More Trinomials

Example

$$(x+3)(2x+1)(x-4)$$

$$= \left[2x^2 + 6x + x + 3\right](x-4)$$

$$= \left[2x^2 + 7x + 3\right](x-4)$$

$$= 2x^3 + 7x^2 + 3x$$
$$\quad - 8x^2 - 28x - 12$$

$$\overline{2x^3 - x^2 - 25x - 12}$$

Exercise

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

$$= \left[x^2 + x + 3x + 3\right](x+5)$$

$$= \left[x^2 + 4x + 3\right](x+5) \qquad = x^3 + 4x^2 + 3x$$
$$\qquad + 5x^2 + 20x + 15$$
$$= x^3 + 9x^2 + 23x + 15$$

2) $(x-1)(x+4)(x-2)$

$$= \left[x^2 - x + 4x - 4\right](x-2)$$

$$= \left[x^2 + 3x - 4\right](x-2)$$

$$= x^3 + 3x^2 - 4x$$
$$\quad - 2x^2 - 6x + 8$$

$$= x^3 + x^2 - 10x + 8$$

3) $(2x+1)(3x-2)(x+4)$

$= [6x^2 + 3x - 4x - 2](x+4)$

$= [6x^2 - x - 2](x+4)$

$$\begin{array}{rl} = & 6x^3 - x^2 - 2x \\ & \quad + 24x^2 - 4x - 8 \\ \hline = & 6x^3 + 23x^2 - 6x - 8 \end{array}$$

Factorising Quadratic Expressions

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

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

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

Factorising is the reverse of this operation

Example 1

$x^2 + 6x + 8$

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

+1	+8
-1	-8
+2	+4 ✓
-2	-4

Ex 2

$x^2 - 7x + 10$

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

+1	+10
-1	-10
+2	+5
-2	-5 ✓

Ex 3

$$x^2 + 5x - 24$$
$$= (x - 3)(x + 8)$$

+1	−24
−1	+24
+2	−12
−2	+12
+3	−8
−3	+8 ✓
+4	−6
−4	+6

Ex 4

$$x^2 - x - 30$$
$$= (x + 5)(x - 6)$$

+1	−30
−1	+30
+2	−15
−2	+15
+3	−10
−3	+10
+5	−6 ✓
−5	+6

Exercise Factorise

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

+1	+4
−1	−4
+2	+2 ✓
−2	−2

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

+1	+5
−1	−5 ✓

3) $x^2 + 9x - 10$
$= (x - 1)(x + 10)$

+1	−10
−1	+10 ✓
+2	−5
−2	+5

4) $x^2 - 6x - 7$

+1 −7 ✓

$= (x+1)(x-7)$ $\quad -1 \quad +7$

5) $x^2 + 8x + 12$

$= (x+2)(x+6)$

+1	+12
−1	−12
+2	+6 ✓
−2	−6
+3	+4
−3	−4

6) $x^2 - 8x + 15$

$= (x-3)(x-5)$

+1	+15
−1	−15
+3	+5
−3	−5 ✓

7) $x^2 - 12x + 20$

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

+1	+20
−1	−20
+2	+10
−2	−10 ✓

8) $x^2 + 2x - 15$

$= (x-3)(x+5)$

+1	−15
−1	+15
+3	−5
−3	+5 ✓

9) $x^2 - 29x + 100$

$= (x-4)(x-25)$

+1	+100	+4	+25
−1	−100	−4	−25 ✓
+2	+50		
−2	−50		

10) $x^2 + 4x - 21$

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

+1	−21	+3	−7
−1	+21	−3	+7 ✓

11) $x^2 - x - 42$

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

+1	−42	+3	−14
−1	+42	−3	+14
+2	−21	+6	−7 ✓
−2	+21	−6	+7

12) $x^2 + 3x - 28$

$= (x-4)(x+7)$

+1	−28	+4	−7
−1	+28	−4	+7 ✓
+2	−14		
−2	+14		

13) $x^2 - 2x + 1$

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

+1	+1
−1	−1 ✓

14) $x^2 - 7x - 18$

$= (x + 2)(x - 9)$

+1	−18
−1	+18
+2	−9 ✓
−2	+9

15) $x^2 + 11x + 30$

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

+1	+30	+3	+10
−1	−30	−3	−10
+2	+15	+5	+6 ✓
−2	−15	−5	−6