Mount St Joseph

Induimini Arma Lucis

Student Number _____

2025 Year 12 Task 3

Mathematics Standard 1

General Instruction

- Reading time – 5 minutes
- Working Time – 50 minutes
- Write using black pen
- Calculators approved by NESA may be used
- A reference sheet is provided as a separate sheet
- For questions in Section II, show relevant mathematical reasoning and/or calculations
- Write your student number at the top of this page

Total Marks: 34

Section I – 5 marks

- Attempt Question 1 – 5
- Allow about 8 minutes for this section
- Answer these questions on the multiple-choice answer sheet provided

Section II – 29 marks

- Attempt Questions 6 – 12
- Allow about 42 minutes for this section

	Networks and Paths	Right-Angled Triangles	Simultaneous Linear Equations	Total
Section I	/2	/1	/2	/5
Section II	/8	/9	/12	/29
Total	**/10**	**/10**	**/14**	**/34**

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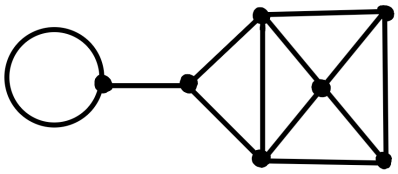
Section I – Multiple Choice

5 marks
Attempt Questions 1-5
Allow approximately 8 minutes for this section

Answer Questions 1-5 on a multiple-choice answer sheet

Question 1

What is the sum of all the degrees in this network diagram?



A) 23

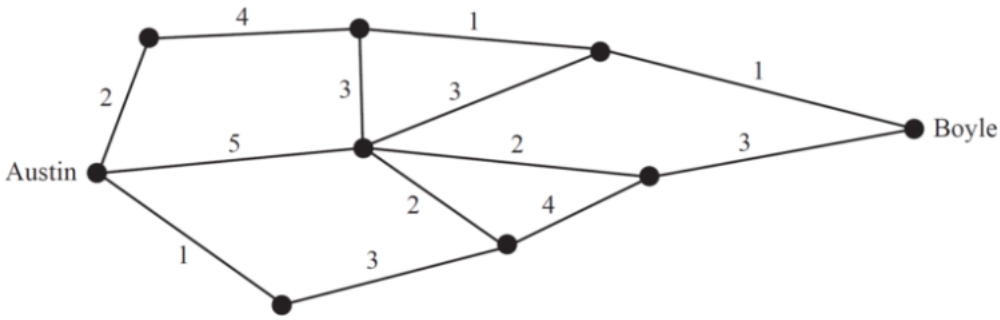
B) 24

C) 7

D) 11

Question 2

What is the shortest distance to travel between Austin and Boyle?



A) 7

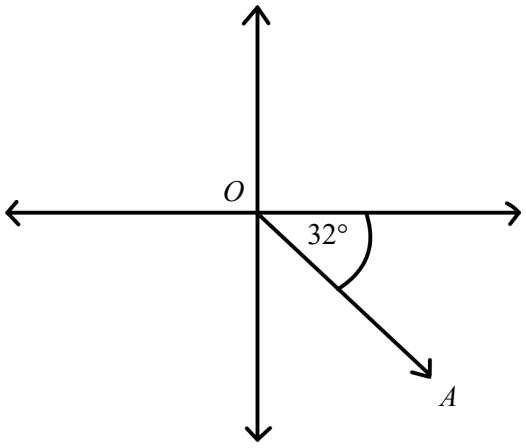
B) 8

C) 9

D) 19

Question 3

What is the bearing of A from O?



A) S58°E

B) S32°E

C) E32°S

D) E58°S

Question 4

Nathan owns a bakery selling gooey butter cake. The cost of all equipment needed to produce the cakes was $20 000. Each gooey butter cake costs $12.50 to make.

What is the correct equation to represent his cost (C) if he sells n gooey butter cakes?

