

2020 HSC Mathematics Standard 1 Marking Guidelines

Section I

Multiple-choice Answer Key

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

Section II

Question 11 (a)

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

Sample answer:

$$\tan \theta = \frac{8}{10}$$

$$\theta = 39^\circ \quad (\text{nearest degree})$$

Question 11 (b)

Criteria	Marks
• Provides correct solution	2
• Attempts to use a relevant trigonometric ratio or attempts to use Pythagoras' Theorem	1

Sample answer:

$$x^2 = 10^2 + 8^2$$

$$x^2 = 164$$

$$x = \sqrt{164}$$

$$x = 12.8 \quad (\text{one decimal place})$$

Question 12

Criteria	Marks
• Provides correct solution	3
• Finds the cost for one painter and provides a numerical expression for the cost of the other	2
• Provides a numerical expression for the cost for one of the painters, or equivalent merit	1

Sample answer:

$$\begin{aligned}\text{Quote for Painter A} &= 100 \times \frac{1500}{30} \\ &= \$5000\end{aligned}$$

$$\begin{aligned}\text{Quote for Painter B} &= 80 \times \frac{1500}{25} \\ &= \$4800\end{aligned}$$

\therefore \$200 is saved by using the quote from Painter B

Question 13

Criteria	Marks
• Provides correct solution	3
• Substitutes into the compound interest formula, or equivalent merit	2
• Attempts to use compound interest formula	1

Sample answer:

$$A \times (1.03)^5 = 1000$$

$$\begin{aligned}A &= \frac{1000}{(1.03)^5} \\ &= \$862.61\end{aligned}$$

Question 14 (a)

Criteria	Marks
<ul style="list-style-type: none"> Describes the journey referring to the change of speed and the distance travelled 	2
<ul style="list-style-type: none"> Describes the journey referring to the change of speed or the distance travelled 	1

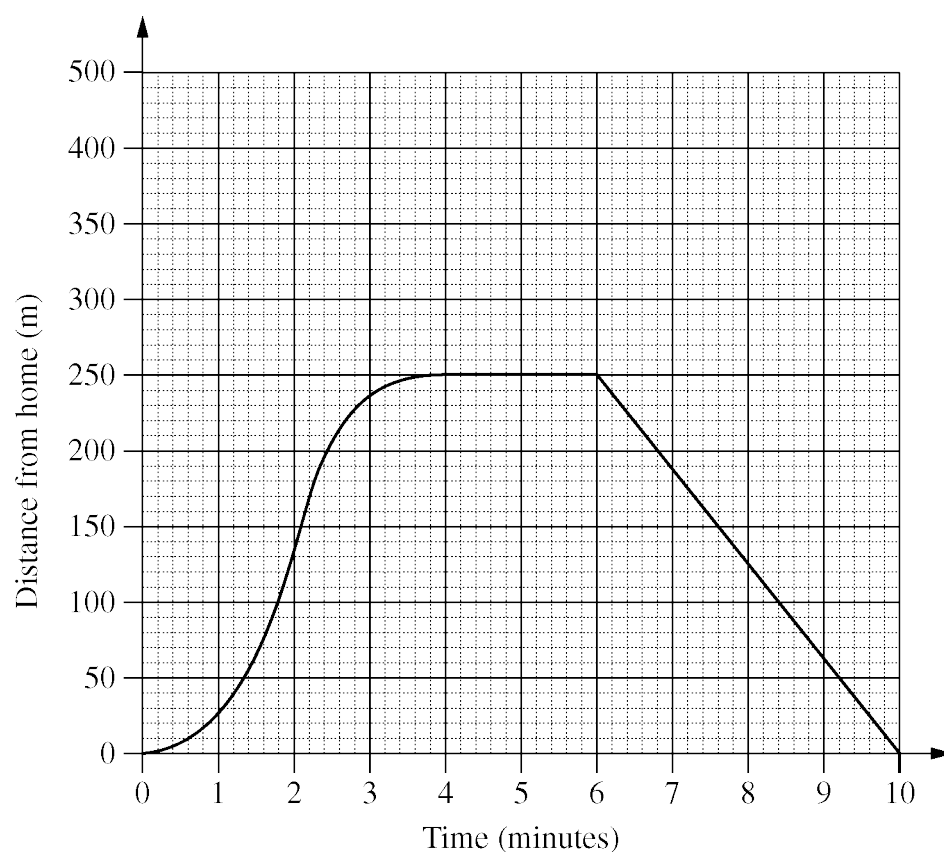
Sample answer:

Adam starts slowly and gradually speeds up. He then slows down. He travels a distance of 250 metres.

