

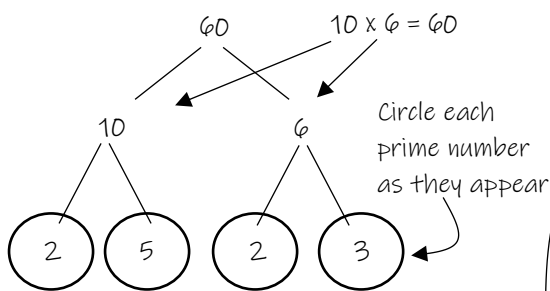
Y8 Maths Knowledge Organiser Topic 1: Types of number and indices

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



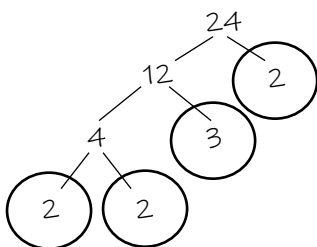
So the prime factors of 60 are 2, 3 and 5.

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

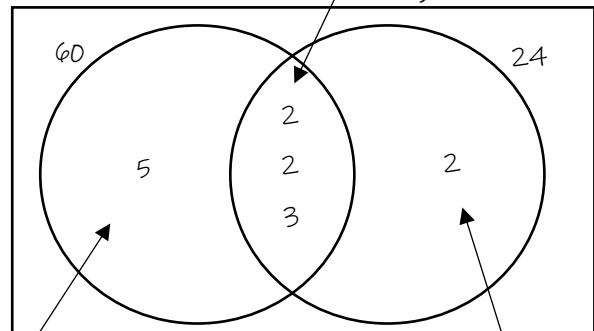
HCF and LCM using prime factorisation

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.

$$\text{e.g. } 36 = 2^2 \times 3^2 \qquad 81 = 3^4 \qquad 144 = 2^4 \times 3^2$$

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

Cube numbers have powers which are multiples of 3

$$\text{e.g. } 125 = 5^3 \qquad 216 = 2^3 \times 3^3 \qquad 512 = 2^9$$

To cube root these you divide the powers by 3.