education equals

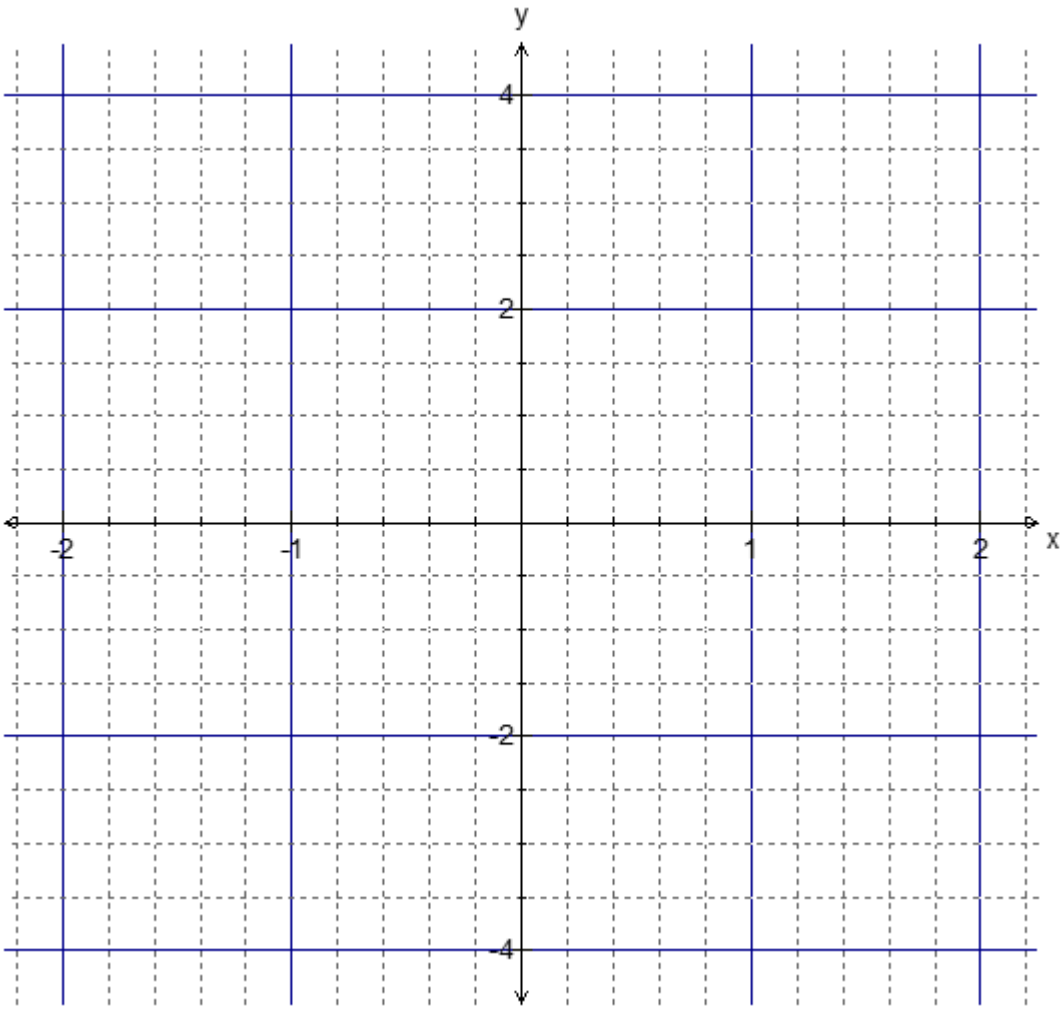
Topic: Line Graph mixed applications 1

Time: 45 mins Marks: /45 marks

Calculator Assumed

Question One: [6, 2, 3: 11 marks]

a) Graph the lines; $y = -0.5$, $y = 4.5x + 4$ and $y = -\frac{9}{2}x + 4$ on the axis below.

