

## Sec. 1.6 Multiplying and Dividing Real Numbers

For

$\otimes$	Same sign	$\oplus$
$\div$	different sign	$\ominus$

reciprocal :  $a \rightarrow \frac{1}{a}$

$$\frac{3}{5} \rightarrow \frac{5}{3}$$

$$7 \rightarrow \frac{1}{7}$$

$$-\frac{4}{3} \rightarrow -\frac{3}{4}$$

Inverse P  $\otimes$

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

$$\frac{3}{5} \cdot \frac{5}{3} = 1$$

$$7 \cdot \frac{1}{7} = 1$$

$$-\frac{4}{3} \left(-\frac{3}{4}\right) = 1$$

Practice:

1.  $\boxed{3} \boxed{-7} = -4 \quad 3 + (-7)$

2.  $\boxed{9} \boxed{-6} = 3 \quad 9 + (-6)$

3.  $\boxed{-5} \boxed{-1} = -6 \quad -5 - 1 \quad -5 + (-1)$

4.  $-7 - (-8) = -7 + 8 = 1$

5.  $\boxed{5} \boxed{-(-2)} = 5 + 2 = 7$

Vocabulary

- multiplicative inverse: reciprocal  
 For  $a$ ,  $\frac{1}{a}$  is the multiplicative inverse  
 because  $a \cdot \frac{1}{a} = 1$

Inverse Property of Multiplication:  $a \cdot \frac{1}{a} = 1$

- reciprocal of  $\frac{a}{b}$  is  $\frac{b}{a}$ .

$$\text{Thus } \frac{a}{b} \cdot \frac{b}{a} = 1$$

Problem 1: What is each product?

a.  $9(-7) = -63$

b.  $32(0.5) = 16$

c.  $-\frac{1}{2} \times \frac{5}{6} = -\frac{5}{12}$

d.  $(-5)^2 =$

Problem 2: Simplify each expression.

a.  $-\sqrt{49} = -7$        $\sqrt{7^2} = 7$   
 $-1 \cdot \sqrt{49}$

b.  $\pm \sqrt{\frac{4}{9}} = \pm \sqrt{\left(\frac{2}{3}\right)^2} = \pm \frac{2}{3}$

c.  $\pm \sqrt{\frac{9 \cdot 3}{121}} = \pm \sqrt{\left(\frac{3}{11}\right)^2} = \pm \frac{3}{11}$

$$x^2 = \frac{4}{9}$$

$$x^2 = 9$$

$$\sqrt{x^2} = \pm \sqrt{9}$$

$$x = \pm 3$$

Problem 3:

a. The elevation of a hot air balloon changes by  $-3750$  ft in 5 min after opening the parachute. What is the change in the hot air balloon's height each minute?

$$\frac{-3750 \text{ ft}}{5 \text{ min}} = -750 \text{ ft/min}$$

b. FSW students grew  $20\frac{3}{4}$  buckets of potatoes. Students take them home at a rate of  $1\frac{1}{2}$  buckets per day. What is the change in the number of buckets FSW has after 5 days?

$$\boxed{-7\frac{1}{2}}$$

$$1\frac{1}{2} \times 5$$

$$\frac{3}{2} \times \frac{5}{1} = \frac{15}{2} = 7\frac{1}{2}$$

Problem 4 : What is the value of  $\frac{x}{y}$  when  $x = \frac{1}{2}$  and  $y = -\frac{2}{3}$   
 \* division: multiply by the reciprocal

$$a. \frac{x}{y} = \frac{\frac{1}{2} \cdot -\frac{3}{2}}{-\frac{2}{3} \cdot -\frac{3}{2}} = \frac{1}{2} \cdot -\frac{3}{2} = \boxed{-\frac{3}{4}}$$

$$b. \frac{-\frac{3}{5}}{-\frac{2}{7}} = -\frac{3}{5} \cdot -\frac{2}{7} = \boxed{\frac{6}{35}}$$

$$c. \frac{\frac{7}{3}}{-\frac{5}{12}} = \frac{7}{3} \cdot -\frac{12}{5} = -\frac{28}{5} \quad -5\frac{9}{15} = -5\frac{3}{5}$$

$$-\frac{84}{15} \div 3$$

