

3.2

Adding and Subtracting Decimals

GOAL

Develop strategies to add and subtract decimals.

1. Estimate.

- a) $3.201 + 5.198 =$ _____
 b) $9.852 - 3.201 =$ _____
 c) $12.694 - 7.561 =$ _____

2. Calculate each sum.

- a) $12.201 + 2.230 =$ _____
 b) $30.202 + 1.106 =$ _____
 c) $2.944 + 0.280 =$ _____
 d) $2.526 + 0.644 + 6.003 =$ _____
 e) $8.002 + 0.233 + 7.636 =$ _____
 f) $0.992 + 32.805 + 76.023 =$ _____

3. Calculate each difference.

- a) $6.750 - 4.250 =$ _____ d) $4.883 - 1.992 =$ _____
 b) $8.206 - 4.153 =$ _____ e) $7.457 - 6.954 =$ _____
 c) $9.000 - 8.351 =$ _____ f) $8.000 - 1.999 =$ _____

4. Estimate and then calculate each answer.

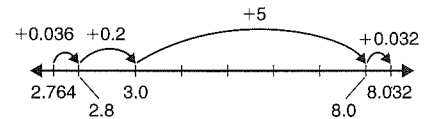
- a) $5.442 + 6.301 + 2.120$
 b) $6.001 - 4.999$
 c) $4.318 + 5.000 + 7.300$

5. Fiona had \$20.00. She bought a sandwich for \$3.99, juice for \$1.29, and salad for \$1.55. How much change will Fiona get back?

At-Home Help

Here are some strategies to add and subtract decimals:

- Use front-end estimation.
For example, to estimate $2.14 + 4.93$, add $2 + 4$ to $0.1 + 0.9$. The total is $6 + 1.0 = 7.0$.
- Use mental math.
For example, $8.032 - 2.764$ means "How far is it from 2.764 to 8.032?" Jump up by steps to calculate the answer:



$$0.036 + 0.2 + 5 + 0.032 = 5.27$$

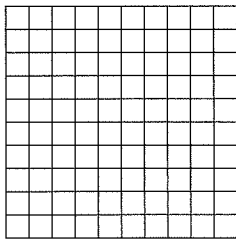
3.3 Multiplying by Numbers Less than 1

GOAL

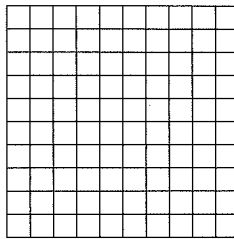
Multiply by decimals less than 1.

1. Use a grid to model each multiplication.

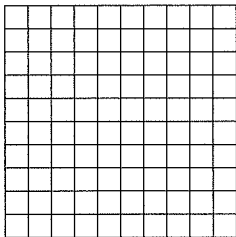
a) $0.6 \times 0.2 = \underline{\hspace{2cm}}$



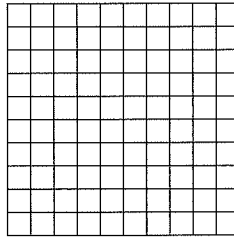
c) $0.8 \times 0.7 = \underline{\hspace{2cm}}$



b) $0.3 \times 0.9 = \underline{\hspace{2cm}}$



d) $0.5 \times 0.5 = \underline{\hspace{2cm}}$



2. Calculate.

a) $4.5 \times 0.2 = \underline{\hspace{2cm}}$

d) $8.7 \times 0.3 = \underline{\hspace{2cm}}$

b) $1.3 \times 0.4 = \underline{\hspace{2cm}}$

e) $9.2 \times 0.5 = \underline{\hspace{2cm}}$

c) $3.2 \times 0.6 = \underline{\hspace{2cm}}$

f) $5.6 \times 0.8 = \underline{\hspace{2cm}}$

3. Predict the order of these four products from least to greatest: _____

Check your prediction by calculating.

a) $6.5 \times 0.7 = \underline{\hspace{2cm}}$

c) $9.6 \times 0.2 = \underline{\hspace{2cm}}$

b) $8.4 \times 0.4 = \underline{\hspace{2cm}}$

d) $7.7 \times 0.9 = \underline{\hspace{2cm}}$

4. Julie bought apples at the market. Apples cost \$0.75 for each kilogram.

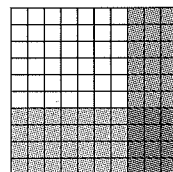
If Julie bought 6 kg of apples, how much did she pay?

