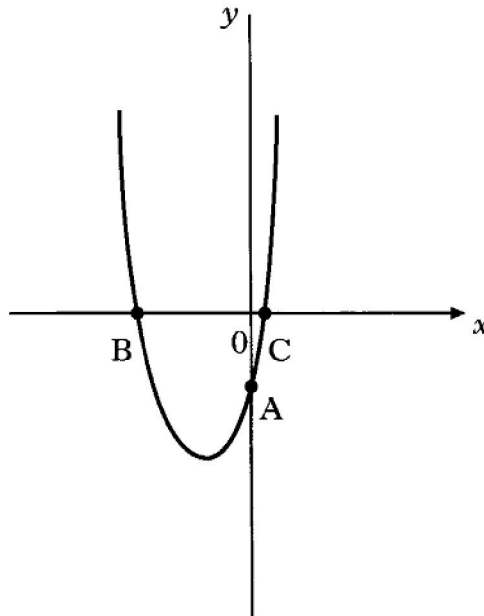


Quadratics. Not always apparent that these questions concern Quadratic equations.

Most common errors are from candidates trying to factorise the Paper 2 Quadratics. The clue here is “to 2 decimal places” indicating that they have non-integer roots.

Please substitute exactly into equations, and state the discriminant if using the quadratic formula.

8. The diagram below shows part of the graph of $y = 4x^2 + 4x - 3$.
The graph cuts the y -axis at A and the x -axis at B and C.



- (a) Write down the coordinates of A.
- (b) Find the coordinates of B and C.
- (c) Calculate the minimum value of $4x^2 + 4x - 3$.
9. Two functions are given below.

$$f(x) = x^2 + 2x - 1$$
$$g(x) = 5x + 3$$

Find the values of x for which $f(x) = g(x)$.

3. Solve the equation

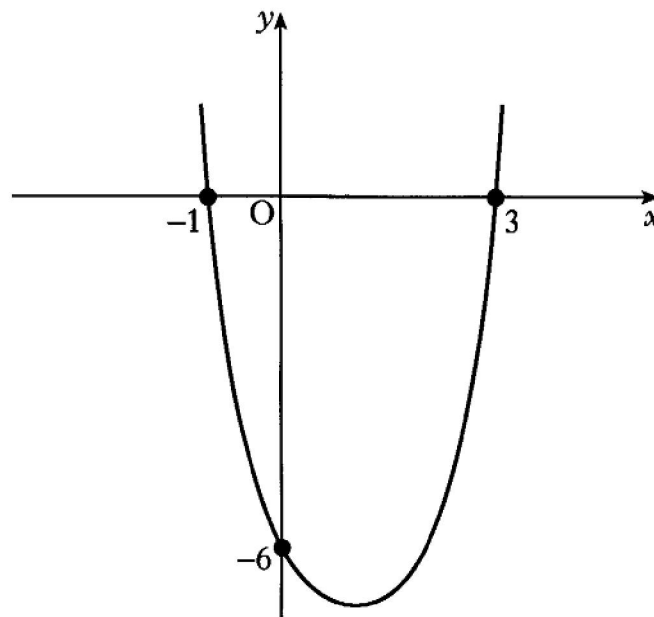
$$2x^2 + 3x - 7 = 0.$$

Give your answers **correct to 1 decimal place**.

4

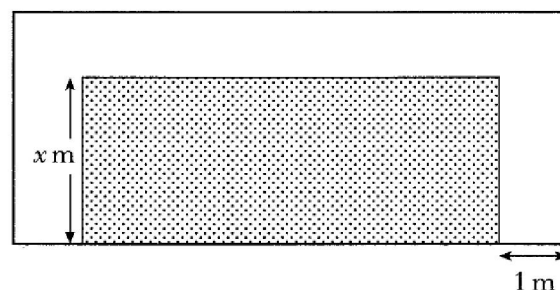
8. The diagram below shows part of the graph of a quadratic function, with equation of the form $y = k(x - a)(x - b)$.

The graph cuts the y -axis at $(0, -6)$ and the x -axis at $(-1, 0)$ and $(3, 0)$.



- (a) Write down the values of a and b .
- (b) Calculate the value of k .
- (c) Find the coordinates of the minimum turning point of the function.

11. A rectangular lawn has a path, 1 metre wide, on 3 sides as shown.



The breadth of the lawn is x metres.

The length of the lawn is three times its breadth.

The area of the lawn equals the area of the path.

- (a) Show that $3x^2 - 5x - 2 = 0$.

3

- (b) Hence find the **length** of the lawn.

4

4. Solve the equation

$$x^2 + 2x = 9.$$

Give your answers **correct to 1 decimal place**.

