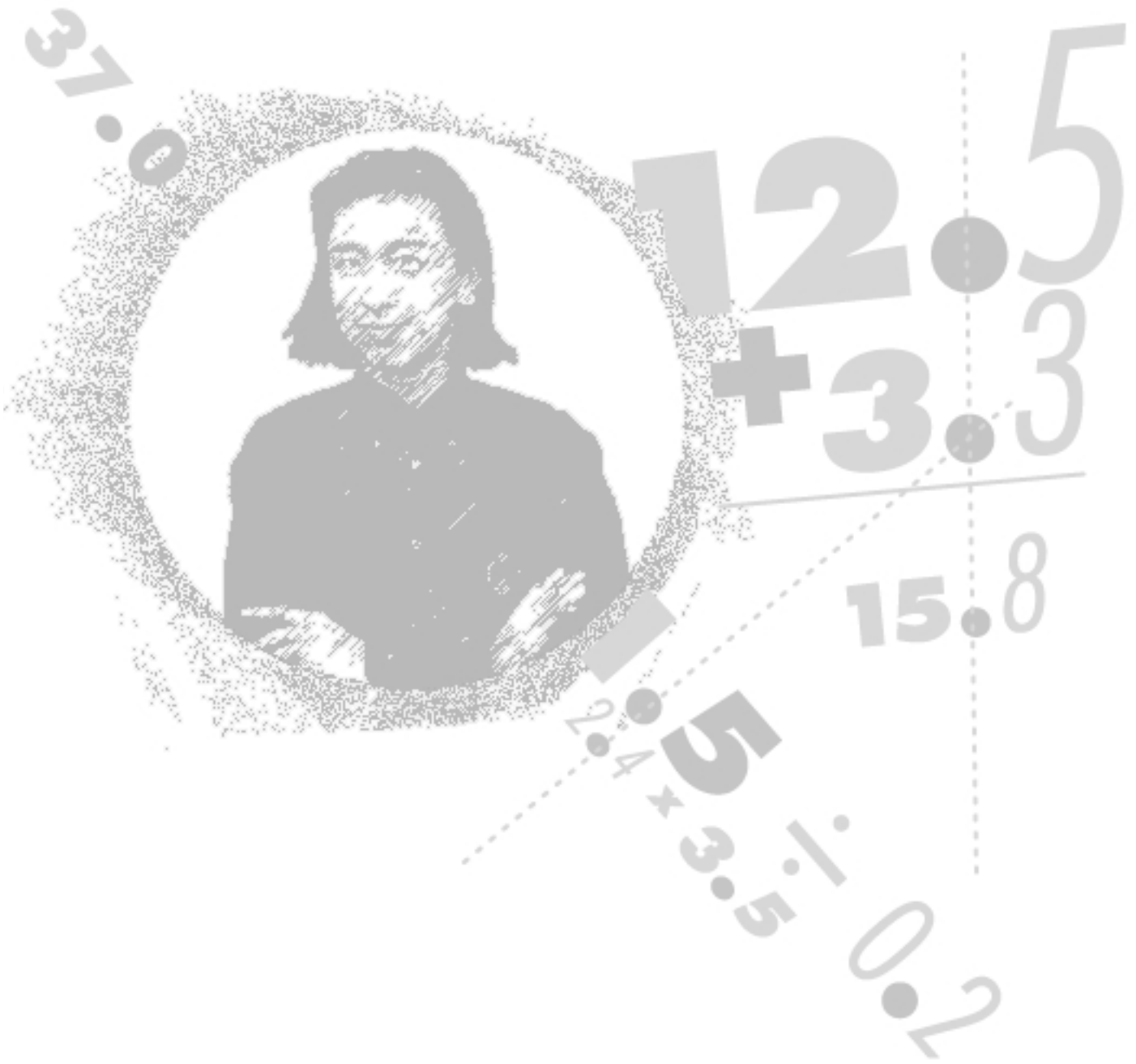


# LESSON F2.4 - DECIMALS II

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# Overview

You have already studied decimal notation as well as how to convert a decimal number to a fraction and a fraction to a decimal number.

In this lesson, you will learn how to add, subtract, multiply, and divide decimal numbers. You will also learn how to solve some equations that contain decimal numbers.

Before you begin, you may find it helpful to review the following mathematical ideas that will be used in this lesson. To help you review, you may want to work out each example.

To see these Review problems worked out, go to the Overview module of this lesson on the computer.

**Review 1**

Adding whole numbers

$$3675 + 193 + 2781 = ?$$

*Answer: 6649*

**Review 2**

Subtracting whole numbers

$$520 - 173 = ?$$

*Answer: 347*

**Review 3**

Multiplying whole numbers

$$381 \times 67 = ?$$

*Answer: 25,527*

**Review 4**

Dividing whole numbers

$$4158 \div 62 = ?$$

*Answer: 67 remainder 4*

**Review 5**

Multiplying or dividing a whole number by a power of 10

a.  $87 \times 100 = ?$

*Answer: 8700*

b.  $2300 \div 100 = ?$

*Answer: 23*

**Review 6**

Determining the value of a digit in a decimal number

What is the value of the 5 in the decimal number 3.524?

*Answer: 0.5 or  $\frac{5}{10}$*



# Explain

In Concept 1: Adding and Subtracting, you will find a section on each of the following:

- Adding Decimal Numbers
- Subtracting Decimal Numbers
- Adding and Subtracting Decimal Terms that Contain a Letter such as “x” or “y”
- Solving Some Equations that Contain Decimal Numbers.

## CONCEPT 1: ADDING AND SUBTRACTING

### Adding Decimal Numbers

To add decimal numbers:

- Line up the decimal points.
- Add the digits in each column, as you would add whole numbers.

When the total in a column is ten or more, carry 1 to the next column to the left.

To add decimal numbers that have a different number of decimal places, attach trailing zeros until the numbers have the same number of decimal places.

You may find these Examples useful while doing the homework for this section.

#### Example 1

1. Add these decimal numbers: 7.134 and 8.215

To add these decimal numbers:

- Line up the decimal points.
 

7.134
+ 8.215
15.349
- Add the digits in each column.

So,  $7.134 + 8.215 = 15.349$ .

#### Example 2

2. Will spent \$13.58 on a book and \$4.65 on a snack. Estimate whether the total amount he spent is closer to \$17 or to \$18.

Here's one way to estimate the total amount Will spent:

- Add the whole dollars.  $\$13 + \$4 = \$17$
- Consider the parts of a dollar.  $\$0.58$  and  $\$0.65$

Each part is more than \$0.50, so when you add them you get more than \$1. So Will's total is at least \$1 more.  $\$17 + \$1 = \$18$

So, the total amount that Will spent is closer to \$18.

#### Example 3

3. Will spent \$13.58 on a book and \$4.65 on a snack. How much did he spend on both?

To find out, find  $\$13.58 + \$4.65$ :

- Line up the decimal points.
 

13.58
+ \$ 4.65
\$18.23
- Add the digits in each column.

Since the total in the pennies column is ten or more, carry a 1 from the pennies column to the dimes column.

Since the total in the dimes column is ten or more, carry a 1 from the dimes column to the dollars column.

So, the total that Will spent was \$18.23.

4. Add these decimal numbers: 6.13, 4.2, and 0.5819.

**Example 4**

- Notice that each decimal number has a different number of decimal places. So attach trailing zeros until each number has the same number of decimal places.

$$6.1300 + 4.2000 + 0.5819$$

- Line up the decimal points.

$$\begin{array}{r} 1 \\ 6.1300 \\ 4.2000 \end{array}$$

- Add the digits in each column. Carry a 1 from the hundredths column to the tenths column.

$$\begin{array}{r} + 0.5819 \\ \hline 10.9119 \end{array}$$

So,  $6.13 + 4.2 + 0.5819 = 10.9119$ .

## Subtracting Decimal Numbers

To subtract decimal numbers:

- Line up the decimal points.
- Subtract the digits in each column, as you would subtract whole numbers.

To subtract decimal numbers that have a different number of decimal places, attach trailing zeros until the numbers have the same number of decimal places.

5. Do this subtraction:  $8.573 - 4.361$

**Example 5**

To subtract these decimal numbers:

- Line up the decimal points.

$$\begin{array}{r} 8.573 \\ - 4.361 \\ \hline \end{array}$$

- Subtract the digits in each column.

$$4.212$$

So,  $8.573 - 4.361 = 4.212$ .

