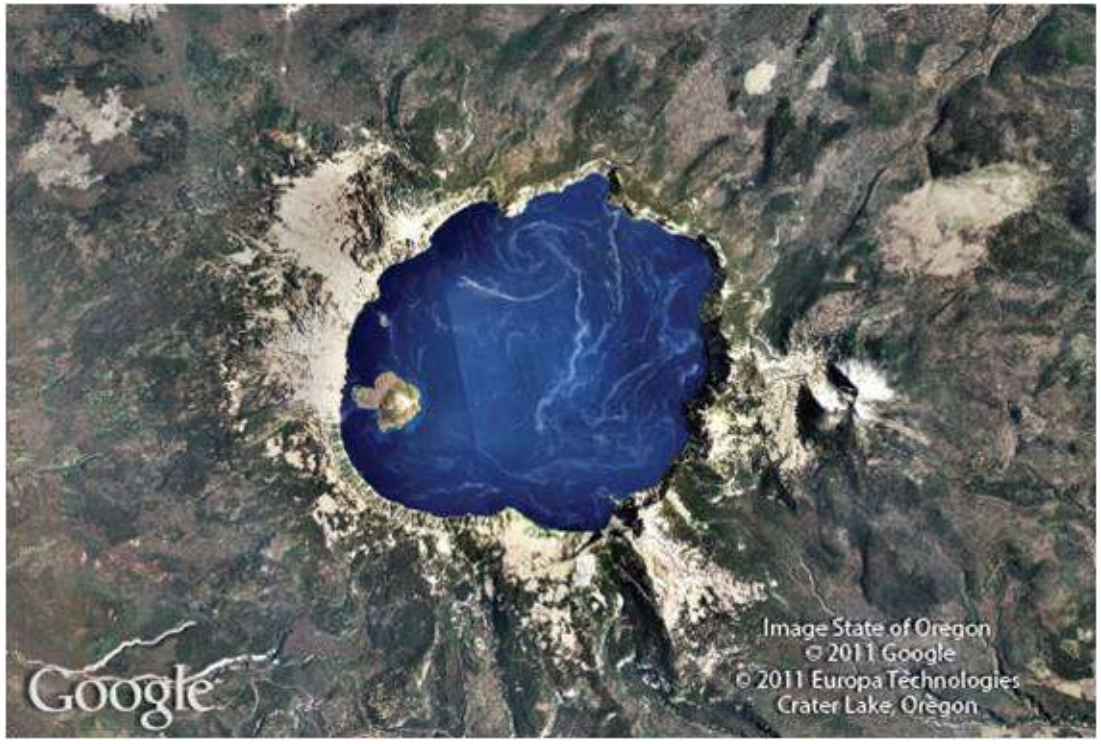
Fractions and Mixed Numbers

3



SECTION 3.8

Addition and Subtraction with Mixed Numbers

Objectives

A Perform addition and subtraction with mixed numbers.

B Perform subtraction involving borrowing with mixed numbers.

A Combining Mixed Numbers

Example 1

Add: $3\frac{2}{3} + 4\frac{1}{5}$.

Solution:

Method 1: We begin by writing each mixed number showing the + sign.

We then apply the commutative and associative properties to rearrange the order and grouping.

$$3\frac{2}{3} + 4\frac{1}{5} = 3 + \frac{2}{3} + 4 + \frac{1}{5}$$

Expand each number to show the + sign.

$$= 3 + 4 + \frac{2}{3} + \frac{1}{5}$$

Commutative property

Example 1 – *Solution*

cont'd

$$= (3 + 4) + \left(\frac{2}{3} + \frac{1}{5}\right)$$

Associative property

$$= 7 + \left(\frac{\mathbf{5} \cdot 2}{\mathbf{5} \cdot 3} + \frac{\mathbf{3} \cdot 1}{\mathbf{3} \cdot 5}\right)$$

Add $3 + 4 = 7$; then multiply to get the LCD.

$$= 7 + \left(\frac{10}{15} + \frac{3}{15}\right)$$

Write each fraction with the LCD.

$$= 7 + \frac{13}{15}$$

Add the numerators.

$$= 7\frac{13}{15}$$

Write the answer in mixed-number notation.

Example 1 – *Solution*

cont'd

Method 2: As you can see, we obtain our result by adding the whole-number parts (3 + 4 = 7) and the fraction parts $\left(\frac{2}{3} + \frac{1}{5} = \frac{13}{15}\right)$ of each mixed number.

Knowing this, we can save ourselves some writing by doing the same problem in columns.

$$3\frac{2}{3} = 3\frac{2 \cdot \mathbf{5}}{3 \cdot \mathbf{5}} = 3\frac{10}{15}$$

Add whole numbers.

$$+\ 4\frac{1}{5} = 4\frac{1 \cdot \mathbf{3}}{5 \cdot \mathbf{3}} = 4\frac{3}{15}$$

Then add fractions.

$$7\frac{13}{15}$$

Write each fraction with LCD 15.

B Borrowing with Mixed Numbers

Example 6

Subtract: $10 - 5\frac{2}{7}$

Solution:

In order to have a fraction from which to subtract $\frac{2}{7}$, we borrow 1 from 10 and rewrite the 1 we borrow as $\frac{7}{7}$.

The process looks like this:

$$\begin{array}{rl} 10 = & \mathbf{9\frac{7}{7}} \\ -\ 5\frac{2}{7} = & -\ 5\frac{2}{7} \\ \hline & 4\frac{5}{7} \end{array}$$

We rewrite 10 as $9 + 1$, which is $9 + \frac{7}{7} = 9\frac{7}{7}$.

Then we can subtract as usual.