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## Multiplying and Dividing Real Numbers

Unit 1 Lesson 6

# MULTIPLYING AND DIVIDING REAL NUMBERS

**Students will be able to:**

multiply and divide integers and rational numbers.

**Key Vocabulary:**

- Division Rule
- The quotient

# MULTIPLYING AND DIVIDING REAL NUMBERS

## MULTIPLYING REAL NUMBERS

- The product of two real numbers with the same sign is positive.

$$-a \cdot (-b) = ab$$

- The product of two real numbers with different signs is negative.

$$a \cdot (-b) = -ab$$

## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 1:** Find the product.

a.  $-4(6)$

b.  $(-21)(-3)$

c.  $11(-7)$



# MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 1:** Find the product.

a.  $-4(6)$   
 $= -24$

b.  $(-21)(-3)$   
 $= 63$

c.  $11(-7)$   
 $= -77$

## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 2:** Simplify each expression.

a.  $3(-4x) - 15x$

b.  $3s(-8r)$

c.  $(8x)(-9y) - 12xy$

## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 2:** Simplify each expression.

a.  $3(-4x) - 15x$

$$= -12x - 15x$$

$$= -27x$$

b.  $3s(-8r)$

$$= -24sr$$

c.  $(8x)(-9y) - 12xy$

$$= -72xy - 12xy$$

$$= -84xy$$

## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 3:** Evaluate each expression if  $n = \frac{2}{5}$ .

a.  $n^2 \left( -\frac{5}{8} \right)$

b.  $5n$

c.  $15n + 6$



## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 3:** Evaluate each expression if  $n = \frac{2}{5}$ .

$$\begin{aligned}\text{a.} \quad & n^2 \left( -\frac{5}{8} \right) \\ & = \left( \frac{2}{5} \right)^2 \left( -\frac{5}{8} \right) \\ & = \frac{4}{25} \left( -\frac{5}{8} \right) \\ & = -\frac{1}{10}\end{aligned}$$

$$\begin{aligned}\text{b.} \quad & 5n \\ & = 5 \left( \frac{2}{5} \right) \\ & = 2\end{aligned}$$

$$\begin{aligned}\text{c.} \quad & 15n + 6 \\ & = 15 \left( \frac{2}{5} \right) + 6 \\ & = 3(2) + 6 \\ & = 6 + 6 \\ & = 12\end{aligned}$$



## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 4:** An average person need to drink 3 liters of water a day. How many liters of water an average person drinks in a month?

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$$3(30) = 90 \text{ liters}$$



# MULTIPLYING AND DIVIDING REAL NUMBERS

## DIVISION RULE

To divide a number  $a$  by a nonzero number  $b$ , multiply  $a$  by the reciprocal of  $b$ .

$$a \div b = a \cdot \frac{1}{b}$$

The result is the quotient of  $a$  and  $b$ .

## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 5:** Find the quotient.

a.  $-66 \div 11$

b. 
$$\frac{48}{-3}$$

c. 
$$\frac{1}{3/4}$$



# MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 5:** Find the quotient.

a.  $-66 \div 11$

$$= -\frac{66}{11}$$

$$= -6$$

b.  $\frac{48}{-3}$

$$= -16$$

c.  $\frac{1}{3/4}$

$$= 1 \div \frac{3}{4}$$

$$= 1 \cdot \frac{4}{3}$$

$$= \frac{4}{3}$$



# MULTIPLYING AND DIVIDING REAL NUMBERS

## THE SIGN OF A QUOTIENT

- The quotient of two numbers with the same sign is positive.

$$-a \div (-b) = \frac{a}{b}$$

- The quotient of two numbers with opposite signs is negative.

$$a \div (-b) = -\frac{a}{b}$$

## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 6:** Find the quotient.

a. 
$$\frac{24 - 8x}{4}$$

b. 
$$\frac{32x - 8}{4}$$

c. 
$$\frac{45 + 10x}{5}$$





# MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 6:** Simplify each expression.

$$\begin{aligned}\text{a. } \frac{24 - 8x}{4} \\&= \frac{24}{4} - \frac{8x}{4} \\&= 6 - 2x\end{aligned}$$

$$\begin{aligned}\text{b. } \frac{32x - 8}{4} \\&= \frac{32x}{4} - \frac{8}{4} \\&= 8x - 2\end{aligned}$$

$$\begin{aligned}\text{c. } \frac{45 + 10x}{5} \\&= \frac{45}{5} + \frac{10x}{5} \\&= 9 + 2x\end{aligned}$$

## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 7:** Evaluate each expression if  $a = -3$  and  $b = -2$ .

a.  $\frac{2a}{a - b}$

b.  $\frac{4 - b}{a^2}$

c.  $\frac{a}{3 - b}$

## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 7:** Evaluate each expression if  $a = -3$  and  $b = -2$ .

a.  $\frac{2a}{a - b}$

$$= \frac{2(-3)}{-3 - (-2)}$$

$$= \frac{-6}{-3 + 2} = \frac{-6}{-1}$$

$$= 6$$

b.  $\frac{4 - b}{a^2}$

$$= \frac{4 - (-2)}{(-3)^2}$$

$$= \frac{4 + 2}{9} = \frac{6}{9}$$

$$= \frac{2}{3}$$

c.  $\frac{a}{3 - b}$

$$= \frac{-3}{3 - (-2)}$$

$$= \frac{-3}{3 + 2}$$

$$= -\frac{3}{5}$$

## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 8:** Russia has a land area of **17,098,242  $km^2$**   
Russia is approximately seven times bigger than Algeria in terms of land area. What is the land area of Algeria?

## MULTIPLYING AND DIVIDING REAL NUMBERS

**Sample Problem 8:** Russia has a land area of **17, 098, 242  $km^2$**   
Russia is approximately seven times bigger than Algeria in terms of land area. What is the land area of Algeria?

$$\frac{R}{A} = 7$$

$$7 = \frac{17\ 098\ 242}{A}$$

$$A = \frac{17\ 098\ 242}{7}$$

$$A = 2\ 442\ 606\ km^2$$