You may find these Examples useful while doing the homework for this section.

6. Will spent \$9.39 on dinner and \$4.65 on lunch. Estimate how much more Will's dinner cost than his lunch.

**Example 6**

Here's one way to estimate how much more his dinner cost than his lunch:

- Round each amount to the nearest dollar.  $\$9$       $\$5$
- Subtract these whole dollars.  $\$9 - \$5 = \$4$

So, Will's dinner cost about \$4 more than his lunch.

**Example 7**

7. Will spent \$9.39 on dinner and \$4.65 on lunch. Calculate how much more his dinner cost than his lunch.

To find out how much more Will's dinner cost, find  $\$9.39 - \$4.65$ :

- Line up the decimal points.

$$\begin{array}{r} \phantom{0}8\phantom{0}13 \\ \$9.\phantom{0}39 \\ - \$4.65 \\ \hline \phantom{0}4.74 \end{array}$$

- Subtract the digits in each column.

Since 6 is greater than 3 in the dimes column, look at the dollars column. Change 9 dollars into 8 dollars and 10 dimes. Now you have 10 dimes and 3 dimes, or 13 dimes.

So, Will spent \$4.74 more on dinner.

**Example 8**

8. Do this subtraction:  $143 - 5.137$

- Notice that each decimal number has a different number of decimal places, so attach trailing zeros until each number has the same number of decimal places.

$$143.000 - 5.137$$

- Line up the decimal points.

$$\begin{array}{r} \phantom{0}12\phantom{0}9\phantom{0} \\ \phantom{0}3\phantom{0}2\phantom{0}10\phantom{0}10 \\ 143.\phantom{0}0\phantom{0}0 \\ - \phantom{0}5.1\phantom{0}3\phantom{0}7 \\ \hline \phantom{0}137.8\phantom{0}6\phantom{0}3 \end{array}$$

- Subtract the digits in each column.

Since 7 is greater than 0 in the thousandths column, look at the hundredths column.

Since you have 0 in the hundredths column, look at the tenths column.

Since you have 0 in the tenths column, look at the ones column.

Change 3 ones into 2 ones and 10 tenths.

Change 10 tenths into 9 tenths and 10 hundredths.

Change 10 hundredths into 9 hundredths and 10 thousandths.

Since 5 is greater than 2 in the ones column, look at the tens column.

Change 4 tens into 3 tens and 10 ones.

Now you have 10 ones and 2 ones, or 12 ones.

So,  $143 - 5.137 = 137.863$ .

## Adding and Subtracting Decimal Terms that Contain a Letter such as “x” or “y”

To add and subtract decimal terms that contain a letter such as  $x$  or  $y$ :

- Write all the  $x$ -terms together.
- Combine the  $x$ -terms by adding or subtracting.
- Write all the  $y$ -terms together.
- Combine the  $y$ -terms by adding or subtracting.
- Combine the decimal numbers by adding or subtracting.

9. Combine the terms:  $4.53x + 3.29x$

**Example 9**

You may find these Examples useful while doing the homework for this section.

To find  $4.53x + 3.29x$ :

- They are both  $x$  terms, so add.

$$\begin{array}{r} 4.53x \\ + 3.29x \\ \hline 7.82x \end{array}$$

So,  $4.53x + 3.29x = 7.82x$ .

10. Combine the terms:  $12.38x + 5.21y + 7.3x + 4.001y$

**Example 10**

To find  $12.38x + 5.21y + 7.3x + 4.001y$ :

- Write all the  $x$ -terms together.

$$12.38x + 7.3x + 5.21y + 4.001y$$

- Add the  $x$ -terms.  
Attach a trailing zero.

$$\begin{array}{r} 12.38x \\ + 7.30x \\ \hline 19.68x \end{array}$$

- Write all the  $y$ -terms together.  
They are written together above.

- Add the  $y$ -terms.  
Attach a trailing zero.

$$\begin{array}{r} 5.210y \\ + 4.001y \\ \hline 9.211y \end{array}$$

So,  $12.38x + 5.21y + 7.3x + 4.001y = 19.68x + 9.211y$ .

11. Combine the terms:  $x - 8.39y + 7.15x - 4.35y$

**Example 11**

To find  $x - 8.39y + 7.15x - 4.35y$ :

- Write all the  $x$ -terms together.

$$x + 7.15x + 8.39y - 4.35y$$

- Add the  $x$ -terms.  
Write  $x$  as  $1x$ , then attach trailing zeros.

$$\begin{array}{r} 1.00x \\ + 7.15x \\ \hline 8.15x \end{array}$$

- Write all the  $y$ -terms together.  
They are written together above.

- Subtract the  $y$ -terms.

$$\begin{array}{r} 8.39y \\ - 4.35y \\ \hline 4.04y \end{array}$$

So,  $x - 4.35y + 7.15x + 8.39y = 8.15x + 4.04y$ .

**Example 12**12. Combine the terms:  $7.14x + 4.19y + 18.29 - 3.083x + 2.768y + 8.1$ *To find  $7.14x + 4.19y + 18.29 - 3.083x + 2.768y + 8.1$ :*

- Write all the  $x$ -terms together.  $7.14x - 3.083x + 4.19y + 18.29 + 2.768y + 8.1$

- Subtract the  $x$ -terms.  
Attach a trailing zero.
 
$$\begin{array}{r} 7.140x \\ - 3.083x \\ \hline 4.057x \end{array}$$

- Write all the  $y$ -terms together.  $4.057x + 4.19y + 2.768y + 18.29 + 8.1$

- Add the  $y$ -terms.  
Attach a trailing zero.
 
$$\begin{array}{r} 4.190y \\ + 2.768y \\ \hline 6.958y \end{array}$$

- Combine the number terms  
by adding the digits.  
Attach a trailing zero.
 
$$\begin{array}{r} 18.29 \\ + 8.10 \\ \hline 26.39 \end{array}$$

So,  $7.14x + 4.19y + 18.29 - 3.083x + 2.768y + 8.1 = 4.057x + 6.958y + 26.39$ .

**Solving Some Equations that Contain Decimal Numbers**

To solve some equations that contain decimal numbers for an unknown:

- Get the unknown, say  $x$ , by itself on one side of the equation.
  - Add or subtract the same number on both sides.
- Simplify by adding or subtracting decimal numbers.

You may find these Examples useful while doing the homework for this section.

**Example 13**13. Find the value of  $x$  in this equation:  $x + 0.4 = 0.7$ *To solve this equation for the unknown,  $x$ :*

- Get  $x$  by itself on one side of the equation:

- On the left side of the equation,  $0.4$  is added to  $x$ .  $x + 0.4 = 0.7$

So, to get  $x$  by itself, we take away  $0.4$ .  $x + 0.4 - 0.4 = 0.7 - 0.4$

To keep the left side and the right side equal, we also take away  $0.4$  from the right side.  $x + 0 = 0.7 - 0.4$   
 $x = 0.3$

- Check the answer.

- Replace  $x$  in the original equation with the value  $0.3$ .  $x + 0.4 = 0.7$   
Is  $0.3 + 0.4 = 0.7$ ?  
Is  $0.7 = 0.7$ ? Yes.

So, the value of  $x$  in the equation is  $0.3$ .



14. Find the value of  $x$  in this equation:  $x - 0.379 = 4.25$

**Example 14**

To solve this equation for the unknown,  $x$ :

• Get  $x$  by itself on one side of the equation:

— On the left side  $0.379$  is taken away from  $x$ .

$$x - 0.379 = 4.25$$

So, to get  $x$  by itself, we add  $0.379$ .

$$x - 0.379 + 0.379 = 4.25 + 0.379$$

To keep the left side and the right side

$$x + 0 = 4.25 + 0.379$$

equal, we also add  $0.379$  to the right side.

$$x = 4.629$$

So, the value of  $x$  in the equation is  $4.629$ .

You can check your answer by replacing  $x$  with  $4.629$  in the original equation.

$$x - 0.379 = 4.25$$

Is  $4.629 - 0.379 = 4.25$  ?

Is  $4.25 = 4.25$  ? Yes.

