2-3 **Multiplying Rational Numbers** *(Pages 79–83)*

The product of two numbers having the *same sign* is positive. The product of two numbers having *different signs* is negative. It is also useful to note that multiplying a number or expression by -1 results in the opposite of the number or expression. This is called the **multiplicative property of -1**.

Examples

a. Evaluate $-3x^2$ for $x = -\dfrac{2}{3}$.

$-3x^2 = -3\left(-\dfrac{2}{3}\right)^2$ *Replace x with $-\dfrac{2}{3}$.*

$= -3\left(\dfrac{4}{9}\right)$ $\left(-\dfrac{2}{3}\right)^2 = -\dfrac{2}{3}\cdot\left(-\dfrac{2}{3}\right)$ or $\dfrac{4}{9}$

$= -\dfrac{\overset{1}{3}\left(4\right)}{\underset{3}{1\left(9\right)}}$ *Divide out common factors.*

$= -\dfrac{4}{3}$ or $-1\dfrac{1}{3}$ *Multiply. The signs are different, so the product is negative.*

b. Simplify $(-1)(2x)(-3y) + (4x)(-5y)$

$(-1)(2x)(-3y) + (4x)(-5y)$

$= 2x(-1)(-3y) + (4x)(-5y)$ *Commutative Property*

$= 2x(3y) + (-20xy)$ *Multiply.*

$= 6xy + (-20xy)$ *Multiply.*

$= -14xy$ *Combine like terms.*

Practice

Find each product.

1. $(-2)(3)(-5)$ **2.** $5.26(-0.011)$ **3.** $-10.01(-10.11)$ **4.** $2\left(\dfrac{3}{5}\right)\left(-\dfrac{5}{7}\right)$

5. $\left(-\dfrac{8}{11}\right)\left(\dfrac{9}{10}\right)$ **6.** $\left(-\dfrac{7}{10}\right)\left(-\dfrac{13}{21}\right)$ **7.** $\left(-\dfrac{8}{13}\right)(0)\left(-\dfrac{4}{5}\right)$ **8.** $3\left(\dfrac{4}{9}\right)(-4)\left(\dfrac{6}{7}\right)$

9. $\left(-\dfrac{2}{5}\right)(-4)\left(-\dfrac{3}{8}\right)$ **10.** $5\left(\dfrac{3}{4}\right)(-4)(-2)$ **11.** $8(-0.25)(-3)$ **12.** $\dfrac{2}{7}(-21)(13)\left(\dfrac{1}{14}\right)$

Evaluate each expression if $r = -\dfrac{1}{8}$, $s = \dfrac{4}{5}$, $t = -2\dfrac{9}{10}$, and $w = -1\dfrac{2}{9}$.

13. $4rs$ **14.** $2tw$ **15.** $rt - s$ **16.** $s^2\left(-\dfrac{1}{8}\right)$

Simplify.

17. $2m\left(-\dfrac{1}{3}n\right) + 3m(-2n)$ **18.** $1.2(3x + y) - 0.8(22x - 2y)$

19. Standardized Test Practice   The velocity of an object t seconds after the object is dropped from the top of a tall building is about $-9.8t$ meters per second (m/s). What is its velocity 2.5 seconds after it is dropped?

A -24.5 m/s   **B** -7.3 m/s   **C** 7.3 m/s   **D** 18.4 m/s

Answers: 1. 30 2. -0.05786 3. 101.2011 4. $-\dfrac{6}{7}$ 5. $-\dfrac{36}{55}$ 6. $\dfrac{13}{30}$ 7. 0 8. $-4\dfrac{4}{7}$ 9. $-\dfrac{3}{5}$ 10. 30 11. 6 12. $-5\dfrac{4}{7}$ 13. $-\dfrac{2}{5}$ 14. $7\dfrac{4}{45}$ 15. $-\dfrac{7}{16}$ 16. $-\dfrac{2}{25}$ 17. $-6\dfrac{2}{3}\,mn$ 18. $-14x + 2.8y$ 19. A