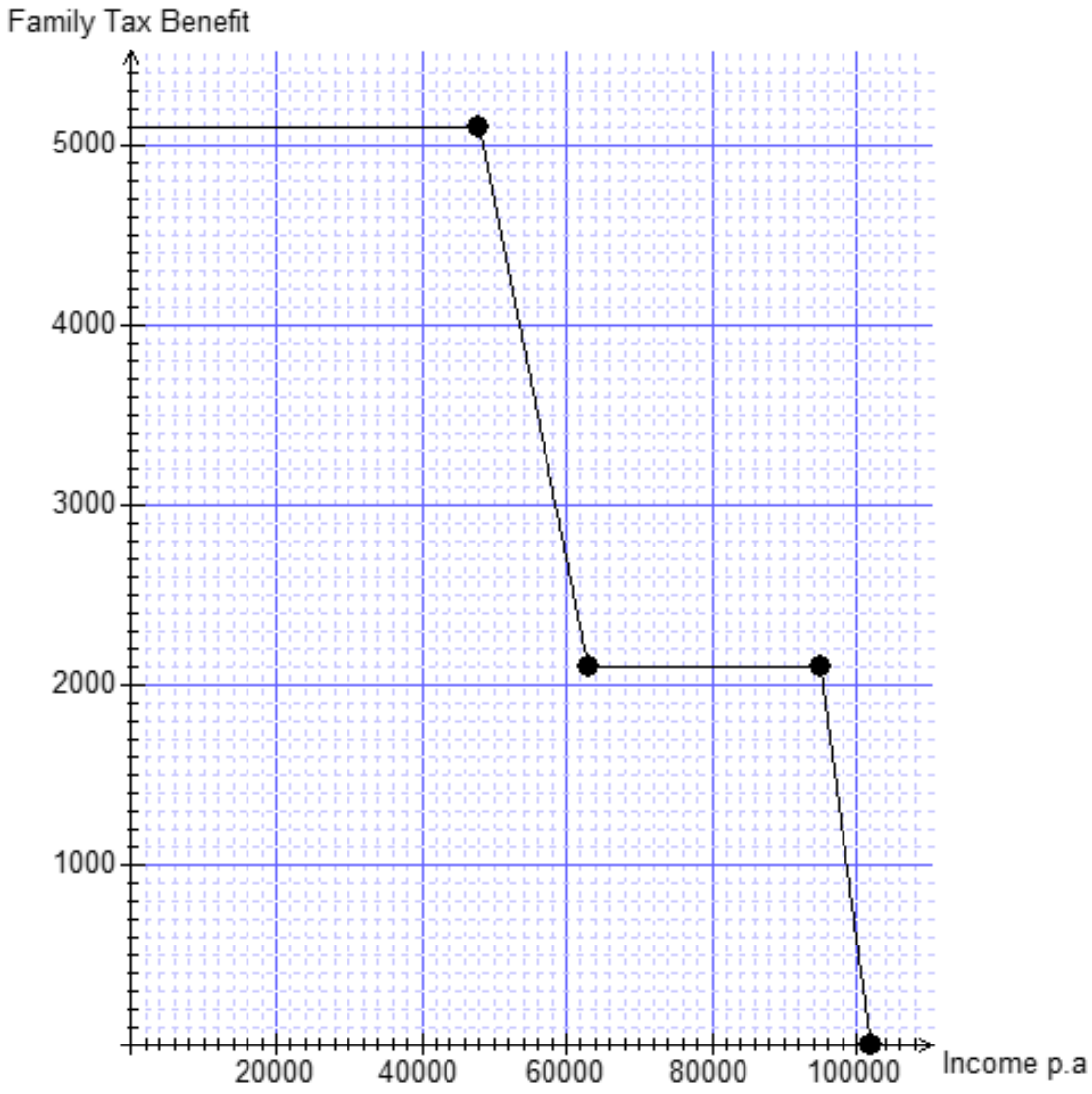


b) Does the point (-1, -1) lie on the perimeter of the triangle formed by these three lines? Justify your answer.

c) Calculate the area of the triangle formed by these three lines.

Question Two: [2, 2, 6: 10 marks]

The following graph shows the family tax benefit payable to families based on their combined annual income.



a) What is the family tax benefit allowed for a family with a combined annual income of:

i) $50 000 p.a?

ii) $104 000 p.a?