3

8. The graph of $y = x^2$ has been moved to the position shown in Figure 1.

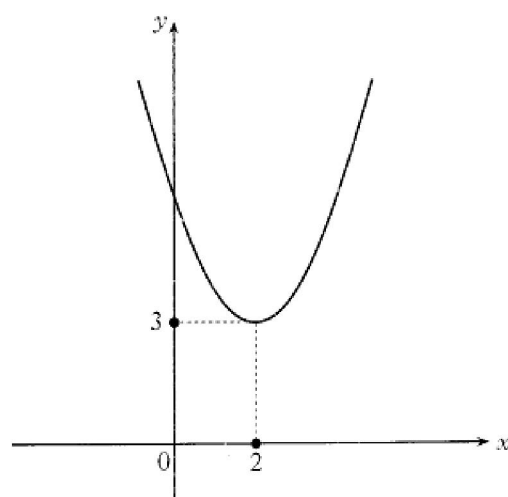


Figure 1

The equation of this graph is $y = (x - 2)^2 + 3$.

The graph of $y = x^2$ has now been moved to the position shown in Figure 2.

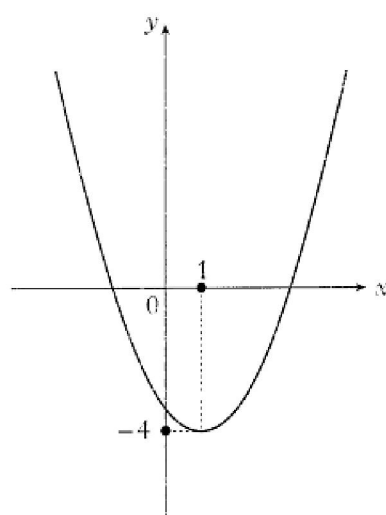


Figure 2

Write down the equation of the graph in Figure 2.

2

2. Solve the equation

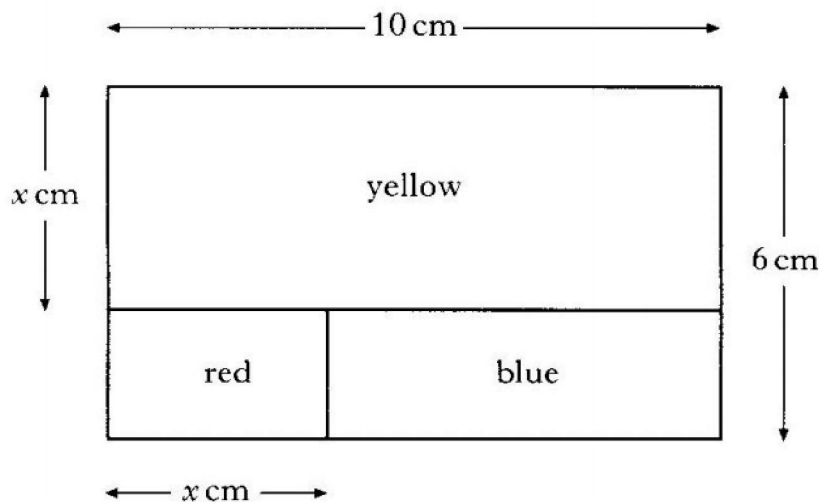
$$3x^2 - 2x - 10 = 0.$$

Give your answer **correct to 2 significant figures**.

4

11. (a) A decorator's logo is rectangular and measures 10 centimetres by 6 centimetres.

It consists of three rectangles: one red, one yellow and one blue.



The yellow rectangle measures 10 centimetres by x centimetres.

The width of the red rectangle is x centimetres.

Show that the area, A , of the blue rectangle is given by the expression

$$A = x^2 - 16x + 60.$$

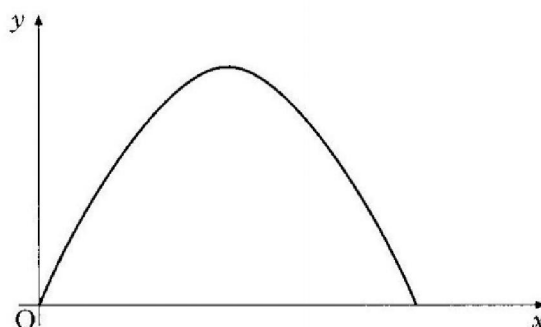
- (b) The area of the blue rectangle is equal to $\frac{1}{5}$ of the total area of the logo.
Calculate the value of x .

13. The profit made by a publishing company of a magazine is calculated by the formula

$$y = 4x(140 - x),$$

where y is the profit (in pounds) and x is the selling price (in pence) of the magazine.

The graph below represents the profit y against the selling price x .

