

# QT Quadratic Formula



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

Give your solutions correct to 2 decimal places.

(3 marks)

$$\begin{aligned} a &= 2 \\ b &= 17 \\ c &= 8 \end{aligned} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$= \frac{-(17) \pm \sqrt{(17)^2 - 4(2)(8)}}{2(2)}$$
$$= \frac{-17 + \sqrt{225}}{4} \quad \text{or} \quad \frac{-17 - \sqrt{225}}{4}$$
$$= \underline{\underline{3.25}} \quad \text{or} \quad \underline{\underline{-4.25}}$$

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

Give your solutions correct to 2 decimal places.

(3 marks)

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

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

Give your solutions correct to 2 decimal places.

(3 marks)

$$\begin{aligned} a &= 2 \\ b &= -18 \\ c &= +18 \end{aligned} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$= \frac{-(-18) \pm \sqrt{(-18)^2 - 4(2)(18)}}{2(2)}$$
$$= \frac{18 + \sqrt{180}}{4} \quad \text{or} \quad \frac{18 - \sqrt{180}}{4}$$
$$= 7.45410 \quad \text{or} \quad 3.79937$$
$$= \underline{\underline{7.85}} \text{ (2dp)} \quad \text{or} \quad \underline{\underline{3.80}} \text{ (2dp)}$$

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

Give your solutions correct to 2 decimal places.

(3 marks)

$$4x^2 - 19x - 36 = 0$$
$$\begin{aligned} a &= 4 \\ b &= -19 \\ c &= -36 \end{aligned} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$= \frac{-(-19) \pm \sqrt{(-19)^2 - 4(4)(-36)}}{2(4)}$$
$$= \frac{19 + \sqrt{937}}{8} \quad \text{or} \quad \frac{19 - \sqrt{937}}{8}$$
$$= 6.201306 \quad \text{or} \quad -1.451306$$
$$= \underline{\underline{6.20}} \text{ (2dp)} \quad \text{or} \quad \underline{\underline{-1.45}} \text{ (2dp)}$$

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5. Solve  $3x^2 - 7x = 3$

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

(3 marks)

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

$$a = 3$$

$$b = -7$$

$$c = -3$$

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

$$= \frac{-(-7) \pm \sqrt{(-7)^2 - 4(3)(-3)}}{2(3)}$$

$$= \frac{7 + \sqrt{85}}{6} \quad \text{or} \quad \frac{7 - \sqrt{85}}{6}$$

=

6. Solve  $d^2 - 39d - 12 = 0$

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

(3 marks)

$$a = 1$$

$$b = -39$$

$$c = -12$$

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

$$= \frac{-(-39) \pm \sqrt{(-39)^2 - 4(1)(-12)}}{2(1)}$$

$$= \frac{39 + \sqrt{1569}}{2} \quad \text{or} \quad \frac{39 - \sqrt{1569}}{2}$$

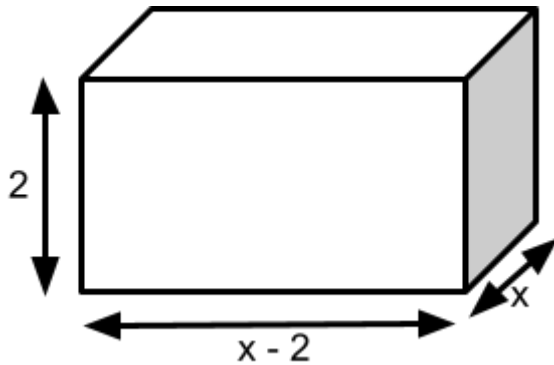
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7. The diagram shows a cuboid with sides 2cm,  $x$  cm and  $x - 2$  cm.  
The volume of the cuboid is  $51\text{cm}^3$

- (a) Show that  $2x^2 - 4x - 51 = 0$   
(b) Find the value of  $x$

(2 marks)  
(2 marks)



$$\begin{aligned} \text{(a) Area} \times \text{Depth} &= \text{Volume} \\ (2)(x-2)(x) &= 51 \\ (2x-4)(x) &= 51 \\ x(2x-4) &= 51 \\ 2x^2-4x &= 51 \end{aligned}$$

$$\therefore 2x^2 - 4x - 51 = 0$$

$$\text{(b) } 2x^2 - 4x - 51$$

$$a = 2$$

$$b = -4$$

$$c = -51$$

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

$$= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(-51)}}{2(2)}$$

$$= \frac{4 + \sqrt{424}}{4} \quad \text{or} \quad \frac{4 - \sqrt{424}}{4}$$

$$= \underline{6.1478} \quad \text{or} \quad -4.1478$$

$$x = \underline{6.15} \text{ (2dp)}$$

or must be positive value

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

The area of the shape is  $95\text{cm}^2$

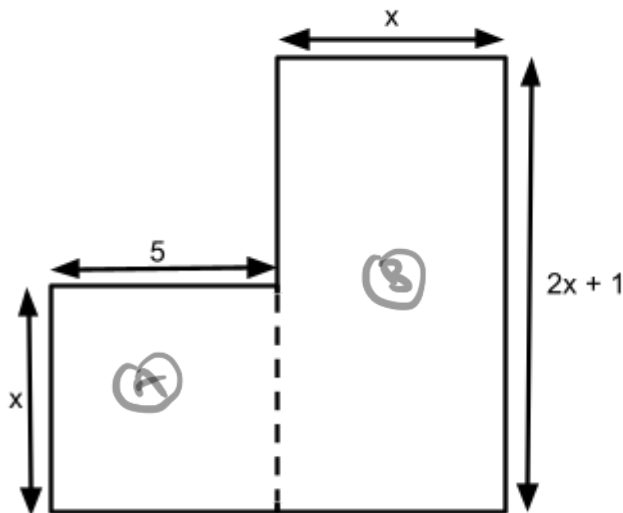
All measurements are given in cm.

(a) Show that  $2x^2 + 6x - 95 = 0$

(2 marks)

(b) Find the value of  $x$

(3 marks)



$$\begin{aligned} \text{(A)} + \text{(B)} &= \text{Area} \\ (5)(x) + (x)(2x+1) &= 95 \\ 5x + 2x^2 + x &= 95 \\ \therefore 2x^2 + 6x - 95 &= 0 \end{aligned}$$

$$(b) \quad 2x^2 + 6x - 95 = 0$$

$$a = 2$$

$$b = 6$$

$$c = -95$$

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

$$= \frac{-(6) \pm \sqrt{(6)^2 - 4(2)(-95)}}{2(2)}$$

$$= \frac{-6 + \sqrt{796}}{4} \quad \text{or} \quad \frac{-6 - \sqrt{796}}{4}$$

$$= \underline{5.55336} \quad \text{or} \quad -8.55336$$

$$x = \underline{5.55} \text{ (2dp)}$$

as must be a positive value