

Exercise walk-through

Algebraic manipulation ■ E2.2

eXercise

You must be able to

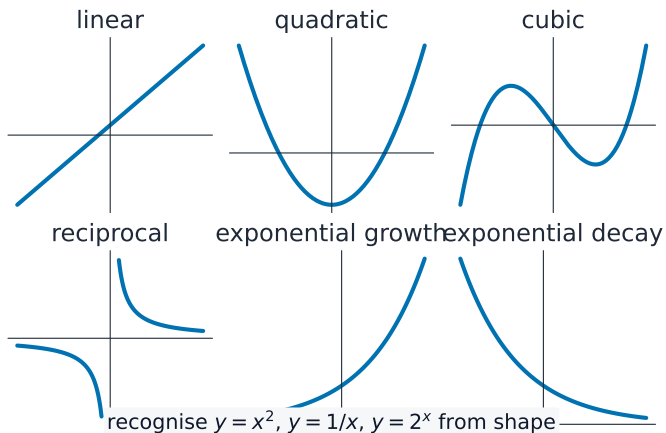
- expand single and double brackets
- factorise by taking out a common factor
- factorise a difference of two squares and a quadratic

Method — Expand and factorise

- **Expand:** $(2x + 1)(x - 4) = 2x^2 - 7x - 4$.
- **Common factor:** $9x^2 + 15xy = 3x(3x + 5y)$.
- **Difference of two squares 平方差:** $9x^2 - 16 = (3x + 4)(3x - 4)$.
- **Quadratic:** $2x^2 + 7x + 3 = (x + 3)(2x + 1)$ (split the middle term).

Answer shapes: **M1** a correct method, **A1** the correct answer.

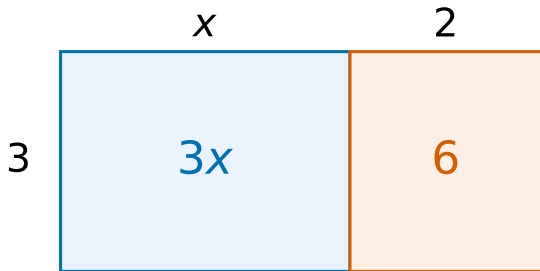
Method — Expand and factorise



A suspension bridge cable forms a parabola

Method — Expand and factorise

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



$a(b + c) = ab + ac$ · area model of expansion

A rectangle of height 3 splits into areas $3x$ and 6, so $3(x+2)=3x+6$

Practice 2.1 ■ 1 mark

Expand $3x(2x - 5)$.

Solution 2.1

Worked steps

$$3x(2x - 5) = 6x^2 - 15x \quad \text{B1}.$$

Practice 2.2 ■ 1 mark

Factorise $6a + 9ab$.

Solution 2.2

Worked steps

$$6a + 9ab = 3a(2 + 3b) \quad \text{B1}.$$

Practice 2.3 ■ 2 marks

Expand and simplify $(x + 2)(x - 5)$.

Solution 2.3

Worked steps

$(x + 2)(x - 5) = x^2 - 5x + 2x - 10 = x^2 - 3x - 10$ **M1** **A1** *for three or four correct terms; for $x^2 - 3x - 10$.*

Exam-style 3.1 ■ 1 mark

Factorise $x^2 - 49$.

Solution 3.1

Worked steps

$$x^2 - 49 = (x + 7)(x - 7) \quad \text{B1}.$$

Exam-style 3.2 ■ 2 marks

Factorise $x^2 + 3x - 10$.

Solution 3.2

Worked steps

two numbers multiplying to -10 and adding to 3 are 5 and -2 : $(x + 5)(x - 2)$

M1 **A1** *for the numbers.*

Exam-style 3.3 ■ 2 marks

Factorise $2x^2 + 5x - 3$.

Solution 3.3

Worked steps

$a \times c = -6$, middle $+5$: numbers 6 and $-1 \rightarrow 2x^2 + 6x - x - 3 = 2x(x+3) - (x+3) = (2x-1)(x+3)$ **M1** **A1** for splitting the middle term; for $(2x-1)(x+3)$.