


# 3-1 Prime Factorization



California  
Standards

Preparation for  §2.4 Determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions (e.g. to find a common denominator to add two fractions or to find the reduced form for a fraction).

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## 3-1 Prime Factorization

# Objective

We will identify<sup>1</sup> **prime** and **composite** numbers and represent<sup>2</sup> the **prime factorization** of composite numbers.

<sup>1</sup> find

<sup>2</sup> show

# 3-1 Prime Factorization

## Warm Up

Write each number as a product of two whole numbers in as many ways as possible.

1. 16

$1 \cdot 16, 2 \cdot 8, 4 \cdot 4$

2. 60

3. 36

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## 3-1 Prime Factorization

A **prime number** is a whole number greater than 1 that has exactly two positive factors, 1 and itself.

- 3 is a prime number because its only positive factors are 1 and 3.

A **composite number** is a whole number that has more than two positive factors.

- 6 is a composite number because it has more than two positive factors—1, 2, 3, and 6

## 3-1 Prime Factorization

A composite number can be written as the product of its prime factors. This is called the **prime factorization** of the number.

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

## 3-1 Prime Factorization

**What is it called when a composite number is written as the product of its prime factors?**

**Which shows an example of prime factorization?**

**A.)  $3 \cdot 3 \cdot 5 \cdot 2$**

**B.)  $10 \cdot 3 \cdot 5$**

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## 3-1 Prime Factorization

### Check It Out! Example 1

Tell whether each number is prime or composite.

A. 11

The positive factors of 11 are 1 and 11.

11 is prime.

B. 7

The positive factors of 7 are 1 and 7.

7 is prime.

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## 3-1 Prime Factorization

### Check It Out! Example 1

Tell whether each number is prime or composite.

**A. 14**

The positive factors of 14 are 1, 2, 7, and 14.

14 is composite.

**B. 16**

The positive factors of 16 are 1, 2, 4, 8, and 16.

16 is composite.

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## 3-1 Prime Factorization

1. Write your number as the product of 2 positive numbers.
2. Continue factoring until all the numbers are prime.
3. Circle the prime numbers.
4. You can write prime factorization by using exponents. The exponent tells how many times to use the base as a factor.

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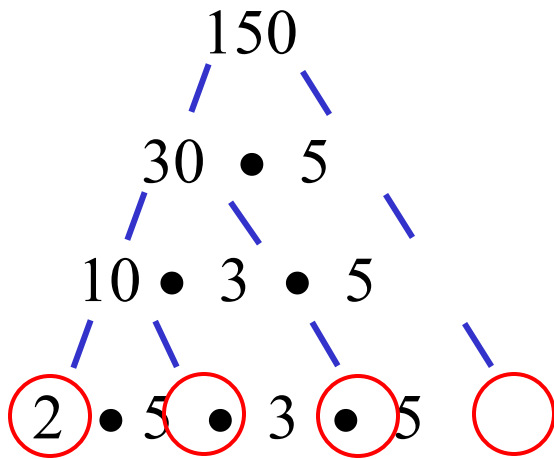


# 3-1 Prime Factorization

## Additional Example 2B: Using a Factor Tree to Find Prime Factorization

Write the prime factorization of the number.

150



• Write 24 as the product of two positive factors.

• Continue factoring until all factors are prime.

• Circle your prime numbers

• Write the prime factorization using exponents.

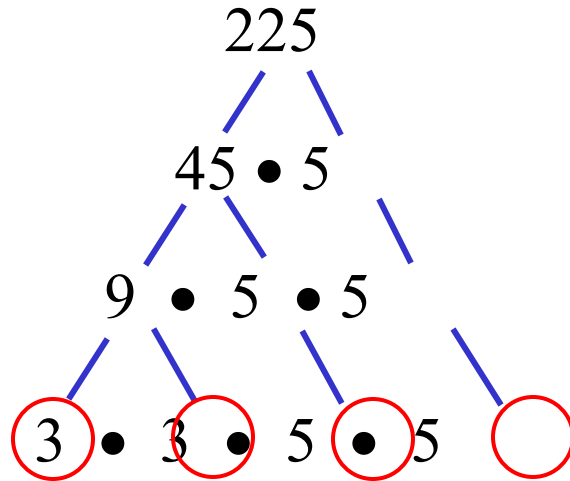
The prime factorization of 150 is  $2 \cdot 3 \cdot 5 \cdot 5$ , or  $2 \cdot 3 \cdot 5^2$ .

# 3-1 Prime Factorization

## Check It Out! Example 2A

Write the prime factorization of the number.

225



The prime factorization of 225 is  $3 \cdot 3 \cdot 5 \cdot 5$ , or  $3^2 \cdot 5^2$ .

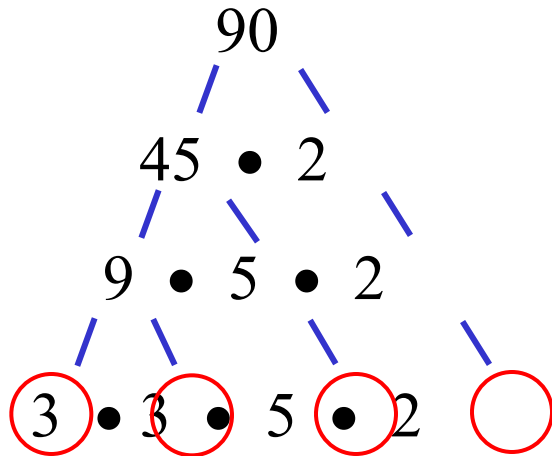
- Write 24 as the product of two positive factors.
- Continue factoring until all factors are prime.
- Circle your prime numbers
- Write the prime factorization using exponents.

# 3-1 Prime Factorization

## Check It Out! Example 2B

Write the prime factorization of the number.

90



• Write 24 as the product of two positive factors.

• Continue factoring until all factors are prime.

• Circle your prime numbers

• Write the prime factorization using exponents.

The prime factorization of 90 is  $3 \cdot 3 \cdot 5 \cdot 2$ , or  $2 \cdot 3^2 \cdot 5$ .

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# 3-1 Prime Factorization

Closure

What is a number called that has only 2 positive factors?

What is a number called that has more than 2 positive factors?

What is it called when you write a composite number as the product of its prime factors?

Is is prime or composite?

23

39

Write the prime factorization of the number 120

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# 3-1 Prime Factorization

## Lesson Quiz

Tell whether each number is prime or composite.

1. 23 2. ~~93~~ 27

composite

composite

Write the prime factorization of each number.

4. 27 5. ~~36~~

$$2^2 \cdot 3^2$$

6. 287. 1~~32~~ • 7

$$2^2 \cdot 3 \cdot 11$$

8. 529. 1~~08~~ • 13

$$2^2 \cdot 3^3$$

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