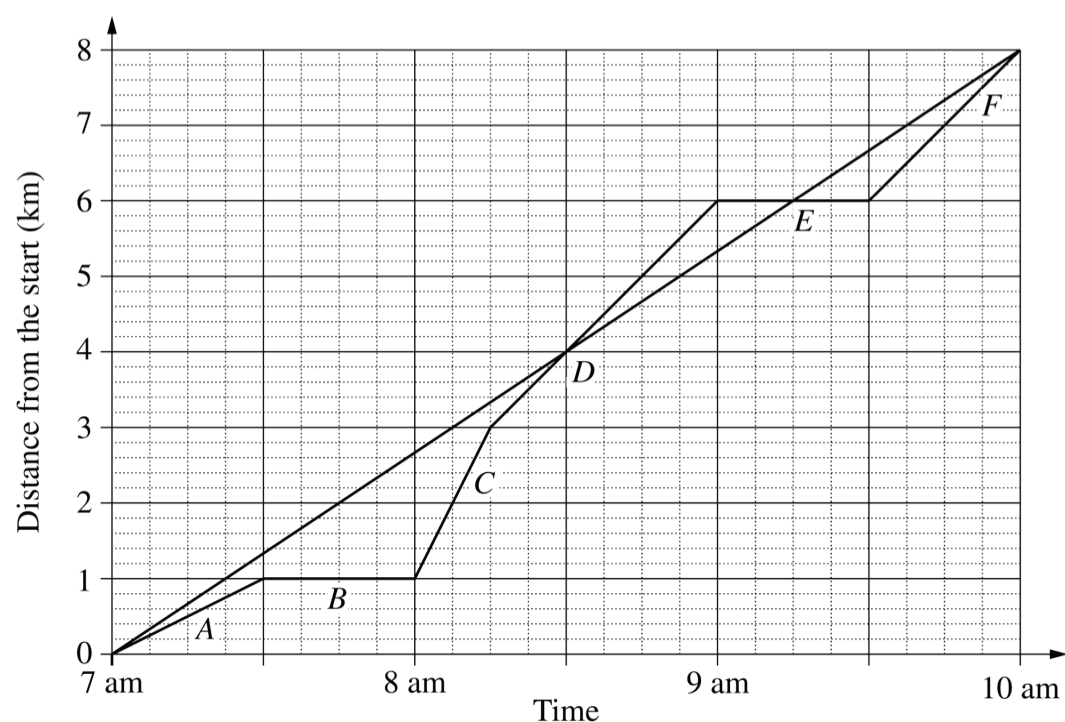
Sample answer:

C because the line segment is steepest

Question 23 (c)

Criteria	Marks
<ul style="list-style-type: none"> Provides correct solution 	3
<ul style="list-style-type: none"> Draws a straight line and identifies one endpoint of the time interval 	2
<ul style="list-style-type: none"> Draws a straight line showing Kim's journey 	1

Sample answer:



Sue was ahead of Kim between 8:30 am and 9:15 am.

Question 24 (a)

Criteria	Marks
• Provides both correct answers	1

Sample answer:

Internal length = 5000 mm

$$= 5 \text{ m}$$

Internal width = 3600 mm

$$= 3.6 \text{ m}$$

Question 24 (b)

Criteria	Marks
• Provides correct solution	3
• Calculates the area to be carpeted, or equivalent merit	2
• Uses their answer to part (a) to find an area, or equivalent merit	1

Sample answer:

Area to be carpeted = $5 \times 3.6 - 1.6$

$$= 16.4 \text{ m}^2$$

Rod therefore purchases 17 m^2 of carpet.

