

QT Quadratic Formula



1. Solve $2a^2 + 17a + 8 = 0$

Give your solutions correct to 2 decimal places.

(3 marks)

$$\begin{aligned} a &= 2 \\ b &= 17 \\ c &= 8 \end{aligned} \quad \begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ &= \frac{-(17) \pm \sqrt{(17)^2 - 4(2)(8)}}{2(2)} \\ &= \frac{-17 + \sqrt{225}}{4} \quad \text{or} \quad \frac{-17 - \sqrt{225}}{4} \\ &= \underline{\underline{-\frac{1}{2}}} \quad \text{or} \quad \underline{\underline{-8}} \end{aligned}$$

2. Solve $3d^2 + 3d - 7 = 0$

Give your solutions correct to 2 decimal places.

(3 marks)

$$\begin{aligned} a &= 3 \\ b &= 3 \\ c &= -7 \end{aligned} \quad \begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ &= \frac{-(3) \pm \sqrt{(3)^2 - 4(3)(-7)}}{2(3)} \\ &= \frac{-3 + \sqrt{93}}{6} \quad \text{or} \quad \frac{-3 - \sqrt{93}}{6} \\ &= 1.107275 \quad \text{or} \quad -2.107275 \\ &= \underline{\underline{1.11}} \text{ (2dp)} \quad \text{or} \quad \underline{\underline{-2.11}} \text{ (2dp)} \end{aligned}$$

QT Quadratic Formula



3. Solve $2t^2 - 18t + 18 = 0$

Give your solutions correct to 2 decimal places.

(3 marks)

$$a = 2$$

$$b = -18$$

$$c = 18$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-18) \pm \sqrt{(-18)^2 - 4(2)(18)}}{2(2)}$$

$$= \frac{18 + \sqrt{180}}{4} \quad \text{or} \quad \frac{18 - \sqrt{180}}{4}$$

$$= 7.55410 \quad \text{or} \quad 1.145898$$

$$= \underline{\underline{7.85}} \text{ (2dp)} \quad \text{or} \quad \underline{\underline{1.15}} \text{ (2dp)}$$

4. Solve $4x^2 = 19x + 36$

Give your solutions correct to 2 decimal places.

(3 marks)

$$4x^2 - 19x - 36 = 0$$

$$a = 4$$

$$b = -19$$

$$c = -36$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-19) \pm \sqrt{(-19)^2 - 4(4)(-36)}}{2(4)}$$

$$= \frac{19 + \sqrt{937}}{8} \quad \text{or} \quad \frac{19 - \sqrt{937}}{8}$$

$$= 6.201306 \quad \text{or} \quad -1.451306$$

$$= \underline{\underline{6.20}} \text{ (2dp)} \quad \text{or} \quad \underline{\underline{-1.45}} \text{ (2dp)}$$

QT Quadratic Formula



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

Give your solution in the form $a \pm b\sqrt{c}$.

(3 marks)

$$x^2 + 2x - 9 = 0$$

$$a = 1$$

$$b = 2$$

$$c = -9$$

$$\frac{-2 + \sqrt{4 + 36}}{2}$$

$$\frac{-2 - \sqrt{4 + 36}}{2}$$

$$-1 + \sqrt{10}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-2) \pm \sqrt{(2)^2 - 4(1)(-9)}}{2(1)}$$

$$= \frac{-2 + \sqrt{40}}{2} \quad \text{or} \quad \frac{-2 - \sqrt{40}}{2}$$

$$= \underline{\underline{-1 + \sqrt{10}}} \quad \text{or} \quad \underline{\underline{-1 - \sqrt{10}}}$$

6. Solve $d^2 - 4d - 8 = 0$

Give your solution in the form $a \pm b\sqrt{c}$.