15. On a trip to the amusement park, Will's entrance ticket cost \$17.53. When he left the park he had spent a total of \$38.49. To find how much he spent on items other than his entrance ticket, solve this equation for  $x$ :

**Example 15**

$$x + \$17.53 = \$38.49$$

To solve this equation for the unknown,  $x$ :

• Get  $x$  by itself on one side of the equation:

— On the left side, \$17.53 is added to  $x$ .

$$x + \$17.53 = \$38.49$$

So, to get  $x$  by itself, we take

away \$17.53.

$$x + \$17.53 - \$17.53 = \$38.49 - \$17.53$$

To keep the left side and the right side

$$x + 0 = \$38.49 - \$17.53$$

equal, we also take away \$17.53 from the right side.

$$x = \$20.96$$

So, Will spent \$20.96 on items other than his entrance ticket.

You can check your answer by replacing  $x$  with \$20.96 in the original equation.

$$x + \$17.53 = \$38.49$$

Is  $\$20.96 + \$17.53 = \$38.49$  ?

Is  $\$38.49 = \$38.49$  ? Yes.

16. Find the value of  $x$  in this equation:  $x - 0.381 = 24 + 13.27$

**Example 16**

To solve this equation for the unknown,  $x$ :

• Get  $x$  by itself on one side of the equation:

— Add the numbers on the right side of the equation.

$$x - 0.381 = 24 + 13.27$$

On the left side,  $0.381$  is taken away from  $x$ .

$$x - 0.381 = 37.27$$

So, to get  $x$  by itself, we add  $0.381$ .

$$x - 0.381 + 0.381 = 37.27 + 0.381$$

To keep the left side and the right side

equal, we also add  $0.381$  to the right side.

$$x + 0 = 37.27 + 0.381$$

$$x = 37.651$$

So, the value of  $x$  in the equation is  $37.651$ .

You can check your answer by replacing  $x$  with  $37.651$  in the original equation.

$$x - 0.381 = 24 + 13.27$$

Is  $37.651 - 0.381 = 24 + 13.27$  ?

Is  $37.27 = 37.27$  ? Yes.



# Explain

In Concept 2: Multiplying and Dividing, you will find a section on each of the following:

- **Multiplying Decimal Numbers**
- **Dividing Decimal Numbers**
- **Solving Some Equations that Contain Decimal Numbers**
- **Using the Properties of Real Numbers and the Order of Operations to Add, Subtract, Multiply, and Divide Decimal Numbers**

## CONCEPT 2: MULTIPLYING AND DIVIDING

### Multiplying Decimal Numbers

To multiply decimal numbers:

- Multiply as if the numbers are whole numbers.
- Count the total number of decimal places in the numbers being multiplied.
- Place the decimal point in the answer so that the answer has that total number of decimal places.

To multiply a decimal number by a power of ten:

- Count the number of zeros in the power of ten.
- To multiply, move the decimal point that number of places to the right.

You may find these Examples useful while doing the homework for this section.

#### Example 17

17. Multiply these decimal numbers: 7.2 and 0.9

To multiply these decimal numbers:

- Multiply as if the numbers are whole numbers. (Ignore the decimal points.)
- $$\begin{array}{r} 7.2 \\ \times 0.9 \\ \hline 6.48 \end{array}$$

- Count the total number of decimal places in the numbers being multiplied. There are 2.

- Place the decimal point in the answer so the answer has that total number of decimal places.

So,  $7.2 \times 0.9 = 6.48$ .

#### Example 18

18. Multiply these decimal numbers: 2.374 and 1.08

To multiply these decimal numbers:

- Multiply as if the numbers are whole numbers. (Ignore the decimal points.)
- $$\begin{array}{r} 2.374 \\ \times 1.08 \\ \hline 18992 \\ 00000 \\ \hline 237400 \end{array}$$

- Count the total number of decimal places in the numbers being multiplied. There are 5.

- Place the decimal point in the answer so the answer has that total number of decimal places.

There are 5.

- Place the decimal point in the answer so the answer has that total number of decimal places.

So,  $2.374 \times 1.08 = 2.56392$ .

19. Will put 12 gallons of gasoline in his car. The gasoline cost \$1.37 per gallon.  
How much did Will pay for the gasoline?

**Example 19**

To find out, do this multiplication:  $12 \times \$1.37$

- Multiply as if the numbers are whole numbers.  $1.37$   
(Ignore the decimal points.)  $\times 12$   
 $274$
- Count the total number of decimal places in the numbers being multiplied.  $1370$   
There are 2.  $16.44$

- Place the decimal point in the answer so the answer has that total number of decimal places.

So,  $12 \times \$1.37 = \$16.44$ .  
Will paid \$16.44 for the gasoline.

20. Will wants to figure out the area of the rectangular car hood that he's going to paint.  
The length is 3.6 feet and the width is 4.35 feet. What is the area of the hood?

**Example 20**

To find out the area, multiply the length by the width.  
That is, do this multiplication:  $3.6 \times 4.35$ .

- Multiply as if the numbers are whole numbers.  $4.35$   
(Ignore the decimal points.)  $\times 36$   
 $2610$
- Count the total number of decimal places in the numbers being multiplied.  $13050$   
There are 3.  $15.660$

- Place the decimal point in the answer so the answer has that total number of decimal places.

So,  $3.6 \times 4.35 = 15.660$ .  
The area of Will's hood is 15.66 square feet.

21. a. Multiply 2.31 by 100.  
b. Multiply 5.3872 by 1000.

**Example 21**

a. To multiply the decimal number 2.31 by 100:

- Count the number of zeros in 100, the power of ten. 2 zeros
- Move the decimal point 2 places to the right.  $2.31$

So  $2.31 \times 100 = 231$ .

Some powers of 10 are 10, 100, 1000, 10,000, and so on.

b. To multiply the decimal number 5.3872 by 1000:

- Count the number of zeros in 1000, the power of ten. 3 zeros
- Move the decimal point 3 places to the right.  $5.3872$

So  $5.3872 \times 1000 = 5387.2$ .

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## Dividing Decimal Numbers

To divide a decimal number by a whole number:

- In the answer, put the decimal point directly above the decimal point in the number being divided.
- Divide as you would divide whole numbers. Attach a decimal point or trailing zeros to the number being divided, if necessary.

To divide a decimal number by another decimal number:

- Rewrite the division by moving both decimal points the same number of places, until you are dividing by a whole number.
- Divide by the whole number, as described above.

When you're dividing decimal numbers and the remainder is not zero, you may want to round your answer.

To divide a decimal number by a power of ten:

- Count the number of zeros in the power of ten.
- To divide, move the decimal point that number of places to the left.

Recall also that you can use division to write a fraction as a decimal number. For example,  $\frac{1}{4}$  means  $1 \div 4$ .

You may find these Examples useful while doing the homework for this section.

### Example 22

22. Do this division:  $6.45 \div 75$

*To divide these decimal numbers:*

- *In the answer, put the decimal point directly above the decimal point in the number being divided.*
- *Divide as if the numbers are whole numbers. Attach a trailing zero to 6.45.*

$$\begin{array}{r} 0.086 \\ 75 \overline{)6.450} \\ \underline{600} \phantom{0} \\ 450 \\ \underline{450} \\ 0 \end{array}$$

*So,  $6.45 \div 75 = 0.086$ .*

23. Do this division:  $4.68 \div 0.24$

**Example 23**

To divide these decimal numbers:

- Rewrite the division by moving both decimal points 2 places to the right, so that you are dividing by a whole number.
- In the answer, put the decimal point directly above the decimal point in the number being divided.

$$\begin{array}{r} 19.5 \\ 24 \overline{)4.68.0} \\ \underline{24} \phantom{0} \\ 228 \\ \underline{216} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

- Divide as if the numbers are whole numbers. Attach a trailing zero to 468.

So,  $4.68 \div 0.24 = 19.5$ .

24. Do this division and round your answer to two decimal places:

**Example 24**

$3.91 \div 0.7$

To divide these decimal numbers:

- Rewrite the division by moving both decimal points one place to the right, so that you are dividing by a whole number.
- In the answer, put the decimal point directly above the decimal point in the number being divided.

$$\begin{array}{r} 5.585 \\ .7 \overline{)3.9100} \\ \underline{35} \phantom{00} \\ 41 \\ \underline{35} \\ 60 \\ \underline{56} \\ 40 \\ \underline{35} \\ 5 \end{array}$$

- Divide as if the numbers are whole numbers. Attach trailing zeros to 39.1.