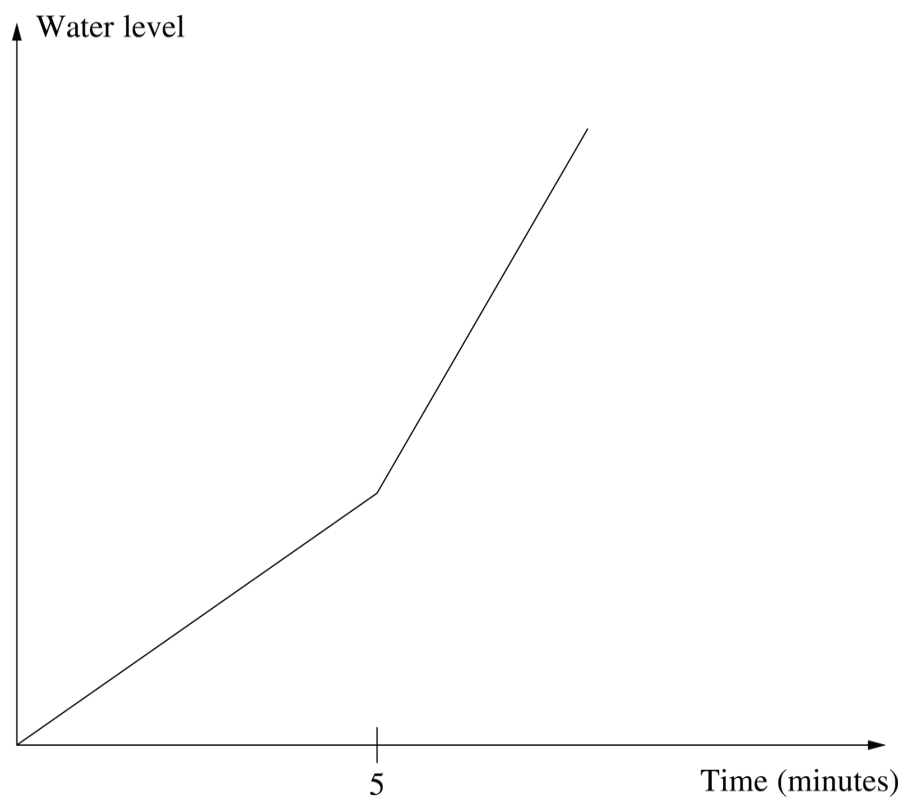
Cost = 17×40

$$= \$680$$

Question 25

Criteria	Marks
• Provides correct answer	2
• Plots a line with a positive slope, or equivalent merit	1

Sample answer:

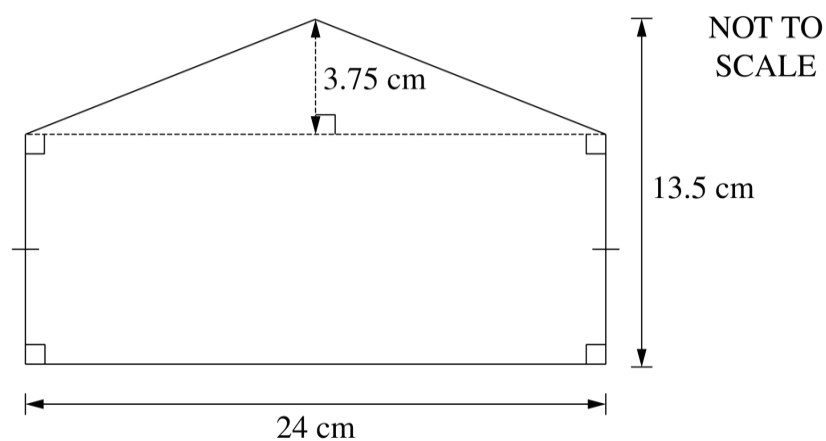


Question 26

Criteria	Marks
• Provides correct solution	3
• Correctly applies the area formulae for the rectangle and the triangle, or equivalent merit	2
• Correctly determines one of the relevant measurements of the large shape, or equivalent merit	1

Sample answer:

The dimensions of the large shape are shown.



$$\begin{aligned}
 \text{Area of large shape} &= 24 \times 9.75 + \frac{24 \times 3.75}{2} \\
 &= 279 \text{ cm}^2
 \end{aligned}$$

Question 27 (a)

Criteria	Marks
• Provides correct solution	2
• Calculates the interest charged, or equivalent merit	1

Sample answer:

Interest charged in second month

$$= 0.0025 \times 678\,833.09$$

$$= \$1697.08$$

Amount owing at end of second month

$$= 678\,833.09 + 1697.08 - 2866.91$$

$$= \$677\,663.26$$

Question 27 (b)

Criteria	Marks
• Provides correct solution	2
• States that the term of the loan will reduce	1

Sample answer:

The term of the loan will reduce. With less interest charged and the same monthly repayment, the loan will be repaid faster.

