

UNIT 10 *Equations*

Overhead Slides

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OS 10.1

Using Negative Numbers

MULTIPLICATION	<i>Example</i>
$+ \times + \Rightarrow +$	$4 \times 3 = 12$
$+ \times - \Rightarrow -$	$4 \times (-3) =$
$- \times + \Rightarrow -$	$(-4) \times 3 =$
$- \times - \Rightarrow +$	$(-4) \times (-3) =$

DIVISION	<i>Example</i>
$+ \div + \Rightarrow +$	$12 \div 3 = 4$
$+ \div - \Rightarrow -$	$12 \div (-3) =$
$- \div + \Rightarrow -$	$(-12) \div 3 =$
$- \div - \Rightarrow +$	$(-12) \div (-3) =$

OS 10.2*Brackets*

Expand

$$4(x + 3) =$$

$$3(5 - x) =$$

$$2(3x - 2) =$$

$$x(4 + x) =$$

$$3x(2x - 3) =$$

$$2(x + 5) + 3(x + 1) =$$

$$4(x + 2) + 2(5 - 2x) =$$

$$x(x - 3) + 3(x + 1) =$$

OS 10.3

Equations

Solve

$$x + 5 = 7$$

$$2x + 3 = 9$$

$$2x + 5 = x + 7$$

$$3x + 1 = 11 - x$$

OS 10.5

Factorisation of Quadratic Equations

$$(x - a)(x - b) = x^2 - (a + b)x + ab$$

For example:

$$x^2 - 7x + 12 = 0$$

$$\Rightarrow \left. \begin{array}{l} a + b = \\ ab = \end{array} \right\} \Rightarrow \begin{array}{l} a = \\ b = \end{array}$$

$$x^2 + 7x + 12 = 0$$

$$\Rightarrow \left. \begin{array}{l} a + b = \\ ab = \end{array} \right\} \Rightarrow \begin{array}{l} a = \\ b = \end{array}$$

$$x^2 - x - 12 = 0$$

$$\Rightarrow \left. \begin{array}{l} a + b = \\ ab = \end{array} \right\} \Rightarrow \begin{array}{l} a = \\ b = \end{array}$$

$$x^2 + x - 12 = 0$$

$$\Rightarrow \left. \begin{array}{l} a + b = \\ ab = \end{array} \right\} \Rightarrow \begin{array}{l} a = \\ b = \end{array}$$

OS 10.6

Quadratic Equations: Formula

$$ax^2 + bx + c = 0$$

Divide by a : $\Rightarrow x^2 + \frac{b}{a}x + \frac{c}{a} = 0$

Complete the square:

$$\left(x + \frac{b}{2a}\right)^2 + \frac{c}{a} - \frac{b^2}{4a^2} = 0$$

$$\left(x + \frac{b}{2a}\right)^2 + \frac{4ac - b^2}{4a^2} = 0$$

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

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

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

$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{or} \quad x = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

OS 10.7

Number of Roots

Compare, rewriting if necessary, each of the following equations with

$$ax^2 + bx + c = 0$$

giving the values of a , b and c .

<i>Equation</i>	a	b	c	$b^2 - 4ac$
$x^2 + 2x - 1 = 0$				
$6x^2 + 3x - 7 = 0$				
$1 - 2x + 3x^2 = 0$				
$5x^2 = -x + 6$				
$7x = -3x^2 - 5$				

What does $(b^2 - 4ac)$ tell you about the solution of the equation?