- Round 5.585 to two decimal places. 5.585, when rounded to two decimal places, is 5.59. So, when rounded to two decimal places,  $3.91 \div 0.7 = 5.59$ .

5.59

**Example 25**

25. Will bought a new electronic keyboard for \$821.19. He can pay for it in twelve equal monthly installments. How much must he pay each month? Round your answer to the nearest penny.

To find how much Will must pay each month, you can do this division:  $\$821.19 \div 12$ .

To divide these decimal numbers:

- In the answer, put the decimal point directly above the decimal point in the number being divided.

$$\begin{array}{r} 68.432 \\ 12 \overline{)821.190} \\ \underline{72} \phantom{0} \\ 101 \phantom{0} \\ \underline{96} \phantom{0} \\ 51 \phantom{0} \\ \underline{48} \phantom{0} \\ 39 \phantom{0} \\ \underline{36} \phantom{0} \\ 30 \phantom{0} \\ \underline{24} \phantom{0} \\ 6 \phantom{0} \end{array}$$

- Divide, as if the numbers are whole numbers. Attach a trailing zero to 821.19.

- Round 68.432 to two decimal places. 68.43  
68.432, when rounded to two decimal places, is 68.43. So, when rounded to the nearest penny, Will must pay \$68.43 each month.

**Example 26**

26. a. Divide 6.7391 by 10.  
b. Divide 6.7391 by 1000.

Remember:

To **multiply** by a power of ten, move the decimal point to the **right**.

To **divide** by a power of ten, move the decimal point to the **left**.

- a. To divide the decimal number 6.7391 by 10:

- Count the number of zeros in 10, the power of ten.
- Move the decimal point 1 place to the left.

1 zero

So,  $6.7391 \div 10 = 0.67391$ .

$$\begin{array}{r} 6.7391 \\ \downarrow \end{array}$$

- b. To divide the decimal number 6.7391 by 1000:

- Count the number of zeros in 1000, the power of ten.
- Move the decimal point 3 places to the left.

3 zeros

So,  $6.7391 \div 1000 = 0.0067391$ .

$$\begin{array}{r} .006.7391 \\ \downarrow \end{array}$$

**Example 27**

27. By dividing, write the fraction  $\frac{7}{8}$  as a decimal number.

Here's one way to write the fraction  $\frac{7}{8}$  as a decimal number:

- Do the division  $7 \div 8$ .

$$\begin{array}{r} 0.875 \\ 8 \overline{)7.000} \\ \underline{64} \phantom{00} \\ 60 \phantom{0} \\ \underline{56} \phantom{0} \\ 40 \phantom{0} \\ \underline{40} \phantom{0} \\ 0 \end{array}$$

So, the fraction  $\frac{7}{8}$  can be written as the decimal number 0.875.

## Solving Some Equations that Contain Decimal Numbers

To solve some equations that contain decimal numbers for an unknown:

- Get the unknown, say  $x$ , by itself on one side of the equation.
- Simplify.

How you get the unknown by itself on one side of the equation depends on the equation itself. The following examples illustrate some of the different situations you may encounter.

28. Find the value of  $x$  in this equation:  $8x = 42.56$

Here's one way to get  $x$  by itself on one side of the equation:

- Divide both sides by 8.

$$\frac{8x}{8} = \frac{42.56}{8}$$

- Simplify by dividing the decimals.

$$x = 42.56 \div 8$$

Here's how to do the division:

$$\begin{array}{r} 5.32 \\ 8 \overline{)42.56} \\ \underline{40} \phantom{0} \\ 25 \phantom{0} \\ \underline{24} \phantom{0} \\ 16 \phantom{0} \\ \underline{16} \\ 0 \end{array}$$

So,  $x = 5.32$ .

### Example 28

You may find these Examples useful while doing the homework for this section.

You can check your answer by replacing  $x$  with 5.32 in the original equation.

$$8x = 42.56$$

$$\text{Is } 8 \times 5.32 = 42.56 ?$$

$$\text{Is } 42.56 = 42.56 ? \text{ Yes.}$$

29. Find the value of  $x$  in this equation:  $2.3x = 42.251$

Here's one way to get  $x$  by itself on one side of the equation:

- Divide both sides by 2.3.

$$\frac{2.3x}{2.3} = \frac{42.251}{2.3}$$

- Simplify by dividing the decimals.

$$x = 42.251 \div 2.3$$

Here's how to do the division:

$$\begin{array}{r} 18.37 \\ 2.3 \overline{)42.251} \\ \underline{46} \phantom{0} \\ 192 \phantom{0} \\ \underline{184} \phantom{0} \\ 85 \phantom{0} \\ \underline{69} \phantom{0} \\ 161 \phantom{0} \\ \underline{161} \\ 0 \end{array}$$

So,  $x = 18.37$ .

### Example 29

You can check your answer by replacing  $x$  with 18.37 in the original equation.

$$2.3x = 42.251$$

$$\text{Is } 2.3 \times 18.37 = 42.251 ?$$

$$\text{Is } 42.251 = 42.251 ? \text{ Yes.}$$

**Example 30**

30. It took Will one quarter of an hour (0.25 hour) to drive 8.5 miles home. Solve the following equation to find Will's average speed,  $x$ :

$$0.25x = 8.5$$

Here's one way to get  $x$  by itself on one side of the equation:

• Divide both sides by 0.25.

$$\frac{0.25x}{0.25} = \frac{8.5}{0.25}$$

• Simplify by dividing the decimals.

$$x = 8.5 \div 0.25$$

Here's how to do the division:

$$\begin{array}{r} 34. \\ 25 \overline{)8.50} \\ \underline{75} \phantom{0} \\ 100 \\ \underline{100} \\ 0 \end{array}$$

You can check your answer by replacing  $x$  with 34 in the original equation.

$$0.25x = 8.5$$

$$\text{Is } 0.25 \times 34 = 8.5 ?$$

$$\text{Is } 8.5 = 8.5 ? \text{ Yes.}$$

So,  $x = 34$ . Will's average speed was 34 miles per hour.

## Using the Properties of Real Numbers and the Order of Operations to Add, Subtract, Multiply, and Divide Decimal Numbers

When a decimal number “comes to an end” it is called a “terminating” decimal. When a decimal number has a pattern that repeats indefinitely, it is called a “nonterminating, repeating” decimal. Each of these types of numbers is called a rational number.

Sometimes a decimal does not end and does not repeat. This type of decimal number is called an irrational number.

The rational numbers and the irrational numbers make up the real numbers.

Here are several properties that will help you to work with real numbers.

Name	Description	Example
Commutative Property of Addition	You can add real numbers in any order.	$3.2 + 4.6 = 7.8$ and $4.6 + 3.2 = 7.8$ . So, $3.2 + 4.6 = 4.6 + 3.2$ .
Commutative Property of Multiplication	You can multiply real numbers in any order.	$0.2 \times 0.4 = 0.08$ and $0.4 \times 0.2 = 0.08$ . So, $0.2 \times 0.4 = 0.4 \times 0.2$ .
Associative Property of Addition	When you add real numbers, you can group the numbers in any way.	$0.2 + (0.3 + 0.6) = 0.2 + 0.9 = 1.1$ and $(0.2 + 0.3) + 0.6 = 0.5 + 0.6 = 1.1$ . So, $0.2 + (0.3 + 0.6) = (0.2 + 0.3) + 0.6$ .
Associative Property of Multiplication	When you multiply real numbers, you can group the numbers in any way.	$0.2 \times (0.3 \times 0.6) = 0.2 \times 0.18 = 0.036$ and $(0.2 \times 0.3) \times 0.6 = 0.06 \times 0.6 = 0.036$ . So, $0.2 \times (0.3 \times 0.6) = (0.2 \times 0.3) \times 0.6$ .
Distributive Property	To multiply a sum of two numbers by a number, you can first multiply, then add. Or, you can first add, then multiply.	$0.2 \times (0.3 + 0.6)$ $= (0.2 \times 0.3) + (0.2 \times 0.6)$ $= 0.06 + 0.12$ $= 0.18$ and $0.2 \times (0.3 + 0.6) = 0.2 \times 0.9 = 0.18$ .



Now you will look at order of operations.

When you work with real numbers, it is important to work in the correct order. Here is the order to use:

- First, do operations inside parentheses.
- Next, do multiplication or division, as they appear from left to right.
- Finally, do addition or subtraction, as they appear from left to right.

