

Exercise walk-through

Powers and roots ■ E1.3

eXercise

You must be able to

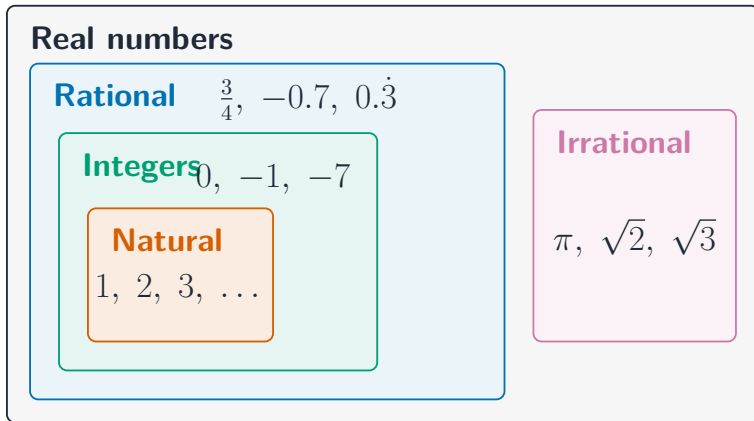
- recall squares to 15^2 and the cubes of 1–5 and 10
- find square roots and cube roots
- evaluate expressions combining powers and roots

Method — Powers and roots

- **Power 幂:** $2^5 = 32$. **Square root 平方根:** $\sqrt{169} = 13$. **Cube root 立方根:** $\sqrt[3]{8} = 2$.
- **Worked:** $5^2 \times \sqrt[3]{8} = 25 \times 2 = 50$.
- Recall squares (1–15) and cubes (1, 2, 3, 4, 5, 10).

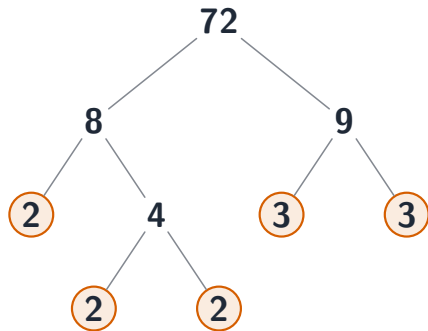
Answer shapes: **M1** a correct method, **A1** the correct answer.

Method — Powers and roots



Each kind of number sits inside the next

Method — Powers and roots



$$72 = 2^3 \times 3^2$$

Prime factorisation underlies powers and roots

Practice 2.1 ■ 1 mark

Work out $\sqrt{196}$.

Solution 2.1

Worked steps

$$\sqrt{196} = 14 \text{ (B1).}$$

Practice 2.2 ■ 2 marks

Work out $\sqrt[3]{27} + 4^2$.

Solution 2.2

Worked steps

$\sqrt[3]{27} = 3$ and $4^2 = 16$, so $3 + 16 = 19$ **M1** **A1** *for either value; for 19.*

Practice 2.3 ■ 2 marks

Work out $\sqrt{144} - \sqrt[3]{64}$.

Solution 2.3

Worked steps

$\sqrt{144} = 12$, $\sqrt[3]{64} = 4$, so $12 - 4 = 8$ **M1** **A1** for 8.

Exam-style 3.1 ■ 2 marks

Work out $3^3 - \sqrt{121}$.

Solution 3.1

Worked steps

$3^3 = 27$, $\sqrt{121} = 11$, so $27 - 11 = 16$ **M1** **A1** for 16.

Exam-style 3.2 ■ 2 marks

Work out $\sqrt{169} \times \sqrt[3]{125}$.

Solution 3.2

Method: Powers and roots

Worked steps

$\sqrt{169} = 13$, $\sqrt[3]{125} = 5$, so $13 \times 5 = 65$ **M1** **A1** for 65.

Exam-style 3.3 ■ 2 marks

Work out the value of $\sqrt{2^2 + 3^2 + 6^2}$.

Solution 3.3

Worked steps

$2^2 + 3^2 + 6^2 = 4 + 9 + 36 = 49$, so $\sqrt{49} = 7$ **M1** **A1** for 49 inside the root; for 7.