Worksheet 3

Factorisation

Solve the following quadratic equations.

1. $x^2 - x - 30 = 0$

$(x-6)(x+5) = 0$

$x = 6; \quad x = -5$

2. $x^2 - 10x + 18 = 0$

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(18)}}{2(1)}$$

$$= \frac{10 \pm \sqrt{100 - 72}}{2} = \frac{10 \pm \sqrt{28}}{2}$$

$$= \frac{10 \pm 2\sqrt{7}}{2} = 5 \pm \sqrt{7}$$

$x = 5 + \sqrt{7}; \quad x = 5 - \sqrt{7}$

3. $4x^2 - 4x - 39 = 0$

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

$$= \frac{4 \pm \sqrt{16 + 624}}{8} = \frac{4 \pm \sqrt{640}}{8}$$

$$= \frac{4 \pm 8\sqrt{10}}{8} = \frac{1}{2} \pm \sqrt{10}$$

$x = \frac{1}{2} + \sqrt{10}; \quad x = \frac{1}{2} - \sqrt{10}$

4.	$2x^2 = 7 - x$ $2x^2 + x - 7 = 0$ $x = \frac{-1 \pm \sqrt{1^2 - 4(2)(-7)}}{2(2)}$ $= \frac{-1 \pm \sqrt{1+56}}{4} = \frac{-1 \pm \sqrt{57}}{4}$ $x = \frac{-1+\sqrt{57}}{4}; \quad x = \frac{-1-\sqrt{57}}{4}$
5.	$3x^2 - 2x - 4 = 0$ $x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-4)}}{2(3)}$ $= \frac{2 \pm \sqrt{4+48}}{6} = \frac{2 \pm \sqrt{52}}{6}$ $= \frac{2 \pm 2\sqrt{13}}{6} = \frac{1 \pm \sqrt{13}}{3}$ $x = \frac{1+\sqrt{13}}{3}; \quad x = \frac{1-\sqrt{13}}{3}$
6.	$r^2 - 7r + 3 = 0$ $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(3)}}{2(1)}$ $= \frac{7 \pm \sqrt{49-12}}{2} = \frac{7 \pm \sqrt{37}}{2}$ $x = \frac{7+\sqrt{37}}{2}; \quad x = \frac{7-\sqrt{37}}{2}$

7.

$$1 + \frac{3}{x^2} = \frac{5}{x}$$

$$x^2 - 5x + 3 = 0$$

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(3)}}{2(1)}$$

$$= \frac{5 \pm \sqrt{25 - 12}}{2} = \frac{5 \pm \sqrt{13}}{2}$$

$$x = \frac{5 + \sqrt{13}}{2}; \quad x = \frac{5 - \sqrt{13}}{2}$$