

Lesson 1–2

Example 1 Classify Numbers

Name the sets of numbers to which each number belongs.

- a. $-\frac{2}{3}$ rationals (Q) and reals (R)
- b. 97 naturals (N), wholes (W), integers (Z), rationals (Q), and reals (R)
- c. 2π irrationals (I) and reals (R)
- d. $0.5\overline{6}$ rationals (Q) and reals (R)
The bar over the 6 indicates that the six repeats forever.
- e. $\sqrt{361}$ naturals (N), wholes (W), integers (Z), rationals (Q), and reals (R)
 $\sqrt{361} = 19$

Example 2 Identify Properties of Real Numbers

Name the property illustrated by each equation.

a. $6 + (-3 + 7) = [6 + (-3)] + 7$

Associative Property of Addition

The Associative Property says that the way you group three numbers when adding does not change the sum.

b. $xy \cdot 1 = xy$

Identity Property of Multiplication

The Identity Property says that any number multiplied by 1 is itself.

Example 3 Additive and Multiplicative Inverse

Identify the additive inverse and multiplicative inverse for each number.

a. -3.75

Since $-3.75 + 3.75 = 0$, the additive inverse of -3.75 is 3.75 .

The multiplicative inverse of -3.75 is $\frac{1}{-3.75}$ or $-0.2\overline{6}$ or $-\frac{4}{15}$.

CHECK Notice that $-3.75 \times \left(-\frac{4}{15}\right) = 1$. ✓

b. $3\frac{2}{9}$

Since $3\frac{2}{9} + \left(-3\frac{2}{9}\right) = 0$, the additive inverse of $3\frac{2}{9}$ is $-3\frac{2}{9}$.

Since $3\frac{2}{9} = \frac{29}{9}$ and $\left(\frac{29}{9}\right)\left(\frac{9}{29}\right) = 1$, the multiplicative inverse of $3\frac{2}{9}$ is $\frac{9}{29}$.

Example 4 Use the Distributive Property to Solve a Problem

ENTERTAINMENT A drama club presented a play for three consecutive nights. There were three different prices for tickets: \$2.50 for elementary students, \$4.50 for high school students, and \$6.50 for adults. The table shows the number of each type of ticket sold each evening. How much did the drama club collect from ticket sales?

	Thursday	Friday	Saturday
Elementary students	17	32	41
High school students	50	96	124
Adults	83	136	186

There are two ways to find the total amount of money collected from ticket sales.

Method 1

Find the total amount collected for each night by multiplying the ticket sales in each category for that night by the ticket price. Then add the sales for the three nights.

$$\begin{aligned}
 T &= [17(2.50) + 50(4.50) + 83(6.50)] + [32(2.50) + 96(4.50) + 136(6.50)] + [41(2.50) + 124(4.50) + 186(6.50)] \\
 &= (807) + (1396) + (1869.50) \\
 &= 4072.50
 \end{aligned}$$

Method 2

Add to find the total number of each type of ticket sold for the three nights. Multiply by the ticket price for each type of ticket. Then add the results.

$$\begin{aligned}
 T &= 2.50[17 + 32 + 41] + 4.50[50 + 96 + 124] + 6.50[83 + 136 + 186] \\
 &= 2.50(90) + 4.50(270) + 6.50(405) \\
 &= 225 + 1215 + 2632.50 \\
 &= 4072.50
 \end{aligned}$$

The drama club collected \$4072.50 from the ticket sales for all three nights.

Notice that both methods result in the same answer. The two methods illustrate the Distributive Property.

Example 5 Simplify an Expression

Simplify $3(a - 7b) - 6(2b - 8a)$

$$\begin{aligned}
 &3(a - 7b) - 6(2b - 8a) && \text{Distributive Property} \\
 &= 3(a) + 3(-7b) - 6(2b) - 6(-8a) && \text{Multiply.} \\
 &= 3a + (-21b) - 12b + 48a && \text{Commutative Property (+)} \\
 &= 3a + 48a - 21b - 12b && \text{Distributive Property} \\
 &= (3 + 48)a + (-21 - 12)b && \text{Simplify.} \\
 &= 51a - 33b
 \end{aligned}$$