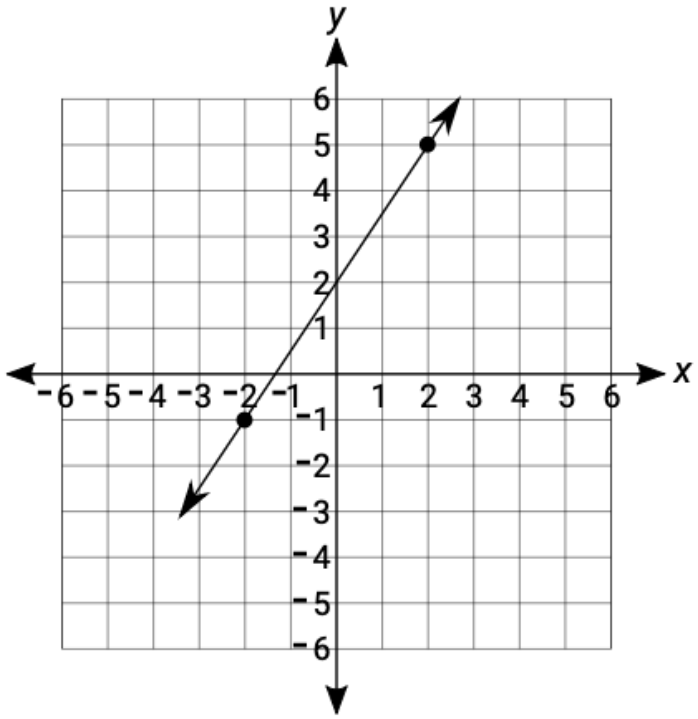
A) $C = 20\,000n - 12.50$

B) $C = 12.50n - 20\,000$

C) $C = 12.50 + 20\,000n$

D) $C = 20\,000 + 12.50n$

Question 5
Find the equation of the line.



A) $y = -\frac{3}{2}x + 2$

B) $y = \frac{3}{2}x + 2$

C) $y = -\frac{2}{3}x + 2$

D) $y = \frac{2}{3}x + 2$

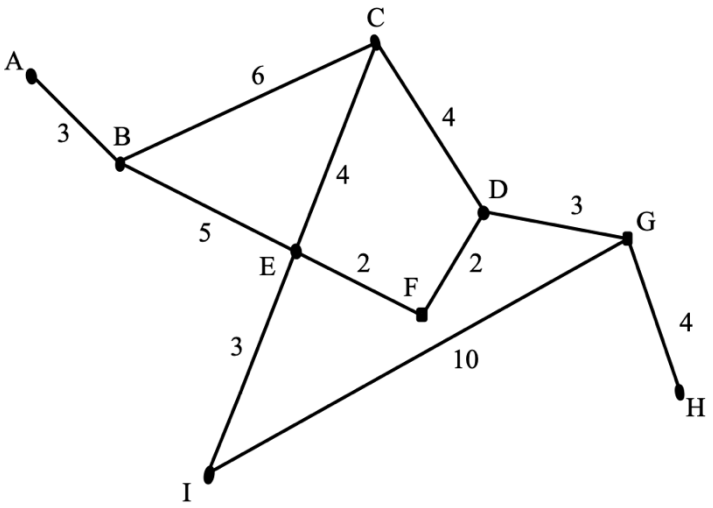
Section II – Short Answer

29 marks
Attempt Questions 6 - 12
Allow approximately 35 minutes for this section

- Answer the questions on the lines provided in **black pen.**
- Your responses should include relevant mathematical reasoning and/or calculations.

Question 6 (4 marks)

The network diagram shows the plumbing system between seven campsites all in a park.
The numbers by the paths show lengths (in km) of the plumbing.



a) The park wants to re-lay the pipes and minimise the plumbing system. **3**
Draw a minimum spanning tree, and find its length, of the network diagram above to show in the space provided to show what this new system will look like.

Length of the minimum spanning tree: _____

b) What is the cost of the pipes for the new system in part a) if each kilometre costs $2500? **1**

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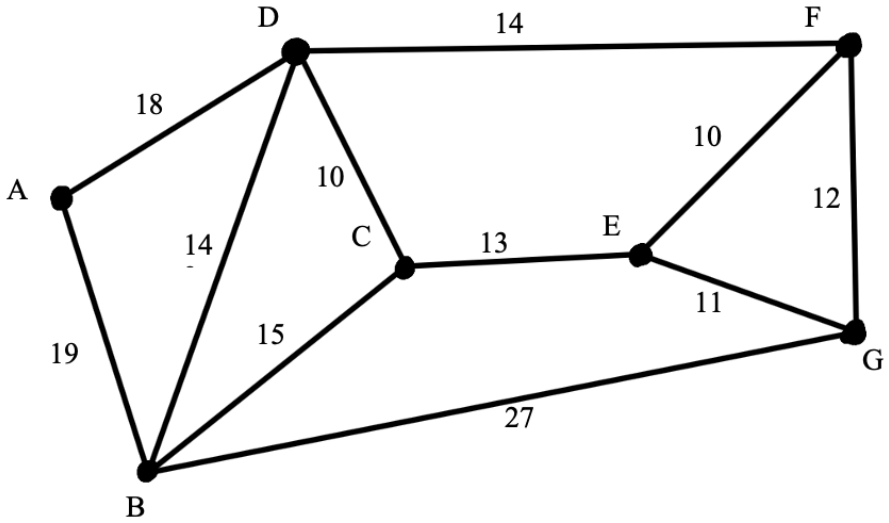
Question 7 (4 marks)

The network diagram below represents tracks joining seven buildings on a dairy farm.



