

Q Forming and Solving Quadratics using Formula or by Factorising

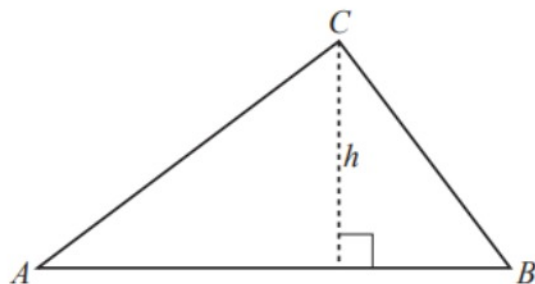
- 19** Solve the equation $x^2 + 5x - 7 = 0$.
You must show all your working and give your answers correct to 2 decimal places.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [4]

- (c)** Solve $x^3 + 4x^2 - 17x = x^3 - 9$.
You must show all your working and give your answers correct to 2 decimal places.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [5]

(b)



NOT TO
SCALE

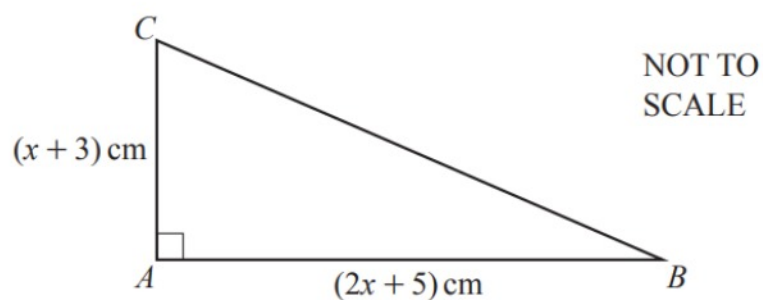
$AB = (2x + 3)$ cm and $h = (x + 5)$ cm.

The area of triangle $ABC = 50$ cm².

Find the value of x , giving your answer correct to 2 decimal places.

You must show all your working.

$x =$ [6]



The diagram shows a right-angled triangle ABC .

- (a) (i) The area of the triangle is 60 cm^2 .

Show that $2x^2 + 11x - 105 = 0$.

[3]

- (ii) Solve by factorisation.

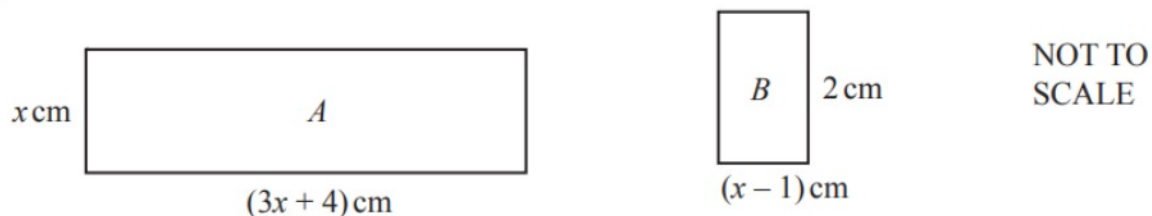
$$2x^2 + 11x - 105 = 0$$

$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots [3]$$

- (iii) Calculate angle ACB .

$\dots\dots\dots [3]$

9 (a)



The total of the areas of rectangles A and B is 20 cm^2 .

(i) Show that $3x^2 + 6x - 22 = 0$.

[2]

(ii) Solve the equation $3x^2 + 6x - 22 = 0$, giving your answers correct to 4 significant figures. You must show all your working.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [4]

(iii) Find the perimeter of rectangle B .

$\dots\dots\dots$ cm [1]

9 (a)

$(x - 1)$ cm



$(2x + 1)$ cm

x cm



x cm

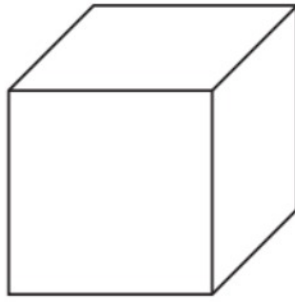
NOT TO
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The area of the rectangle is 29 cm^2 greater than the area of the square.
The difference between the perimeters of the two shapes is k cm.

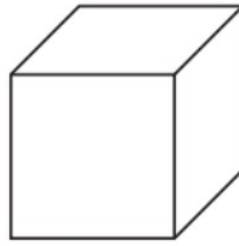
Find the value of k .
You must show all your working.

$k = \dots\dots\dots$ [6]

(b)



$(y + 1) \text{ cm}$



$y \text{ cm}$

NOT TO
SCALE

The volume of the larger cube is 5 cm^3 greater than the volume of the smaller cube.

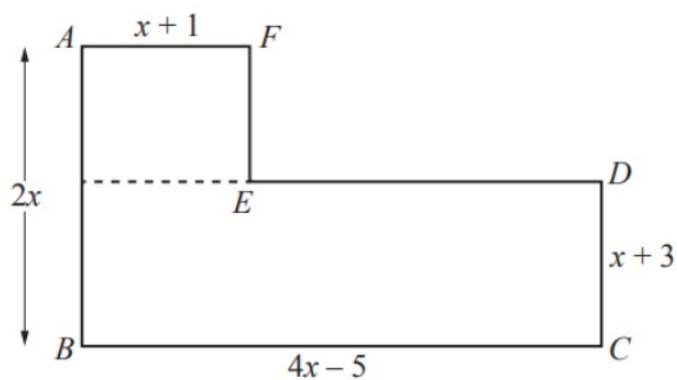
(i) Show that $3y^2 + 3y - 4 = 0$.