Question 14 (b)

Criteria	Marks
<ul style="list-style-type: none"> Provides correct graph 	2
<ul style="list-style-type: none"> Provides a graph with one correct feature, or equivalent merit 	1

Sample answer:



Question 15

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

Sample answer:

Time difference: $11 + 10 = 21$ hours

Lands at Honolulu: $7 \text{ pm} + 9 \text{ hours}$
 $= 4 \text{ am, Wednesday (Melbourne time)}$

Time in Honolulu: $4 \text{ am} - 21 \text{ hours}$
 $= 7 \text{ am, Tuesday}$

Question 16

Criteria	Marks
• Provides correct solution	2
• Provides a correct step towards the solution	1

Sample answer:

$$m = 6 - \frac{3R}{2R - 5}$$

$$m = 6 - \frac{3 \times 10}{2 \times 10 - 5}$$

$$= 6 - \frac{30}{20 - 5}$$

$$= 6 - \frac{30}{15}$$

$$= 6 - 2$$

$$= 4$$

Question 17

Criteria	Marks
• Provides correct solution	3
• Calculates the value of savings, or equivalent merit	2
• Provides the value of personal expenses, or equivalent merit	1

Sample answer:

$$\begin{aligned}\text{Personal expenses} &= 510 \times 0.2 \\ &= \$102\end{aligned}$$

$$\begin{aligned}\text{Total expenses} &= 115 + 210 + 102 + 25 \\ &= \$452\end{aligned}$$

$$\text{Savings} = \$510 - \$452 = \$58$$

$$\frac{4930}{58} = 85 \text{ weeks}$$

Question 18

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

Sample answer:

$$40^2 = 70^2 - 100d$$

$$1600 = 4900 - 100d$$

$$-3300 = -100d$$

$$d = 33 \text{ (metres)}$$

Question 19 (a)

Criteria	Marks
• Provides both values	2
• Multiplies one of the populations by three	1

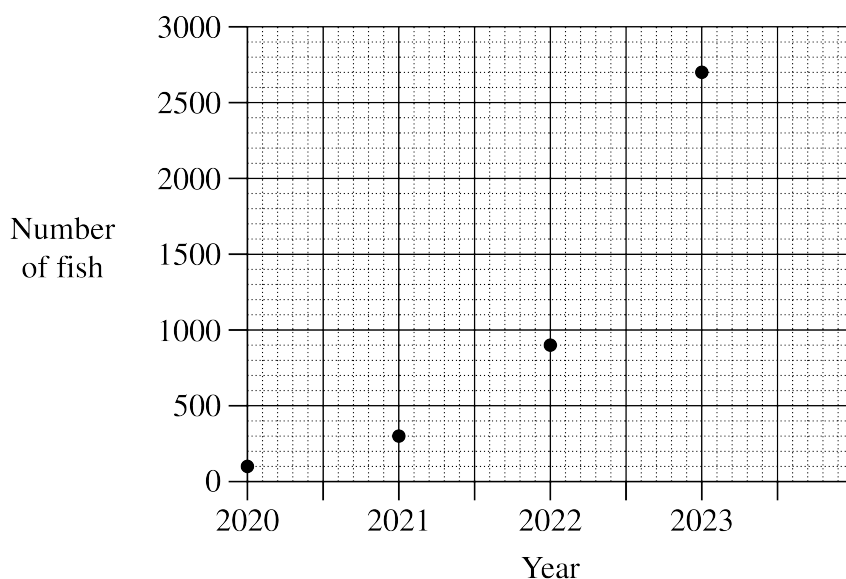
Sample answer:

300, 900

Question 19 (b)

Criteria	Marks
• Plots all values	2
• Plots two values, or equivalent merit	1

Sample answer:



Question 19 (c)

Criteria	Marks
• States it is an exponential model and explains why	2
• Provides correct model or justification	1

Sample answer:

An exponential model is more suitable because the number of fish is multiplied by a constant to obtain the number of fish in the next year.

