Solving Quadratic Equations By Factorising

Ex1 Solve $x^2 - 6x + 8 = 0$

$(x-2)(x-4) = 0$

$+1 \quad +8$
$-1 \quad -8$
$+2 \quad +4$
$-2 \quad -4$ ✓

Either $x - 2 = 0$ or $x - 4 = 0$

$\underline{x = 2}$ $\underline{x = 4}$

Ex2 Solve $x^2 + 8x - 20 = 0$

$(x-2)(x+10) = 0$

$+1 \quad -20$
$-1 \quad +20$
$+2 \quad -10$
$-2 \quad +10$ ✓

Either $x - 2 = 0$ or $x + 10 = 0$

$\underline{x = 2}$ $\underline{x = -10}$

Exercise Solve

1) $x^2 - 9x + 18 = 0$

$(x-3)(x-6) = 0$

Either $x - 3 = 0$ or $x - 6 = 0$

$\underline{x = 3}$ $\underline{x = 6}$

2) $x^2 + 4x - 5 = 0$

$(x-1)(x+5) = 0$

Either $x - 1 = 0$ or $x + 5 = 0$

$\underline{x = 1}$ $\underline{x = -5}$

3) $x^2 + 5x + 6 = 0$

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

Either $x + 2 = 0$ or $x + 3 = 0$

$\underline{x = -2}$ $\underline{x = -3}$

4) $x^2 - 4x - 21 = 0$

$(x+3)(x-7) = 0$

Either $x + 3 = 0$ or $x - 7 = 0$

$\underline{x = -3}$ $\underline{x = 7}$

5) $x^2 + 7x - 30 = 0$

$(x-3)(x+10) = 0$

Either $x - 3 = 0$ or $x + 10 = 0$

$\underline{x = 3}$ $\underline{x = -10}$

6) $x^2 - x - 30 = 0$

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

Either $x + 5 = 0$ or $x - 6 = 0$

$\underline{x = -5}$ $\underline{x = 6}$

7) $x^2 + 12x + 32 = 0$

$(x+4)(x+8) = 0$

Either $x+4=0$ or $x+8=0$

$\underline{x=-4}$ $\underline{x=-8}$

8) $x^2 - 2x + 1 = 0$

$(x-1)(x-1) = 0$

Either $x-1=0$ or $x-1=0$

$\underline{x=1}$ $\underline{x=1}$ Double Root

9) $x^2 - 13x - 14 = 0$

$(x+1)(x-14) = 0$

Either $x+1=0$ or $x-14=0$

$\underline{x=-1}$ $\underline{x=14}$

10) $x^2 + x - 42 = 0$

$(x-6)(x+7) = 0$

Either $x-6=0$ or $x+7=0$

$\underline{x=6}$ $\underline{x=-7}$

Difference of Two Squares

Consider $(a+b)(a-b)$

$$= a^2 + \cancel{ab} - \cancel{ab} - b^2$$

$$= a^2 - b^2$$

$\therefore$ (Therefore) $a^2 - b^2 = (a+b)(a-b)$

<u>Examples</u> 1) $x^2 - 16$

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

2) $x^2 - 1$

$$= x^2 - 1^2 = (x+1)(x-1)$$

3) $4x^2 - 9$

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

4) Solve $x^2 - 81 = 0$

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

$$(x+9)(x-9) = 0$$

Either $x + 9 = 0$ or $x - 9 = 0$

$x = -9$ $\quad$ $x = +9$

Exercise Factorise

1) $x^2 - 25$

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

2) $x^2 - 100$

$= x^2 - 10^2 = (x+10)(x-10)$

3) $4p^2 - 9q^2$

$= (2p)^2 - (3q)^2 = (2p+3q)(2p-3q)$