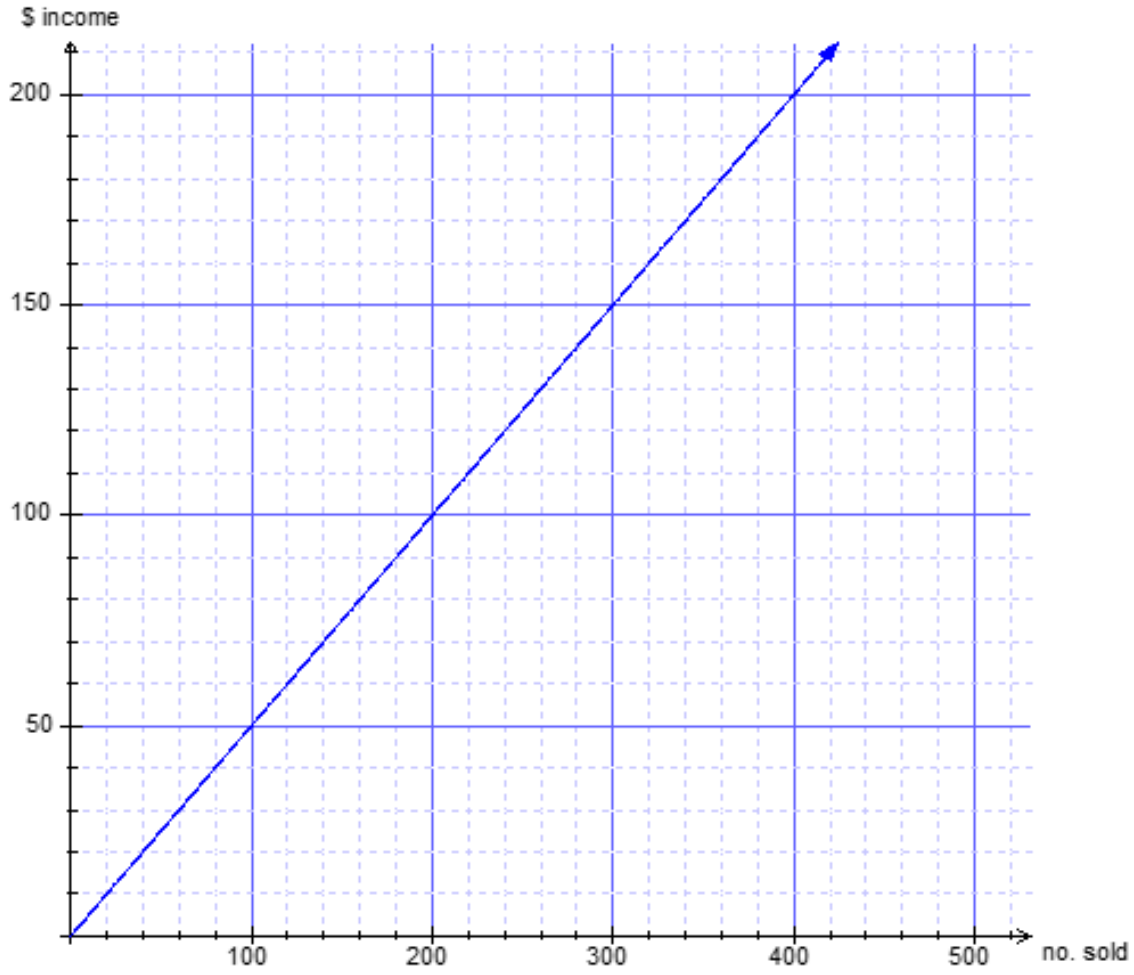
This information can be summaries by this table:

b) Complete the information in the two empty fields.

Families with 1 child meeting the criteria		
Combined annual income	Family Tax Benefit for the year	Equation on the graph
Up to \$48000	\$5100	$y = 5100;\ 0 \leq x \leq 48000$
\$48001 to \$63000	\$5100 less 20 cents for each \$1 annual income exceeds \$48000	
\$63001 to \$95000	\$2100	$y = 2100;\ 63000 \leq x \leq 95000$
\$95001 to \$102000		$y = 2100 - 0.3(x - 95000);$ $95000 \leq x \leq 102000$
Over \$102000	Nil	$y = 0;\ x \geq 102000$

Question Three: [2, 2, 2, 2: 8 marks]

Mandy starts a business selling hair ties to her friends. Her revenue based on the sales of her product are modeled by the graph below.



a) How much does she sell each item for?

To set up the business, Mandy initially spent $20 and each hair tie costs her 30 cents to make.

b) What is Mandy's cost equation?

c) Show the cost equation on the graph above and hence or otherwise state Many's 'break even' point.

d) Determine the single equation used to show Mandy's profit. Simplify your answer.

