

Exercise walk-through

E1.1

Types of number

IGCSE Mathematics

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

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The method

Method — Prime factors, HCF and LCM

- **Prime factors:** $72 = 2^3 \times 3^2$ (split until every branch is prime).
- **HCF** : the **lowest** power of each shared prime. **LCM** : the **highest** power of every prime.
- **Worked (72 and 120):** $72 = 2^3 \times 3^2$, $120 = 2^3 \times 3 \times 5 \rightarrow \text{HCF} = 2^3 \times 3 = 24$, $\text{LCM} = 2^3 \times 3^2 \times 5 = 360$.
- **Irrational** : 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):

Exercises 2.1·2.2

2.1 Write 90 as a product of its prime factors.

[2]

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

[2]

Exercises 2.1·2.2

2.1 Write 90 as a product of its prime factors.

[2]

2.1

- split 90 until every factor is prime

$$90 = 2 \times 3^2 \times 5$$

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

[2]

2.2

- $\sqrt{9} = 3$ and $\frac{2}{3}$ can be written as fractions, so they are rational
- the two irrationals are π and $\sqrt{5}$

Exercise 2.3

2.3 Find the HCF of 24 and 36.

[2]

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[2]

2.3

- $24 = 2^3 \times 3$, $36 = 2^2 \times 3^2$
- HCF takes the lowest power of each shared prime

$$\text{HCF} = 2^2 \times 3 = \mathbf{12}$$

Exercise 3.1 (a)

3.1 $A = 2^2 \times 3 \times 5$ and $B = 2 \times 3^2 \times 5$.

(a) Find the HCF of A and B .

[2]

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[2]

(a)

- HCF: lowest power of each shared prime

$$2^1 \times 3 \times 5 = \mathbf{30}$$

Exercise 3.1 (b)

3.1 $A = 2^2 \times 3 \times 5$ and $B = 2 \times 3^2 \times 5$.

(b) Find the LCM of A and B .

[2]

Exercise 3.1 (b)

3.1 $A = 2^2 \times 3 \times 5$ and $B = 2 \times 3^2 \times 5$.

(b) Find the LCM of A and B .

[2]

(b)

- LCM: highest power of every prime

$$2^2 \times 3^2 \times 5 = \mathbf{180}$$

Exercise 3.2

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

[2]

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[2]

3.2

- $18 = 2 \times 3^2, 24 = 2^3 \times 3$

$$\text{LCM} = 2^3 \times 3^2 = \mathbf{72}$$