(3 marks)

$$a = 1$$

$$b = -4$$

$$c = -8$$

$$\frac{4 + \sqrt{16 + 32}}{2}$$

$$\frac{4 - \sqrt{16 + 32}}{2}$$

$$2 + 2\sqrt{3}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-8)}}{2(1)}$$

$$= \frac{4 + \sqrt{48}}{2} \quad \text{or} \quad \frac{4 - \sqrt{48}}{2}$$

$$= \underline{\underline{2 + 2\sqrt{3}}} \quad \text{or} \quad \underline{\underline{2 - 2\sqrt{3}}}$$

QT Quadratic Formula



7. The diagram shows a cuboid with sides 2cm, x cm and $x - 1$ cm.

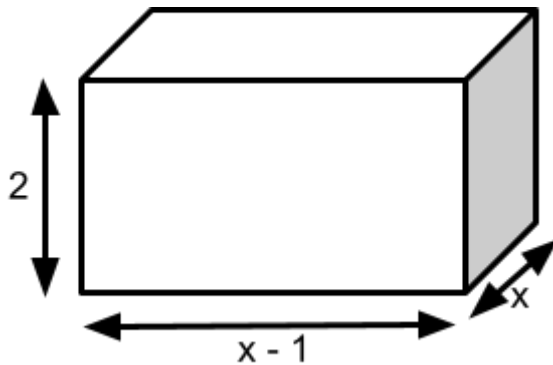
The volume of the cuboid is 47cm^3

(a) Show that $2x^2 - 4x - 47 = 0$

(2 marks)

(b) Find the value of x

(2 marks)



$$\begin{aligned} \text{Area} \times \text{Depth} &= \text{Volume} \\ 2(x-1) \times x &= 47 \\ (2x-2) \times x &= 47 \\ x(2x-2) &= 47 \\ 2x^2 - 2x - 47 &= 0 \end{aligned}$$

$$2x^2 - 2x - 47 = 0$$

$$a = 2$$

$$b = -2$$

$$c = -47$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-2) \pm \sqrt{(-2)^2 - 4(2)(-47)}}{2(2)}$$

$$= \frac{2 + \sqrt{380}}{4} \quad \text{or} \quad \frac{2 - \sqrt{380}}{4}$$

$$= 5.37339 \quad \text{or} \quad -4.37339$$

$$\therefore x = \underline{\underline{5.37}} \text{ (2dp)} \text{ as must be a positive value}$$

QT Quadratic Formula



8. The diagram shows a six sided shape formed from two rectangles.

The area of the shape is 102cm^2

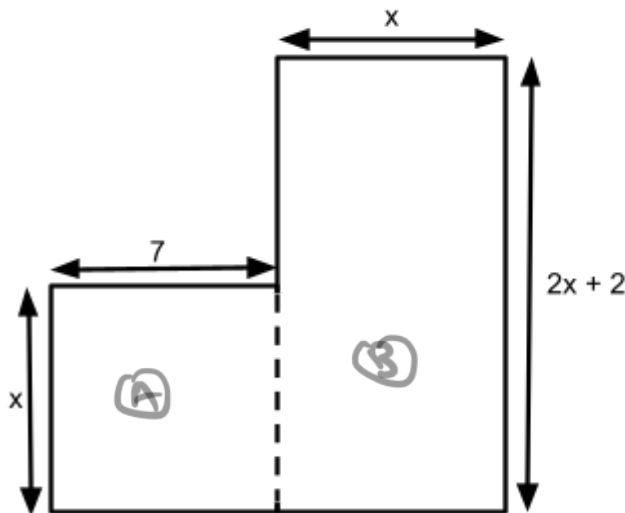
All measurements are given in cm.

(a) Show that $2x^2 + 9x - 102 = 0$

(2 marks)

(b) Find the value of x . Give your answer to 2 decimal places.

(3 marks)



$$A + B = \text{Area}$$

$$7x + x(2x + 2) = 102$$

$$7x + 2x^2 + 2x = 102$$

$$\underline{\underline{2x^2 + 9x - 102 = 0}}$$

$$2x^2 + 9x - 102 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 2$$

$$b = 9$$

$$c = -102$$

$$= \frac{-(9) \pm \sqrt{(9)^2 - 4(2)(-102)}}{2(2)}$$

$$= \frac{-9 + \sqrt{897}}{4} \quad \text{or} \quad \frac{-9 - \sqrt{897}}{4}$$

$$= 5.23748 \quad \text{or} \quad -9.23748$$

$$\therefore x = \underline{\underline{5.24}} \text{ (2 d.p.)} \text{ as must be a positive value}$$