The properties, and order of operations, are used when working with all real numbers. That includes the rational numbers, irrational numbers, whole numbers, fractions and decimals.

31. Name the property of real numbers that is used in each of the following statements:

- $2.3 \times 17.8 = 17.8 \times 2.3$
- $5 \times (6.1 - 3.2) = (5 \times 6.1) - (5 \times 3.2)$
- $(17.1 + 2.34) + 5.06 = 17.1 + (2.34 + 5.06)$

- This is the commutative property of multiplication. It allows you to multiply two numbers in either order.*
- This is the distributive property. It combines multiplication with addition or subtraction.*
- This is the associative property of addition. It allows you to group terms in any way.*

**Example 31**

You may find these Examples useful while doing the homework for this section.

32. Use order of operations to evaluate this expression:  $2.3 + 4.7 \times 5.1$ .

Use order of operations to do this problem:  $2.3 + 4.7 \times 5.1$

- *First do the multiplication.*  $= 2.3 + 23.97$
- *Next do the addition.*  $= 26.27$

So, the value of  $2.3 + 4.7 \times 5.1$  is 26.27.

**Example 32**

scratch work:

$$\begin{array}{r} 4.7 \\ \times 5.1 \\ \hline 47 \\ 2350 \\ \hline 23.97 \end{array}$$

$$\begin{array}{r} 2.30 \\ + 23.97 \\ \hline 26.27 \end{array}$$

33. Use order of operations to evaluate this expression:  $5.3 \div (2.4 \times 0.7)$

Round your answer to two decimal places.

Use order of operations to do this problem:  $5.3 \div (2.4 \times 0.7)$

- *First do the multiplication in the parentheses.*  $= 5.3 \div 1.68$
- *Next do the division.*  $= 3.15$   
*Round to two decimal places.*

So, the value of  $5.3 \div (2.4 \times 0.7)$  is 3.15, when rounded to two decimal places.

**Example 33**

scratch work:

$$\begin{array}{r} 2.4 \\ \times 0.7 \\ \hline 1.68 \end{array}$$

$$\begin{array}{r} 3.154 \\ 1.68 \overline{)5.30.000} \\ \underline{504} \phantom{00} \\ 260 \phantom{00} \\ \underline{168} \phantom{00} \\ 920 \phantom{00} \\ \underline{840} \phantom{00} \\ 800 \phantom{00} \\ \underline{672} \phantom{00} \\ 128 \phantom{00} \end{array}$$

**Example 34**

34. Use order of operations to evaluate this expression:  $(1.2 + 3.5) \times 2.1 \div (4 - 1.5) - 2.6$

scratch work:

$$\begin{array}{r} 1.2 \\ + 3.5 \\ \hline 4.7 \end{array}$$

$$\begin{array}{r} 4.0 \\ - 1.5 \\ \hline 2.5 \end{array}$$

$$\begin{array}{r} 4.7 \\ \times 2.1 \\ \hline 47 \\ \underline{940} \\ 9.87 \end{array}$$

$$\begin{array}{r} 3.948 \\ 2.5 \overline{)9.8700} \\ \underline{75} \phantom{00} \\ 237 \phantom{0} \\ \underline{225} \phantom{0} \\ 120 \\ \underline{100} \\ 200 \\ \underline{200} \\ 0 \end{array}$$

$$\begin{array}{r} 3.948 \\ - 2.600 \\ \hline 1.348 \end{array}$$

Use order of operations to do this problem:  $(1.2 + 3.5) \times 2.1 \div (4 - 1.5) - 2.6$

• Do the addition inside the first set of parentheses.  $= 4.7 \times 2.1 \div (4 - 1.5) - 2.6$

• Do the subtraction inside the second set of parentheses.  $= 4.7 \times 2.1 \div 2.5 - 2.6$

• Do the multiplication.  $= 9.87 \div 2.5 - 2.6$

• Do the division.  $= 3.948 - 2.6$

• Finally, do the subtraction.  $= 1.348$

So, the value of  $(1.2 + 3.5) \times 2.1 \div (4 - 1.5) - 2.6$  is 1.348.

# Explore

**This Explore contains two investigations.**

- **A Calculator Game**
- **A Target Game**

You have been introduced to these investigations in the Explore module of this lesson on the computer. You can complete them using the information given here.

## **Investigation 1: A Calculator Game**

Here, you will use your calculator to explore operations on decimals.

1. Guess the missing number in the following multiplication problem. Record your guess as Guess 1 below.

$$7.3 \times \underline{\hspace{2cm}} = 230.388.$$

Now enter 7.3 in your calculator and multiply by your guess. Record the result as Answer 1 below. Notice how close your answer is to 230.388.

Now repeat this process with several guesses. Each time try to get closer to 230.388. How can one guess help you to improve the next guess?

Guess 1 \_\_\_\_\_ Answer 1 \_\_\_\_\_

Guess 2 \_\_\_\_\_ Answer 2 \_\_\_\_\_

Guess 3 \_\_\_\_\_ Answer 3 \_\_\_\_\_

Guess 4 \_\_\_\_\_ Answer 4 \_\_\_\_\_

Guess 5 \_\_\_\_\_ Answer 5 \_\_\_\_\_

Now confirm your guesses by doing a division problem.

Write the division problem here: \_\_\_\_\_  $\div$  \_\_\_\_\_ = \_\_\_\_\_

2. Now repeat the same investigation with the following multiplication problem.

$$8.6 \times \underline{\hspace{2cm}} = 340$$

To check each guess, enter 8.6 in your calculator and multiply by your guess. Notice how close your answer is to 340. How can one guess help you to improve the next guess?

Guess 1 \_\_\_\_\_ Answer 1 \_\_\_\_\_

Guess 2 \_\_\_\_\_ Answer 2 \_\_\_\_\_

Guess 3 \_\_\_\_\_ Answer 3 \_\_\_\_\_

Guess 4 \_\_\_\_\_ Answer 4 \_\_\_\_\_

Guess 5 \_\_\_\_\_ Answer 5 \_\_\_\_\_

Now confirm your guesses by doing a division problem.

Write the division problem here: \_\_\_\_\_  $\div$  \_\_\_\_\_ = \_\_\_\_\_

3. Write a description of the differences that you observed in questions 1 and 2.

---

## Investigation 2: A Target Game

In this game you have these six decimal numbers:

1.2      0.7      3.9      0.15      2.1      3.33

And these four operations:

+      -      ×      ÷

The object of the game is to put together a selection of the six numbers and the four operations so that you get as close as possible to a target number. (You can only use each number once. However, you can use each operation more than once.)

For example, if the target number is 6.6, you might “play” with this combination:

$$3.9 \div 1.2 + 3.33$$

The result of performing the operations is 6.58.

Try the following target numbers with another person to see who can get the closest. (In each problem, place a decimal number in each blank and an operation in each circle.)

1.    \_\_\_\_ ○ \_\_\_\_                      Target 5.8
2.    \_\_\_\_ ○ \_\_\_\_ ○ \_\_\_\_              Target 3.45
3.    \_\_\_\_ ○ \_\_\_\_ ○ \_\_\_\_              Target 0.386
4.    \_\_\_\_ ○ \_\_\_\_ ○ \_\_\_\_ ○ \_\_\_\_      Target 5.95
5. Now make up a problem of your own and give it to your partner.



# Homework

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## CONCEPT 1: ADDING AND SUBTRACTING

### Adding Decimal Numbers

For help working these types of problems, go back to Examples 1–4 in the Explain section of this lesson.