All the tracks can be travelled in either direction.

The numbers indicate the travel time between buildings in minutes.

a) Complete the following activity chart to represent the network diagram. **2**

	A	B	C	D	E	F	G
A	-						
B		-					27
C			-				
D				-		14	
E					-	10	11
F				14	10	-	12
G		27			11	12	-

b) Determine the shortest travel time between buildings *A* and *G* and the tracks which would be followed to achieve this time. **2**

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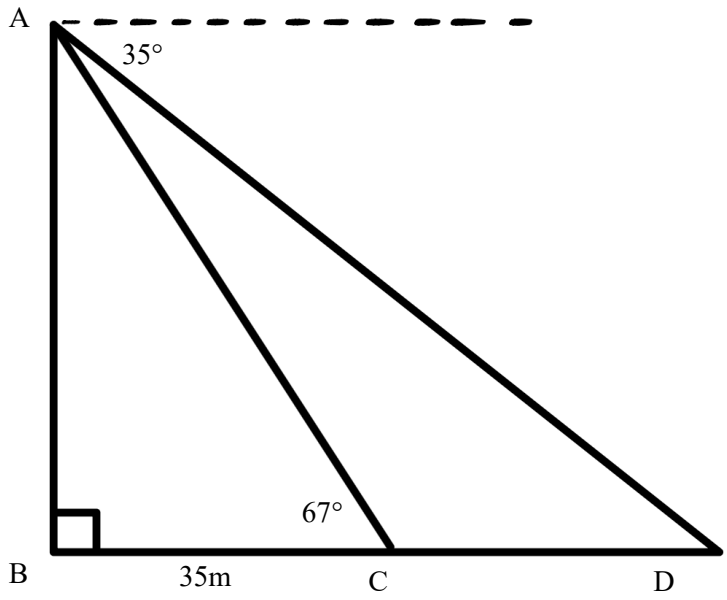
Question 8 (5 marks)

A diagram of a right-angled triangle is shown below.



a) What is the size of $\angle ADC$? **1**

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b) Find the length of AB correct to 1 decimal place. **2**

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c) Find the length of CD correct to the nearest whole number. **2**

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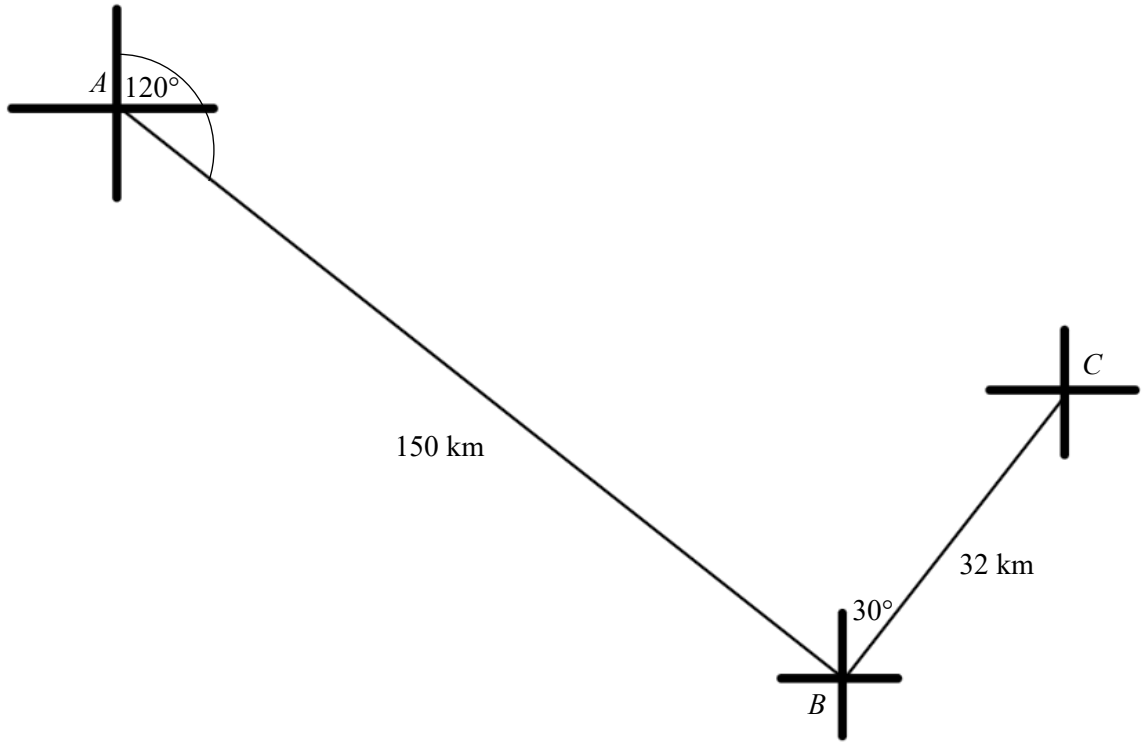
Question 9 (4 marks)

