9 Jack bought a new boat for £12 500

BM9A

The value, £V, of Jack's boat at the end of n years is given by the formula

$$V = 12\,500 \times (0.85)^n$$

(a) At the end of how many years was the value of Jack's boat first less than 50% of the value of the boat when it was new?

.....

(2)

A savings account pays interest at a rate of R% per year.
Jack invests £5500 in the account for one year.

At the end of the year, Jack pays tax on the interest at a rate of 40%.
After paying tax, he gets £79.20

(b) Work out the value of R.

.....

(3)

(Total for Question 9 is 5 marks)

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15 (a) Show that the equation $x^3 + 7x - 5 = 0$ has a solution between $x = 0$ and $x = 1$

BM15A

(2)

(b) Show that the equation $x^3 + 7x - 5 = 0$ can be arranged to give $x = \dfrac{5}{x^2 + 7}$

(2)

(c) Starting with $x_0 = 1$, use the iteration formula $x_{n+1} = \dfrac{5}{x_n^{\,2} + 7}$ three times to find an estimate for the solution of $x^3 + 7x - 5 = 0$

.....

(3)

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(d) By substituting your answer to part (c) into $x^3 + 7x - 5$,
comment on the accuracy of your estimate for the solution to $x^3 + 7x - 5 = 0$

.....

.....

(2)

(Total for Question 15 is 9 marks)

16 The petrol consumption of a car, in litres per 100 kilometres, is given by the formula

BM16A

$$\text{Petrol consumption} = \frac{100 \times \text{Number of litres of petrol used}}{\text{Number of kilometres travelled}}$$

Nathan's car travelled 148 kilometres, correct to 3 significant figures.
The car used 11.8 litres of petrol, correct to 3 significant figures.

Nathan says,

"My car used less than 8 litres of petrol per 100 kilometres."

Could Nathan be wrong?
You must show how you get your answer.

(Total for Question 16 is 3 marks)

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14 (a) Simplify $\dfrac{x^2 - 16}{2x^2 - 5x - 12}$

BP14A

.....

(3)

(b) Make v the subject of the formula $w = \dfrac{15(t - 2v)}{v}$

.....

(3)

(Total for Question 14 is 6 marks)

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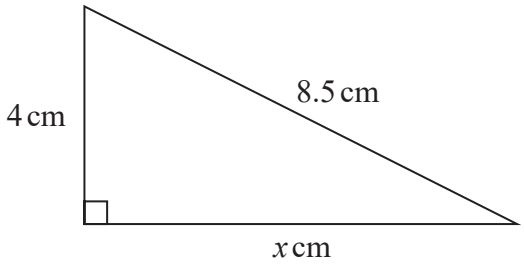
Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

PF1A

1 Here is a right-angled triangle.



Work out the value of x.

$x =$ .....

(Total for Question 1 is 2 marks)

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PF2A

2 $T = 4m^2 - 11$

(a) Work out the value of T when $m = -3$

$T =$ .....

(2)

(b) Make p the subject of the formula $d = 3p + 4$

.....

(2)

(Total for Question 2 is 4 marks)

17 (a) Show that the equation $x^4 - x^2 - 5 = 0$ can be written in the form $x = \sqrt[4]{x^2 + 5}$

PL17A

(1)

(b) Starting with $x_0 = 1.5$

use the iteration formula $x_{n+1} = \sqrt[4]{x_n^2 + 5}$ three times to find an estimate for a solution of $x^4 - x^2 - 5 = 0$

.....

(3)

(Total for Question 17 is 4 marks)

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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Make a the subject of the formula $p = 3a - 9$

PJ1A

.....

(Total for Question 1 is 2 marks)

2 Rob has been asked to divide 120 in the ratio 3 : 5

Here is his working.

$120 \div 3 = 40$ $120 \div 5 = 24$

Rob's working is not correct.

Describe what Rob has done wrong.

.....

.....

.....

(Total for Question 2 is 1 mark)

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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Expand and simplify $3(2y - 5) + 7(y + 2)$

PP1A

.....

(2)

(b) Factorise fully $6x^2 + 15x$

.....

(2)

(c) Make g the subject of the formula $f = 3g + 11$

.....

(2)

(Total for Question 1 is 6 marks)

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17 (a) Show that the equation $x^3 + 2x - 6 = 0$ has a solution between $x = 1$ and $x = 2$

(2)

(b) Show that the equation $x^3 + 2x - 6 = 0$ can be rearranged to give $x = \dfrac{6}{x^2 + 2}$

(1)

(c) Starting with $x_0 = 1.45$

use the iteration formula $x_{n+1} = \dfrac{6}{x_n^{\,2} + 2}$ twice to find an estimate for the solution of $x^3 + 2x - 6 = 0$

Give your answer correct to 4 decimal places.

PP17A

.....

(3)

(Total for Question 17 is 6 marks)

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10 Make m the subject of $k = p + \frac{2m}{5}$

PQ10A

.....

(Total for Question 10 is 3 marks)

11 The floor plan of a house is drawn using a scale of 1 : 50
On the plan, a room in the house has a floor area of 48 cm^2

Work out the real area of the floor of this room.
Give your answer in m^2

PQ11A

..... m^2

(Total for Question 11 is 3 marks)

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18 (a) Show that the equation $x^3 + x = 7$ has a solution between 1 and 2

BJ18A

(2)

(b) Show that the equation $x^3 + x = 7$ can be rearranged to give $x = \sqrt[3]{7 - x}$

(1)

(c) Starting with $x_0 = 2$,
use the iteration formula $x_{n+1} = \sqrt[3]{7 - x_n}$ three times to find an estimate for a solution of $x^3 + x = 7$

(3)

(Total for Question 18 is 6 marks)

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(b) Work out an estimate for the distance the car travels in the first 20 seconds of its journey.
Use 4 strips of equal width.

.....m

(3)

(Total for Question 14 is 7 marks)

15 Make m the subject of the formula $f = \dfrac{3m + 4}{m - 1}$

KY15A

.....

(Total for Question 15 is 3 marks)

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