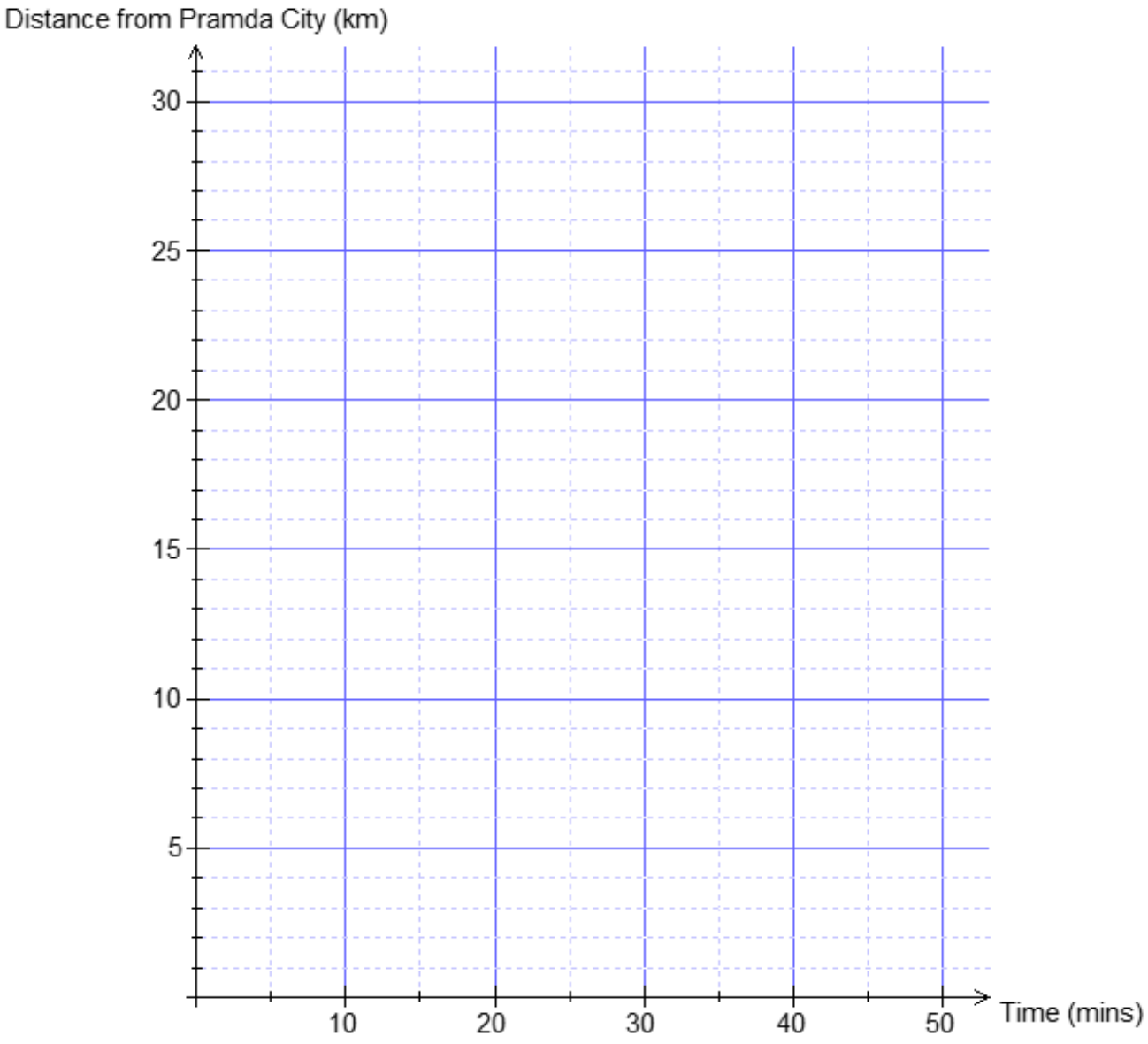
Question Four: [4, 6, 2, 4: 16 marks]

A motorist s travelling from Pramda City to Joonda. The first 5km of the journey the car travels at 60km/hr due to heavy traffic. She then comes to a complete standstill for a full 15 mins before recommencing her journey at 120km/hr for the remaining journey to Joonda.

A train leaves Joonda for Pramda City at the same time that the motorist left Pramda City for Joonda. The train travels at 60km/hr for the whole journey. It stops every 10km for 5 mins each time.

The distance from Pramda City to Joonda is 31km.

a) Draw a travel graph on the axes below showing the journey of the motorist.



b) Add the travel graph of the train to the axes on the previous page.

c) How many kilometres from Pramda City does the motorist and the train pass each other?

d) At what time do both the train and the motorist complete their journeys if they begin their journeys at 5:30 pm?