Question 20 (a)

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

Sample answer:

$$W = kN$$

$$2.5 = k \times 500$$

$$k = \frac{2.5}{500}$$

$$= 0.005$$

Question 20 (b)

Criteria	Marks
<ul style="list-style-type: none"> Provides correct solution 	2
<ul style="list-style-type: none"> Substitutes $W = 1.2$ and $k = 0.005$ into the equation $W = kN$, or equivalent merit 	1

Sample answer:

$$1.2 = 0.005 N$$

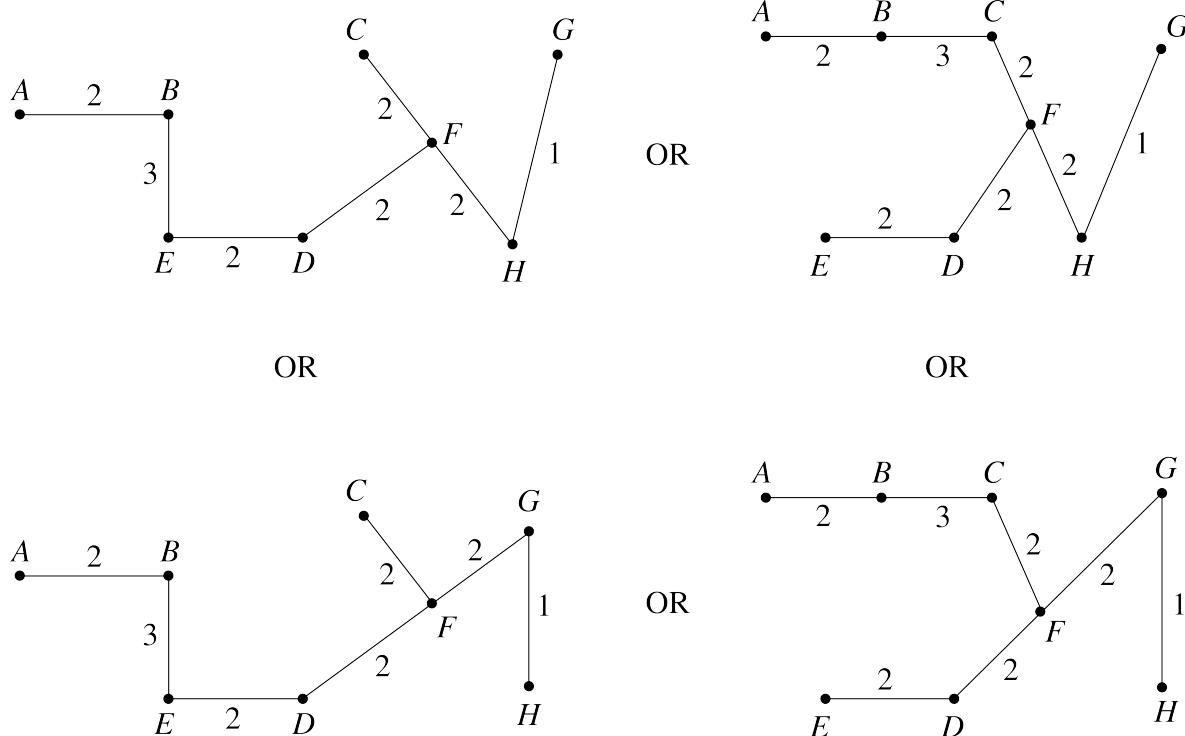
$$N = \frac{1.2}{0.005}$$

$$= 240 \text{ sheets}$$

Question 21 (a)

Criteria	Marks
• Draws a minimum spanning tree and states minimum length	3
• Draws a spanning tree (which is not minimum) and calculates its length	2
• Provides correct length based on the diagram drawn	1

Sample answer:



The length of the minimum spanning tree is 14.

Question 21 (b)

Criteria	Marks
• Adds 10 to the length found in part (a)	1

Sample answer:

$$14 + 10 = 24$$

Question 22 (a)

Criteria	Marks
• Provides a correct description	2
• States that the association is strong or that the direction is negative	1

Sample answer:

The linear association is strong and the direction is negative.

