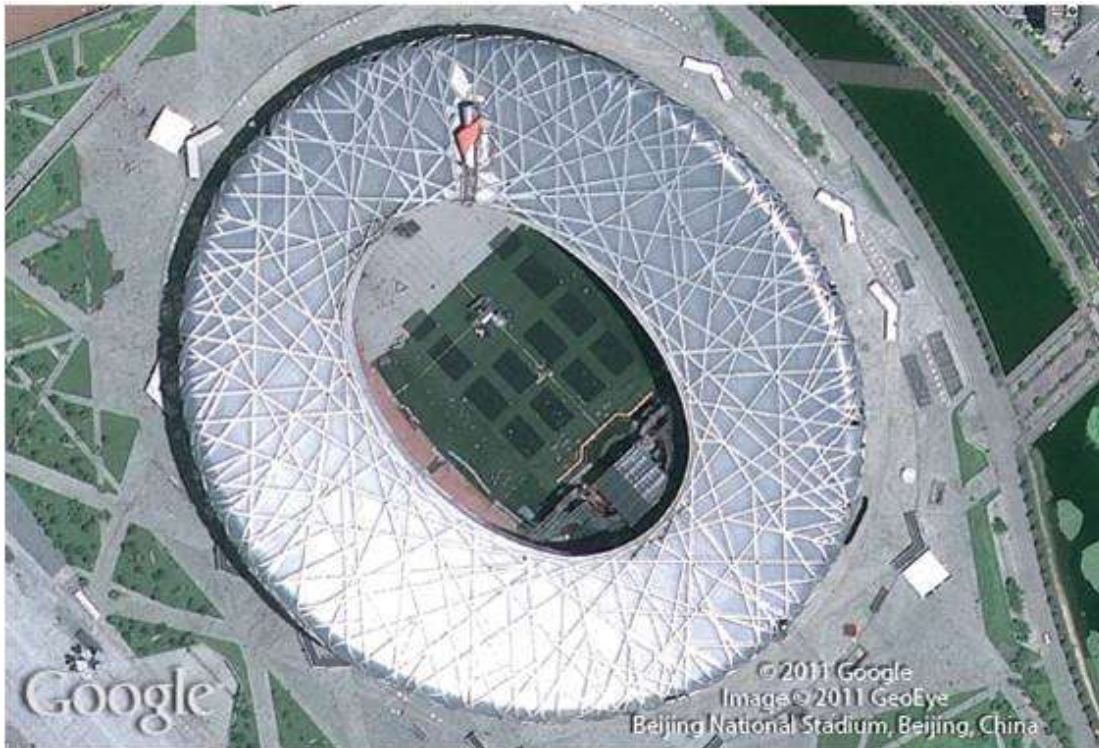


Decimals

5



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SECTION 5.4

Division with Decimals

Objectives

- A** Divide decimal numbers.
- B** Solve application problems involving decimals.

Division with Decimals

The chart shows the top finishing times for the men's 200-meter freestyle swim during the 2008 Olympics.

An Olympic pool is 50 meters long, so each swimmer will have to complete 4 lengths during a 200-meter race.

BEIJING OLYMPICS		
Swimmer	Country	Time (seconds)
Michael Phelps	USA	1:42.96
Taehwan Park	Korea	1:44.85
Peter Vanderkaay	USA	1:45.14
Jean Basson	Russia	1:45.97
Source: ESPN		

Division with Decimals

During the race, each swimmer keeps track of how long it takes him to complete each length.

To find the time of a swimmer's average lap, we need to be able to divide with decimal numbers, which we will learn in this section.



A Dividing with Decimals

Example 1

Divide: $5,974 \div 20$.

Solution:

$$\begin{array}{r} 298 \\ 20 \overline{)5974} \\ \underline{40} \downarrow \\ 197 \downarrow \\ \underline{180} \downarrow \\ 174 \\ \underline{160} \\ 14 \end{array}$$

Example 1 – *Solution*

cont'd

In the past we have written this answer as $298\frac{14}{20}$ or, after reducing the fraction, $298\frac{7}{10}$.

