Exercise walk-through

Types of number ▪ E1.1

eXercise

You must be able to

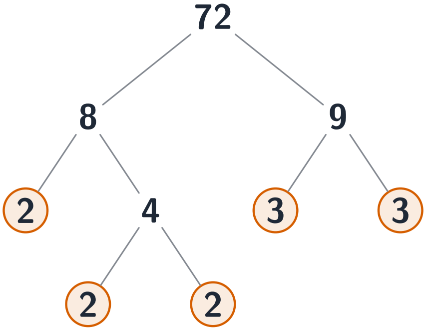
- write a number as a product of its prime factors
- find the HCF and LCM using prime factors
- identify rational and irrational numbers

Method — Prime factors, HCF and LCM

- **Prime factors:** $72 = 2^3 \times 3^2$ (split until every branch is prime).
- **HCF 最大公因数**: the **lowest** power of each shared prime. **LCM 最小公倍数**: the **highest** power of every prime.
- **Worked (72 and 120):** $72 = 2^3 \times 3^2$, $120 = 2^3 \times 3 \times 5 \to \text{HCF} = 2^3 \times 3 = 24$, $\text{LCM} = 2^3 \times 3^2 \times 5 = 360$.
- **Irrational 无理数**: cannot be written as a fraction (e.g. π, $\sqrt{2}$).

Answer shapes (marked by **method marks** — M1 for a correct method, A1 for the correct answer):

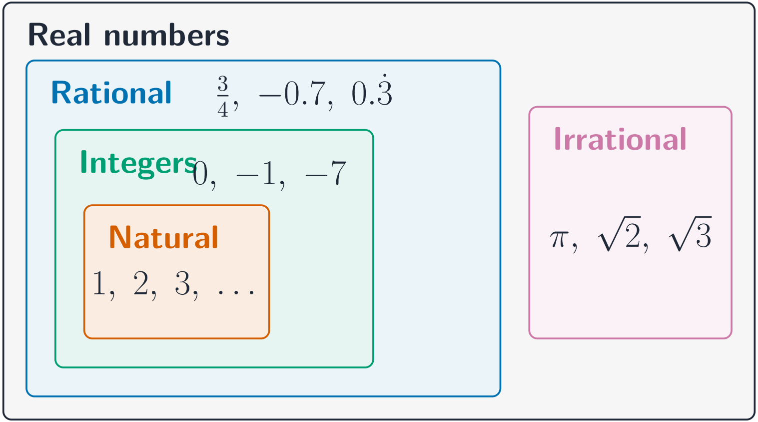
Method — Prime factors, HCF and LCM



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

A factor tree splits a number down to its primes

Method — Prime factors, HCF and LCM



The number sets: natural, integer, rational and real

Practice 2.1 ▪ 2 marks

Write 90 as a product of its prime factors.

Solution 2.1

Method: Prime factors, HCF and LCM

Worked steps

$90 = 2 \times 3^2 \times 5$ **M1** **A1** *for a correct factor tree or division; for* $2 \times 3^2 \times 5$.

Practice 2.2 ▪ 2 marks

From the list $\sqrt{9}$, π, $\frac{2}{3}$, $\sqrt{5}$, write down the two **irrational** numbers.

Solution 2.2

Method: Prime factors, HCF and LCM

Worked steps

π and $\sqrt{5}$ **B1** *each;* $\sqrt{9} = 3$ *and* $\frac{2}{3}$ *are rational.*

Practice 2.3 ▪ 2 marks

Find the HCF of 24 and 36.

Solution 2.3

Worked steps

$24 = 2^3 \times 3$, $36 = 2^2 \times 3^2 \to \text{HCF} = 2^2 \times 3 = 12$ **M1** **A1** *for the prime factors or a factor list; for* 12.

Exam-style 3.1 ▪ 2 marks

$A = 2^2 \times 3 \times 5$ and $B = 2 \times 3^2 \times 5$.

(a) Find the HCF of A and B.

(b) Find the LCM of A and B.

Solution 3.1

Worked steps

(a) HCF — lowest power of each shared prime: $2^1 \times 3 \times 5 = 30$ **M1** **A1** *for* 30.
(b) LCM — highest power of every prime: $2^2 \times 3^2 \times 5 = 180$ **M1** **A1** *for* 180.

Exam-style 3.2 ▪ 2 marks

Find the lowest common multiple (LCM) of 18 and 24.

Solution 3.2

Worked steps

$18 = 2 \times 3^2$, $24 = 2^3 \times 3 \to \mathsf{LCM} = 2^3 \times 3^2 = 72$ **M1** **A1** *for the prime factors; for* 72.