Question 22 (b)

Criteria	Marks
• Provides a correct answer	1

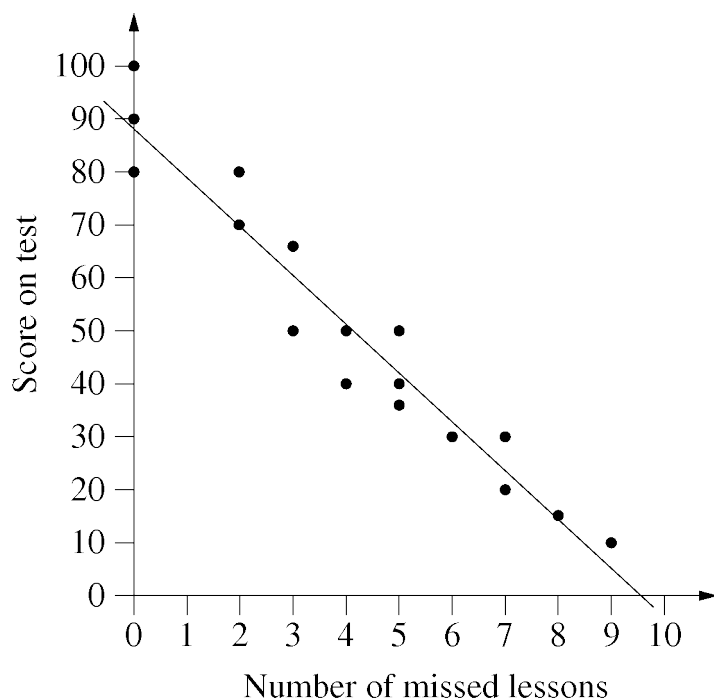
Sample answer:

$$\begin{aligned}\text{Range} &= 100 - 80 \\ &= 20\end{aligned}$$

Question 22 (c)

Criteria	Marks
• Provides a line of best fit	1

Sample answer:



Question 22 (d)

Criteria	Marks
• Obtains an appropriate value from the graph drawn	1

Sample answer:

Between 41 and 46 depending on the line of best fit drawn.

Question 22 (e)

Criteria	Marks
• Provides a correct reason	1

Sample answer:

No. Extrapolation beyond the range of the data is usually not appropriate.

Question 23

Criteria	Marks
• Provides correct solution	3
• Finds actual width of the room, or equivalent merit	2
• Calculates scale used, or applies formula for area of a rectangle, or equivalent merit	1

Sample answer:

$$8 \text{ cm} = 12 \text{ m}$$

$$\therefore 1 \text{ cm} = 1.5 \text{ m}$$

$$\therefore 5 \text{ cm} = 7.5 \text{ m}$$

$$\begin{aligned} \text{Area} &= 12 \times 7.5 \\ &= 90 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Cost} &= 90 \times \$100 \\ &= \$9000 \end{aligned}$$

Question 24 (a)

Criteria	Marks
• Provides correct solution	2
• Shows some understanding of how to calculate the median, or equivalent merit	1

Sample answer:

The scores in ascending order are:

25 36 38 38 38 46 55 55 68 72

The median is $\frac{38 + 46}{2} = 42$. There is one person aged between the mean and the median.

Question 24 (b)

Criteria	Marks
• Compares the spread of the two datasets, and provides correct explanation	2
• Makes reference to spread or variation	1