At-Home Help

Here are some strategies to multiply decimals:

- Estimate, and then use your calculator.
- Use a 10 by 10 grid to model the problem.

For example, to multiply 0.3×0.4 , colour three columns to show 0.3, and four rows to show 0.4. Then, count the squares in the area where the shaded parts overlap. There are 12 squares in the overlapping area, so the answer is 0.12.



3.4

Multiplying by Numbers Greater than 1

GOAL

Multiply by decimals greater than 1.

1. Place the decimal point correctly in each product.

- a) $5.7 \times 2.22 = 1\ 2\ 6\ 5\ 4$ c) $35.2 \times 19.11 = 6\ 7\ 2\ 6\ 7\ 2$
b) $11.3 \times 6.77 = 7\ 6\ 5\ 0\ 1$ d) $5.54 \times 87.4 = 4\ 8\ 4\ 1\ 9\ 6$

You can use a calculator to complete these questions.

2. Estimate and then calculate.

- a) $8.6 \times 2.6 =$ _____
b) $9.17 \times 2.2 =$ _____
c) $15.1 \times 8.2 =$ _____
d) $35.01 \times 2.01 =$ _____

3. Calculate.

- a) 7.12×4 _____ d) 8.7×0.3 _____
b) 20.4×3.3 _____ e) 356.1×4.31 _____
c) 8.09×1.9 _____ f) 80.2×7.44 _____

4. Predict the order of these four products from least to greatest: _____
Check your prediction by calculating.

- a) $3.25 \times 6.7 =$ _____ c) $1.1 \times 3.05 =$ _____
b) $10.3 \times 2.4 =$ _____ d) $7.9 \times 1.99 =$ _____

5. Max's sister earns \$14.50 for each hour at work. How much money does she make in 8 h?

6. Louise took two friends to the movies. She had \$50.00 with her. If she bought tickets, pop, and popcorn for everyone, how much money does she have left?

At-Home Help

Here is an additional strategy to multiply decimals:

- Multiply one of the decimal terms by 10, 100, or 1000 to get a whole number. Next, multiply the other decimal term by the new whole number term. Finally, divide your answer by the power of 10 you used.

For example, calculate

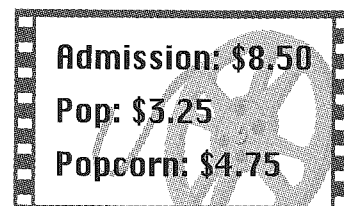
$$0.18 \times 7.2:$$

$$0.18 \times 100 = 18$$

$$18 \times 7.2 = 129.6$$

$$129.6 \div 100 = 1.296$$

The answer is 1.296.



3.5 Solve Problems Using Guessing and Testing

GOAL

Use guess and test to solve measurement problems.

You can use a calculator to complete these questions.

- Liam built a fence around his yard. The perimeter of the fence is 68.50 m.
 - If the length of the fence is 21.75 m, what is the width?
 - What is the area of Liam's yard?

- A rectangular box has a width of 34.5 mm. The volume of the box is 5383 mm^3 .

Complete the chart to determine possible lengths and heights of the box.

Width (mm)	Length (mm)	Height (mm)	Volume (mm^3) = $w \times l \times h$
34.5	10		5383
34.5	20		5383
34.5			5383
34.5			5383

- Yan made a table cloth. The area of the table cloth is 5.3 m^2 .
 - What might be the length and width of the table cloth?
 - Is there more than one answer? Explain.

At-Home Help

Follow these steps to solve problems using guessing and testing:

- Understand the Problem
- Make a Plan
- Carry Out the Plan (remember to organize your guesses in a table or list to keep track)
- Look Back

3.6

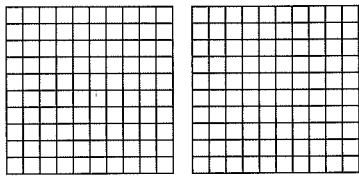
Dividing by Numbers Less than 1

GOAL

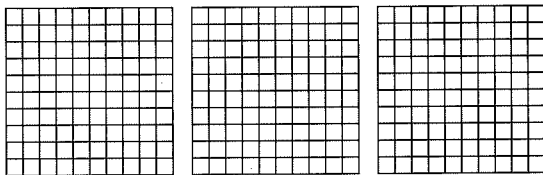
Divide by one-digit decimals to solve problems.

