

Exercise walk-through

C1.1

Types of number

IGCSE Mathematics

You must be able to

- Classify numbers and find reciprocals
- Use prime factors to find HCF and LCM
- Choose HCF for equal groups and LCM for repeating events

1

The method

Method — Key knowledge: Types of number

A natural number is a positive counting number. Integers include zero and negative whole numbers. A prime has exactly two positive factors; 1 is not prime. Squares are n^2 and cubes are n^3 . Rational numbers can be written as fractions of integers; irrational numbers cannot. The reciprocal of a is $1/a$ for $a \neq 0$. For prime factors, divide until each factor is prime. The HCF uses the lowest shared prime powers; the LCM uses the highest powers needed by either number. Write large numbers using place-value groups.

Exercises 2.1·2.3

2.1 Write seven million and forty as digits. Write 20009 in words. [2]

2.2 From $-4, 0, 1, 8, 13, 25$, write the prime number and a cube number. [2]

2.3 Classify $\sqrt{25}$ and $\sqrt{7}$ as rational or irrational. Give the reciprocal of $3/8$. [2]

Exercises 2.1·2.3

2.1 Write seven million and forty as digits. Write 20009 in words. [2]

2.1

- Place-value groups give **7000040**. The second number is **twenty thousand and nine**.
-

2.2 From $-4, 0, 1, 8, 13, 25$, write the prime number and a cube number. [2]

2.2

- 13 has only factors 1 and 13, so the prime is **13**. Since $2^3 = 8$, **8** is a cube (1 is also accepted).
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2.3 Classify $\sqrt{25}$ and $\sqrt{7}$ as rational or irrational. Give the reciprocal of $3/8$. [2]

2.3

- $\sqrt{25} = 5 = 5/1$ is **rational**; $\sqrt{7}$ is **irrational**. Inverting the nonzero fraction gives $8/3$.

Exercise 2.4

2.4 Write 84 as a product of prime factors.

[2]

3 Exam-style questions

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[2]

3 Exam-style questions

2.4

- Divide by primes: $84 = 2 \times 42 = 2^2 \times 21 = \mathbf{2^2 \times 3 \times 7}$.

Exercise 3.1 (a)

3.1 Apply the types of number methods below. Show working and include units where appropriate.

(a) Find the HCF of 30 and 42.

[2]

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[2]

(a)

- $30 = 2 \times 3 \times 5$, $42 = 2 \times 3 \times 7$. Lowest common powers give $\text{HCF} = 2 \times 3 = \mathbf{6}$.

Exercise 3.1 (b)

3.1 Apply the types of number methods below. Show working and include units where appropriate.

(b) Find their LCM.

[2]

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3.1 Apply the types of number methods below. Show working and include units where appropriate.

(b) Find their LCM.

[2]

(b)

- Highest powers give $\text{LCM} = 2 \times 3 \times 5 \times 7 = \mathbf{210}$.

Exercise 3.1 (c)

3.1 Apply the types of number methods below. Show working and include units where appropriate.

(c) Two lights flash every 30 s and 42 s. They flash together at noon. Find the next time they flash together. [2]

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(c)

- Together again after the LCM: $t = 210 \text{ s} = 3 \text{ min } 30 \text{ s}$. The time is **12:03:30**.

Exercise 3.2 (a)

3.2 A club has 54 red badges and 72 blue badges. It makes identical packs, using every badge.

(a) Find the greatest possible number of packs and the numbers of red and blue badges in each pack. [3]

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(a) Find the greatest possible number of packs and the numbers of red and blue badges in each pack. [3]

(a)

- Identical packs must divide both totals, so use the HCF.
- $N = \text{HCF}(54, 72) = \mathbf{18}$ packs.
- Each has $r = 54/18 = \mathbf{3}$ red and $b = 72/18 = \mathbf{4}$ blue badges.

Exercise 3.2 (b)

3.2 A club has 54 red badges and 72 blue badges. It makes identical packs, using every badge.

(b) Two bells ring every 18 min and 24 min. Both ring at 09:15. Find their next common ringing time and explain your choice of operation. [3]

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3.2 A club has 54 red badges and 72 blue badges. It makes identical packs, using every badge.

(b) Two bells ring every 18 min and 24 min. Both ring at 09:15. Find their next common ringing time and explain your choice of operation. [3]

(b)

- The next shared event requires the LCM.
- $t = \text{LCM}(18, 24) = \mathbf{72}$ min.
- Add 1 h 12 min to 09:15: the time is **10:27**.