



## 2.3 - Multiplying and Dividing Rational Numbers

### Vocabulary:

- multiplicative inverse
- reciprocal

reciprocal	$\frac{3}{4} \leftrightarrow \frac{4}{3}$
	switch the numerator & denominator

multiplicative inverse	$\frac{3}{4} \cdot \frac{4}{3} = \frac{12}{12} = 1$
	the product of a # and its multiplicative inverse is 1

OBJECTIVE

1

1

EXAMPLE

Simplify each expression.

$$\begin{array}{l} + \cdot + = + \text{ same} \\ - \cdot - = + \text{ sign} \end{array}$$

$$\begin{array}{l} + \cdot - = - \text{ diff} \\ - \cdot + = - \text{ signs} \end{array}$$

$$\text{a. } -3(-11) = 33$$

$$\text{b. } -6\left(\frac{3}{4}\right)$$

$$-3 \cdot \frac{3}{4} = \frac{-9}{4} = -4\frac{1}{4}$$

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Simplify each expression.

$$\#1. \quad 3(-5) = -15$$

$$\#10. \quad -20(-4) = 80$$

2

EXAMPLE

Evaluate  $5rs$  for  $r = -18$  and  $s = -5$ .

$$\begin{array}{r} 4 \\ 18 \\ \underline{5} \\ 90 \end{array}$$

$$5(-18)(-5)$$

$$(-90)(-5)$$

$$+450$$

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Evaluate each expression for  $m = -4$ ,  $n = 3$ ,  $p = -1$ .#15.  $3m - n$ 

$$3(-4) - 3$$

$$-12 - 3 = \boxed{-15}$$

#23.  $4n^3 \cdot m$ 

$$4 \cdot 3^3 \cdot (-4)$$

$$4 \cdot 27 \cdot -4$$

$$108 \cdot -4$$

$$\boxed{-432}$$

**3 EXAMPLE** Use the expression  $-5.5\left(\frac{a}{1000}\right)$  to calculate the change in temperature for an increase in altitude  $a$  of 7200 ft.

$$-5.5\left(\frac{7200}{1000}\right)$$

$$-5.5 \cdot 7.2$$

$$-39.60 \text{ temperature}$$

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#31. The function  $w = -39 + \frac{3}{2}t$ , where  $t$  is the actual air temperature, gives the approximate wind chill temperature  $w$  when the wind speed is 20mph. Find the approximate wind chill temperature for the given air temperatures with a 20mph.

$$t = 20^{\circ}\text{F}$$

$$w = -39 + \frac{3}{2} \cdot 20$$

$$= -39 + 30$$

$$= -9^{\circ}\text{F}$$



OBJECTIVE

1

4

EXAMPLE

Use the order of operations to simplify each expression.

$$\begin{aligned} \text{a. } -0.2^4 &= \cancel{-} \left( 0.2 \cdot 0.2 \cdot 0.2 \cdot 0.2 \right) \\ &= -1 \cdot 0.0016 = \boxed{-0.0016} \end{aligned}$$

$$\begin{aligned} \Rightarrow \text{b. } (-0.2)^4 &= -0.2 \cdot -0.2 \cdot -0.2 \cdot -0.2 \\ &\quad \quad \quad \vee \quad \quad \quad \vee \\ &\quad \quad \quad +0.04 \quad \cdot \quad +0.04 \end{aligned}$$

$$\boxed{0.0016}$$

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Simplify each expression.

$$\#33. \quad \cancel{-}(-2)^3 - (-8) = \boxed{8}$$

$-2 \cdot -2 \cdot -2$

$$\#35. \quad (-9)^2 = -9 \cdot -9 = \boxed{81}$$

$$\#37. \quad 3(-4)^3$$

$-4 \cdot -4 \cdot -4$

$\downarrow$   
 $16 \cdot -4$

$$\#36. \quad -9^2 = -(9 \cdot 9)$$

$\boxed{-81}$

$$3 \cdot -64$$

$\boxed{-192}$

**5** **EXAMPLE** Simplify each expression.

a.  $70 \div (-5) = -14$

b.  $-54 \div (-9) = 6$

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Simplify each expression.

$$\# 42. \quad \frac{3 - 14}{-2} = \frac{-11}{-2} = 5\frac{1}{2}$$

$$\# 45. \quad -64 \div (-5)$$
$$12.8$$

$$\# 47. \quad -56 \div (4 + 3)$$
$$-56 \div 7$$
$$-8$$

**6 EXAMPLE**

Evaluate  $-\frac{x}{y} - 4z^2$  for  $x = 4$ ,  $y = -2$ , and  $z = -4$ .

$$-\frac{4}{-2} - 4 \cdot (-4)^2$$

$$-\left(\frac{4}{-2}\right) - 4 \cdot 16$$

$$+2 - 64 = \boxed{-62}$$

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Evaluate each expression for  $x = -2$ ,  $y = 3$ ,  $z = 3.5$ .

# 51. ~~\*~~  $(3x + 2y) \div (2x + 3y)$

# 53.  $8 + 6x \div 4y - \frac{3z}{y}$

**7** **EXAMPLE** Evaluate  $\frac{p}{r}$  for  $p = \frac{3}{2}$  and  $r = -\frac{3}{4}$ .

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Evaluate each expression.

$$\# 55. \quad \frac{-3m}{t} \quad m = \frac{5}{6} \quad t = \frac{1}{6}$$

$$\# 57. \quad \frac{3x}{5y} \quad x = \frac{1}{5} \quad y = -\frac{1}{2}$$



## Homework Problems:

pg. 74-75 #58, 65, 71, 75, 87, 105