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Finding hcf and lcm using prime factors worksheet

2 September 2019 corbettmaths Understanding the main factors is important to be able to find the lowest common multiple (LCM) and the highest common factor (HCF) of two or more numbers. Make sure you are satisfied with the following topics before continuing. We define a main factor of any given number to be any factor that the number has, which is also a main number. Each positive whole number has a unique primary factorization – a list of first numbers that, when multiplying together, give the original number. In more complicated cases, we use something called a factor tree. Example: Determine the main factorization of 60. Step 1: To build a tree factor, think about 2 numbers that multiply together to make 60 – here, we went with 10 and 6. Step 2: Draw two branches that descend from 60, and at the end of the branches write the two factors you chose. Step 3: If a factor is first, then look for it. If a factor is not first, then repeat the process as shown in the factor tree below. Step 4: The main factorization of 60 is therefore $60 = 2 \times 2 \times 3 \times 5$ Step 5: we write this primary factorization in index form, where if there is more than one of the same factor, we write it as power instead, where the power is the number of times that occurs. So $60 = 2^2 \times 3 \times 5$ KS3Level 4-5 The highest common factor, or HCF, of two numbers is the largest number that goes in both. Example: Considering numbers 12 and 20 The factors of 12 are: 1, 2, 3, 4, 6 and 12 Factors of 20 are: 1, 2, 4, 5, 10 and 20 They have some factors in common, but the biggest factor they have in common is 4, so 4 is the 12 and 20 HCF. KS3Level 4-5 The lowest common multiple, or LCM, of two numbers is the smallest number which is a multiple of both. Example: Consider the 5 and 7 multiple numbers of 5 are: 5, 10, 15, 20, 25, 30, 35, 40, 45, ... multiples of 7 are: 7, 14, 21, 28, 35, 42, And so on. So, we can see that the first event number which is a multiple of both these numbers is 35, so 35 is the LCM of 5 and 7. KS3Level 4-5 For large numbers, the easiest way to find HCF and LCM is to use Venn diagrams. Example: Find the HCF and LCM of 60 and 27. Step 1: We first need the main factorization of both numbers, in which we will use factor trees. However we already have the primary factorization of 60, which is $60 = 2 \times 2 \times 3 \times 5$ and $27 = 3 \times 3 \times 3$ Phase 2: Now, we draw a Venn diagram where a circle is for the main factors of 60 and a circle is for the main factors of 27. Step 3: Looking at the list of factors, if one is shared by both numbers, then we will put it in the intersection and cross it from both lists. $\text{HCF} = 2 \times 2 \times 3 = 12$ and $\text{LCM} = 2 \times 2 \times 3 \times 3 \times 5 = 90$ Step 4: Any factor that is not shared and has not been exceeded, we put in their respective circles. Step 5: To find the HCF, we multiply numbers in the intersection (these are the factors that are common between both numbers). Here is only one number, then $\text{HCF} = 3$ Step 6: To find the LCM, we multiply all numbers in the Venn diagram together. Then $\text{LCM} = 2 \times 2 \times 3 \times 3 \times 5 = 180$ KS3Level 4-5 Find the LCM and HCF of 420 and 132. [4 signs] To do this method, we need full main factorization of 420 and 132. So, we're going to use the factor tree method. The main factor tree for 420 can be seen on the right, This gives, $420 = 2^2 \times 3 \times 5 \times 7$ Through the same process, you get that the full factorization of 132 is $132 = 2^2 \times 3 \times 11$ So now that we have the main factorization, we have to draw a Venn diagram where a circle is for the main factors of 420 and a circle is for the main factors of 132. Looking at the list of factors, if one is shared by both numbers, then we will put it in the intersection and cross it from both lists. Then, any factor that are not shared, and so have not been deleted, will be placed in their respective circles. Finding the HCF is multiplying numbers in the intersection: $\text{HCF} = 2 \times 2 \times 3 = 12$ To find the LCM, all we have to do is multiply all numbers now in the Venn diagram together: $\text{LCM} = 2^2 \times 3 \times 5 \times 7 \times 11 = 4620$ KS3Level 4-5 GCSE Maths Revision Cards (242 Reviews) £8.99 View Example Questions The main factors of a number can be displayed using a main factor tree. The main factorization of 72 is, $72 = 2^3 \times 3^2$ Written in the index notation, the answer is: $72 = 2^3 \times 3^2$ The main factors of a number can be displayed using a main factor tree. The main factor of 140 is, $140 = 2^2 \times 5 \times 7$ Written in the index notation, the answer is: $140 = 2^2 \times 5 \times 7$ First, we must find the main factorization of 24 and 40: Early factors of 24: $24 = 2^3 \times 3$ Main factors of 40: $40 = 2^3 \times 5$ To find the HCF, find all the main factors that are in common between both numbers. $\text{HCF} = 2^2 \times 2 = 4$ Subsequently, cross any number used so far out of the products. Main factors of 24: $24 = 2^3 \times 3$ Basic factors of 40: $40 = 2^3 \times 5$ To find the LCM, multiply the HCF from all the factors that have not been exceeded so far. $\text{LCM} = 4 \times 3 \times 5 = 60$ The main factors of both 495 and 220 can be viewed using primary factor trees. So the factorization of 220 is, $220 = 2^2 \times 5 \times 11$ and the factorization of 495 is, $495 = 3^3 \times 5 \times 11$ Now, let's draw a Venn diagram with a circle containing 495 and the other factors 220 factors. Any major factors shared by these two numbers must be placed in the intersection. $495 = 3^3 \times 5 \times 11$ $220 = 2^2 \times 5 \times 11$ $\text{HCF} = 5 \times 11 = 55$ Finally, we find the LCM multiplying all the numbers of the Venn diagram together, $\text{LCM} = 3^3 \times 2^2 \times 11 = 1980$ First, we must find the main factorization of 32, 152 and 600: Main factors of 32 = 2^5 Main factors of 152 = $2^3 \times 19$ Main factors of 600 = $2^3 \times 3 \times 5^2$ Then we can put each main factor in the correct circle in the Venn diagram. Any common factors should be placed in the intersections of the circles. The highest common factor (HCF) is found by multiplying together numbers in the intersection of all three circles. $\text{HCF} = 2^2 \times 2 = 4$ The lowest common multiple (LCM) is found by multiplying numbers from all sections of the circles together. $\text{LCM} = 2^5 \times 3 \times 5^2 \times 19 = 45600$ Copyright 2021 MathsMadeEasySitemap-Terms and Conditions

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