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High Impact Tutoring Built By Math Experts Personalized standards-aligned one-on-one math tutoring for schools and districts Request a demo Here you will learn about GCF and LCM (greatest common factor and least common multiple), including how to find the GCF and LCM of two or more numbers using the prime factorization method and recognize when to find the GCF or the LCM in word problems. Students will first learn about GCF and LCM as part of the number system in 6th grade. GCF and LCM are two abbreviations for the greatest common factor (GCF) and the least common multiple (LCM). The greatest common factor (GCF) is the largest whole number that two or more numbers can be divided by. The lowest common multiple (LCM) is the smallest whole number which is a multiple of two or more whole numbers. Let’s take a look at some examples below: Example of GCF, also known as the greatest common divisor (GCD) and the highest common factor (HCF).Find the GCF of 8 and 12. Let’s start by writing the factors of 8 and 12. Factors of {\bf{8}} {\textbf{: }} 1, 2, 4, 8 Factors of {\bf{12}} {\textbf{: }} 1, 2, 3, 4, 6, 12 There are several numbers that occur in both lists (1, 2, and 4).The largest factor that occurs in each list is 4, and so the greatest common factor of 8 and 12 is \bf{4}. Example of LCMFind the LCM of 8 and 12. Let’s start by writing the first 12 multiples of 8 and 12. Multiples of {\bf{8}} {\textbf{: }} 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96 Multiples of {\bf{12}} {\textbf{: }} 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132, 144 There are several values that occur in both lists (24, 48, 72, and 96). The lowest of these is 24, hence the least common multiple of 8 and 12 is \bf{24}. To calculate the GCF or LCM of two or more numbers, you can write out a list of factors or multiples as we have above, however, this approach can be very time consuming and can be complicated when dealing with factors and multiples of large numbers (3 digit numbers in particular). You can therefore use prime factorization to find these values. The fundamental theorem of arithmetic states that every positive whole number greater than one is either a prime number, or can be written as a product of its prime factors. Every number has a unique set of numbers called prime factors. By presenting prime factors within a Venn diagram, you can quickly determine both the GCF and LCM of the two or more numbers in the question. For example, 8=2\times{2}\times{2} 12=2\times{2}\times{3} The intersection of the two circles contains the greatest common factor, where you multiply the values within the intersection together. Here, the GCF of 8 and 12 is equal to 2\times{2}=4. The union of the two circles contains the least common multiple where you multiply the values within both circles together. Here, the LCM of 8 and 12 is equal to 2\times(2\times{2})\times{3}=24. As the least common multiple is found by multiplying all of the factors together within the Venn diagram, the least common multiple can be found by multiplying the greatest common factor by the remaining prime factors. \text{LCM } = \text{ GCF } \times \text{ Remaining prime factors} This allows you to solve problems where you are given the GCF and LCM of two numbers and you need to determine the original two numbers. How does this relate to 6th grade math? Grade 6 – The Number System (6.NS.4)Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers (1–100) with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express 36 + 8 \, as \, 4 (9 + 2). Use this worksheet to check your 6th grade students’ understanding of GCF and LCM. 15 questions with answers to identify areas of strength and support! DOWNLOAD FREE x Use this worksheet to check your 6th grade students’ understanding of GCF and LCM. 15 questions with answers to identify areas of strength and support! DOWNLOAD FREE In order to find the greatest common factor of two or more numbers: State the product of prime factors for each number. Write all the prime factors for each number into a Venn diagram. Multiply the prime factors in the intersection to find the GCF. In order to find the least common multiple of two or more numbers: State the product of prime factors for each number. Write all the prime factors for each number into a Venn diagram. Multiply each prime factor in the Venn diagram to find the LCM. Find the greatest common factor of 30 and 42. State the product of prime factors for each number. 30=2\times{3}\times{5} 42=2\times{3}\times{7} 2Write all the prime factors for each number into a Venn diagram. 3Multiply the prime factors in the intersection to find the GCF. GCF =2\times{3}=6. Calculate the least common multiple of 16 and 18. State the product of prime factors for each number. 16=2\times{2}\times{2}\times{2} 18=2\times{3}\times{3} Write all the prime factors for each number into a Venn diagram. Multiply each prime factor in the Venn diagram to find the LCM. LCM =(2\times{2}\times{2})\times{2}\times(3\times{3})=8\times{2}\times{9}=144. 120 \ ml of red paint and 156 \ ml of blue paint are mixed together to create a tin of purple paint. The paint is then distributed equally into sample tubes. Each tube must contain the same amount of paint that must be over 20 \ ml. What is the maximum number of tubes that can be filled with the minimum amount of paint? State the product of prime factors for each number. 120=2\times{2}\times{2}\times{3}\times{5} 156=2\times{2}\times{3}\times{13} Write all the prime factors for each number into a Venn diagram. Multiply the prime factors in the intersection to find the GCF. GCF =2\times{2}\times{3}=12. The total amount of paint is 120 + 156 = 276 \ ml. Dividing 276 \ ml into 12 equal shares (the GCF), we have 276\div{12}=23. As each tube must contain over 20 \ ml of paint, we must have 12 tubes, each containing 23 \ ml of paint. A plumber is fixing multiple leaking pipes. Pipe A drips water every 12 seconds. Pipe B drips water every 22 seconds. Both pipes drip at the same time. How much time passes before they next drip at the same time? Write your answer using minutes and seconds. State the product of prime factors for each number. 12=2\times{2}\times{3} 22=2\times{11} Write all the prime factors for each number into a Venn diagram. Multiply each prime factor in the Venn diagram to find the LCM. LCM =(2\times{3})\times{2}\times{11}=6\times{2}\times{11}=132 132 seconds pass. Converting this to minutes and seconds is 2 minutes and 12 seconds (60 + 60 + 12 = 132 , with 60 seconds = 1 minute). In order to find the original values given the GCF and the LCM: Divide the LCM by the GCF. Calculate the product of primes of the remainder. Determine which prime factors match each original number. The greatest common factor of 3 numbers is 7. The product of their remaining prime factors is 30 and each number is greater than 10. Determine the value of the three numbers. Divide the LCM by the GCF to determine the remainder. As we already know the remainder (30), we can move on to step 2. Calculate the product of primes of the remainder. Using a prime factor tree, the product of primes for 30 is: 30=2\times{3}\times{5} Determine which prime factors match each original number. As each value is greater than 10, the GCF 7 must be a factor of all 3 numbers and it must be multiplied by another factor. 30 has 3 prime factors, 2, 3, and 5 and so the original three numbers are: A=7\times{2}=14 B=7\times{3}=21 C=7\times{5}=35 Two numbers, A and B, have the following number properties: GCF (A,B) = 7 LCM (A,B) = 2,310 A is divisible by 3 B is an even number 100