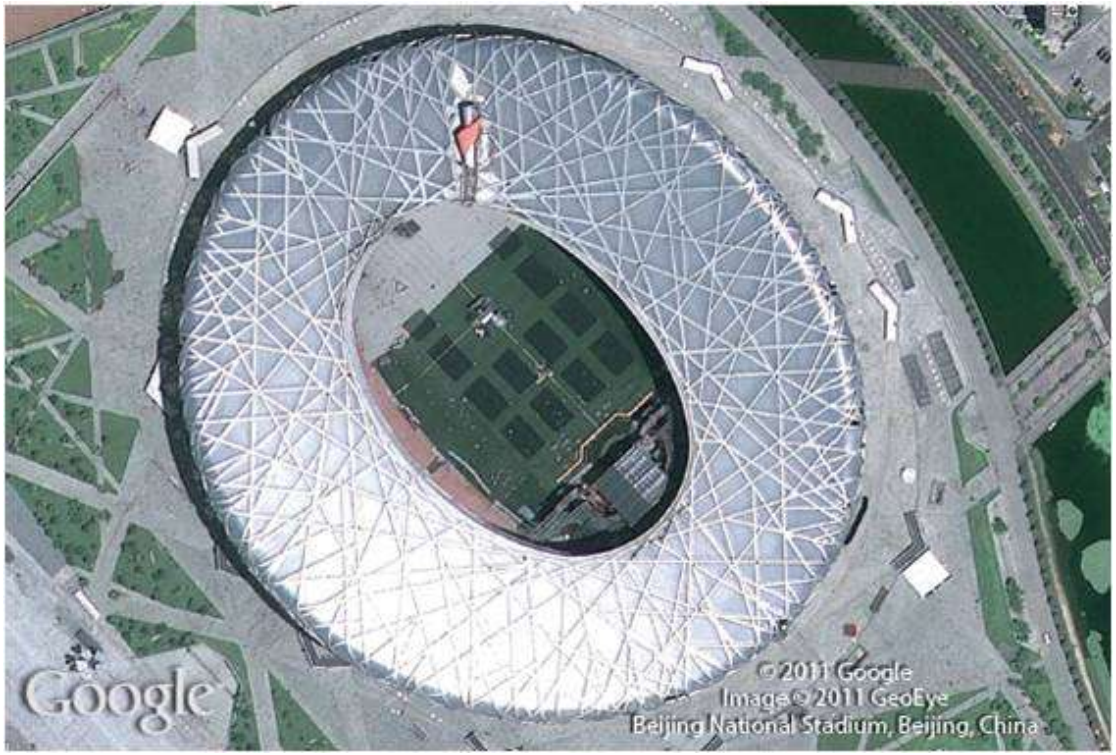
Decimals

5



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SECTION 5.2

Addition and Subtraction with Decimals

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Objectives

A Add and subtract decimals.

B Solve applications involving addition and subtraction of decimals.

Addition and Subtraction with Decimals

The chart shows the top finishing times (in seconds) for the men's 500-meter speed skating race during the 2010 Vancouver Olympics.

VANCOUVER OLYMPICS		
Skater	**Country**	**Time (seconds)**
Charles Hamelin	Canada	40.770
Si-Bak Sung	Korea	40.821
Francois-Louis Tremblay	Canada	41.326
Yoo-Gy Kwak	Korea	41.620

Source: ESPN

In order to analyze the different finishing times, it is important that you are able to add and subtract decimals, and that is what we will cover in this section.

A Combining Decimals

Combining Decimals

Suppose you are earning $8.50 an hour and you receive a raise of $1.25 an hour.

To add the two rates of pay, we align the decimal points, and then add the columns.

$$\begin{array}{r} \$8.50 \\ +\ \$1.25 \\ \hline \$9.75 \end{array}$$

Your new hourly rate of pay is $9.75.

