# Factorising Quadratic Expressions

Consider $(x+a)(x+b)$

$$= x^2 + ax + bx + ab$$

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

Factorising is the opposite of this process

$$x^2 + 5x + 6$$

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

| +1 | +6 |
|----|----|
| -1 | -6 |
| +2 | +3 ✓ |
| -2 | -3 |

The pair of numbers which go in the brackets have to multiply to give the number on the end "+6" and add together to give the number of $x$s "+5".

Further examples

1) $$x^2 + 6x + 8$$
$$= (x+2)(x+4)$$

| +1 | +8 |
|----|----|
| -1 | -8 |
| +2 | +4 ✓ |
| -2 | -4 |

2) $$x^2 + 11x + 24$$
$$(x+3)(x+8)$$

| +1 | +24 |
|----|-----|
| -1 | -24 |
| +2 | +12 |
| -2 | -12 |
| +3 | +8 ✓ |
| -3 | -8 |
| +4 | +6 |

$-4 \quad -6$

Exercise    Factorise

1)  $x^2 + 6x + 5$
$= (x + 1)(x + 5)$

$+1 \quad +5 \checkmark$
$-1 \quad -5$

2)  $x^2 + 7x + 10$
$= (x + 2)(x + 5)$

$+1 \quad +10$
$-1 \quad -10$
$+2 \quad +5 \checkmark$
$-2 \quad -5$

3)  $x^2 + 7x + 12$
$= (x + 3)(x + 4)$

$+1 \quad +12$
$-1 \quad -12$
$+2 \quad +6$
$-2 \quad -6$
$+3 \quad +4 \checkmark$
$-3 \quad -4$

4)  $x^2 + 12x + 20$
$= (x + 2)(x + 10)$

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

5)  $x^2 + 15x + 14$
$= (x + 1)(x + 14)$

$+1 \quad +14 \checkmark$
$-1 \quad -14$
$+2 \quad +7$

6)  $x^2 + 10x + 21$
$= (x + 3)(x + 7)$

$+1 \quad +21$
$-1 \quad -21$
$+3 \quad +7 \checkmark$

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

$+1 \quad +1 \checkmark$
$-1 \quad -1$