

# FACTORISING

## VISUAL SCAFFOLD CARDS



**Goal:** Write expressions as a product of factors.



**Check:** Expand to check your answer.



**Think:** What is the common factor or pattern?



### 1 COMMON FACTOR

Take out the highest common factor.

$$\underbrace{ax + ay}_a$$

Example:

$$6x + 9x = 3x(2 + 3)$$

### 2 GROUPING

Group terms, factor each group, then factor out the common binomial.

$$\underbrace{ax + ay} + \underbrace{bx + by} \\ \downarrow \\ (a + b)(x + y)$$

Example:

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

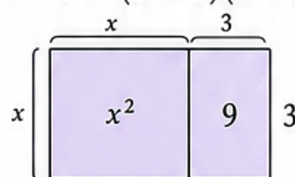
### 3 DIFFERENCE OF TWO SQUARES

Recognise the pattern.

$$a^2 - b^2 = (a - b)(a + b)$$

Example:

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



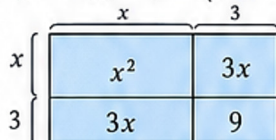
### 4 PERFECT SQUARE TRINOMIAL

Recognise the pattern.

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

Example:

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



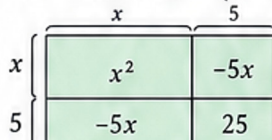
### 5 PERFECT SQUARE TRINOMIAL (MINUS)

Recognise the pattern.

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

Example:

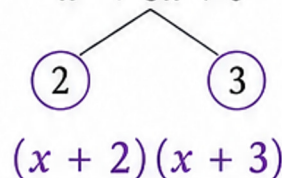
$$x^2 - 10x + 25 = (x - 5)^2$$



### 6 TRINOMIAL ( $x^2 + bx + c$ )

Find two numbers that multiply to  $c$  and add to  $b$ .

Example:  $x^2 + 5x + 6$



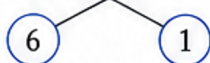
### 7 TRINOMIAL ( $ax^2 + bx + c$ )

Factor  $a$  from  $ac$ . Find two numbers that multiply to  $ac$  and add to  $b$ .

Example:

$$2x^2 + 7x + 3$$

$$ac = 2 \times 3 = 6$$



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

### 8 QUADRATIC WHEN $a \neq 1$ (AC METHOD)

Multiply  $a$  and  $c$ . Find two numbers that multiply to  $ac$  and add to  $b$ . Split the middle term.

Example:

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

$$ac = 3 \times 4 = 12$$



$$3x^2 + 6x + 2x + 4 \\ = 3x(x + 2) + 2(x + 2) \\ = (3x + 2)(x + 2)$$

### 9 SPECIAL CASES TO CHECK

- Common factor
- Difference of two squares
- Perfect square trinomials
- Sum or difference of cubes ( $a^3 + b^3$ )
- Grouping

If none apply, use trinomial methods.

### 10 EXPAND TO CHECK

Multiply your factors. You should get the original expression.

Example:

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

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

### 11 VOCABULARY

**Factor:** A number or expression that divides another exactly.

**Binomial:** Expression with two terms (e.g.  $x + 3$ ).

**Trinomial:** Expression with three terms (e.g.  $x^2 + 5x + 6$ ).

**Coefficient:** The number in front of the variable.

**Constant:** A term with no variable.

### 12 REMEMBER

- Look for patterns first.
- Keep your steps clear.
- Check by expanding.
- Practice builds confidence.