1. Use the 10 by 10 grids to calculate.

a) $1.9 \div 0.1 = \underline{\hspace{2cm}}$

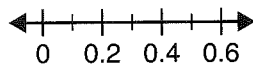


b) $2.4 \div 0.6 = \underline{\hspace{2cm}}$

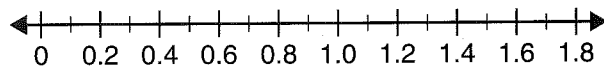


2. Use the number lines to calculate.

a) $0.6 \div 0.2 = \underline{\hspace{2cm}}$



b) $1.8 \div 0.9 = \underline{\hspace{2cm}}$



3. Divide.

a) $3.2 \div 0.8 = \underline{\hspace{2cm}}$ c) $0.72 \div 0.08 = \underline{\hspace{2cm}}$

b) $7.5 \div 0.5 = \underline{\hspace{2cm}}$ d) $11.2 \div 0.14 = \underline{\hspace{2cm}}$

4. Yan has 9.6 m of ribbon. She wants to divide it into equal pieces. How many pieces of ribbon will there be if the pieces are each length below?

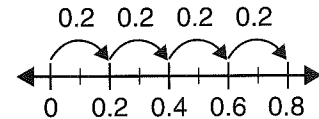
- a) 0.3 m b) 0.6 m

5. A jug contains 4.8 L of juice. If glasses hold 0.43 L of juice, about how many glasses can the jug fill?

At-Home Help

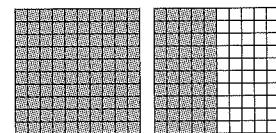
Here are some strategies to divide decimal numbers:

- Multiply both numbers by the same power of 10, and then divide. For example, to calculate $0.64 \div 0.08$, multiply both numbers by 100.
- Estimate, and then divide using a calculator.
- Use a number line. For example, calculate $0.8 \div 0.2$:



It takes 4 "hops" of 0.2 to reach 0.8, so $0.8 \div 0.2 = 4$.

- Use grids. For example, calculate $1.5 \div 0.1$:



I shaded 1 and $\frac{1}{2}$ grids to represent 1.5. Each column represents 1 tenth, or 0.1.

There are 15 tenths in 1.5, so $1.5 \div 0.1 = 15$.

3.7 Dividing by Numbers Greater than 1

GOAL

Divide by decimals greater than 1.

1. Place the decimal point correctly in each quotient.

a) $4.1 \div 2.5 = 1\ 6\ 4$ b) $2.25 \div 1.2 = 1\ 8\ 8$

You can use a calculator to complete these questions.

2. Calculate.

a) $8.8 \div 2.2 =$ _____ d) $21.0 \div 3.5 =$ _____

b) $6.3 \div 3.1 =$ _____ e) $102.5 \div 8.2 =$ _____

c) $5.7 \div 1.9 =$ _____ f) $18.9 \div 6.5 =$ _____

3. Estimate and then calculate.

a) $6.8 \div 2.2$ b) $21.2 \div 5.3$ c) $147.4 \div 13.4$

4. Julie has 15.30 m of fabric to make flags for a festival.

About how many flags can she make if each flag is:

a) 0.9 m wide? b) 1.1 m wide? c) 2.1 m wide?

5. Sandeep earns \$9.50 for each hour at his job. He earned \$118.75 last week.

How many hours did he work?

6. A small box can hold 94.24 g of candy. If each candy has a mass of 1.52 g, how many candies can fit into each box?

7. The mass of a 1.5 L carton of juice is 1625.0 g. The mass of 0.5 L of juice is 503.5 g. What is the mass of the empty carton?

At-Home Help

You can estimate to determine where the decimal point should go in a quotient.

For example, place the decimal point correctly in this quotient:
 $11.907 \div 2.1 = 567.$

Some possible answers might be: 0.567, 5.67, or 56.7.

I will estimate: $11.907 \div 2.1$ is about $12 \div 2 = 6$.

The quotient must be 5.67.

3.8 Using the Order of Operations with Decimals

GOAL

Evaluate expressions using the order of operations.

