

C1.1 Types of number

Name: _____ Class: _____ Date: _____ **Total: 20 marks**

KEY WORDS factor 因数 • prime number 质数 • integer 整数 • fraction 分数
 • common factor 公因数 • factor 因数 • prime number 质数 • integer 整数 • fraction 分数
 • common factor 公因数

Objective

Use types of number to solve Core IGCSE Mathematics problems.

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

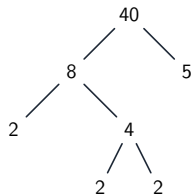
1 Key knowledge and worked examples

■ 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.

■ Worked example: Types of number



For 40 and 60, find the prime factors first: $40 = 2^3 \times 5$, $60 = 2^2 \times 3 \times 5$.

- The common factors give $\text{HCF} = 2^2 \times 5 = 20$.
- Every needed factor gives $\text{LCM} = 2^3 \times 3 \times 5 = 120$.
- $\sqrt{16} = 4$ is rational, while $\sqrt{3}$ is irrational. The reciprocal of $2/5$ is $5/2$.

- For number words, 6000042 means six million and forty-two. The zeros keep the empty places. A square such as $5^2 = 25$ differs from a cube such as $2^3 = 8$.

■ Method check

Choose the operation from the situation: equal largest groups need a common factor; events meeting again need a common multiple.

2 Practice

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]

2.4 Write 84 as a product of prime factors. [2]

3 Exam-style questions

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]

(b) Find their LCM. [2]

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

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]

(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]

Solutions

Award method and answer marks as indicated; accept equivalent correct methods.

2.1

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

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).

2.3

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

2.4

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

3.1

(a)

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

(b)

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

(c)

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

3.2

(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.

(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**.