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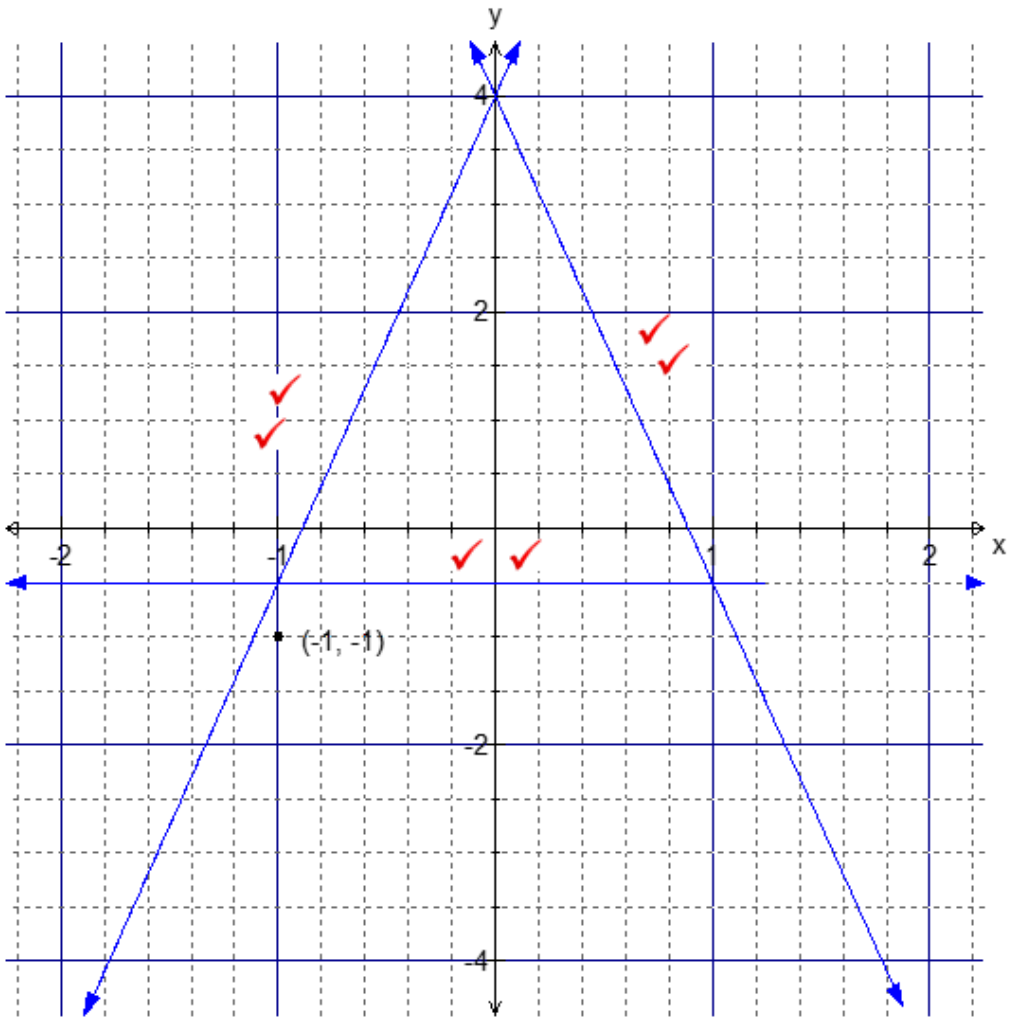
Topic: Line Graph mixed applications 1
SOLUTIONS
Time: 45 mins Marks: /45 marks

Calculator Assumed

Question One: [6, 2, 3: 11 marks]

a) Graph the lines; $y = -0.5$, $y = 4.5x + 4$ and $y = -\frac{9}{2}x + 4$ on the axis below.



b) Does the point (-1, -1) lie on the perimeter of the triangle formed by these three lines? Justify your answer.

