

Real Numbers

CBSE Class 10 Maths · Knowledge organiser

KEY DEFINITIONS

Prime factorisation

Writing a number as a product of primes; it is unique apart from the order.

HCF

The highest common factor: the largest number that divides each of the numbers exactly.

LCM

The lowest common multiple: the smallest number that each of the numbers divides exactly.

YOU SHOULD BE ABLE TO...

- Write any number as a product of primes and find the HCF and LCM of two numbers quickly and accurately.
- Handle every standard board question: HCF/LCM word problems, the $\text{HCF} \times \text{LCM}$ rule, and the short 'show that it is irrational' proofs.
- Write complete 5-mark and case-study answers, with the prime factorisation shown, a clear final sentence and units, so no step mark slips away.
- Crack the trickiest questions: finding unknown powers, listing all possible number pairs and spotting which sums and products of surds stay irrational.

COMMON MISTAKES

- ✗ Using $\text{HCF} \times \text{LCM} = \text{product}$ for three numbers.
- ✗ Taking the highest power for HCF (or the lowest for LCM).
- ✗ In irrationality proofs, forgetting to state that a and b are *coprime*, or not stating the contradiction clearly.
- ✗ Leaving a "prime factorisation" with a composite factor such as 77 or 143.

KEY FORMULAS

Fundamental Theorem of Arithmetic: every composite number is a product of primes, uniquely apart from order

HCF = product of the smallest power of each common prime; LCM = product of the greatest power of each prime

For two positive integers $\text{HCF}(a, b) \times \text{LCM}(a, b) = a \times b$

$\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$ and $\sqrt{p}$ (p prime) are irrational: prove by contradiction ($p \mid a^2 \Rightarrow p \mid a$)

WORKED EXAMPLE

Find HCF and LCM of 96 and 360.

$96 = 2^5 \times 3$, $360 = 2^3 \times 3^2 \times 5$. $\text{HCF} = 2^3 \times 3 = 24$; $\text{LCM} = 2^5 \times 3^2 \times 5 = 1440$. Check: $24 \times 1440 = 34560 = 96 \times 360$.