Because $\frac{7}{10}$ can be written as 0.7, we could also write our answer as 298.7.

This last form of our answer is exactly the same result we obtain if we write 5,974 as 5,974.0 and continue the division until we have no remainder.

Example 1 – *Solution*

cont'd

Here is how it looks:

$$\begin{array}{r} 298.7 \\ 20 \overline{) 5974.0} \\ \underline{40} \\ 197 \\ \underline{180} \\ 174 \\ \underline{160} \\ 140 \\ \underline{140} \\ 0 \end{array}$$

Notice that we place the decimal point in the answer directly above the decimal point in the problem.

Dividing with Decimals

We can use these facts to write a rule for dividing decimal numbers.

Rule Division of Decimal Numbers

To divide a decimal by a whole number, we do the usual long division as if there were no decimal point involved. The decimal point in the answer is placed directly above the decimal point in the problem.

Example 3

Divide: $49.896 \div 27$.

Solution:

$$\begin{array}{r} 1.848 \\ 27 \overline{)49.896} \\ \underline{27} \\ 22 \\ \underline{21} \\ 1 \\ \underline{1} \\ 0 \\ \underline{0} \\ 216 \\ \underline{216} \\ 0 \end{array}$$

Check:

$$\begin{array}{r} 1.848 \\ \times \quad 27 \\ \hline 12 \ 936 \\ 36 \ 96 \\ \hline 49.896 \end{array}$$

Dividing with Decimals

We can write as many zeros as we choose after the rightmost digit in a decimal number without changing the value of the number.

For example,

$$6.91 = 6.910 = 6.9100 = 6.91000$$

Until now we have considered only division by whole numbers.

Extending division to include division of a decimal number by another decimal number is a matter of knowing what to do about the decimal point in the divisor.

Example 5

Divide: $31.35 \div 3.8$.

Solution:

In fraction form, this problem is equivalent to

$$\frac{31.35}{3.8}$$

If we want to write the divisor as a whole number, we can multiply the numerator and the denominator of this fraction by 10:

$$\frac{31.35 \times \mathbf{10}}{3.8 \times \mathbf{10}} = \frac{313.5}{38}$$

Example 5 – *Solution*

cont'd

So, since this fraction is equivalent to the original fraction, our original division problem is equivalent to

$$\begin{array}{r} 8.25 \\ 38 \overline{) 313.50} \\ \underline{304} \\ 95 \\ \underline{76} \\ 190 \\ \underline{190} \\ 0 \end{array}$$

Put 0 after the last digit.

Dividing with Decimals

We can summarize division with decimal numbers by listing the following points.

Summary of Division with Decimals

1. We divide decimal numbers by the same process used in Chapter 1 to divide whole numbers. The decimal point in the answer is placed directly above the decimal point in the dividend.
2. We are free to write as many zeros after the last digit in a decimal number as we need.
3. If the divisor is a decimal, we can change it to a whole number by moving the decimal point to the right as many places as necessary so long as we move the decimal point in the dividend the same number of places.



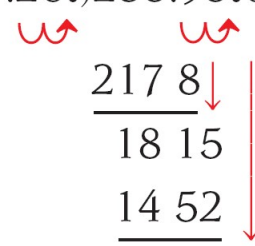
B Applications

Example 8

If a man earning \$7.26 an hour receives a paycheck for \$235.95, how many hours did he work?

Solution:

To find the number of hours the man worked, we divide \$235.95 by \$7.26.

$$\begin{array}{r} 32.5 \\ 7.26 \overline{)235.95.0} \\ \underline{2178} \\ 1815 \\ \underline{1452} \\ 3630 \\ \underline{3630} \\ 0 \end{array}$$


The man worked 32.5 hours.