Factorising Quadratics With Multiple x^2

Example 1

$$2x^2 + 9x + 10$$

$2 \times 10 = 20$

$+1 \quad +20$

$+2 \quad +10$

$+4 \quad +5$ ✓

$$= 2x^2 + 4x + 5x + 10$$

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

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

Example 2

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

$3 \times -8 = -24$

$+1 \quad -24$

$-1 \quad +24$

$+4 \quad -6$

$-4 \quad +6$ ✓

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

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

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

Example 3

$$5x^2 - x - 6$$

$5 \times -6 = -30$

$+5 \quad -6$ ✓

$-5 \quad +6$

$$= 5x^2 + 5x - 6x - 6$$

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

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

Example 4

$$4x^2 - 8x + 3$$

$4 \times 3 = 12$

$-1 \quad -12$

$-2 \quad -6$ ✓

$$= 4x^2 - 2x - 6x + 3$$

$$= 2x(2x-1) - 3(2x-1)$$

$$= (2x-1)(2x-3)$$

Step 1 Multiply number of x^2 by constant term

Step 2 Find factors of the answer to this that add up to the number of xs

Step 3 Split the number of xs into 2 parts matching the factors

Step 4 Factorise the front 2 terms

Step 5 Use the bracket created to factorise the back 2 terms

Step 6 Find the second factor by observing how many of the bracket you have.

Exercise Factorise

1) $2x^2 + 11x + 9$

$2 \times 9 = 18$

$+1 \quad +18$

$$= 2x^2 + 2x + 9x + 9$$

$+2 \quad +9$ ✓

$$= 2x(x+1) + 9(x+1)$$

$$= (x+1)(2x+9)$$

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2) $$3x^2 + 11x + 6$$

$3 \times 6 = 18$

$+1 \quad +18$

$+2 \quad +9$ ✓

$$= 3x^2 + 2x + 9x + 6$$

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

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

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3) $$5x^2 + 11x + 2$$

$5 \times 2 = 10$

$+1 \quad +10$ ✓

$$= 5x^2 + x + 10x + 2$$

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

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

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4) $$4x^2 - 11x - 3$$

$4 \times -3 = -12$

$+1 \quad -12$ ✓

$$= 4x^2 + x - 12x - 3$$

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

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

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5) $6x^2 + 13x - 5$

$6 \times -5 = -30$

$+1 \quad -30$

$-1 \quad +30$

$+2 \quad -15$

$-2 \quad +15$ ✓

$= 6x^2 - 2x + 15x - 5$

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

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

CLASSWORK AND HOMEWORK FOR TOMORROW

6) $2x^2 + 11x + 12 = (2x + 3)(x + 4)$

7) $3x^2 + 2x - 1 = (3x - 1)(x + 1)$

8) $4x^2 - 19x - 5 = (4x + 1)(x - 5)$

9) $5x^2 - 13x + 6 = (5x - 3)(x - 2)$

10) $6x^2 + x - 7 = (6x + 7)(x - 1)$