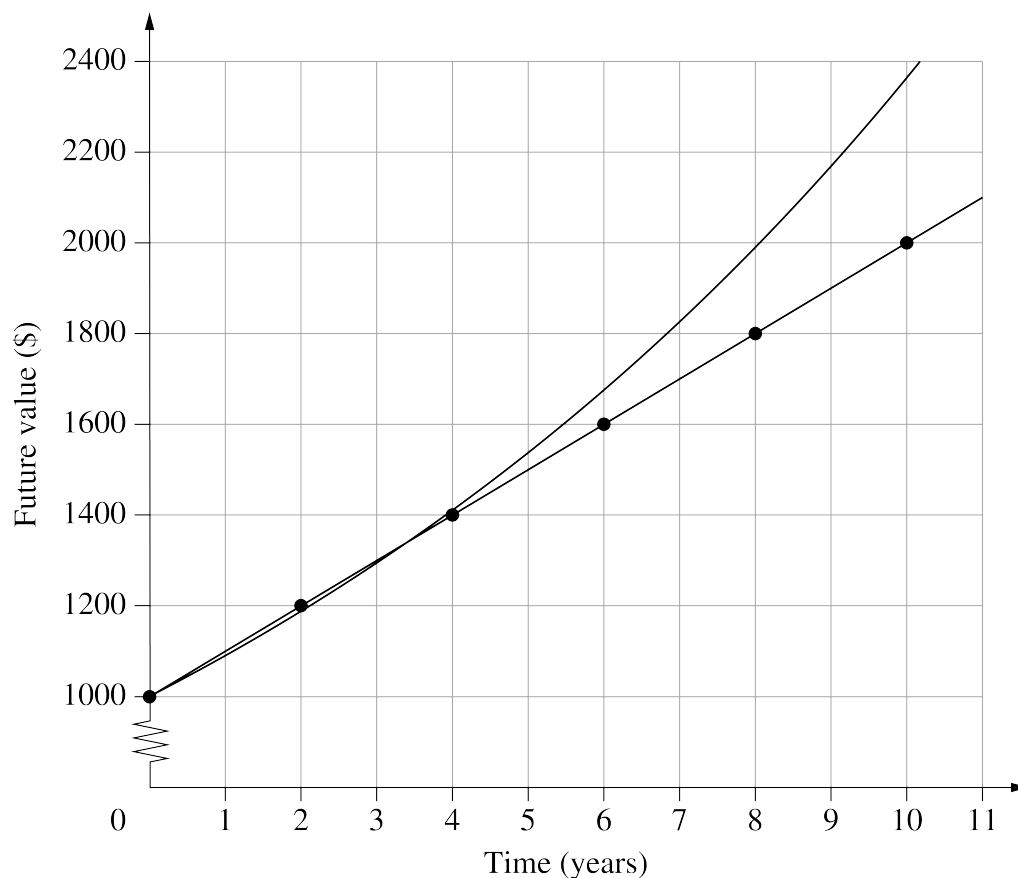
Sample answer:

On Wednesday, all the ages were the same, so the spread of the data is very low (in fact zero) compared to the spread of the Saturday data. Therefore the standard deviation of the Wednesday dataset will be smaller.

Question 25

Criteria	Marks
• Provides correct solution	3
• Attempts to provide an estimate based on a simple interest line, or equivalent merit	2
• Draws a straight line starting at (0, 1000), or equivalent merit	1

Sample answer:



Estimate of difference = (Just under) \$200

Question 26 (a)

Criteria	Marks
• Provides all scores	1

Sample answer:

		Die 1					
		1	2	3	4	5	6
Die 2	1	0	1	2	3	4	5
	2	1	0	1	2	3	4
	3	2	1	0	1	2	3
	4	3	2	1	0	1	2
	5	4	3	2	1	0	1
	6	5	4	3	2	1	0

Question 26 (b)

Criteria	Marks
• Provides correct answer	2
• Identifies a probability in the context of the problem	1

Sample answer:

$$\frac{30}{36} = \frac{5}{6}$$

Question 27

Criteria	Marks
• Provides correct solution	3
• Provides correct calculation of tax, or equivalent merit	2
• Makes some progress towards calculating the tax payable, or equivalent merit	1

Sample answer:

$$\begin{aligned}\text{Tax} &= 20\,797 + 0.37(122\,680 - 90\,000) \\ &= \$32\,888.60\end{aligned}$$

$$\begin{aligned}\text{PAYG tax} &= 3000 \times 12 \\ &= \$36\,000\end{aligned}$$

$$\begin{aligned}\text{Refund} &= 36\,000 - 32\,888.60 \\ &= \$3111.40\end{aligned}$$

Question 28

Criteria	Marks
• Provides a correct solution	4
• Finds the length of DE , or equivalent merit	3
• Finds the length of BC and identifies the ratio of sides in the two triangles, or equivalent merit	2
• Finds the length of BC , or equivalent merit	1

