10.12 Solving Quadratic Equations using the Formula

1. Solve the following equations by using the formula. Give your answers correct to 3 decimal places.

   (a) $x^2 + 6x + 4 = 0$

   (b) $y^2 - 5y + 5 = 0$

   (c) $x^2 + 2x - 1 = 0$

   (d) $x^2 - 5x + 1 = 0$

   (e) $x^2 = -5x - 3$

   (f) $y^2 = 10y - 18$

2. Solve the following equations by using the formula. Give your answers correct to 3 decimal places.

   (a) $2t^2 - 4t - 3 = 0$

   (b) $2y^2 + 3y - 4 = 0$

   (c) $2x^2 - 14x + 7 = 0$

   (d) $4x^2 - 6 = -7x$

   (e) $7 = 3t^2 + 6t$

   (f) $5t^2 = 11t + 7$

3. Bill sets Ben this problem.

   "When 2 is added to a certain number, the result is the same as dividing 8 by the number."

   Ben uses this equation to solve the problem:

   $$x + 2 = \frac{8}{x}$$

   Solve this equation, and show that there are two possible solutions to Bill's problem.

4. The surface area of a circular cylinder can be calculated using the formula $A = 2\pi r^2 + 2\pi rh$, where r is the radius and h the height. Find the radius of the cylinder, correct to 2 decimal places, if the cylinder has a surface area of 322π cm^2 and a height of 10 cm.
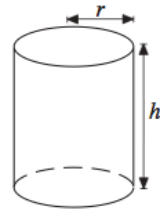
5. If the area of the field shown is 26 m^2, what is the value of x correct to 1 decimal place?
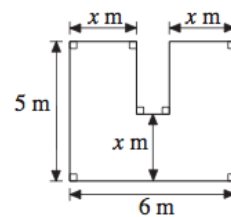
6. A cuboid has dimensions $(x + 3)$ cm by $(x + 3)$ cm by 5 cm. If its volume is 555 cm^3, find x correct to 2 decimal places.

7. The area of a triangular plate is 16 cm^2. If the base is 1 cm longer than the height, what are the lengths of its base and height? Give your answers correct to 1 decimal place.

8. A picture 8 cm by 3 cm has a border x cm wide all round it. The area of the border is equal to the area of the picture. Find the value of x correct to 2 decimal places.
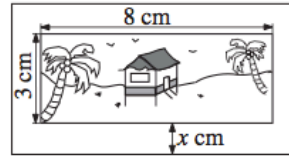
9. The diagram shows a closed rectangular box whose dimensions are in cm. Given that the area of material used to make the box is 146 cm^2, find the value of y correct to 2 decimal places.
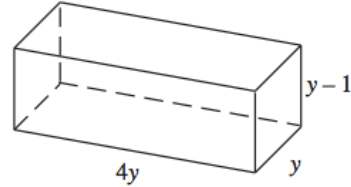
10. A rectangular photograph, 15 cm by 18 cm, is mounted on a large rectangular piece of card so as to leave a border, x cm wide along both the top and bottom and y cm wide along each side.
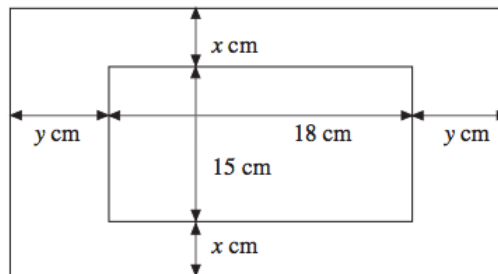
The perimeter of the mount is 102 cm. The cost of mounting this photograph is £12.88.

(a) Show that $x = 9 - y$.

The cost of mounting a photograph is 2 pence per cm^2 of card.

(b) Show that $(18 + 2y)(15 + 2x) = 644$.

(c) Use the expression for x in part (a) to show that the equation in part (b) can be written as $2y^2 - 15y + 25 = 0$.

(d) Solve this equation to determine the possible dimensions of the piece of card.

11. (a) Simplify $2a^3 \times 4a^2$

(b) Solve the equation $x^2 - 8x + 10 = 0$

(c) Make y the subject of this formula.
$$x(2y - 3) = 5(y - 2)$$

(d) Solve algebraically these simultaneous equations. Show your method clearly.
$$x + y = 5$$
$$x^2 + 3y^2 = 49$$

(OCR)