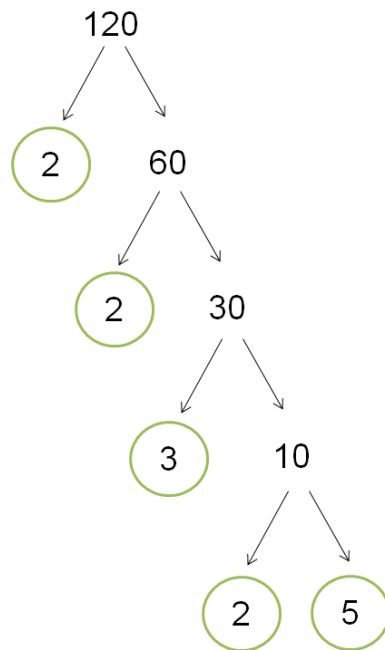


Outcome	NF5	Student can consistently:	Write a number as a product of its prime factors.
How the topic is examined	<ul style="list-style-type: none"> <li>• Examined through test paper questions.</li> <li>• This topic is usually examined on non-calculator examination papers. However for larger numbers a calculator may be allowed.</li> <li>• The questions will ask students to write or express a given number as a product of its prime factors.</li> <li>• Sometimes the question may ask for the answer to be written in index form.</li> </ul>		
Prior knowledge	<ul style="list-style-type: none"> <li>• Students should be confident: <ul style="list-style-type: none"> <li>○ Multiplying and dividing without a calculator.</li> <li>○ Factors and multiples</li> <li>○ Index notation (AEx3)</li> </ul> </li> <li>• In addition questions involving products of prime factors can have links to: <ul style="list-style-type: none"> <li>○ Lowest common multiple and highest common factor (NF6)</li> </ul> </li> </ul>		
Suggested tuition approaches	<ul style="list-style-type: none"> <li>• It is important for students to understand the wording in this topic <ul style="list-style-type: none"> <li>○ Product – means multiply</li> <li>○ Factor – a number that goes equally into another number without remainder.</li> <li>○ Prime factor – a factor that is a prime number (a prime number is a number with two numbers, 1 and itself)</li> </ul> </li> <li>• Essentially students are trying to write a number as a long string of numbers multiplied together. The fact you can write every number as a product of prime factors in a unique way is one of the most fundamental properties of numbers. It has many uses.</li> <li>• The most common method that students use to express a number as a product of its prime factors is to use a factor tree. <ul style="list-style-type: none"> <li>○ The original number goes at the top of the tree and then put two branches coming from this number.</li> <li>○ At the end of each branch a number should be written. The two numbers must multiply to make the number above.</li> <li>○ If any of these numbers are prime numbers then circle them. .</li> <li>○ Choose any non-circled number and draw two branches off it.</li> <li>○ Find two numbers that multiply to make this number and circle any prime numbers.</li> <li>○ The process continues until all numbers are circled (i.e. prime numbers)</li> </ul> </li> <li>• Once these steps have been followed students should write their answer as one long string of numbers multiplied together. Sometimes the question asks for this to be given in index (power form).</li> </ul>		



This diagram shows 120 as a factor tree.

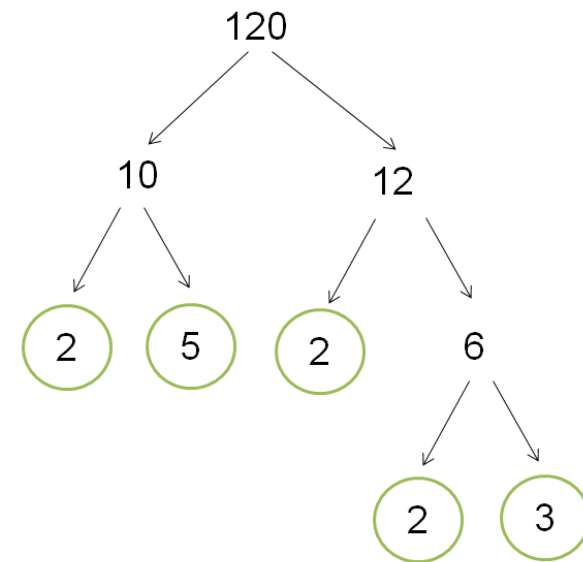
120 as a product of its prime factors is

$$120 = 2 \times 2 \times 2 \times 3 \times 5$$

or in index form  $120 = 2^3 \times 3 \times 5$

It is possible to have a different looking factor tree.

For example you could have had 12 and 10 coming from 120



Notice you get the same circled numbers and therefore the same product.

It is useful to write the numbers in numerical order in your answer, but you don't have to. Any arrangement would be fine as long as they are multiplied together.

<b>Common errors and misconceptions</b>	<ul style="list-style-type: none"> <li>• Students put the addition symbol (+) between the numbers as opposed to the multiply sign (x). Students need to remember it is product and product means multiply.</li> <li>• Students tend to stop too early and circle numbers that are not prime numbers. Some particular numbers that are circled are 9, 15, 25. Students often circle these instead of realising that these numbers are actually products of other numbers (<math>9 = 3 \times 3</math>, <math>15 = 3 \times 5</math> and <math>25 = 5 \times 5</math>). This usually happens because students think it doesn't divide by 2.</li> </ul>
<b>Suggested resources</b>	<ul style="list-style-type: none"> <li>• Questions <ul style="list-style-type: none"> <li>◦ <a href="https://corbettmaths.files.wordpress.com/2013/02/product-of-primes-pdf1.pdf">https://corbettmaths.files.wordpress.com/2013/02/product-of-primes-pdf1.pdf</a></li> </ul> </li> <li>• Past GCSE Questions <ul style="list-style-type: none"> <li>◦ <a href="https://keshgcsemaths.files.wordpress.com/2013/11/52_hcf-lcm-product-of-primes.pdf">https://keshgcsemaths.files.wordpress.com/2013/11/52_hcf-lcm-product-of-primes.pdf</a></li> </ul> </li> <li>• Video tutorial <ul style="list-style-type: none"> <li>◦ <a href="http://corbettmaths.com/2012/08/20/product-of-primes/">http://corbettmaths.com/2012/08/20/product-of-primes/</a></li> <li>◦ <a href="http://corbettmaths.com/2012/08/20/lcm-and-hcf-using-product-of-primes/">http://corbettmaths.com/2012/08/20/lcm-and-hcf-using-product-of-primes/</a></li> </ul> </li> </ul>