

Exercise walk-through

Indices II ■ E2.4

eXercise

You must be able to

- simplify products, quotients and powers of algebraic terms
- handle negative powers in algebra
- solve $a^x = b$ by writing both sides with the same base

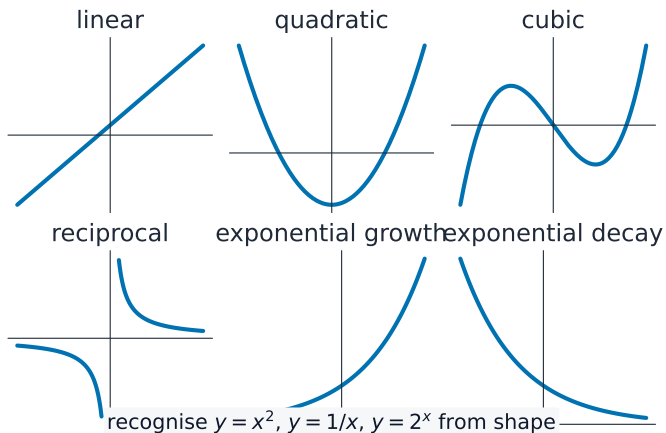
Method — Indices with letters

$$a^m \times a^n = a^{m+n} \quad a^m \div a^n = a^{m-n} \quad (a^m)^n = a^{mn}$$

- **Worked:** $(5x^3)^2 = 25x^6$; $12a^5 \div 3a^{-2} = 4a^7$; $6x^7y^4 \times 5x^{-5}y = 30x^2y^5$.
- **Index equation:** $2^x = 32 = 2^5 \rightarrow x = 5$.

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

Method — Indices with letters



The basic graph shapes

Practice 2.1 ■ 2 marks

Simplify $(3a^2)^3$.

Solution 2.1

Worked steps

$$(3a^2)^3 = 3^3 a^6 = 27a^6$$

M1 **A1** for 3^3 or a^6 ; for $27a^6$.

Practice 2.2 ■ 2 marks

Simplify $10x^6 \div 2x^2$.

Solution 2.2

Worked steps

$10 \div 2 = 5$, $x^6 \div x^2 = x^4$, so $5x^4$ **M1** **A1** for $5x^4$.

Practice 2.3 ■ 1 mark

Simplify $a^4 \times a^{-7}$.

Solution 2.3

Worked steps

$$a^4 \times a^{-7} = a^{-3} \text{ (or } \frac{1}{a^3}) \text{ B1.}$$

Exam-style 3.1 ■ 2 marks

Simplify $(2x^2y)^3$.

Solution 3.1

Worked steps

$$(2x^2y)^3 = 2^3x^6y^3 = 8x^6y^3$$
 M1 **A1** *for two correct parts; for $8x^6y^3$.*

Exam-style 3.2 ■ 2 marks

Simplify $\frac{15a^7b^2}{5a^3b^2}$.

Solution 3.2

Worked steps

$\frac{15}{5} = 3$, $a^7 \div a^3 = a^4$, $b^2 \div b^2 = 1$, so $3a^4$ **M1** **A1** for $3a^4$.

Exam-style 3.3 ■ 2 marks

Solve $3^x = 81$.

Solution 3.3

Worked steps

$81 = 3^4$, so $3^x = 3^4 \rightarrow x = 4$ **M1** **A1** *for $81 = 3^4$; for 4.*