Sample answer:

$$\text{Area} = \frac{1}{2} \times 8 \times BC = 20$$

$$4 \times BC = 20$$

$$BC = 5 \text{ cm}$$

$$\text{Scale factor} = \frac{4}{5}$$

$$\therefore DE = \frac{4}{5} \times 8$$

$$= 6.4 \text{ cm}$$

$$DF^2 = 4^2 + 6.4^2$$

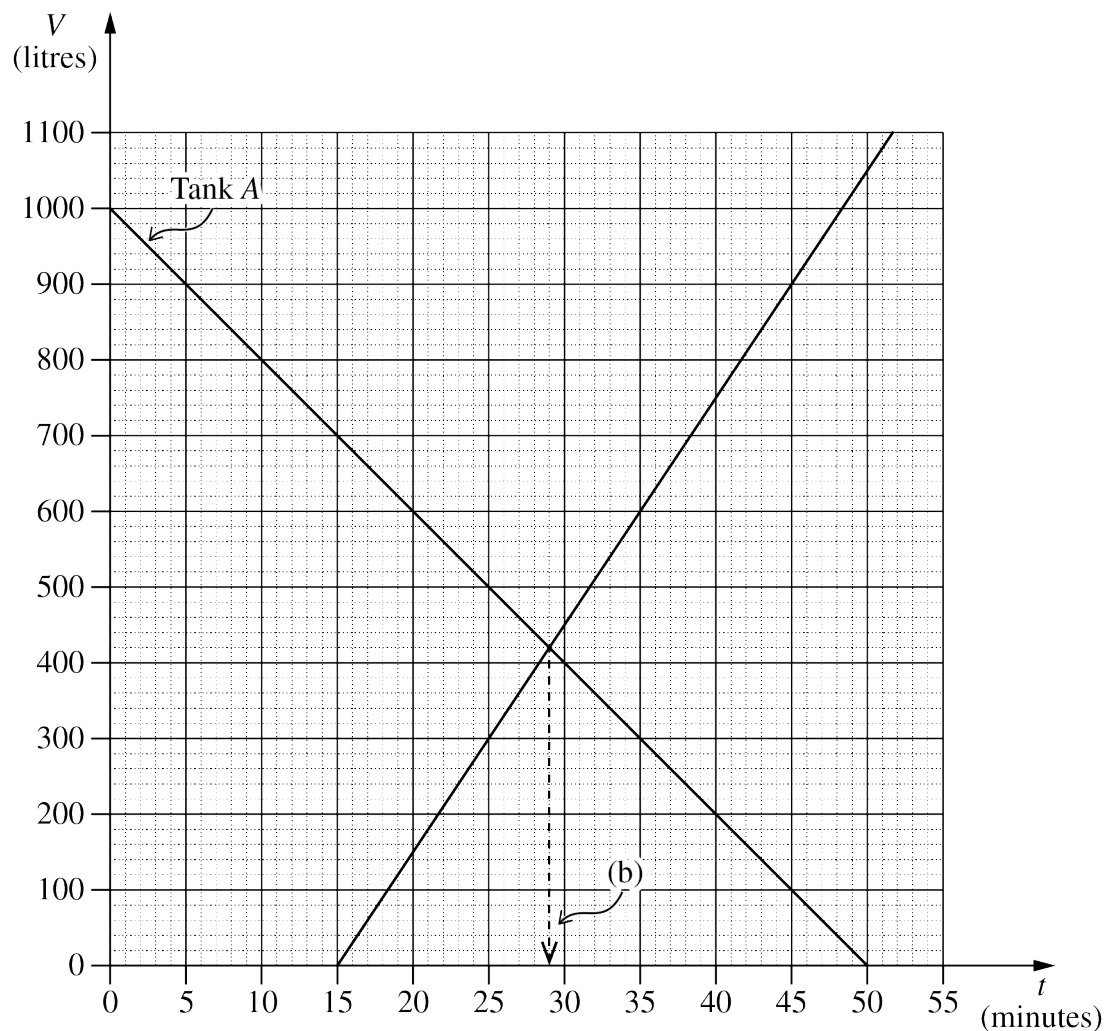
$$= 56.96$$

$$DF = 7.55 \text{ cm}$$

Question 29 (a)

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

Sample answer:



Question 29 (b)

Criteria	Marks
• Provides the correct solution	2
• Draws the graph of volume for tank B , or equivalent merit	1

Sample answer:

29 minutes

Question 29 (c)

Criteria	Marks
• Provides the correct answer	1

Sample answer:

