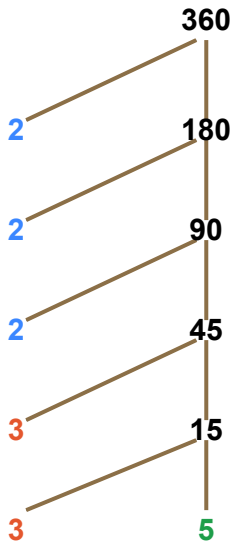
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Real Numbers: Chapter Introduction

1. Break it into primes



360 = 2 × 2 × 2 × 3 × 3 × 5 = 2³ × 3² × 5. Start with 6 × 60 or 10 × 36 instead: you always end with the same primes.

2. Fundamental Theorem of Arithmetic

Every composite number can be expressed as a product of primes, and this factorisation is **unique**, apart from the order of the factors.

3. HCF and LCM

Number	Prime factors
12	$2^2 \times 3$
18	2×3^2
HCF (smallest powers of common primes)	$2 \times 3 = 6$
LCM (greatest powers of all primes)	$2^2 \times 3^2 = 36$

Check: HCF × LCM = 6 × 36 = 216 = 12 × 18.

4. Irrational numbers

√2 cannot be written as p/q (p, q integers, q ≠ 0): it is **irrational** (1.41421356…, never ending, never repeating). Proof idea: if √2 = p/q in lowest terms, then p² = 2q², so p is even; then q is even too, a contradiction. √3 and √5 are irrational in the same way.

Solved example

Q. Find the HCF and LCM of 24 and 36.
A. $24 = 2^3 \times 3$, $36 = 2^2 \times 3^2$. HCF $= 2^2 \times 3 =$ **12**; LCM $= 2^3 \times 3^2 =$ **72**. Check: $12 \times 72 = 864 = 24 \times 36$.

Practice questions

1. (MCQ) The prime factorisation of 140 is (a) $2^2 \times 35$ (b) $2^2 \times 5 \times 7$ (c) 4×35 (d) 2×70
2. (Very short) State the Fundamental Theorem of Arithmetic.
3. (Numerical) Find the HCF and LCM of 8 and 12.
4. (Numerical) The HCF of two numbers is 9 and their product is 1620. Find their LCM.
5. (Short) Is $\sqrt{9}$ irrational? Explain.
6. (Short) Why is 1 not a prime number?

Answer key

1. (b).
2. Every composite number is a product of primes, uniquely apart from order.
3. $8 = 2^3$, $12 = 2^2 \times 3$: HCF = 4, LCM = 24.
4. LCM = $1620 \div 9 = 180$.
5. No: $\sqrt{9} = 3 = 3/1$ is rational.
6. A prime has exactly two factors (1 and itself); 1 has only one.

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