1. Do this addition:  $6.32 + 3.15$
2. Do this addition:  $2.84 + 4.12$
3. Do this addition:  $7.324 + 2.135$
4. Do this addition:  $5.184 + 3.813$
5. Do this addition:  $4.2832 + 3.7123$
6. Do this addition:  $8.3194 + 1.4803$
7. Sonja spent \$14.03 on a book and \$5.11 on a snack. Estimate whether the total amount she spent was closer to \$19 or to \$20.
8. Crystal spent \$27.08 on a book and \$13.24 on a snack. Estimate whether the total amount she spent was closer to \$40 or to \$41.
9. Chau spent \$16.43 on a CD and \$9.51 on gasoline. Estimate whether the total amount he spent was closer to \$25 or to \$26.
10. Xuan spent \$27.49 on a videotape and \$14.63 on gasoline. Estimate whether the total amount he spent was closer to \$41 or to \$42.
11. Shoma spent \$28.83 on dinner and \$7.96 on a movie. Estimate whether the total amount she spent was closer to \$35, to \$36, or to \$37.
12. Thao spent \$35.89 on dinner and \$6.94 on a movie. Estimate whether the total amount she spent was closer to \$41, to \$42, or to \$43.
13. Trisha spent \$8.61 on a movie and \$5.78 on popcorn and candy. How much did she spend in total?
14. Romeo spent \$7.28 on a movie and \$4.39 on popcorn and candy. How much did he spend in total?
15. Troy spent \$22.78 on gasoline and \$71.93 on a muffler repair. How much did he spend on both?
16. Alphonsine spent \$13.69 on gasoline and \$63.88 on a muffler repair. How much did she spend on both?
17. Angela cut 8.94 yards of fabric from a roll, followed by another 9.67 yards from the same roll. How much did she cut in total?
18. Javier cut 9.68 yards of fabric from a roll, followed by another 18.77 yards from the same roll. How much did he cut in total?
19. Do this addition:  $6.27 + 5.3$
20. Do this addition:  $4.308 + 9.85$
21. Do this addition:  $4.28 + 0.07 + 11.325$
22. Do this addition:  $9.8 + 1.037 + 0.09$
23. Do this addition:  $17 + 0.098 + 96.895$
24. Do this addition:  $8.6 + 1.837 + 25.004$

---

## Subtracting Decimal Numbers

For help working these types of problems, go back to Examples 5–8 in the Explain section of this lesson.

25. Do this subtraction:  $8.57 - 5.14$
26. Do this subtraction:  $5.92 - 2.71$
27. Do this subtraction:  $9.583 - 4.462$
28. Do this subtraction:  $4.637 - 1.316$
29. Do this subtraction:  $14.637 - 11.304$
30. Do this subtraction:  $18.094 - 13.062$
31. Alyssa spent \$13.21 on dinner and \$5.23 on lunch. Estimate how much more her dinner cost than her lunch.
32. Jeannie spent \$18.93 on dinner and \$7.89 on lunch. Estimate how much more her dinner cost than her lunch.
33. Hank spent \$43.97 on a textbook and \$17.11 on school supplies. Estimate how much more the textbook cost than the school supplies.
34. Monica spent \$52.98 on a textbook and \$18.09 on school supplies. Estimate how much more the textbook cost than the school supplies.
35. Huy spent \$473.88 on rent and \$83.06 on utilities. Estimate how much more his rent cost than his utilities.
36. Kimanh spent \$524.07 on rent and \$94.92 on utilities. Estimate how much more his rent cost than his utilities.
37. Will spent \$17.98 on dinner and \$5.69 on lunch. Calculate how much more his dinner cost than his lunch.
38. Joanne spent \$27.84 on dinner and \$8.67 on lunch. Calculate how much more her dinner cost than her lunch.
39. Aidalyn spent \$52.47 on a textbook and \$13.68 on school supplies. Calculate how much more the textbook cost than the school supplies.
40. Clayton spent \$93.26 on two textbooks and \$19.58 on school supplies. Calculate how much more the textbooks cost than the school supplies.
41. Mai measured the distance from her house to the end of her driveway to be 127.6 feet. Then she measured the distance from her house to the nearest fire hydrant to be 378.1 feet. How much farther from her house is the fire hydrant than the end of her driveway?
42. Araceli measured the distance from her house to the next house to be 96.7 feet. Then she measured the distance from her house to the end of the street to be 183.2 feet. How much farther from her house is the end of the street than the next house?
43. Do this subtraction:  $156 - 4.13$
44. Do this subtraction:  $294 - 13.2$
45. Do this subtraction:  $5 - 1.963$
46. Do this subtraction:  $7 - 2.846$
47. Do this subtraction:  $27.3 - 15.08$
48. Do this subtraction:  $28.32 - 17.865$

---

## **Adding and Subtracting Decimal Terms that Contain a Letter such as “x” or “y”**

For help working these types of problems, go back to Examples 9–12 in the Explain section of this lesson.

49. Combine the terms:  $4.62x + 4.39x$
50. Combine the terms:  $15.3x + 1.27x$
51. Combine the terms:  $12.35y + 3.29y$
52. Combine the terms:  $156y + 39.28y$
53. Combine the terms:  $23.45y + 6.55y$
54. Combine the terms:  $0.973y + 0.472y$
55. Combine the terms:  $10.37x + 5.14y + 8.2x + 5.13y$
56. Combine the terms:  $11.95x + 5.38y + 6.5x + 4.63y$
57. Combine the terms:  $10a + 5.01b + 0.234a + 0.62b$
58. Combine the terms:  $1.99a + 4.35b + 0.77a + 1.65b$
59. Combine the terms:  $320.1x + 5.47y + 56.8x + 5.47y$
60. Combine the terms:  $10x + 5.38y + 0.11x + 53.8y$
61. Combine the terms:  $x - 4.37y + 8.15x + 6.39y$
62. Combine the terms:  $2x - 8.11y - 0.2x + 13.99y$
63. Combine the terms:  $0.8a - 3b - 0.75a + 3.28b$
64. Combine the terms:  $0.85a + 3.1b - 0.09a + 3.28b$
65. Combine the terms:  $15x + 3.11y - 1.95y - 13.44x$
66. Combine the terms:  $0.69x + 7.18x - 0.3y + 15.61y$
67. Combine the terms:  $3.1x + 4.2y + 18.3 + 7.4x + 2.8y + 8.1$
68. Combine the terms:  $5.31x + 4.17y + 18.09 + 3.12x + 0.78y + 1.13$
69. Combine the terms:  $4.3x + 2.4y + 18.7 + 3.6x + 1.8y - 2.6$
70. Combine the terms:  $3.44x + 3.27y + 17.39 - 1.14x + 0.72y + 5.13$
71. Combine the terms:  $3.4a - 0.027b + 17.3 - 1.04a + 18b + 4.13$
72. Combine the terms:  $0.1a + 3.006b + 17.39 + a + 0.7b - 5$

## **Solving Some Equations that Contain Decimal Numbers**

For help working these types of problems, go back to Examples 13–16 in the Explain section of this lesson.

73. Find the value of  $x$  in this equation:  $x + 0.3 = 0.7$
74. Find the value of  $x$  in this equation:  $x + 0.9 = 1.7$
75. Find the value of  $y$  in this equation:  $y + 0.19 = 2.37$

- 
76. Find the value of  $y$  in this equation:  $y + 3.14 = 8.21$
77. Find the value of  $x$  in this equation:  $x + 0.1 = 1$
78. Find the value of  $x$  in this equation:  $x + 0.08 = 23.5$
79. Find the value of  $x$  in this equation:  $x - 0.2 = 3.6$
80. Find the value of  $x$  in this equation:  $x - 1.6 = 9.7$
81. Find the value of  $y$  in this equation:  $y - 3.17 = 8.35$
82. Find the value of  $y$  in this equation:  $y - 3.872 = 8.014$
83. Find the value of  $x$  in this equation:  $x - 0.92 = 123.4$
84. Find the value of  $x$  in this equation:  $x - 13 = 0.008$
85. On a trip to the amusement park, Juan's entrance ticket cost \$16.48. Altogether, Juan spent a total of \$39.72. To find how much he spent on items other than his entrance ticket, solve this equation for  $x$ :
- $$x + \$16.48 = \$39.72$$
86. On a trip to the amusement park, Janine's entrance ticket cost \$23.61. Altogether, Janine spent a total of \$41.50. To find how much she spent on items other than her entrance ticket, solve this equation for  $x$ :
- $$x + \$23.61 = \$41.50$$
87. George knows that his total utility bill for the month for gas and electricity was \$324.68. He knows that the gas cost \$121.29. To find how much the electricity cost, solve this equation for  $x$ :
- $$x + \$121.29 = \$324.68$$
88. Kristie knows that her total utility bill for the month for gas and electricity was \$417.45. She knows that the gas cost \$178.91. To find how much the electricity cost, solve this equation for  $x$ :
- $$x + \$178.91 = \$417.45$$
89. After graduation, Nicola went on a trip to Hawaii. Her total bill was \$1018.77. If her plane fare was \$534.22, solve the following equation to find how much she spent on other things.
- $$x + \$534.22 = \$1018.77$$
90. After graduation, Sean went on a trip to Ireland. His total bill was \$1832.66. If his plane fare was \$761.33, solve the following equation to find how much he spent on other things.
- $$x + \$761.33 = \$1832.66$$
91. Find the value of  $x$  in this equation:  $x - 5 = 2.1 + 3.2$
92. Find the value of  $x$  in this equation:  $x - 1.4 = 2.1 + 3.2$
93. Find the value of  $x$  in this equation:  $x - 0.361 = 21 + 11.57$
94. Find the value of  $x$  in this equation:  $x - 1.02 = 31.1 + 11.574$
95. Find the value of  $y$  in this equation:  $y + 1.07 = 31.1 - 11.583$
96. Find the value of  $y$  in this equation:  $6 + y = 7.6 - 0.06$



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## CONCEPT 2: MULTIPLYING AND DIVIDING

### Multiplying Decimal Numbers

For help working these types of problems, go back to Examples 17–21 in the Explain section of this lesson.