A boat is sailing between three different islands. The boat drops off cargo at island *A* first, then heads on a bearing of 120° towards island *B* travelling 150 km. After that, it is on a bearing of 30° to island *C*.



a) By first finding the size of $\angle ABC$, calculate the distance between island *A* and *C* to the nearest whole number. **2**

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b) How far directly south is island *B* from island *A?* **2**

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Question 9 (2 marks)

Solve for *x*.

$$9x - 6 = 5x + 18$$

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Question 10 (2 marks)

Solve for *x*.

$$\frac{2(2x + 3)}{6} = -8$$

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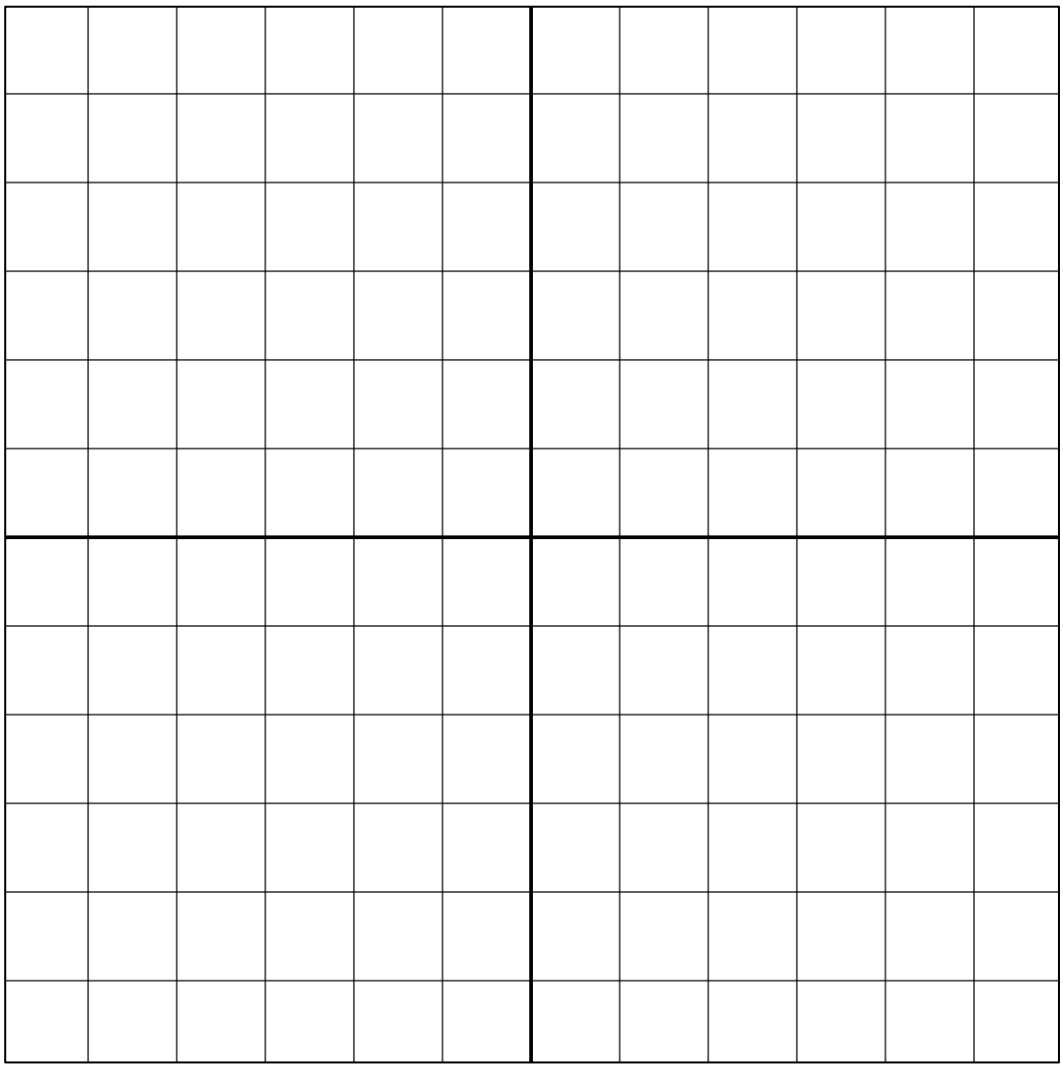
Question 11 (3 marks)