45 minutes

Question 30

Criteria	Marks
• Provides correct solution	4
• Calculates amount owing and attempts to find salvage value, or equivalent merit	3
• Finds amount owing after 3 years, or equivalent merit	2
• Calculates interest for 3rd year, or equivalent merit	1

Sample answer:

$$\begin{aligned}\text{Interest in 3rd year} &= 0.06 \times 12\,056.71 \\ &= \$723.40\end{aligned}$$

$$\begin{aligned}\text{Amount owing at end of 3rd year} &= 12\,506.71 + 723.40 - 4510.53 \\ &= \$8269.58\end{aligned}$$

Year	Amount owing at the start of the year	Interest charged for that year	Repayment	Amount owing at the end of the year
1	19 000.00	1140.00	4510.53	15 629.47
2	15 629.47	937.77	4510.53	12 056.71
3	12 056.71	723.40	4510.53	8269.58

$$\begin{aligned}\text{Salvage value} &= 19\,000 \times (1 - 0.2)^3 \\ &= \$9728\end{aligned}$$

$$\begin{aligned}\text{Amount left over} &= 9728 - 8269.58 \\ &= \$1458.42\end{aligned}$$

2020 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-S3 Further Statistical Analysis	MS1-12-2
3	1	MS-M1 Applications of Measurement	MS11-3
4	1	MS-S3 Further Statistical Analysis	MS1-12-2
5	1	MS-N1 Networks and Paths	MS1-12-8
6	1	MS-M4 Rates	MS1-12-3
7	1	MS-M4 Rates	MS1-12-3
8	1	MS-F2 Investment	MS1-12-5
9	1	MS-N1 Networks and Paths	MS1-12-8
10	1	MS-A2 Linear Relationships	MS11-6

Section II

Question	Marks	Content	Syllabus outcomes
11 (a)	2	MS-M3 Right-angled Trigonometry	MS1-12-4
11 (b)	2	MS-M3 Right-angled Trigonometry	MS1-12-4
12	3	MS-M4 Rates	MS1-12-3
13	3	MS-F2 Investment	MS1-12-5
14 (a)	2	MS-A3 Types of Relationships	MS1-12-6
14 (b)	2	MS-A3 Types of Relationships	MS1-12-6
15	2	MS-M2 Working with Time	MS1-12-10
16	2	MS-A1 Formulae And Equations	MS11-1
17	3	MS-F1 Money Matters	MS11-5
18	2	MS-M4 Rates	MS1-12-1
19 (a)	2	MS-A3 Types of Relationships	MS1-12-2
19 (b)	2	MS-A3 Types of Relationships	MS1-12-6
19 (c)	2	MS-A3 Types of Relationships	MS1-12-10
20 (a)	1	MS-M4 Rates	MS1-12-1
20 (b)	2	MS-M4 Rates	MS1-12-1
21 (a)	3	MS-N1 Networks and Paths	MS1-12-8

Question	Marks	Content	Syllabus outcomes
21 (b)	1	MS-N1 Networks and Paths	MS1-12-8
22 (a)	2	MS-S3 Further Statistical Analysis	MS1-12-7
22 (b)	1	MS-S3 Further Statistical Analysis	MS1-12-7
22 (c)	1	MS-S3 Further Statistical Analysis	MS1-12-7
22 (d)	1	MS-S3 Further Statistical Analysis	MS1-12-7
22 (e)	1	MS-S3 Further Statistical Analysis	MS1-12-10
23	3	MS-M5 Scale Drawings	MS1-12-3
24 (a)	2	MS-S1 Data Analysis	MS11-7
24 (b)	2	MS-S1 Data Analysis	MS11-10
25	3	MS-F2 Investment	MS1-12-5
26 (a)	1	MS-S2 Relative Frequency and Probability	MS11-8
26 (b)	2	MS-S2 Relative Frequency and Probability	MS11-8
27	3	MS-F1 Money Matters	MS11-5
28	4	MS-M5 Scale Drawings	MS1-12-4
29 (a)	1	MS-A2 Linear Relationships	MS1-12-6
29 (b)	2	MS-A3 Types of Relationships	MS1-12-6
29 (c)	1	MS-A3 Types of Relationships	MS1-12-6
30	4	MS-F3 Depreciation and Loans	MS1-12-5