1. Calculate using the order of operations.

a) $2 + 4 \times 3 =$ _____

b) $1.5 \times 2 + 3.5 \times 4 =$ _____

c) $2 - 0.8 \div 4 + 1.1 =$ _____

d) $7 + (2 - 0.2 \times 0.2) =$ _____

2. Is each calculation correct? If not, correct it. Show your work.

a) $3.5 \times 4 + 11 \times 2.2 = 115.5$

b) $10 + (3.4 \times 2.2 - 5) = 12.48$

c) $20 \div 2 \times 6 + 4 \times 1.1 = 110$

3. Calculate.

a) $26.2 \div 2 \times 4 + 5.4 \times 6.1 =$ _____

c) $2.1 \times (3.4 \times 5.2 - 5.56) =$ _____

b) $22 \times 1.4 + 10.62 - 3 \times 1.2 =$ _____

d) $10.2 \times (11.2 - 7) \times 0.33 =$ _____

4. a) How are the word expression and the numerical expression different? Explain.

Word expression: Divide 10.8 by 2, subtract 0.5 from this number, and multiply the difference by 5.

Numerical expression: $10.8 \div 2 - 0.5 \times 5$

b) Write a numerical expression that matches the word expression.

c) Evaluate the word expression.

At-Home Help

The **order of operations** is a set of rules people use when calculating to get the same answer:

Rule 1: Do the operations in brackets first.

Rule 2: Divide and multiply from left to right.

Rule 3: Add and subtract from left to right.

Hint: To remember these rules, think of **BDMAS**: **B**rackets, **D**ivide, **M**ultiply, **A**dd and **S**ubtract.

3.9

Expressing Fractions as Decimals

GOAL

Use division to express fractions as decimals.

1. Write each decimal as a fraction.

a) $0.3 =$ _____ c) $0.145 =$ _____

b) $0.36 =$ _____ d) $0.116 =$ _____

You can use a calculator to complete these questions.

2. Write each fraction as a decimal.

a) $\frac{3}{10} =$ _____ c) $\frac{5}{8} =$ _____

b) $\frac{1}{4} =$ _____ d) $\frac{2}{5} =$ _____

3. Write each fraction as a repeating decimal. Write only the first two repeating sets of digits.

a) $\frac{5}{6} =$ _____ c) $\frac{1}{9} =$ _____

b) $\frac{8}{9} =$ _____ d) $\frac{1}{3} =$ _____

4. Write each fraction as a terminating decimal.

a) $\frac{9}{20} =$ _____ c) $\frac{3}{8} =$ _____

b) $\frac{1}{5} =$ _____ d) $\frac{7}{10} =$ _____

5. Order each set of fractions from least to greatest.

a) $\frac{2}{10}, \frac{1}{7}, \frac{5}{8}, \frac{7}{10}, \frac{4}{7}$ _____

b) $\frac{7}{13}, \frac{6}{10}, \frac{1}{3}, \frac{1}{4}, \frac{55}{100}$ _____

c) $\frac{1}{3}, \frac{2}{9}, \frac{1}{2}, \frac{5}{6}, \frac{2}{3}$ _____

At-Home Help

A **repeating decimal** has a block of one or more digits that repeats in a pattern.

For example, $0.44444\dots$ and $0.134134134\dots$

A **terminating decimal** is complete after a certain number of digits.

For example, 0.777 or 0.13485 .

All terminating decimals can be written over a multiple of

10, such as $\frac{\blacksquare}{10}, \frac{\blacksquare}{100}$, or $\frac{\blacksquare}{1000}$.

To convert a fraction to a decimal, divide the numerator by the denominator.

For example, $\frac{3}{4} = 3 \div 4 = 0.75$.

3.10 Expressing Decimals as Fractions

GOAL

Write decimals as fractions.

1. Write each decimal as a fraction.

- a) $0.2 =$ _____ d) $0.\overline{6} =$ _____
 b) $0.375 =$ _____ e) $0.\overline{15} =$ _____
 c) $0.432 =$ _____ f) $0.\overline{146} =$ _____

2. Draw lines to match each fraction with its decimal equivalent.

- | | |
|---------------------|----------------------|
| a) $\frac{6}{10}$ | A. $0.\overline{16}$ |
| b) $\frac{7}{9}$ | B. 0.375 |
| c) $\frac{1}{6}$ | C. 0.71 |
| d) $\frac{71}{100}$ | D. 0.6 |
| e) $\frac{3}{8}$ | E. $0.\overline{14}$ |
| f) $\frac{14}{99}$ | F. $0.\overline{7}$ |

