Multiplying and Dividing by Powers of 10

Home Link 6-1

NAME DATE TIME

Use the ideas below to help you solve Problems 1–9.

SRB 133, 136

- To *multiply* by a power of 10, move the decimal point to the right the number of places indicated by the exponent. For example, to multiply by 10^3, move the decimal point to the right 3 places. This works because the exponent tells the number of times a start number is multiplied by 10. Each time a number is multiplied by 10, the digits shift 1 place to the left, which moves the decimal point 1 place to the right.

  Example: $4.3 \times 10^3 = 4.3 \times 10 \times 10 \times 10 = 4{,}300$

- To *divide* by a power of 10, move the decimal point to the left the number of places indicated by the exponent. For example, to divide by 10^3, move the decimal point to the left 3 places. This works because dividing by 10 is the same as multiplying by $\frac{1}{10}$. Each time a number is multiplied by $\frac{1}{10}$, the digits shift 1 place to the right, which moves the decimal point 1 place to the left.

  Example: $4.3 \div 10^3 = 4.3 \div (10 \times 10 \times 10) = 4.3 \div 1{,}000 = 0.0043$

1. $6.8 \times 10^2 =$ ____________
2. $43.9 \div 10^2 =$ ____________
3. $237.5 \div 10^2 =$ ____________
4. $5.29 \times 10^4 =$ ____________
5. $13.2 \div 10^3 =$ ____________
6. $71.8 \times 10^3 =$ ____________
7. $9.4 \times 10^5 =$ ____________
8. $3.6 \div 10^4 =$ ____________
9. Explain how you moved the decimal point in Problem 2 and why. Use clear mathematical language.

____

____

____

Practice

10. $\frac{3}{8} + \frac{1}{3}$

11. $2\frac{5}{6} + 1\frac{3}{4}$

Playing *Exponent Ball*

Home Link 6-2

NAME DATE TIME

Tony is playing *Exponent Ball*. He wrote down each of his expressions but wasn't sure how far to move the ball on each play.

SRB 122, 133, 136, 303

1. Complete Tony's record sheet. Use Table 1 to determine the number of yards to move the ball.

Table 1: Runs	
Value of Expression	**Move Ball**
0.0001 to 0.00099	Backward 15 yards
0.001 to 0.0099	Forward 10 yards
0.01 to 99	Forward 20 yards
100 to 3,999	Forward 30 yards
4,000 to 39,999	Forward 40 yards
40,000 and above	Forward 50 yards

Tony's record sheet:

Expression	Value	Move Ball
4.5×10^3		
$3.5 \div 10^2$		
$2.3 \div 10^1$		

2. Choose one of the expressions. Explain how you found the value and determined how far to move the ball.

____

____

____

Practice

3. $\begin{array}{r} 5.4 \\ +\ 9.6 \\ \hline \end{array}$

4. $\begin{array}{r} 12.71 \\ +\ 11.58 \\ \hline \end{array}$

5. $\begin{array}{r} 43.65 \\ +\ 8.94 \\ \hline \end{array}$

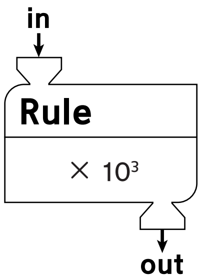
Solving Conversion Problems

Home Link 6-3

NAME DATE TIME

① Convert between kilograms (kg) and grams (g) to complete the table below.

SRB 133, 136, 215–216



in (kg)	out (g)
1	1,000
5.6	
0.3	
	78
	8

② What rule could you use to convert from grams to kilograms? *Hint*: How can you find the *in* number if you know the *out* number? Use exponential notation. ______________

Use the rules from Problems 1 and 2 to help you solve the number stories below. Show your work. Label the units for each step.

③ Micah has a cat and a parrot. Her cat weighs 2.3 kg and her parrot weighs 65 g. How many more kilograms does the cat weigh than the parrot?

The cat weighs ______________ kg more than the parrot.

④ Jasmine's dog weighs 15 kg. The dog's collar weighs 200 g. How many grams does the dog weigh when it is wearing its collar?

The dog weighs ______________ g with its collar.

Practice

Solve.

⑤ $\frac{7}{8} - \frac{1}{4}$

⑥ $3\frac{1}{3} - 1\frac{3}{5}$

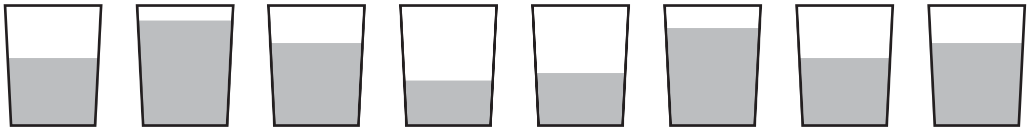
A Milkshake Problem

Home Link 6-5

NAME DATE TIME

Rachel is having a slumber party with 7 friends. Her mom made a big batch of milkshakes. Rachel's little brother tried to help by pouring the milkshakes in glasses, but he had trouble pouring the same amount in each glass.

