

Factors and primes

The **FACTORS** of a number are any numbers that divide into it exactly.

A **PRIME NUMBER** has exactly two factors. It can only be divided by 1 and itself.

Prime factors

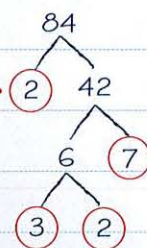
If a number is a factor of another number **AND** it is a prime number then it is called a **PRIME FACTOR**. You use a factor tree to find prime factors.

$$84 = 2 \times 2 \times 3 \times 7$$

$$= 2^2 \times 3 \times 7$$

Remember to put in the multiplication signs. This is called a **PRODUCT** of PRIME FACTORS.

Remember to circle the prime factors as you go along. The order doesn't matter.



The highest common factor (HCF) of two numbers is the **HIGHEST NUMBER** that is a **FACTOR** of both numbers.

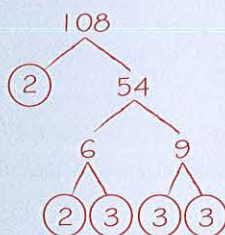
The lowest common multiple (LCM) of two numbers is the **LOWEST NUMBER** that is a **MULTIPLE** of both numbers.

Worked example

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C

- (a) Express 108 as a product of its prime factors.

Everything in red is part of the answer.



$$108 = 2 \times 2 \times 3 \times 3 \times 3 = 2^2 \times 3^3$$

- (b) Find the highest common factor (HCF) of 108 and 24

$$108 = 2 \times 2 \times 3 \times 3 \times 3$$

$$24 = 2 \times 2 \times 2 \times 3$$

$$\text{HCF is } 2 \times 2 \times 3 = 12$$

- (c) Find the lowest common multiple (LCM) of 108 and 24

$$\text{LCM} = 12 \times 3 \times 3 \times 2 = 216$$

When drawing a factor tree, make sure you continue until every branch ends with a prime number. It doesn't matter which factor pairs you choose for each branch. At the end, don't forget to write out the product of primes.

Check it!

$$2 \times 2 \times 3 \times 3 \times 3 = 108 \checkmark$$

To find the HCF circle all the prime numbers which are **common** to both products of prime factors. 2 appears twice in both products so you have to circle it twice. Multiply the circled numbers together to find the HCF.

To find the LCM multiply the HCF by the numbers in both products that were not circled in part (b).

Alternatively, you can multiply 108 and 24 together and divide by the HCF:

$$108 \times 24 = 2592$$

$$2592 \div 12 = 216$$

Now try this

- (a) Express the following numbers as products of their prime factors.

(i) 60

(ii) 96

(4 marks)

- (b) Find the highest common factor (HCF) of 60 and 96

(1 mark)

- (c) Work out the lowest common multiple (LCM) of 60 and 96

(1 mark)

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