Question 28 (a)

Criteria	Marks
• Provides correct solution	2
• Uses correct trigonometric ratio, or equivalent merit	1

Sample answer:

In $\triangle XYZ$

$$\cos 30^\circ = \frac{XY}{16}$$

$$XY = 13.86 \text{ cm (two decimal places)}$$

Question 28 (b)

Criteria	Marks
• Provides correct solution	3
• Finds YZ and attempts to calculate the area of $\triangle XYZ$, or equivalent merit	2
• Finds YZ, or equivalent merit	1

Sample answer:

$$\sin 30^\circ = \frac{YZ}{16}$$

$$YZ = 8$$

$$\begin{aligned} \therefore \text{Area of } \triangle XYZ &= \frac{1}{2} \times 8 \times 13.856... \\ &= 55.4 \text{ cm}^2 \text{ (one decimal place)} \end{aligned}$$

Question 29

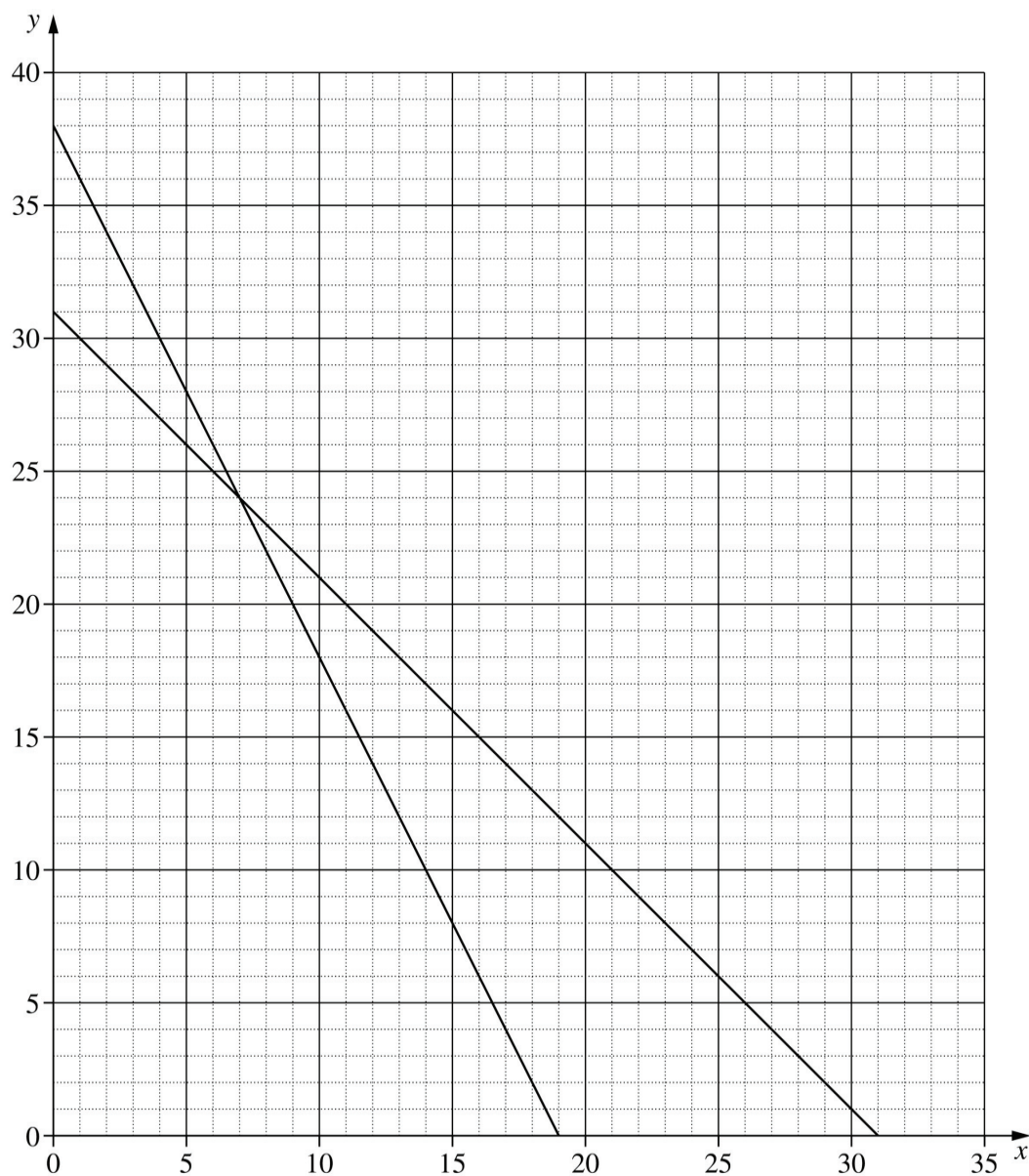
Criteria	Marks
• Provides correct solution	4
• States the other relevant correct equation and graphs two equations correctly, or equivalent merit	3
• States the other relevant correct equation and graphs one equation correctly, or equivalent merit	2
• States the other relevant correct equation, or equivalent merit	1

