

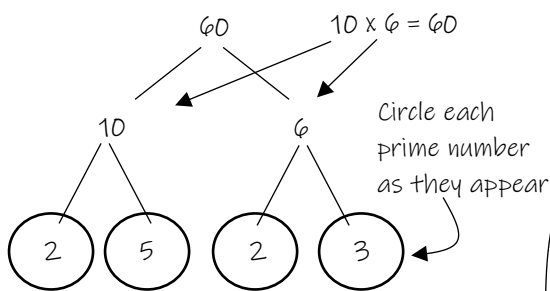
# Y8 Maths Knowledge Organiser Topic 1: Types of number and indices

What must I be able to do?	Key vocabulary
<p>You may need to revise the following:</p> <ul style="list-style-type: none"> <li>Year 7 Topic 1: Types of number</li> </ul> <p>New content:</p> <ul style="list-style-type: none"> <li>Find the prime factors of a number and express as a product of prime factors                      &gt; Sparx M108</li> <li>Determine HCF and LCM by prime factorisation                      &gt; Sparx M698, M227, M365</li> <li>Find squares, square roots, cubes and cube roots using prime factorisation</li> <li>Use indices to record repeated multiplication</li> </ul>	<p><b>HCF</b> Highest common factor. The <u>largest</u> number which is a <u>factor of all the numbers</u> in the question.</p> <p><b>LCM</b> Lowest common multiple. The <u>smallest</u> number which is a <u>multiple of all the numbers</u> in the question.</p> <p><b>Prime factors</b> <u>Factors</u> of an integer which are <u>prime numbers</u></p> <p><b>Product of prime factors</b> All the <u>prime factors</u> of an integer which when <u>multiplied</u> together make the original integer.</p> <p><b>Venn diagram</b> An illustration which uses <u>circles</u> to <u>show</u> what is in <u>common</u> between 2 or more things.</p>

## Express as a product of prime factors

Use a factor tree to find all the prime factors. Then write the prime factors as a multiplication.

e.g. Write 60 as a product of prime factors



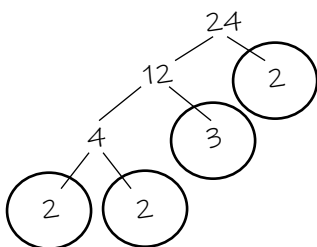
So the prime factors of 60 are 2, 3 and 5.

The product of prime factors for 60 is all of the circled numbers multiplied together which is:

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

If you actually work this out it should equal 60

e.g. Write 24 as a product of prime factors



So as a product of prime factors 24 is

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

$$= 2^3 \times 3$$

Indices notation for repeated multiplication

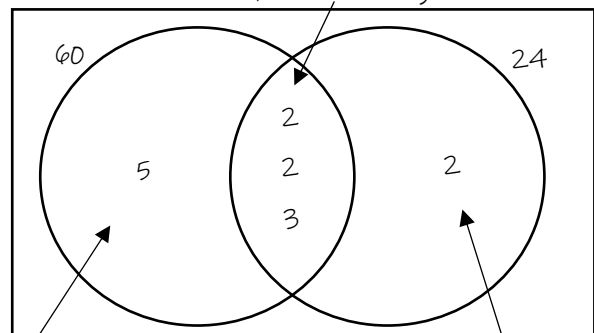
## HCF and LCM using prime factorisation

The first step is to write each number as a product of prime factors, then put the factors into a Venn diagram.

e.g. Find the HCF and LCM of 60 and 24.

We already know that  $60 = 2 \times 2 \times 3 \times 5$  and  $24 = 2 \times 2 \times 2 \times 3$

They both have  $2 \times 2 \times 3$  so these prime factors go into the intersection



60 also has a prime factor of 5 so this goes on its own as does the "extra" prime factor of 2 for 24.

The Highest Common Factor (HCF) is found by multiplying all the numbers in the intersection of the 2 circles.

So the HCF of 60 and 24 is  $2 \times 2 \times 3 = 12$

The Lowest Common Multiple (LCM) is found by multiplying all the numbers in the 2 circles, including the intersection.

So the LCM of 60 and 24 is  $5 \times 2 \times 2 \times 3 \times 2 = 120$

## Prime factors of square and cube numbers

When written as a product of prime factors, all the prime factors of a square number can be written with even powers.

$$\text{e.g. } 36 = 2^2 \times 3^2$$

$$81 = 3^4$$

$$144 = 2^4 \times 3^2$$

To square root these, you just divide the powers by 2.

Cube numbers have powers which are multiples of 3

$$\text{e.g. } 125 = 5^3$$

$$216 = 2^3 \times 3^3$$

$$512 = 2^9$$

To cube root these you divide the powers by 3.