

1.1.1 Number

Name: _____ Class: _____ Date: _____

KEY WORDS prime factor

<!-- Session 2 native-skill companion -->

Objective

Practise number within the labelled native lessons. Public original tasks; locally authored answer guidance.

1 Key knowledge and worked examples

■ Exact arithmetic and estimation · Foundation

Prime factors reveal shared structure. Use the smallest common prime powers for the HCF and the largest for the LCM. Estimate before calculating; use brackets to preserve the order of operations.

$$72 = 2^3 \times 3^2, \quad 90 = 2 \times 3^2 \times 5, \quad \text{HCF} = 18$$

$72=2^3 \times 3^2$ and $90=2 \times 3^2 \times 5$. Their HCF is $2 \times 9=18$. Make 18 bags with 4 pencils and 5 pens each. Their LCM is $2^3 \times 3^2 \times 5=360$. A prime integer is greater than 1 and has exactly two positive factors. The number 1 is not prime; a composite positive integer greater than 1 has more than two positive factors. Every integer greater than 1 has a unique product of prime factors apart from their order. For example, $60=2^2 \times 3 \times 5$. A factor divides a number; a multiple is the result of multiplying it by an integer. HCF uses common smallest powers, while LCM uses largest powers.

The HCF divides both numbers; the LCM is a multiple of both. They answer different questions. A decimal estimate is not an exact fraction.

For a non-calculator paper, keep fractions exact and show cancellation. For a calculator paper, enter the full expression and compare with your estimate.

■ Exact arithmetic and estimation · Higher

Prime factors reveal shared structure. Use the smallest common prime powers for the HCF and the largest for the LCM. Estimate before calculating; use brackets to preserve the order of operations.

$$a = \prod p_i^{\alpha_i}, \quad b = \prod p_i^{\beta_i}, \quad \text{HCF}(a, b) = \prod p_i^{\min(\alpha_i, \beta_i)}$$

$72=2^3 \times 3^2$ and $90=2 \times 3^2 \times 5$. Their HCF is $2 \times 9=18$. Make 18 bags with 4 pencils and 5 pens each. Their LCM is $2^3 \times 3^2 \times 5=360$. A prime integer is greater than 1 and has exactly two positive factors. The number 1 is not prime; a composite positive integer greater than 1 has more than two positive factors. Every integer greater than 1 has a unique product of prime factors apart from their order. For example, $60=2^2 \times 3 \times 5$. A factor divides a number; a multiple is the result of multiplying it by an integer. HCF uses common smallest powers, while LCM uses largest powers.

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$$72 = 2^3 \times 3^2$$

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

Shared smallest powers: $2 \times 3^2 = 18$

Original native-lesson illustration; labels belong to its worked example.

2 Practice

2.1 (Foundation) Find the HCF of 48 and 60.

2.2 (Foundation) Find the LCM of 8 and 12.

2.3 (Foundation) Work out $\frac{3}{4} + \frac{5}{6}$ as a decimal.

3 Exam-style questions

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: The HCF of two positive integers is always larger than either integer.

Solutions

2.1 $48=2^4 \times 3$ and $60=2^2 \times 3 \times 5$. The shared smallest powers give $\text{HCF}=2^2 \times 3=12$.

2.2 $8=2^3$ and $12=2^2 \times 3$. The largest prime powers give $\text{LCM}=2^3 \times 3=24$.

2.3 Use denominator 12: $3/4+5/6=9/12+10/12=19/12$.

3.1 False. $\text{HCF}(12,18)=6$, which is less than both. A positive common divisor cannot exceed either number it divides.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.