

E2.2 Algebraic manipulation

Name: _____ Class: _____ Date: _____

Total: 9 marks

Objective

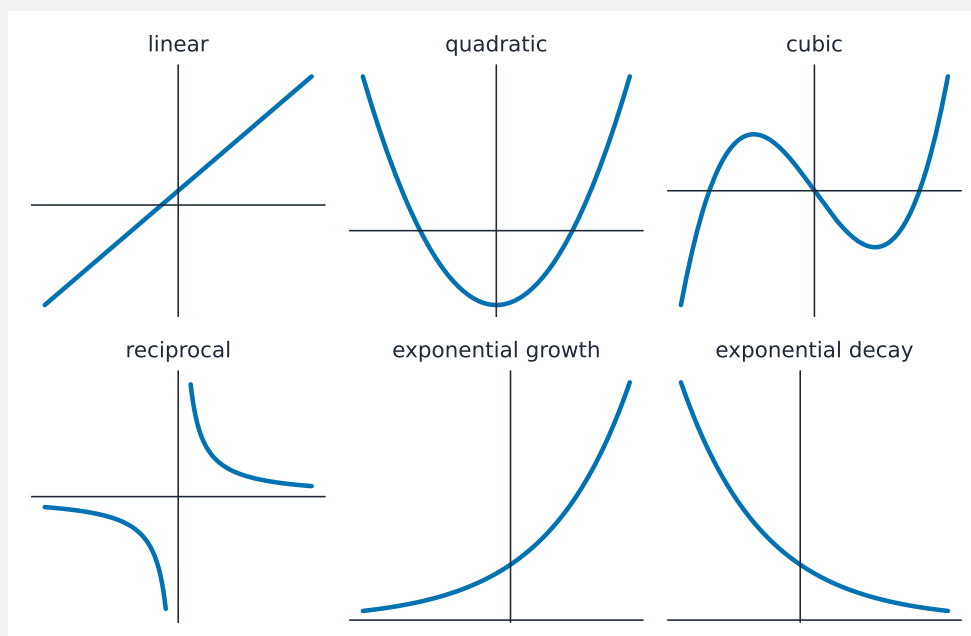
Build the skills to answer Extended exam questions on **algebraic manipulation** 代数运算—**expanding brackets** 展开括号 and **factorising** 因式分解 (common factors, difference of two squares, quadratics).

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

1 Worked examples

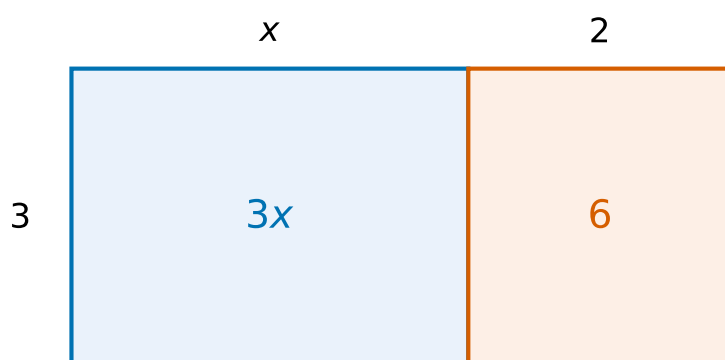
■ Expand and factorise



Factorising is the reverse of expanding

- **Expand:** $(2x + 1)(x - 4) = 2x^2 - 7x - 4$.

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



The area model of expanding a bracket: $3(x + 2) = 3x + 6$

- **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.

2 Practice

2.1 Expand $3x(2x - 5)$. [1]

2.2 Factorise $6a + 9ab$. [1]

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

3 Exam-style questions

3.1 Factorise $x^2 - 49$. [1]

3.2 Factorise $x^2 + 3x - 10$. [2]

3.3 Factorise $2x^2 + 5x - 3$. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **E2.2 Algebraic manipulation** past-paper sheet in the Library, or try these in **Practice mode**:

- 0580/21 N25 —Q17 (factorising)
- 0580/22 N25 —Q10 (expand / factorise)

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

2.1 $3x(2x - 5) = 6x^2 - 15x$.

2.2 $6a + 9ab = 3a(2 + 3b)$.

2.3 $(x + 2)(x - 5) = x^2 - 5x + 2x - 10 = x^2 - 3x - 10$.

3.1 $x^2 - 49 = (x + 7)(x - 7)$.

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

3.3 $a \times c = -6$, middle $+5$: numbers 6 and $-1 \rightarrow 2x^2 + 6x - x - 3 = 2x(x + 3) - (x + 3) = (2x - 1)(x + 3)$.