

Lesson 31

COMMON CORE STANDARD CC.6.NS.4

Lesson Objective: Write the prime factorization of numbers.

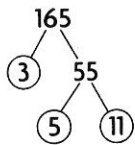
Name _____

Prime Factorization

A number written as the product of prime numbers is called the **prime factorization** of that number. To break a number down into its prime factors, divide it by prime numbers. The first eight prime numbers are listed below.

2, 3, 5, 7, 11, 13, 17, 19

You can use a factor tree to find the prime factorization of a number.

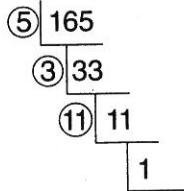


Divide the number by the least prime factor possible. Try 2, 3, 5, and so on.

Break 55 down because it is not a prime number.

The numbers at the bottom of the branches are all prime.

You can use a ladder diagram to find the prime factorization of a number.



165 ends in 5, so it is divisible by 5. Divide 165 by 5.

Write the quotient below 165.

The sum of the digits in 33 is divisible by 3, so divide 33 by 3.

11 is prime. Divide 11 by itself.

The bottom number is 1 and all the numbers to the left are prime.

Write the number as a product of prime factors. The factors should be in order from least to greatest.

So, the prime factorization of 165 is $3 \times 5 \times 11$.

Find the prime factorization of the number.

1. 21

2. 130

3. 84

Name _____

1. The combination for the lock on Santiago's suitcase is based on the prime factorization of 315. What is the prime factorization of 315?

(A) $5 \times 7 \times 9$
 (B) $3 \times 7 \times 15$
 (C) $3 \times 3 \times 5 \times 7$
 (D) $2 \times 3 \times 3 \times 5 \times 7$

2. The combination for Mr. Tao's briefcase is based on the prime factorization of 45. What is the prime factorization of 45?

(A) 3×15
 (B) 5×9
 (C) $3 \times 3 \times 5$
 (D) $2 \times 3 \times 3 \times 5$

3. Manuel left out one prime factor when he wrote this prime factorization for 168.

$$2 \times 2 \times 2 \times 3 \times \blacksquare$$

What is the missing prime factor?

(A) 2
 (B) 3
 (C) 5
 (D) 7

4. Bethaney left out one prime factor when she wrote this prime factorization for 1,092.

$$2 \times 2 \times \blacksquare \times 7 \times 13$$

What is the missing prime factor?

(A) 2
 (B) 3
 (C) 7
 (D) 13

Problem Solving

5. A computer code is based on the prime factorization of 160. Find the prime factorization of 160.

6. The combination for a lock is a 3-digit number. The digits are the prime factors of 42 listed from least to greatest. What is the combination for the lock?