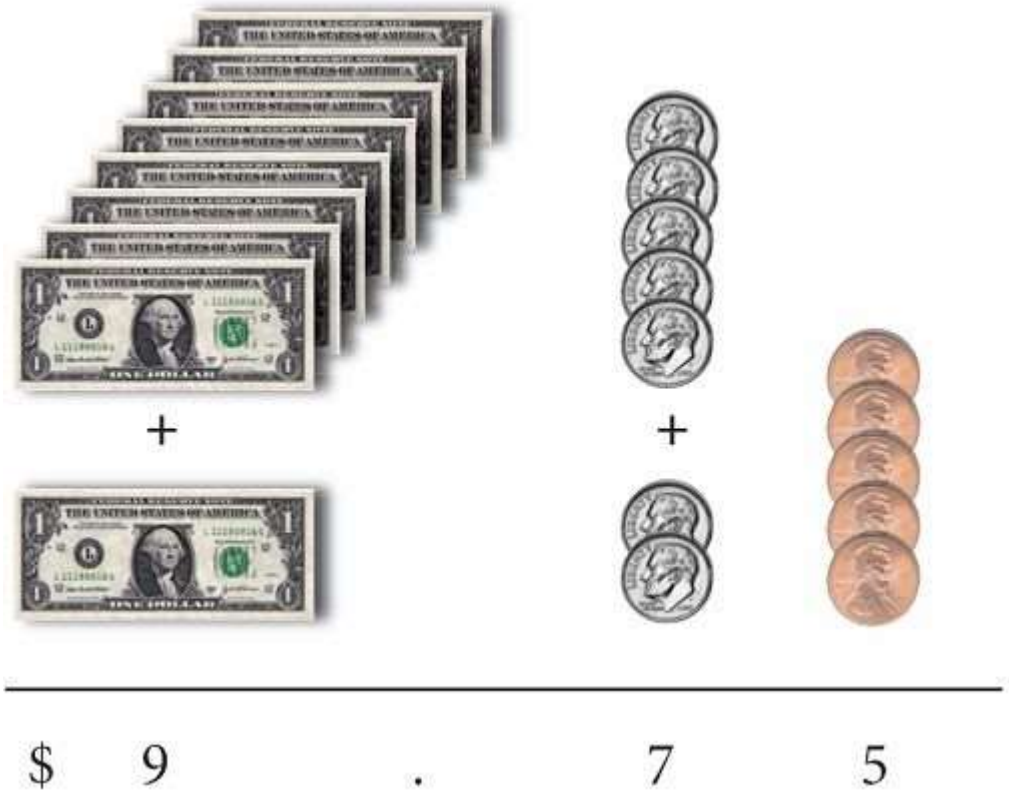
Combining Decimals

To see why this is true in general, we can use mixed-number notation:

$$\begin{aligned} 8.50 &= 8\frac{50}{100} \\ +\ 1.25 &= 1\frac{25}{100} \\ \hline 9.75 &= 9\frac{75}{100} \end{aligned}$$

Combining Decimals

We can visualize the mathematics above by thinking in terms of money:



Example 1

Add by first changing to fractions: 25.43 + 2.897 + 379.6

Solution:

We first change each decimal to a mixed number. We then write each fraction using the least common denominator and add as usual:

$$\begin{aligned} 25.43 &= 25\frac{43}{100} = 25\frac{430}{1{,}000} \\ 2.897 &= 2\frac{897}{1{,}000} = 2\frac{897}{1{,}000} \\ +\ 379.6 &= 379\frac{6}{10} = 379\frac{600}{1{,}000} \\ \hline & \qquad\qquad 406\frac{1{,}927}{1{,}000} = 407\frac{927}{1{,}000} = 407.927 \end{aligned}$$

Example 1 – *Solution*

cont'd

Again, the result is the same if we just line up the decimal points and add as if we were adding whole numbers:

$$\begin{array}{r} 25.430 \\ 2.897 \\ +\ 379.600 \\ \hline 407.927 \end{array}$$

Notice that we can fill in zeros on the right to help keep the numbers in the correct columns. Doing this does not change the value of any of the numbers.

Notice that the decimal point in the answer is directly below the decimal points in the problem.

Combining Decimals

The same thing would happen if we were to subtract two decimal numbers.

We can use these facts to write a rule for addition and subtraction of decimal numbers.

Rule **Addition (or Subtraction) of Decimal Numbers**

To add (or subtract) decimal numbers, we line up the decimal points and add (or subtract) as usual. The decimal point in the result is written directly below the decimal points in the problem.

B Applications

Example 8

While I was writing this section of the book, I stopped to have lunch with a friend at a coffee shop near my office. The bill for lunch was $15.64.

I gave the person at the cash register a $20 bill. For change, I received four $1 bills, a quarter, a nickel, and a penny. Was my change correct?

Example 8 – *Solution*

To find the total amount of money I received in change, we add:

Four $1 bills	=	$4.00
One quarter	=	0.25
One nickel	=	0.05
One penny	=	0.01
Total	=	$4.31

Example 8 – *Solution*

cont'd

To find out if this is the correct amount, we subtract the amount of the bill from $20.00.

$$\begin{array}{r} \$20.00 \\ -\ 15.64 \\ \hline \$\ \ 4.36 \end{array}$$

The change was not correct. It is off by 5 cents.

Instead of the nickel, I should have been given a dime.