

15 The total surface area of a solid hemisphere is equal to the curved surface area of a cylinder.

The radius of the hemisphere is r cm.

The radius of the cylinder is twice the radius of the hemisphere.

Given that

$$\text{volume of hemisphere} : \text{volume of cylinder} = 1 : m$$

find the value of m .

$$m =$$

(Total for Question 15 is 4 marks)



16 (a) Rationalise the denominator of $\frac{a + \sqrt{4b}}{a - \sqrt{4b}}$ where a is an integer and b is a prime number.

Simplify your answer.

(b) Given that $\left(\sqrt{\frac{y}{x}}\right)^{-5} = \frac{x^m}{y^m}$ where $x \neq y$

find the value of m .

$$m =$$

(3)

(1)

(Total for Question 16 is 4 marks)

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17 Here is triangle ABC .

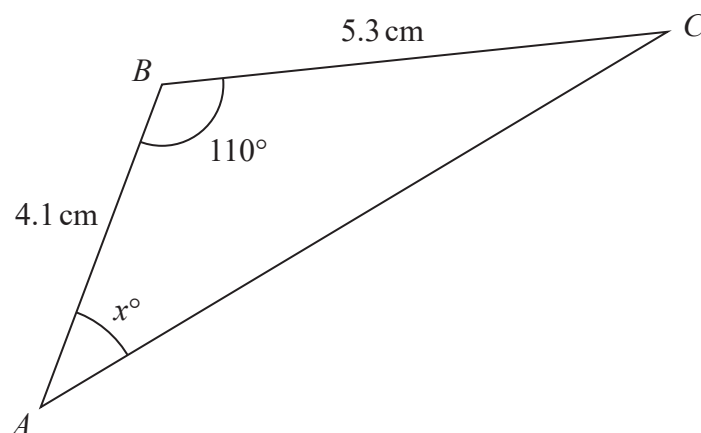


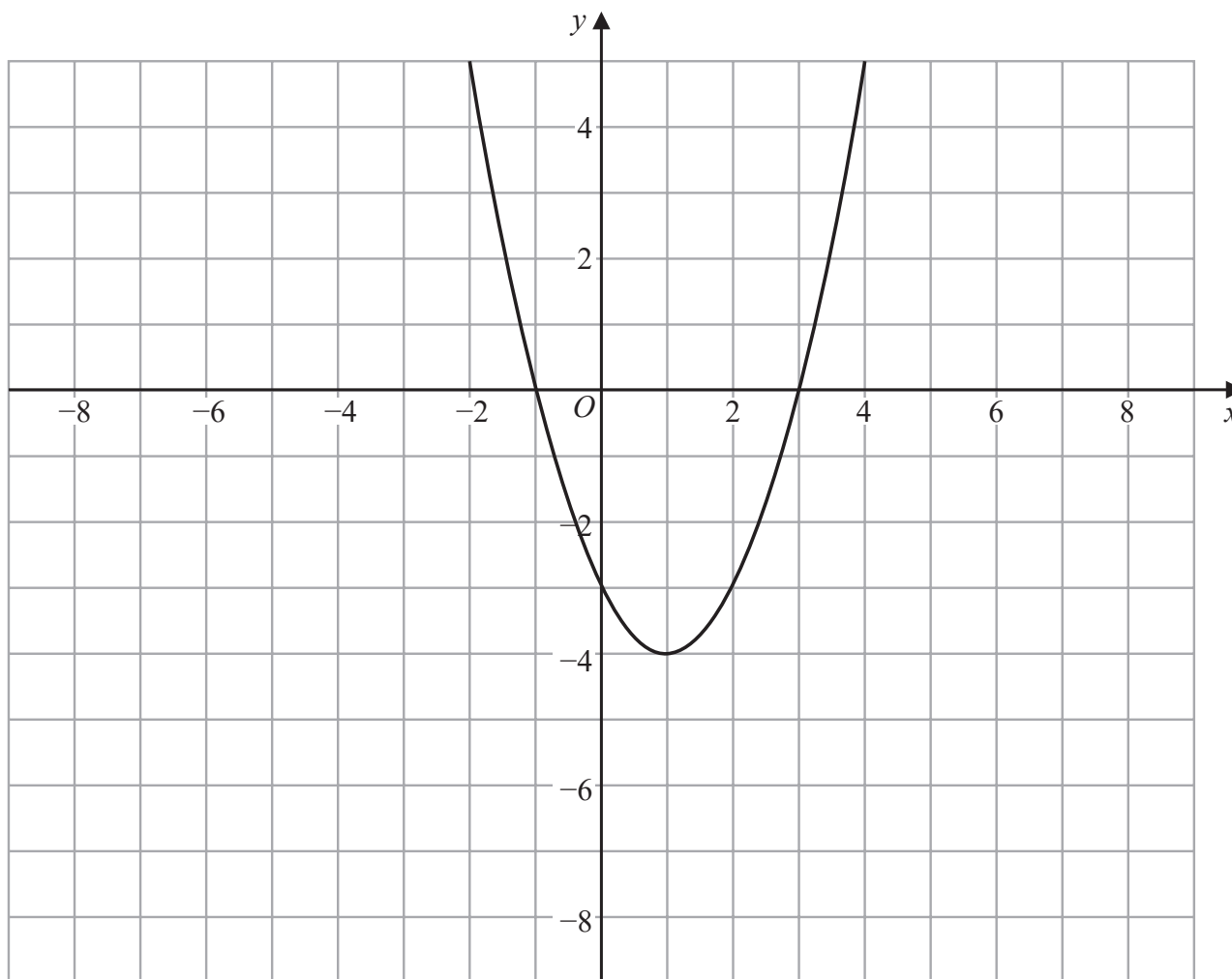
Diagram **NOT** accurately drawn

Calculate the value of x .
Give your answer correct to 3 significant figures.