97. Do this multiplication:  $7.3 \times 0.8$
98. Do this multiplication:  $4.7 \times 10$
99. Do this multiplication:  $2.1 \times 1.4$
100. Do this multiplication:  $3.2 \times 1.6$
101. Do this multiplication:  $5.7 \times 8.3$
102. Do this multiplication:  $8.4 \times 1000$
103. Do this multiplication:  $2.135 \times 0.7$
104. Do this multiplication:  $5.317 \times 0.6$
105. Do this multiplication:  $2.1 \times 0.736$
106. Do this multiplication:  $0.08 \times 13.21$
107. Do this multiplication:  $21.07985 \times 10,000$
108. Do this multiplication:  $52.13 \times 5.671$
109. Will put 13 gallons of gasoline in his car. The gasoline cost \$1.46 per gallon. How much did Will pay for the gasoline?
110. Wilma put 16 gallons of gasoline in her car. The gasoline cost \$1.53 per gallon. How much did Wilma pay for the gasoline?
111. Carl bought a new suit for \$165. The local sales tax is \$0.07 on each dollar. How much did he pay in sales tax?
112. Dinh bought a new dress for \$214. The local sales tax is \$0.075 on each dollar. How much did she pay in sales tax?
113. Sandy bought 23 candy bars for a birthday party. Each bar cost \$0.55. How much did he pay for all the candy?
114. Mercedes bought 29 party favors for a birthday party. Each favor cost \$0.73. How much did she pay for all the party favors?
115. Will wants to figure out the area of the rectangular car hood that he's going to paint. The length of the hood is 3.4 feet and the width is 4.25 feet. What is the area? (Hint: Area = length  $\times$  width)
116. Jill wants to figure out the area of the rectangular kitchen wall that she's going to paint. The height of the wall is 7.4 feet and the width is 12.3 feet. What is the area? (Hint: Area = length  $\times$  width)
117. Mark has just enclosed a new garden with a rectangular fence that is 23.6 feet long and 13.4 feet wide. What is the area of the new garden? (Hint: Area = length  $\times$  width)
118. Anne has just enclosed a new field with a rectangular fence that is 47.5 yards long and 112.5 yards wide. What is the area of the new field? (Hint: Area = length  $\times$  width)
119. John pays \$3.25 each month for a magazine. What does the magazine cost for one year?
120. Quinlyan pays \$19.95 each month for cellular phone service. What does she pay for two years?

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## Dividing Decimal Numbers

For help working these types of problems, go back to Examples 22–27 in the Explain section of this lesson.

121. Do this division:  $20.01 \div 23$
122. Do this division:  $39.06 \div 31$
123. Do this division:  $2.375 \div 1000$
124. Do this division:  $0.00135 \div 100$
125. Do this division:  $6.11 \div 1.3$
126. Do this division:  $15.08 \div 2.6$
127. Do this division:  $49.5488 \div 6.32$
128. Do this division:  $60.4262 \div 0.701$
129. Do this division:  $60.4158 \div 100$
130. Do this division:  $5342.17 \div 1000$
131. By dividing, write the fraction  $\frac{5}{8}$  as a decimal number.
132. By dividing, write the fraction  $\frac{3}{8}$  as a decimal number.
133. By dividing, write the fraction  $\frac{7}{16}$  as a decimal number.
134. By dividing, write the fraction  $\frac{15}{32}$  as a decimal number.
135. Do this division and round your answer to two decimal places:  $41.3 \div 0.76$
136. Do this division and round your answer to two decimal places:  $128.3 \div 0.07$
137. Do this division and round your answer to three decimal places:  $5.1 \div 0.13$
138. Do this division and round your answer to three decimal places:  $1.76 \div 0.081$
139. Will bought a new electronic keyboard for \$763.14. He can pay for it in twelve equal monthly installments.  
How much must he pay each month? Round your answer to the nearest penny.
140. Vicki bought a new electronic sewing machine for \$483.26. She can pay for it in twelve equal monthly installments.  
How much must she pay each month? Round your answer to the nearest penny.
141. Hong has just arranged a mortgage with equal payments for the next 40 years. The total amount she will pay is \$593,276.  
Find the amount she will pay each year. Round your answer to the nearest penny.
142. Frank has just arranged a mortgage with equal payments for the next 40 years. The total amount he will pay is \$537,826.  
Find the amount he will pay each year. Round your answer to the nearest penny.
143. Rosa has just arranged a new car loan with equal payments for the next 5 years. The total amount she will pay is \$23,417.  
Find the amount she will pay each month. Round your answer to the nearest penny.
144. Lyle has just arranged a new car loan with equal payments for the next 3 years. The total amount he will pay is \$17,587.  
Find the amount he will pay each month. Round your answer to the nearest penny.

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## Solving Some Equations That Contain Decimal Numbers

For help working these types of problems, go back to Examples 28–30 in the Explain section of this lesson.

145. Find the value of  $x$  in this equation:  $7x = 44.1$
146. Find the value of  $x$  in this equation:  $11x = 29.7$
147. Find the value of  $x$  in this equation:  $8x = 35.12$
148. Find the value of  $x$  in this equation:  $21x = 96.81$
149. Find the value of  $x$  in this equation:  $6x = 45.4$   
Round your answer to two decimal places.
150. Find the value of  $x$  in this equation:  $13x = 83.1$   
Round your answer to two decimal places.
151. Find the value of  $x$  in this equation:  $4.3x = 33.54$
152. Find the value of  $x$  in this equation:  $9.1x = 70.98$
153. Find the value of  $x$  in this equation:  $5.8x = 25.056$
154. Find the value of  $x$  in this equation:  $7.64x = 71.052$
155. Find the value of  $x$  in this equation:  $1.3x = 54.9$   
Round your answer to two decimal places.
156. Find the value of  $x$  in this equation:  $0.97x = 5.6$   
Round your answer to two decimal places.
157. Find the value of  $x$  in this equation:  $6.1x = 6.71$
158. Find the value of  $x$  in this equation:  $4.5x = 110.475$
159. Find the value of  $x$  in this equation:  $12.21x = 51.99018$
160. Find the value of  $x$  in this equation:  $21.95x = 7.61665$
161. Find the value of  $x$  in this equation:  $81.3x = 104.2$   
Round your answer to two decimal places.
162. Find the value of  $x$  in this equation:  $22.9x = 78.91$   
Round your answer to two decimal places.
163. It took Will a quarter of one hour (0.25 hour) to drive 10.5 miles home. Solve the following equation to find Will's average speed,  $x$ .  
 $0.25x = 10.5$
164. It took Francy one hour and a half (1.5 hours) to drive 70.5 miles. Solve the following equation to find Francy's average speed,  $x$ .  
 $1.5x = 70.5$
165. A coast to coast jet flies 3019.86 miles in 5.7 hours. Solve the following equation for  $x$  to find its average speed.  
 $5.7x = 3019.86$
166. A commuter plane flies 512.64 miles in 1.6 hours. Solve the following equation for  $x$  to find its average speed.  
 $1.6x = 512.64$

167. Jay just purchased a children's backyard pool for \$432.99. In addition, he paid \$32.47 in state sales tax. Solve the following equation to find the sales tax rate,  $x$ . Round your answer to three decimal places.

$$432.99x = 32.47$$

168. Helen just purchased several new trees for her garden for \$327.88. In addition, she paid \$27.05 in state sales tax. Solve the following equation to find the sales tax rate,  $x$ . Round your answer to four decimal places.

$$327.88x = 27.05$$

## Using the Properties of Real Numbers and the Order of Operations to Add, Subtract, Multiply, and Divide Decimal Numbers

For help working these types of problems, go back to Examples 31–34 in the Explain section of this lesson.