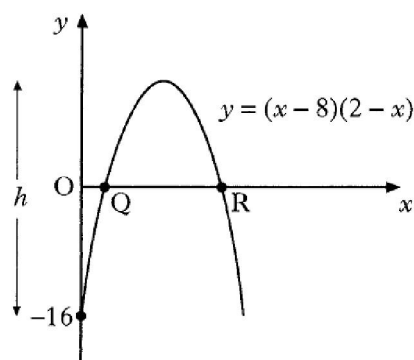
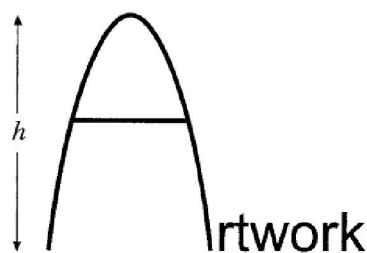


Find the maximum profit the company can make from the sale of the magazine.

4

8. The curved part of the letter A in the *Artwork* logo is in the shape of a parabola.

The equation of this parabola is $y = (x - 8)(2 - x)$.



- (a) Write down the coordinates of Q and R.
- (b) Calculate the height, h , of the letter A.

2

3

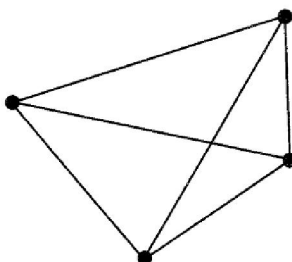
12. Given that

$$x^2 - 10x + 18 = (x - a)^2 + b,$$

find the values of a and b .

KU	RE
3	

11. The minimum number of roads joining 4 towns to each other is 6 as shown.



The minimum number of roads, r , joining n towns to each other is given by the formula

$$r = \frac{1}{2}n(n-1).$$

- (a) State the minimum number of roads needed to join 7 towns to each other.
- (b) When $r = 55$, show that $n^2 - n - 110 = 0$.
- (c) Hence find **algebraically** the value of n .

1	
	2
	3

11. A rectangular wall vent is 30 centimetres long and 20 centimetres wide.

It is to be enlarged by increasing **both** the length and the width by x centimetres.

- (a) Write down the length of the new vent.
- (b) Show that the area, A square centimetres, of the new vent is given by

$$A = x^2 + 50x + 600.$$

- (c) The area of the new vent **must** be **at least 40% more** than the original area.

Find the **minimum** dimensions, to the nearest centimetre, of the new vent.

	1
	2
	5

13. A rectangular clipboard has a triangular plastic pocket attached as shown in Figure 1.

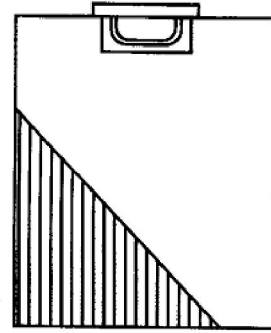


Figure 1

The pocket is attached along edges TD and DB as shown in Figure 2.

B is x centimetres from the corner C.

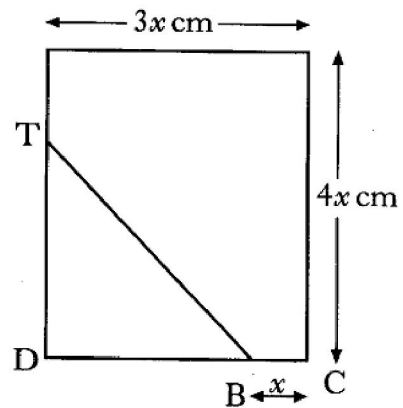


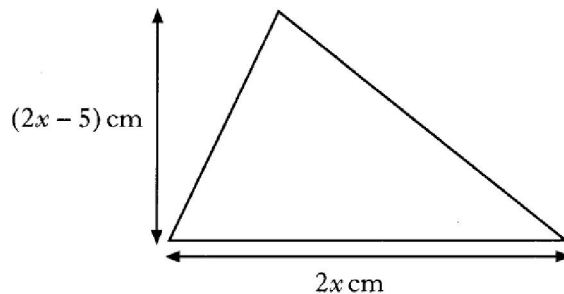
Figure 2

The length of the clipboard is $4x$ centimetres and the breadth is $3x$ centimetres.

The area of the pocket is a quarter of the area of the clipboard.

Find, in terms of x , the length of TD.

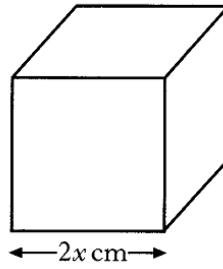
12. The height of a triangle is $(2x - 5)$ centimetres and the base is $2x$ centimetres.



The area of the triangle is 7 square centimetres.

Calculate the value of x .

8. The side length of a cube is $2x$ centimetres.



The expression for the volume in cubic centimetres is equal to the expression for the surface area in square centimetres.

Calculate the side length of the cube.