

Higher GCSE Revision - Exam Style Questions




Solving Quadratic Equations (Total - 22 marks)

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Topics covered in this video...

-  Solving Quadratic Equations by Factorising
-  Completing the Square
-  The Quadratic Formula

1. Solve the equation  $y^2 + 5y = 0$

$$y(y + 5) = 0$$

$\uparrow$                        $\uparrow$

$$\underline{y = 0} \qquad y + 5 = 0$$
$$\qquad \qquad \underline{y = -5}$$

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2. Factorise and solve the equation  $z^2 - 8z + 15 = 0$

$$\underline{-3} \times \underline{-5} = 15$$

$$(z - 3)(z - 5) = 0$$

$$\underline{-3} + \underline{-5} = -8$$

$$z - 3 = 0$$
$$\underline{z = 3}$$

$$z - 5 = 0$$
$$\underline{z = 5}$$

$$\begin{array}{cc} 1 & 15 \\ -3 & -5 \end{array}$$

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3. (i) Factorise  $x^2 - 13x + 36 = \underline{\underline{(x-4)(x-9)}}$        $\underline{-4} \times \underline{-9} = 36$

$$\underline{-4} + \underline{-9} = -13$$

1	36	
2	18	
3	12	
-4	-9	
6	6	(2)

(ii) Hence, or otherwise, solve the equation  $x^2 - 13x + 36 = 0$   
 $(x-4)(x-9) = 0$

$$\begin{array}{l} \uparrow \qquad \qquad \uparrow \\ x-4=0 \qquad x-9=0 \\ \underline{x=4} \qquad \underline{x=9} \end{array}$$

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4. Solve the equation  $2x^2 - 6x - 1 = 0$

Give your answers to two decimal places.

You **must** show your working.

$$a = 2 \quad b = -6 \quad c = -1$$

$$b^2 - 4ac = (-6)^2 - 4 \times 2 \times (-1) = 44$$

$$x = \frac{6 \pm \sqrt{44}}{2 \times 2}$$

$$x = \frac{6 + \sqrt{44}}{4}$$

$$= \underline{\underline{3.16}}$$

$$x = \frac{6 - \sqrt{44}}{4}$$

$$= \underline{\underline{-0.16}}$$

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The Quadratic Equation

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5. (a) Find the values of  $a$  and  $b$  such that

$$(x+3)^2 = (x+3)(x+3)$$

$$x^2 + 6x - 3 = (x+a)^2 + b$$

$$= x^2 + 3x + 3x + 9$$

$$= x^2 + 6x + 9$$

$$\underbrace{x^2 + 6x - 3} = \underbrace{(x+3)^2 - 9 - 3}$$

$$= \underline{(x+3)^2 - 12}$$

$$\underline{a=3} \quad \underline{b=-12}$$

(2)

- (b) Hence, or otherwise, solve the equation  $x^2 + 6x - 3 = 0$  giving your answers in surd form.

$$(x+3)^2 - 12 = 0$$

$$(x+3)^2 = 12$$

$$\begin{aligned} \sqrt{12} \times \sqrt{12} &= 12 \\ -\sqrt{12} \times -\sqrt{12} &= 12 \end{aligned}$$

$$x+3 = \pm\sqrt{12}$$

$$x = -3 \pm \sqrt{12} \quad \checkmark$$

(3)

$$= -3 \pm \sqrt{4} \times \sqrt{3}$$

$$= \underline{-3 \pm 2\sqrt{3}} \quad \checkmark$$

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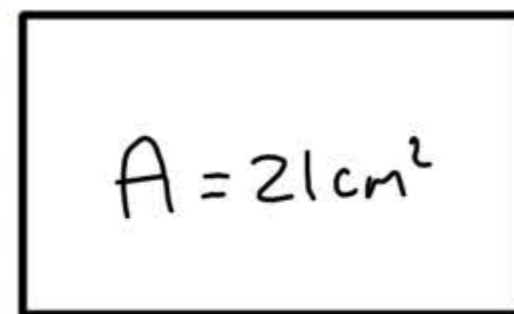
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6. The area of the rectangle shown in the diagram is  $21\text{cm}^2$ .

$$x + 4$$



$$2x - 3$$

(a) Show that  $2x^2 + 5x - 33 = 0$

$$(x + 4)(2x - 3) = 21$$

$$2x^2 + 8x - 3x - 12 = 21$$

$$2x^2 + 5x - 12 = 21$$

$$2x^2 + 5x - 33 = 0$$

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(b) Solve the equation  $2x^2 + 5x - 33 = 0$  and hence find the length and width of the rectangle.

$$a = 2 \quad b = 5 \quad c = -33$$

$$b^2 - 4ac = 5^2 - 4 \times 2 \times (-33) \\ = 289$$

$$x = \frac{-5 \pm \sqrt{289}}{4}$$

$$\underline{x = 3} \quad \underline{x = -5\frac{1}{2}}$$

$$\underline{\underline{\text{length} = 7}} \quad \underline{\underline{\text{width} = 3}}$$

### The Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$  where  $a \neq 0$ , are given by

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

$$\underline{11}x - 6 = -66$$

$$\underline{11} + -6 = 5$$

$$(2x + 11)(2x - 6) = 0$$

$$(2x + 11)(x - 3) = 0$$

$$\begin{array}{l} \uparrow \quad \quad \quad \uparrow \\ 2x = -11 \quad \quad x = 3 \\ \underline{x = -5.5} \end{array}$$

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