(Total for Question 17 is 5 marks)



18 The graph of $y = f(x)$ is shown on the grid.



(a) On the grid above, sketch the graph of $y = f\left(\frac{1}{2}x\right)$

(2)

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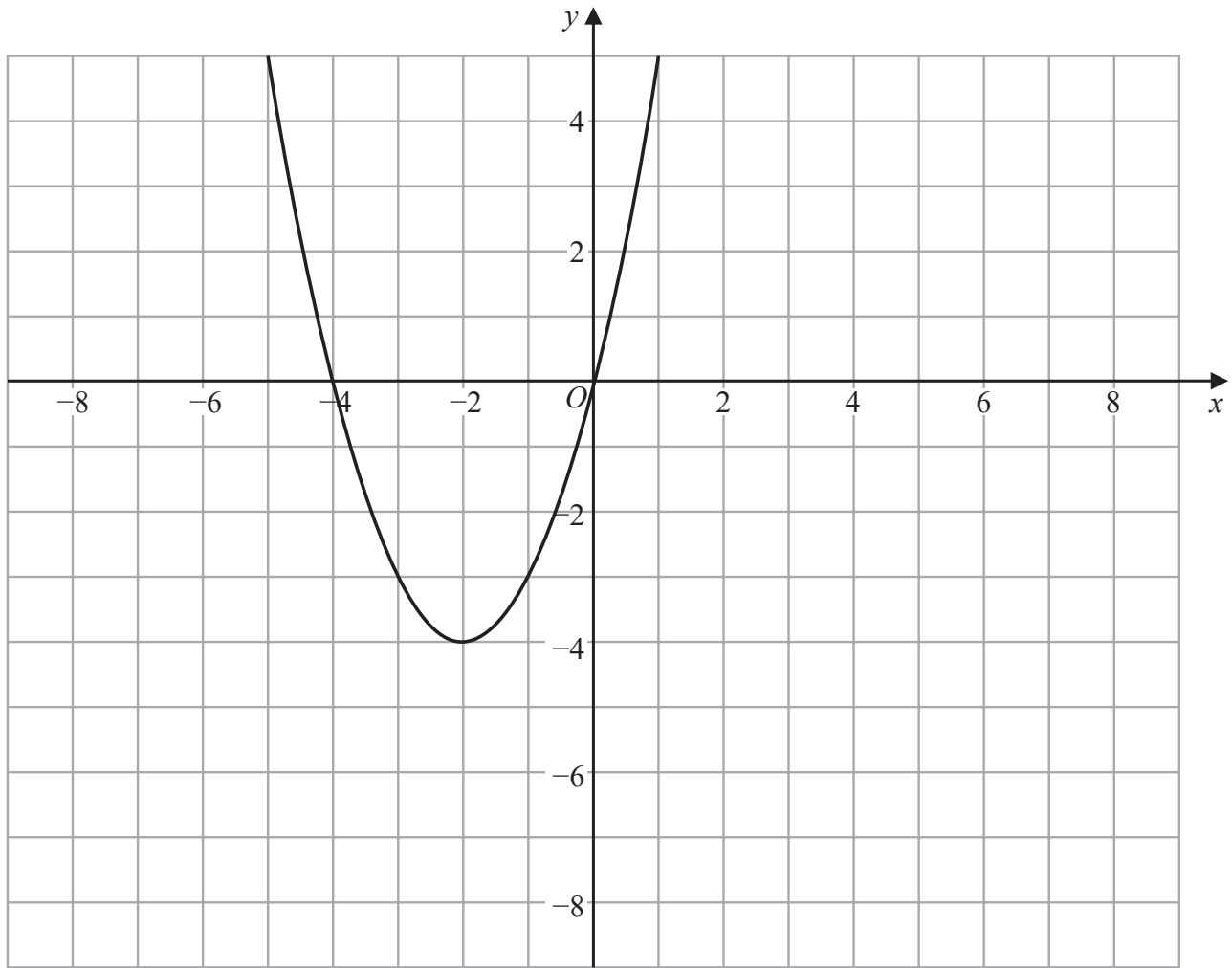
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The graph of $y = f(x + k)$ is shown on the grid below.



(b) Write down the value of k

(1)

(Total for Question 18 is 3 marks)



19 g is the function with domain $x \geq -3$ such that $g(x) = x^2 + 6x$

(a) Write down the range of g^{-1}

(1)

(b) Express the inverse function g^{-1} in the form $g^{-1}:x \mapsto \dots$

$g^{-1}:x \mapsto$

(4)

(Total for Question 19 is 5 marks)

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20 A bowl contains n pieces of fruit.
Of these, 4 are oranges and the rest are apples.

Two pieces of fruit are going to be taken at random from the bowl.

The probability that the bowl will then contain $(n - 6)$ apples is $\frac{1}{3}$

Work out the value of n
Show your working clearly.

(Total for Question 20 is 6 marks)



21 $(2x + 23)$, $(8x + 2)$ and $(20x - 52)$ are three consecutive terms of an arithmetic sequence.

Prove that the common difference of the sequence is 12

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(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

