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Arithmetic & algebra · Lesson 3/7 · ●●○ Intermediate

GCF and LCM made easy

How do you write a number as a product of prime factors? And how do you find the greatest common factor (GCF) and the least common multiple (LCM)? First with lists of factors and multiples, then with the fast prime factor rule.

In this video we solve 3 exercises step by step, up to a real-life LCM problem.

The method

$$\text{GCF}: \text{ common factors, lowest power}$$

$$\text{LCM}: \text{ all factors, highest power}$$

Worked examples

Exercise 1

Write 100 as a product of prime factors.

Data: 100

1. **Divide by the smallest possible prime number**

$$\begin{array}{rl} 100 & 2 \\ 50 & 2 \\ 25 & 5 \\ 5 & 5 \\ 1 & \end{array}$$

2. **Equal factors: write them as a power**

$$100 = 2 \cdot 2 \cdot 5 \cdot 5$$

$$100 = 2^2 \cdot 5^2$$

💡 Remember: 25 can't be divided by 2 or 3, so we moved on to 5

Result: $100 = 2^2 \cdot 5^2$

✓ Check

$$2^2 \cdot 5^2 = 4 \cdot 25 = 100 \checkmark$$

Exercise 2

Find the GCF and the LCM of 12 and 18.

Data: $12 \cdot 18$

1. **Write both numbers as products of primes**

$$12 = 2^2 \cdot 3$$

$$18 = 2 \cdot 3^2$$

Result: $12 = 2^2 \cdot 3 \quad 18 = 2 \cdot 3^2$

2. **GCF: only the common factors, lowest power**

$$\text{GCF}(12, 18) = 2 \cdot 3 = 6$$

Result: $\text{GCF} = 6$

3. **LCM: all the factors, highest power**

$$\text{LCM}(12, 18) = 2^2 \cdot 3^2 = 36$$

💡 The LCM is always a multiple of the GCF: 36 = 6 × 6

Result: $\text{LCM} = 36$

✓ **Check**

$$12 = 6 \cdot 2, \quad 18 = 6 \cdot 3 \checkmark$$

$$36 = 12 \cdot 3 = 18 \cdot 2 \checkmark$$

Exercise 3

Luca goes swimming every 6 days, Sara every 8 days. Today they went together. In how many days will they meet at the pool again?

Data: 6 days $\cdot$ 8 days

1. **They meet again after a common multiple: we need the LCM**

$$6 = 2 \cdot 3$$

$$8 = 2^3$$

2. **All the factors, highest power**

$$\text{LCM}(6, 8) = 2^3 \cdot 3 = 24$$

> 💡 2 is in both numbers: take 2^3, not 2

Result: $\text{LCM}(6, 8) = 24$

3. **They meet again in 24 days**

$$24 \text{ days}$$

Result: 24 days

✓ **Check**

$$6,\ 12,\ 18,\ 24$$

$$8,\ 16,\ 24 \checkmark$$

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