a) Complete the table of values below for: **1**

$$y = -\frac{5}{2}x + 2$$

-2	-1	0	1	2

b) Graph the equation showing all relevant graphing conventions. **2**



Question 12 (5 marks**)**

Peter is setting up a manufacturing business where he plans to make and sell wooden bookshelves. To begin the business, Peter needs to purchase equipment which costs him $600. Each shelf he makes takes 3 hours to build and costs $140 in materials. He sells his bookshelves for $200 each.

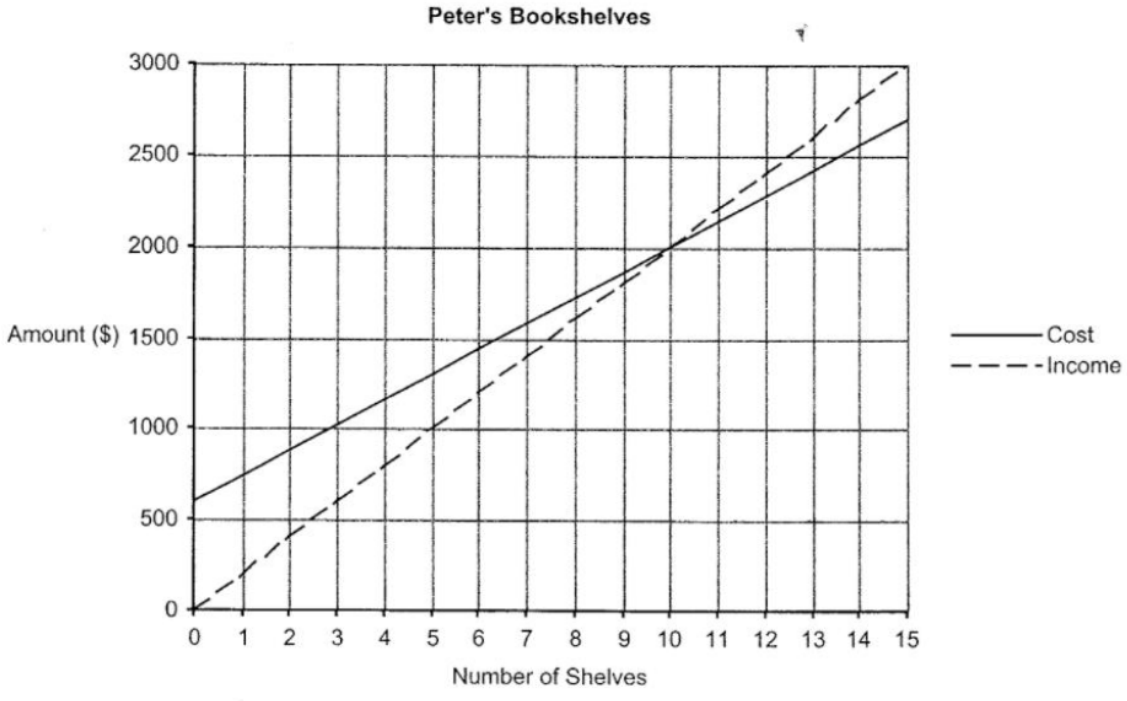
The cost (C) associated with the number of shelves (n) that Peter makes can be modelled. By the equation:

$$C = 140n + 600$$

The income (I) that Peter makes can be modelled by the equation:

$$I = 200n$$

The graph of these equations is shown below:



a) Explain the significance of the point where the two lines intersect. **1**

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b) Write an expression for the profit, P, Peter makes. **2**

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c) Calculate the profit he makes after completing 50 bookshelves. **2**

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END OF ASSESSMENT TASK 3

EXTRA WORKING SPACE

If you use the space, clearly indicate which question you are answering.