169. Name the property of real numbers that is used in the following statement:

$$2.51 \times 17.3 = 17.3 \times 2.51$$

170. Name the property of real numbers that is used in the following statement:

$$2.51 + (17.3 + 19.21) = (2.51 + 17.3) + 19.21$$

171. Name the property of real numbers that is used in the following statement:

$$2.4 \times (3.1 + 9.6) = (2.4 \times 3.1) + (2.4 \times 9.6)$$

172. Name the property of real numbers that is used in the following statement:

$$3.18 \times (12.3 \times 144.21) = (3.18 \times 12.3) \times 144.21$$

173. Name the property of real numbers that is used in the following statement:

$$8.346 + 0.092 = 0.092 + 8.346$$

174. Is the following statement true?

$$3.3 - (2.2 - 1.5) = (3.3 - 2.2) - 1.5$$

175. Use order of operations to evaluate this expression:  $2.1 + 4.8 \times 5.3$

176. Use order of operations to evaluate this expression:  $13.92 + 2.1 \times 8.6$

177. Use order of operations to evaluate this expression:  $16.3 - 1.4 \times 5.2$

178. Use order of operations to evaluate this expression:  $25.7 - 2.2 \times 4.8$

179. Use order of operations to evaluate this expression:  $25.74 - 2.4 \div 4.8$

180. Use order of operations to evaluate this expression:  $10.06 - 3.6 \div 0.8$

181. Use order of operations to evaluate this expression:  $4.8 \div (2.3 \times 0.7)$   
Round your answer to two decimal places.

182. Use order of operations to evaluate this expression:  $15.3 \div (4.1 \times 0.65)$   
Round your answer to two decimal places.

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183. Use order of operations to evaluate this expression:  $4.8 \times (2.3 - 0.7)$
184. Use order of operations to evaluate this expression:  $15.3 \times (19.21 - 18.07)$
185. Use order of operations to evaluate this expression:  $15.3 \div (19.2 \div 2.4)$   
Round your answer to two decimal places.
186. Use order of operations to evaluate this expression:  $54.9 \div (9.72 \div 3.6)$   
Round your answer to two decimal places.
187. Use order of operations to evaluate this expression:  $(1.3 + 3.6) \times 2.2 \div (4 - 1.4) - 2.8$   
Round your answer to two decimal places.
188. Use order of operations to evaluate this expression:  $(2.8 + 0.9) \times 1.7 \div (4 - 2.6) - 1.9$   
Round your answer to two decimal places.
189. Use order of operations to evaluate this expression:  $13.2 - 2 \times [4.3 - 3 \times (1.6 - 1)]$
190. Use order of operations to evaluate this expression:  $5.7 + 4 \times [8.3 - 3 \times (2.8 - 2)]$
191. Use order of operations to evaluate this expression:  $6.2 \times 3.5 \div 2.5 \times 4.5$
192. Use order of operations to evaluate this expression:  $(6.2 \times 3.5) \div (2.5 \times 4.5)$   
Round your answer to two decimal places.





## Evaluate

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**Take this Practice Test to prepare for the final quiz in the Evaluate module of this lesson on the computer.**

### Practice Test

1. Do this addition:  $0.7 + 1.38 + 2.946$
2. Caroline bought a bottle of perfume for \$34.28. She gave the cashier a fifty dollar bill. How much change did she receive?
3. Do this addition and subtraction:  
$$2.3a + 5.7b + 0.9 + 4.8b - 1.9a$$
4. Find the value of  $x$  in this equation:  
$$x + 2.37 = 5.94$$
5. Do this multiplication:  
$$7.3 \times 0.28$$
6. A candy bar costs \$0.65. How many candy bars can Zack buy for \$18.85?
7. Find the value of  $x$  in this equation:  
$$0.39x = 1.794$$
8. Use order of operations to evaluate this expression:  
$$5.1 \times [2.3 + (3.1 - 1.9)] \div 2 + 19.23$$







## Topic F2 Cumulative Review

**These problems cover the material from this and previous topics. You may wish to do these problems to check your understanding of the material before you move on to the next topic, or to review for a test.**

1. Tania took her bike in for a tuneup. She paid \$23.15 for the parts and \$8.92 for the labor. Estimate whether the total amount she spent was closer to \$31 or to \$32.
2. Find the missing number:  $\frac{5}{7} = \frac{?}{28}$
3. Find the value of  $x$  that makes this statement true:  $7 + x = 20$
4. Do this multiplication:  $3.2 \times 4.1$
5. What is the value of  $3^2$ ?
6. Round this number to the nearest hundred: 17,349
7. A recipe calls for  $3\frac{1}{2}$  cups of milk. Write  $3\frac{1}{2}$  as an improper fraction.
8. Find the least common denominator of  $\frac{7}{12}$  and  $\frac{11}{30}$ .
9. Alison bought 12.4 gallons of gasoline. Each gallon cost \$1.33. How much money did she spend on gas? (Round your answer to the nearest cent.)
10. Do this subtraction:  $9.54 - 6.73$
11. Yesterday, Alex mowed  $\frac{2}{3}$  of the lawn in the morning and  $\frac{1}{4}$  of the lawn in the afternoon. What fraction of the lawn did she mow yesterday?
12. What is the prime factorization of 90?
13. Do this division:  $\frac{14}{9} \div \frac{21}{18}$
14. What is the value of the 7 in the decimal number 32.6872?
15. Find:  $3.1 + 2.4 \times (6.1 - 1.4) \div 3$ .
16. A cookie recipe calls for  $2\frac{1}{4}$  cups of flour. Dwayne is making a triple batch. How many cups of flour does he need?
17. True or false?  $110.10 > 110.01$
18. Choose the fraction below that is equivalent to  $\frac{4}{5}$ :  
 $\frac{7}{12}$     $\frac{6}{7}$     $\frac{14}{15}$     $\frac{24}{30}$
19. Do this addition:  $8421 + 2334 + 3120$
20. What is  $\frac{1}{4}$  of 34?
21. What are the factors of 42?
22. Choose the fraction below with the greatest value.  
 $\frac{4}{5}$     $\frac{2}{3}$     $\frac{7}{12}$
23. Find the value of  $y$  which makes this statement true:  $4y = 96$

24. Write as a decimal number: four hundred thirty-two and twenty-one thousandths.
25. Simplify to lowest terms:  $\frac{70}{105}$
26. Write this decimal number as a fraction reduced to lowest terms: 0.44
27. Sally is buying carpet for her living room. Her living room is 13.2 feet long and 11.7 feet wide. What is the area of the living room?  
(Hint: area = length  $\times$  width)
28. What fraction with denominator 60 is equivalent to the fraction  $\frac{8}{15}$ ?
29. Combine the terms with an “x” and combine the terms without an “x”:  $8 + 4x - 6 + x$
30. Find:  $4\frac{6}{9} + 5\frac{7}{9}$
31. Round this decimal number to the nearest thousandth: 0.43681
32. Pete recorded the number of balls and the number strikes thrown by each pitcher on his baseball team in last night’s game.

Pitcher	Number of Balls	Number of Strikes
Dani	11	22
Scott	18	40
Pat	4	10

For each pitcher, make a fraction with the number of balls in the numerator and the number of strikes in the denominator. Put these fractions in order from least to greatest.

33. True or false?  $\frac{4}{5} \geq \frac{4}{5}$
34. Find the GCF of 24 and 42.
35. Combine the terms with an “x” and combine the terms with a “y”:  $\frac{2}{7}x + \frac{5}{7}y + \frac{1}{7}x + \frac{6}{7}y$
36. There are 12 inches in one foot, and there are 2.54 centimeters in one inch. How many centimeters are in one foot? (Hint: multiply 12 by 2.54.)
37. True or false?  $\frac{2}{3} = 0.66$
38. What is the reciprocal of  $\frac{7}{12}$ ?
39. Write  $\frac{19}{5}$  as a mixed numeral.
40. How many  $\frac{2}{3}$  foot long pieces can be cut from a board that is 10 feet long?