No it does not, see graph. ✓✓

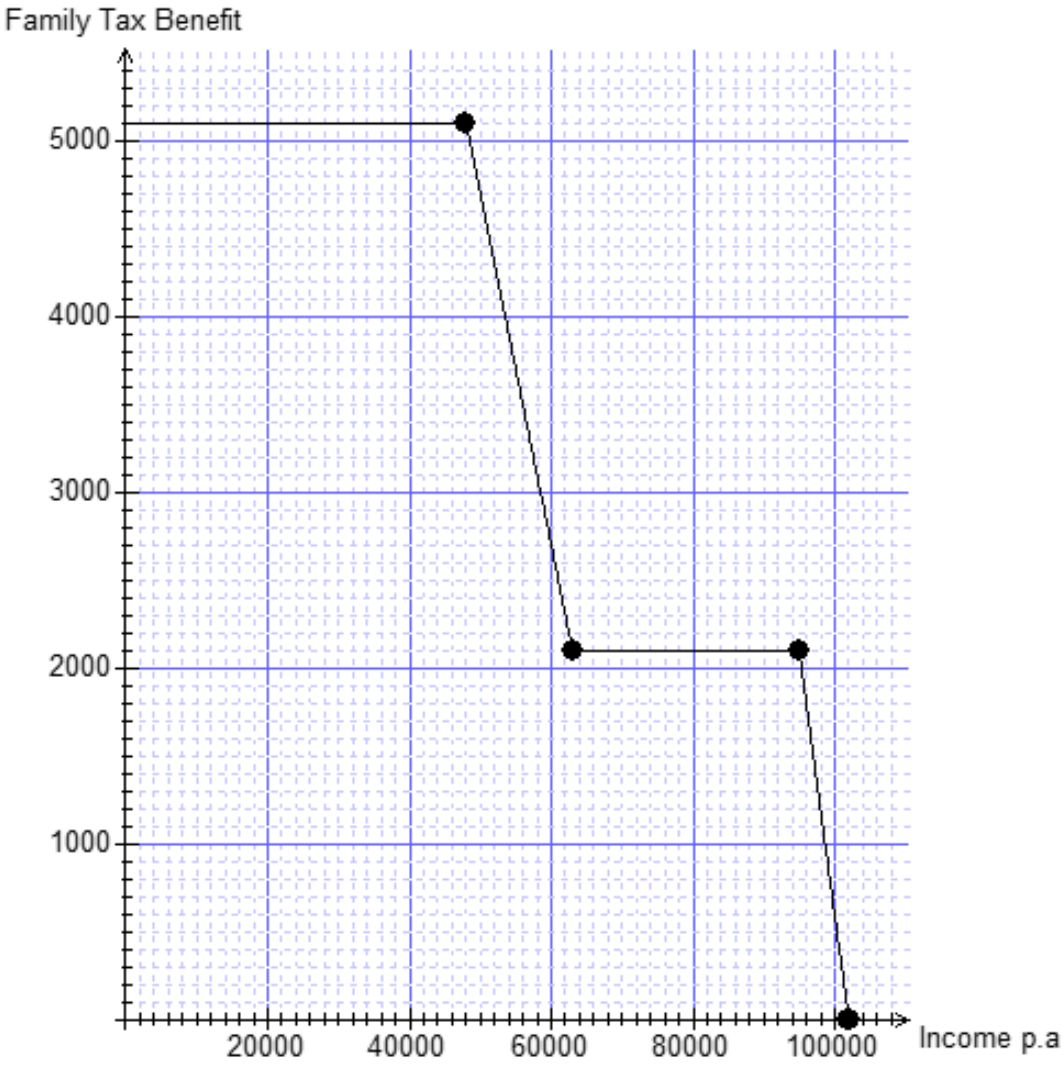
c) Calculate the area of the triangle formed by these three lines.

✓✓

$Area = \frac{2 \times 4.5}{2} = 4.5\ units^2$ ✓

Question Two: [2, 2, 6: 10 marks]

The following graph shows the family tax benefit payable to families based on their combined annual income.



a) What is the family tax benefit allowed for a family with a combined annual income of:

i) $50 000 p.a? $5100 ✓✓

ii) $104 000 p.a? No benefit ✓✓

This information can be summaries by this table:

b) Complete the information in the two empty fields.

