

E1.3 Powers and roots

Name: _____ Class: _____ Date: _____

Total: 11 marks**KEY WORDS** power 幂 • powers and roots 幂和根 • cube root 立方根 • square root 平方根 • prime factor 质因数

Objective

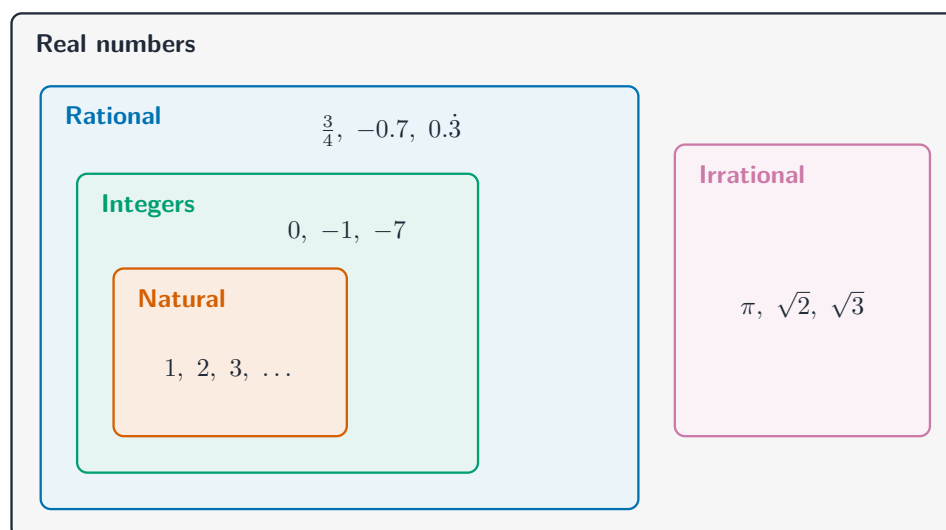
Build the skills to answer Extended exam questions on **powers and roots** 幂和根 — **squares, cubes** 平方、立方 and their roots, and evaluating expressions with powers and roots.

You must be able to:

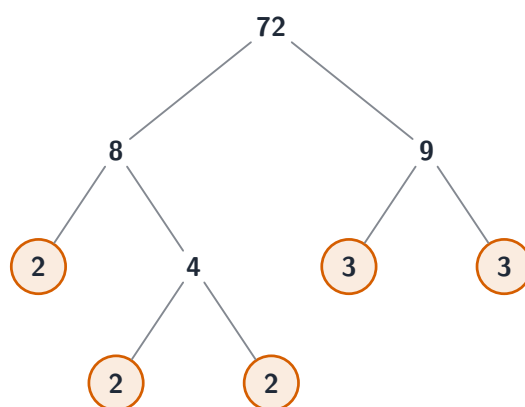
- recall squares to 15^2 and the cubes of 1–5 and 10
- find square roots and cube roots
- evaluate expressions combining powers and roots

1 Worked examples

■ Powers and roots



A power multiplies a number by itself; a root reverses it



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

Prime factorisation underlies 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.

2 Practice

2.1 Work out $\sqrt{196}$. [1]

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

2.3 Work out $\sqrt{144} - \sqrt[3]{64}$. [2]

3 Exam-style questions

3.1 Work out $3^3 - \sqrt{121}$. [2]

3.2 Work out $\sqrt{169} \times \sqrt[3]{125}$. [2]

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

Solutions

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

2.1 $\sqrt{196} = 14$.

2.2 $\sqrt[3]{27} = 3$ and $4^2 = 16$, so $3 + 16 = 19$.

2.3 $\sqrt{144} = 12$, $\sqrt[3]{64} = 4$, so $12 - 4 = 8$.

3.1 $3^3 = 27$, $\sqrt{121} = 11$, so $27 - 11 = 16$.

3.2 $\sqrt{169} = 13$, $\sqrt[3]{125} = 5$, so $13 \times 5 = 65$.

3.3 $2^2 + 3^2 + 6^2 = 4 + 9 + 36 = 49$, so $\sqrt{49} = 7$.