Sample answer:

$$4x + 2y = 76$$

$$\therefore 2x + y = 38$$

\therefore 7 goannas and 24 emus



Question 30 (a)

Criteria	Marks
• Provides correct solution	3
• Correctly applies the compound interest formula, or equivalent merit	2
• Calculates the number of days that interest will be charged, or equivalent merit	1

Sample answer:

$$\text{Closing balance} = 850 \times \left(1 + \frac{0.1975}{365}\right)^{12}$$

$$= 855.54$$

$$\text{Interest charged} = 855.54 - 850$$

$$= \$5.54$$

Question 30 (b)

Criteria	Marks
• Provides correct answer	1

Sample answer:

$$\text{Minimum payment} = 0.03 \times 855.54$$

$$= \$25.67$$

2021 HSC Mathematics Standard 1 Mapping Grid

Section I

Question	Marks	Content	Syllabus outcomes
1	1	MS-N1 Networks and Paths	MS1-12-8
2	1	MS-S1 Data Analysis	MS11-10
3	1	MS-N1 Networks and Paths	MS1-12-8
4	1	MS-F3 Depreciation and Loans	MS1-12-5
5	1	MS-A2 Linear Relationships	MS11-2
6	1	MS-M4 Rates	MS1-12-3
7	1	MS-A1 Formulae and Equations	MS11-1
8	1	MS-A1 Formulae and Equations	MS11-1
9	1	MS-F2 Investment	MS1-12-5
10	1	MS-M3 Right-angled Triangles	MS1-12-4

Section II

Question	Marks	Content	Syllabus outcomes
11	2	MS-M4 Rates	MS1-12-3
12	3	MS-F1 Money Matters	MS11-6
13	2	MS-M4 Rates	MS1-12-3
14	2	MS-F2 Investment	MS1-12-5
15	3	MS-M2 Working with Time	MS11-3
16	2	MS-A1 Formulae and Equations	MS11-1
17 (a)	3	MS-N1 Networks and Paths	MS1-12-8
17 (b)	1	MS-N1 Networks and Paths	MS1-12-8
18 (a)	2	MS-S1 Data Analysis	MS11-7
18 (b)	1	MS-S3 Further Statistical Analysis	MS1-12-2
18 (c)	3	MS-S3 Further Statistical Analysis	MS1-12-2
18 (d)	1	MS-S3 Further Statistical Analysis	MS1-12-7
19 (a)	1	MS-A3 Types of Relationships	MS1-12-1
19 (b)	1	MS-A3 Types of Relationships	MS1-12-1
19 (c)	1	MS-A3 Types of Relationships	MS1-12-1

Question	Marks	Content	Syllabus outcomes
20 (a)	1	MS-S2 Relative Frequency and Probability	MS11-8
20 (b)	1	MS-S2 Relative Frequency and Probability	MS11-8
21	4	MS-M5 Scale Drawings	MS1-12-3
22 (a)	3	MS-M4 Rates	MS1-12-3
22 (b)	1	MS-M4 Rates	MS1-12-3
23 (a)	1	MS-M4 Rates	MS1-12-3
23 (b)	2	MS-M4 Rates	MS1-12-3
23 (c)	3	MS-M4 Rates	MS1-12-10
24 (a)	1	MS-M5 Scale Drawings	MS1-12-4
24 (b)	3	MS-M5 Scale Drawings	MS1-12-4
25	2	MS-A3 Types of Relationships	MS1-12-6
26	3	MS-M5 Scale Drawings	MS1-12-4
27 (a)	2	MS-F3 Depreciation and Loans	MS1-12-9
27 (b)	2	MS-F3 Depreciation and Loans	MS1-12-9
28 (a)	2	MS-M3 Right-angled Triangles	MS1-12-4
28 (b)	3	MS-M3 Right-angled Triangles	MS1-12-4
29	4	MS-A3 Types of Relationships	MS1-12-6
30 (a)	3	MS-F3 Depreciation and Loans	MS1-12-5
30 (b)	1	MS-F3 Depreciation and Loans	MS1-12-5