Families with 1 child meeting the criteria		
Combined annual income	Family Tax Benefit for the year	Equation on the graph
Up to \$48000	\$5100	$y = 5100;\ 0 \leq x \leq 48000$
\$48001 to \$63000	\$5100 less 20 cents for each \$1 annual income exceeds \$48000	$y = \frac{-3000}{15000}$ ✓ $y = 0.2x + c$ $5100 = -0.2 \times 48000 + c$ $c = 14700$ ✓ $y = -0.2x + 14700$ ✓ $48000 < x \leq 63000$ ✓
\$63001 to \$95000	\$2100	$y = 2100;\ 63000 \leq x \leq 95000$
\$95001 to \$102000	✓ \$2100 less 30 cents for each \$1 annual income exceeds \$95000 ✓	$y = 2100 - 0.3(x - 95000);$ $95000 \leq x \leq 102000$
Over \$102000	Nil	$y = 0;\ x \geq 102000$

Question Three: [2, 2, 2, 2: 8 marks]

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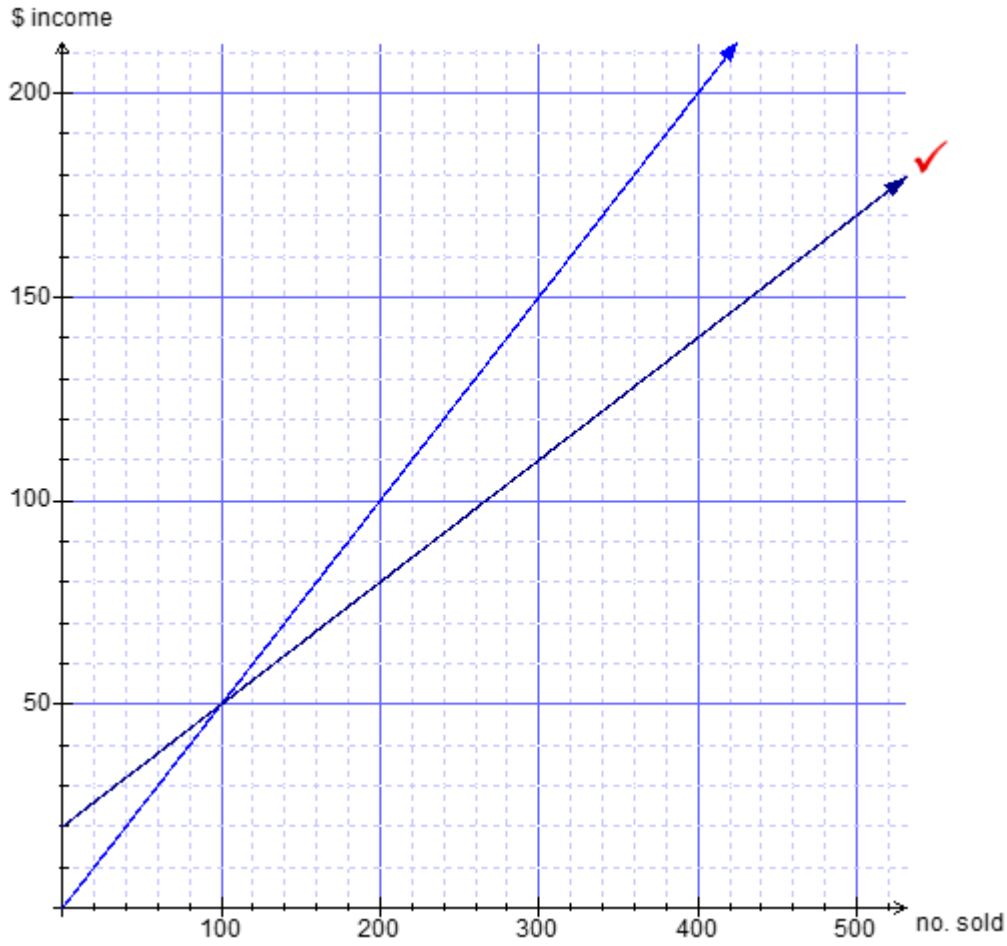

a) How much does she sell each item for?

$0.50 ✓ ✓

To set up the business, Mandy initially spent $20 and each hair tie costs her 30 cents to make.

b) What is Mandy's cost equation?

$C = 20 + 0.30x$

✓ ✓

c) Show the cost equation on the graph above and hence or otherwise state Mandy's 'break even' point.

100 units ✓

d) Determine the single equation used to show Mandy's profit. Simplify your answer.

$P = 0.5x - (20 + 0.3x)$ ✓

$P = 0.2x - 20$ ✓

Question Four: [4, 6, 2, 4: 16 marks]

A motorist s travelling from Pramda City to Joonda. The first 5km of the journey the car travels at 60km/hr due to heavy traffic. She then comes to a complete standstill for a full 15 mins before recommencing her journey at 120km/hr for the remaining journey to Joonda.

