GCSE Mathematics

RSH Jan-2007

Algebra Topics: Forming and Solving Quadratic Equations

1. ABCD represents a rectangular sheet of metal.

DC is 7 cm longer than AD.

A square of side 3 cm is cut from the rectangle.

The area of metal remaining is 37·5 cm².

The length of AD is x cm.

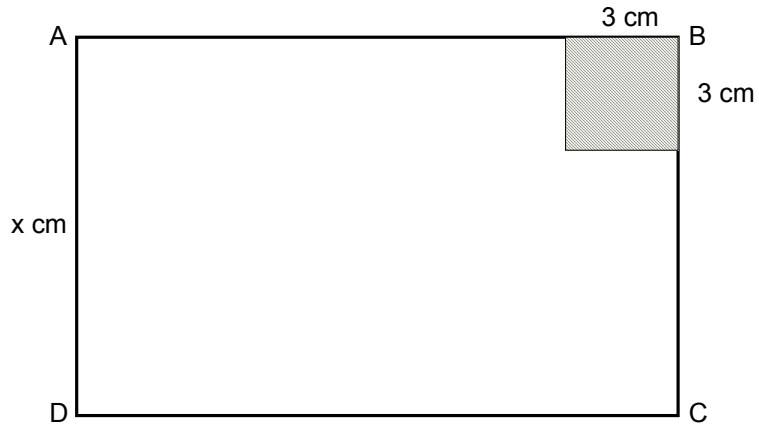

Diagram not drawn to scale.

a) Show that x satisfies the equation $x^2 + 7x - 46.5 = 0$ [2]

b) Solve the equation $x^2 + 7x - 46.5 = 0$ to calculate the dimensions of rectangle ABCD, giving your answers correct to 1 decimal place. [4]

2. ABCD is a square of side 10 cm. The points P, Q, R and S lie on the sides of the square ABCD. AS = BP = CQ = DR = x cm.

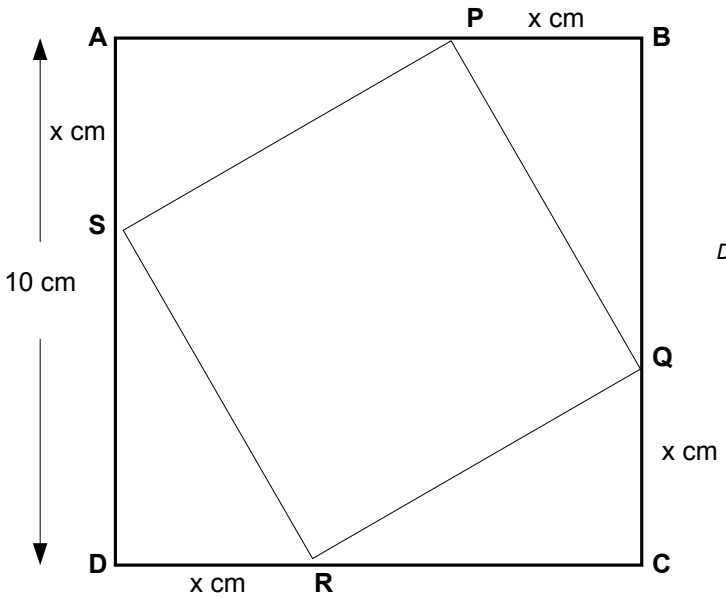

Diagram not drawn to scale.

The area of the square PQRS is 75 cm²

a) Show that x satisfies the equation $2x^2 - 20x + 25 = 0$ [3]

b) Solve the equation $2x^2 - 20x + 25 = 0$ [4]

3. The surface area of a cuboid with length xcm, width (x – 1) cm and height 3 cm is 63 cm^2.

a) Show that x satisfies the equation $2x^2 + 10x - 69 = 0$. [3]

b) (i) Solve the equation $2x^2 + 10x - 69 = 0$. [3]

(ii) Hence write down the dimensions of the cuboid. [1]

4. The volume of a cuboid with height 8 cm, length (x + 2) cm, width (x – 5) cm is 20.6 cm^3.

a) Show that x satisfies the equation $8x^2 - 24x - 100.6 = 0$. [4]

b) (i) Use the formula method to solve the equation

$8x^2 - 24x - 100.6 = 0$

giving solutions to two decimal places. [3]

(ii) Hence write down the dimensions of the cuboid. [1]

5. Solve the following equation

$$\frac{2}{2x+3} + \frac{1}{x+2} = 3$$ [7]

6. Solve the following equation

$$\frac{2}{x+2} + \frac{3}{2x-1} = 1$$ [7]

7. Solve the following equation

$$\frac{3}{x+2} - \frac{2}{2x-3} = \frac{1}{7}$$ [7]