[4]

(ii) Find the volume of the smaller cube.
Show all your working and give your answer correct to 2 decimal places.

..... cm^3 [4]

5 All the lengths in this question are in centimetres.



NOT TO
SCALE

The diagram shows a shape $ABCDEF$ made from two rectangles.
The total area of the shape is 342 cm^2 .

(a) Show that $x^2 + x - 72 = 0$.

[5]

(b) Solve by factorisation.

$$x^2 + x - 72 = 0$$

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [3]

(c) Work out the perimeter of the shape $ABCDEF$.

..... cm [2]

- 18** One day, Anya runs 12 km at a speed of x km/h.
The next day she walks 10 km at a speed of $(x - 4)$ km/h.

(a) Write down an expression, in terms of x , for the time she spends running.

..... h [1]

(b) Write down an expression, in terms of x , for the time she spends walking.

..... h [1]

(c) The time Anya spends walking is 1 hour more than the time she spends running.

Write an equation in terms of x and show that it simplifies to $x^2 - 2x - 48 = 0$.

[4]

(d) Use factorisation to solve the equation $x^2 - 2x - 48 = 0$.

$x =$ or $x =$ [3]

(e) Find the time Anya spends running.

..... h [1]

- 8 Darpan runs a distance of 12 km and then cycles a distance of 26 km. His running speed is x km/h and his cycling speed is 10 km/h faster than his running speed. He takes a total time of 2 hours 48 minutes.

- (a) An expression for the time, in hours, Darpan takes to run the 12 km is $\frac{12}{x}$.

Write an equation, in terms of x , for the total time he takes in hours.

..... [3]

- (b) Show that this equation simplifies to $7x^2 - 25x - 300 = 0$.

[4]

- (c) Use the quadratic formula to solve $7x^2 - 25x - 300 = 0$.
You must show all your working.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [4]

- (d) Calculate the number of minutes Darpan takes to run the 12 km.

..... min [2]

11 Gaya spends \$48 to buy books that cost \$ x each.

(a) Write down an expression, in terms of x , for the number of books Gaya buys.

..... [1]

(b) Myra spends \$60 to buy books that cost \$($x + 2$) each.
Gaya buys 4 more books than Myra.

Show that $x^2 + 5x - 24 = 0$.

(c) Solve by factorisation.

[4]

(c) Solve by factorisation.

$$x^2 + 5x - 24 = 0$$

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [3]

(d) Find the number of books Myra buys.

..... [1]

- (c) Antonio travels 100 km at an average speed of x km/h.
He then travels a further 150 km at an average speed of $(x + 10)$ km/h.
The time taken for the whole journey is 4 hours 20 minutes.

(i) Show that $13x^2 - 620x - 3000 = 0$.

[4]

- (ii) Solve $13x^2 - 620x - 3000 = 0$ to find the speed Antonio travels for the first 100 km of the journey.
You must show all your working and give your answer correct to 1 decimal place.

..... km/h [3]

- 5 (a) In a shop the cost of a fiction book is \$ x and the cost of a reference book is \$ $(x+2)$.
The cost of 11 fiction books is the same as the cost of 10 reference books.

Find the value of x .

$$x = \dots\dots\dots [2]$$

- (b) In another shop, the cost of a fiction book is \$ y and the cost of a reference book is \$ $(y+2)$.
Maria spends \$95 on fiction books and \$147 on reference books.
She buys a total of 12 books.

- (i) Show that $6y^2 - 109y - 95 = 0$.

[4]

- (ii) Factorise $6y^2 - 109y - 95$.

$$\dots\dots\dots [2]$$

- (iii) Find the value of y .

$$y = \dots\dots\dots [1]$$

8 (a) Kaito runs along a 12 km path at an average speed of x km/h.

(i) Write down an expression, in terms of x , for the number of hours he takes.

..... hours [1]

(ii) Yuki takes 1.5 hours longer to walk along the same path as Kaito.
She walks at an average speed of $(x - 4)$ km/h.

Write down an equation, in terms of x , and show that it simplifies to $x^2 - 4x - 32 = 0$.

[4]

(iii) Solve by factorisation.

$$x^2 - 4x - 32 = 0$$

$x =$ or $x =$ [3]

(iv) Find the number of hours it takes Yuki to walk along the 12 km path.

..... hours [2]

(f) Alan invests \$200 at a rate of $r\%$ per year compound interest. After 2 years the value of his investment is \$206.46 .

(i) Show that $r^2 + 200r - 323 = 0$.

[3]

(ii) Solve the equation $r^2 + 200r - 323 = 0$ to find the rate of interest. Show all your working and give your answer correct to 2 decimal places.

$r = \dots\dots\dots$ [3]