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The distance from Pramda City to Joonda is 31km.

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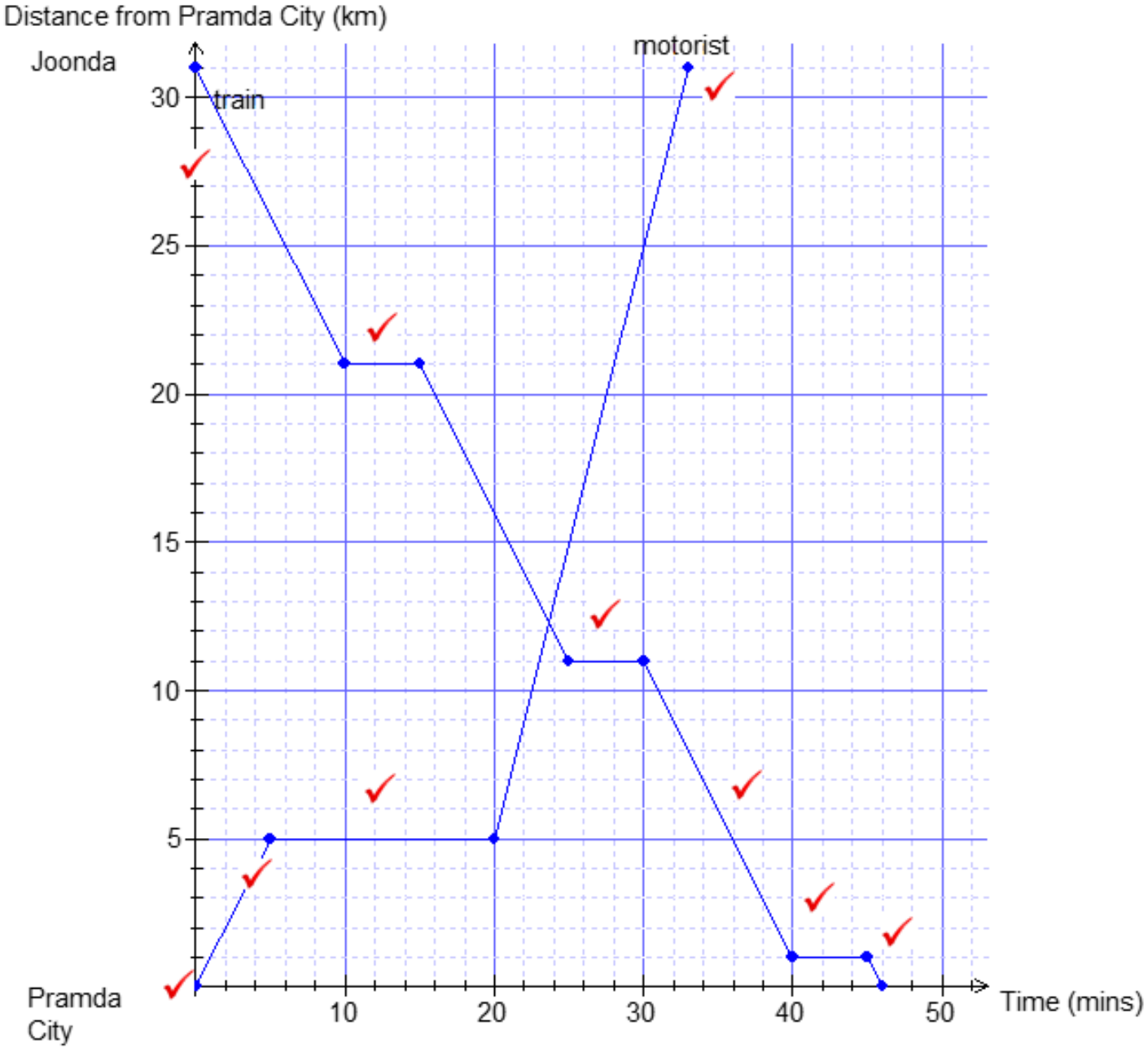

b) Add the travel graph of the train to the axes on the previous page.

c) Approximately how many kilometres from Pramda City does the motorist and the train pass each other?

Approximately 12.2km from Pramda City

d) At what time do both the train and the motorist complete their journeys if they begin their journeys at 5:30 pm?

The motorist's journey takes 33 mins therefore she finishes her journey at 6:03 pm.

The train takes 46 mins therefore finishes the journey at 6:16 pm.