Prime or Composite?

Cross-Curricular Focus: Mathematics

It's not always easy to determine whether a number is a **prime** number or a **composite** number. One way you can figure it out is to make a list of all the **factors** of that number. The only factors of a prime number is 1 and itself. If a number has any additional factors then it is a composite number.

Let's look at an example of a composite number. The number 12 is a composite number because it has several different factors. A good way to find the factors of a number is to start with the number 1 and work your way up. Ask yourself whether there is a way to get 12 as an answer by multiplying a number times 1. Since 1 x 12 =12, both 1 and 12 are factors of 12. Move on to the number 2. Ask yourself if there is a way to get 12 as an answer by multiplying a number times 2. Since 2 x 6 =12, both 2 and 6 are factors of 12. At this point, we already know that 12 is a composite number because it has more factors than just 1 and 12, but let's continue to figure out the rest of the factors of 12. We just used 2, so next is 3. Is there a way to get 12 as an answer by multiplying a number times 3? Since 3 x 4 =12, both 3 and 4 are factors of 12. The next number would be 4, but we already used it in 3 x 4. As soon as you get a factor that was already used, you know you can stop looking for factors. So in our example, we can now list out all the factors of 12 that we discovered: 1, 2, 3, 4, 6 and 12.

Another technique for deciding if a number is prime or composite is to use tiles to make arrays. Count out the number of tiles for your number. In the example above, you would count 12 tiles for the number 12. Put the tiles into equal rows. Look at the dimensions of the rows that come out evenly. For example, you might have four rows with three in each row. Your array represents 4 x 3 = 12. For all the arrays that come out evenly, you can use the number of rows and the number of tiles in each row as factors on your list of factors. Like the first technique above, numbers that have just one and themselves on their list of factors are prime numbers. Those that have additional factors are composite numbers.

The **prime factorization** of a number is a multiplication sentence that shows a number as the product of only prime numbers. You can use a factor tree to find a number's prime factorization. Let's look at 12 again. One way to make 12 is 2 x 6. The number 2 is already prime, so we move on to 6. 2 x 3 = 6. If we put them together we get: 2 x 2 x 3 = 12. Since there are two number 2s, we can write that part using an exponent. The final prime factorization of 12 is $2^2 \times 3$.

Name: _____

Answer the following questions based on the reading passage. Don't forget to go back to the passage whenever necessary to find or confirm your answers.

1) How do you know when a number is a prime number?

_____

_____

2) How do you know when a number is a composite number?

_____

_____

3) Explain how to figure out the prime factorization of a number. _____

_____

_____

4) What is one technique that can help you figure out whether a number is prime or composite?

_____

_____

5) Do you think there are more prime numbers, or more composite numbers?

_____

_____

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Name: Key

Answer the following questions based on the reading passage. Don't forget to go back to the passage whenever necessary to find or confirm your answers.

Actual wording of answers may vary.

1) How do you know when a number is a prime number?

when a number's only factors are 1 and itself

2) How do you know when a number is a composite number?

when a number has more factors than just one and itself

3) Explain how to figure out the prime factorization of a number. You take a multiplication sentence where the number is the answer. Then you break each factor down to prime numbers.

4) What is one technique that can help you figure out whether a number is prime or composite?

the "counting up" strategy or the array strategy.

5) Do you think there are more prime numbers, or more composite numbers?

more composite numbers