3. Order each set of numbers from least to greatest.

- a) $0.23, \frac{1}{7}, 0.\overline{7}$ _____
 b) $\frac{7}{13}, 0.\overline{6}, \frac{1}{3}$ _____
 c) $0.\overline{3}, \frac{2}{9}, \frac{1}{2}$ _____

4. Place $<$, $>$, or $=$ to make each number sentence true.

- a) $0.\overline{3}$ _____ $\frac{1}{4}$ b) $\frac{1}{2}$ _____ 0.4545 c) $\frac{2}{21}$ _____ 0.22 d) $0.\overline{6}$ _____ $\frac{1}{3}$

At-Home Help

You can write a repeating decimal using a horizontal bar.

For example, $0.424242\dots$ can be written as $0.\overline{42}$. To write a repeating decimal as a fraction, write the repeating digit(s) as a whole number over 9, 99, or 999.

For example, $0.\overline{5} = \frac{5}{9}$, $0.\overline{12} = \frac{12}{99}$, and $0.\overline{134} = \frac{134}{999}$.

After writing a decimal as a fraction, you can rewrite the fraction in lowest terms.

For example, $\frac{125}{1000} = \frac{1}{8}$.

Chapter 3 Test Yourself

Circle the letter of the correct answer.

- Calculate $4.5 + 30.2$.
A. 43.52 B. 70.7 C. 304.25 D. 34.7
- Calculate $1.32 + 4.52 + 0.87$.
A. 6.71 B. 5.71 C. 4.71 D. 7.71
- Calculate $8.559 - 5.123$.
A. 3.194 B. 3.087 C. 3.436 D. 3.861
- Calculate 3.3×0.1 .
A. 0.33 B. 0.25 C. 0.11 D. 0.22
- Calculate 9.5×0.7 .
A. 8.02 B. 6.65 C. 7.33 D. 9.23
- Calculate 2.5×4.3 .
A. 15.02 B. 8.64 C. 10.75 D. 6.74
- Calculate $7.4 \div 0.2$.
A. 0.037 B. 0.37 C. 3.7 D. 37
- Calculate $8.7 \div 2.4$. Use a calculator.
A. 3.625 B. 2.874 C. 16.808 D. 4.392
- A piece of ribbon is 5.67 m long. If Megan cut off lengths of 0.23 m, 1.2 m, and 1.009 m, how much ribbon is left?
A. 3.42 B. 3.031 C. 3.14 D. 3.231
- Pavlo has nine bags of spices. Each bag has a mass of 0.752 g. What is the total mass of the bags?
A. 9.752 B. 6.768 C. 8.267 D. 12.021

Chapter 3 Test Yourself continued

11. Julie's table cloth measures 0.77 m by 1.3 m.
What is the area of the table cloth?
A. 1.001 m^2 B. 2.07 m^2 C. 0.53 m^2 D. 1.69 m^2
12. The area of a yard is 189.42 m^2 . The width of the yard is 15.4 m.
What is the length of the yard? Use a calculator.
A. 174.02 m B. 12.3 m C. 204.82 m D. 15.5 m
13. Which fraction is equivalent to $0.\overline{3}$?
A. $\frac{2}{6}$ B. $\frac{1}{7}$ C. $\frac{2}{3}$ D. $\frac{1}{4}$
14. Which decimal is equivalent to $\frac{11}{25}$?
A. 0.4 B. 0.45 C. 0.44 D. 0.5
15. Calculate $(2.6 \times 1.2) + 22 - (4.2 \times 0.4)$.
A. 8.368 B. 25.12 C. 23.44 D. 21.76
16. A rope is 25.50 m long. You want to cut the rope into 0.5 m lengths.
About how many pieces of rope will you get?
A. 51 B. 5 C. 6 D. 10
17. Matthew is cutting pieces of ribbon for a class project. He cut 4.5 cm, 10.02 cm, 5.643 cm, and 12.3 cm of ribbon. If Matthew started with 110.000 cm of ribbon, how much ribbon does he have left?
A. 23.410 cm B. 101.992 cm C. 52.341 cm D. 77.537 cm
18. Jacob's bedroom has a height of 3.0 m and a volume of 62.5 m^3 .
Which length and width are possible for Jacob's bedroom?
A. 4.0 m and 5.2 m B. 3.0 m and 3.1 m
C. 6.2 m and 1.5 m D. 8.4 m and 2.2 m