

RECAP **13**

Name _____

Date _____

Understanding Multiples of Negative Numbers

In this lesson, we

- analyzed patterns in tables to determine products.
- examined a context to make sense of multiplying a positive number times a negative number.
- used properties of operations to find the products of multiplication expressions with factors having opposite signs.

Terminology

The **zero product property** states that if the product of two numbers is zero, then at least one of the numbers is zero.

This means that when $__ \cdot __ = 0$, at least one of the factors is zero.

Examples

1. Lily is scuba diving. She descends 10 feet from the water's surface and rests. Then she descends another 10 feet and rests. Finally, she descends 10 more feet to reach a reef.
 - a. Write an addition expression to represent this situation.

$$-10 + (-10) + (-10)$$

Since Lily is descending 10 feet each time, the addends are -10 .

- b. Write a multiplication expression to represent this situation.

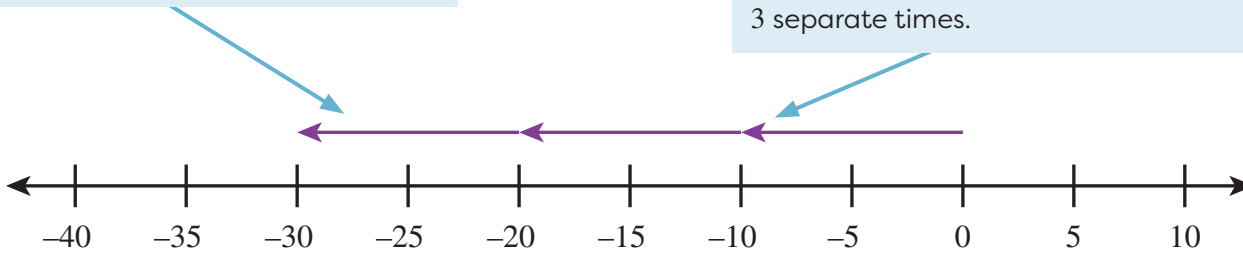
$$3(-10)$$

This multiplication expression describes an addition expression that has 3 groups of -10 .

c. Represent the situation on the number line.

The left end of the last directed line segment represents the reef's depth below sea level.

The directed line segments point to the left because each of them represents -10 . There are 3 of them because Lily descended 3 separate times.



d. What integer represents the location of the reef?

The location of the reef is represented by the integer -30 since it is 30 feet below sea level.

For problems 2–4, write the expression as a repeated addition expression and then evaluate it.

2. $3(6)$

The first factor states how many groups are needed in a repeated addition expression.
The second factor states the value of each addend.

$$3(6) = 6 + 6 + 6 \\ = 18$$

3. $3(-6)$

$$3(-6) = -6 + (-6) + (-6) \\ = -18$$

4. $-3(6)$

$$-3(6) = -(6 + 6 + 6) \\ = -18$$

Having negative groups is impossible, so think of this problem as representing the opposite of three groups of six.