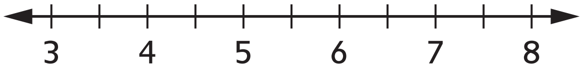
SRB 191, 247–248



$4\frac{1}{2}$ oz   7 oz $5\frac{1}{2}$ oz   3 oz $3\frac{1}{2}$ oz $6\frac{1}{2}$ oz $4\frac{1}{2}$ oz $5\frac{1}{2}$ oz

① Plot the amount of milkshake in each glass on the line plot below.

Milkshakes



Ounces

Rachel wants to even out the servings so that everyone will get the same amount of milkshake. Answer the questions to help you figure out how many ounces Rachel should pour into each glass.

Remember: To even out data, add all the numbers in the data set, and then divide by the number of data points.

② **a.** How many total ounces of milkshake did Rachel's mom make? ________ ounces

b. How many glasses of milkshake are needed? ________ glasses

c. Write a number model that represents dividing the milkshake evenly among all the glasses. ____________________

d. How many ounces of milkshake will each friend get? ________ ounces

Practice

Solve.

③ $7.6 \times 10^2 =$ ____________

④ $18.2 \div 10^2 =$ ____________

⑤ $779.5 \div 10^3 =$ ____________

⑥ $81.23 \times 10^4 =$ ____________

Using Volume Formulas

Home Link 6-6

NAME DATE TIME

SRB 233

Formulas for Volume of a Rectangular Prism

$V = l * w * h$ $V = B * h$

Use either of the volume formulas to help you solve the problems below.
Write a number model to show how you found the volume. You may use a calculator.

1. The Aon Center in Chicago is a tall square tower. Its base covers an area of about 37,636 square feet. The building is about 1,136 feet tall. What is the volume of the Aon Center?

   Volume: about ______________ cubic feet

   Number model: ______________________________

2. The Great Wall of China is about 20 feet high and about 15 feet wide. What is the volume of a 1-mile section of the wall? (The whole wall is more than 5,000 miles long!)

   Hint: 1 mile = 5,280 feet

   Volume: about ______________ cubic feet

   Number model: ______________________________

3. The Cathedral of Notre Dame in Paris, France covers an area of 4,800 square meters. The roof is about 43 meters high. What is the volume of the interior of the cathedral?

   Volume: about ______________ cubic meters

   Number model: ______________________________

Practice

Multiply. Show your work.

4. $\frac{2}{3} * 34 =$ ______________

5. $72 * \frac{1}{7} =$ ______________

Estimating Decimal Products and Quotients

Home Link 6-8

NAME DATE TIME

Kyle and Emma came up with different answers on their homework. For each problem, make an estimate. Write a number sentence to show how you estimated. Then circle the student who has the correct answer.

SRB 128

1. 8.82 ÷ 1.4 = ? Estimate: ______

   Kyle: 63   Emma: 6.3

2. 17.6 * 8.5 = ? Estimate: ______

   Kyle: 149.6   Emma: 14.96

3. 2,812.95 ÷ 89.3 = ? Estimate: ______

   Kyle: 31.5   Emma: 315.0

4. 65.2 * 112.5 = ? Estimate: ______

   Kyle: 733.5   Emma: 7,335

5. 209.1 ÷ 24.6 = ? Estimate: ______

   Kyle: 8.5   Emma: 85.0

6. 3.6 * 0.25 = ? Estimate: ______

   Kyle: 9.0   Emma: 0.9

Practice

Make an estimate. Then solve.

7. 526 ÷ 17 = ?

   ______
   (estimate)

   Answer: ______

8. 1,963 / 88 = ?

   ______
   (estimate)

   Answer: ______

Multiplying Decimals

Home Link 6-9

NAME DATE TIME

Today you learned two different strategies for multiplying decimals. Try to use each decimal multiplication strategy at least once to solve Problems 1–4. Show your work on the back of this page.

SRB 128, 133–135

Estimation Strategy	Shifting the Decimal Point Strategy
Make an estimate. Multiply as if the factors were whole numbers. Use your estimate to insert a decimal point in the product. **Example:** 70.4 ∗ 18.6 = ? *Think:* 70 ∗ 20 is about 1,400. 704 ∗ 186 = 130,944 The product should be close to 1,400, so it must be 1,309.44.	Multiply each factor by a power of 10 to get whole numbers. Multiply the whole-number factors. "Undo" the multiplication by powers of 10. Think about how dividing by the same powers of 10 would shift the decimal point in the answer. **Example:** 70.4 ∗ 18.6 = ? 70.4 ∗ 10^1 = 704 18.6 ∗ 10^1 = 186 704 ∗ 186 = 130,944 *Think:* Dividing by 10^1 will shift the decimal point 1 place to the left, and dividing by the other 10^1 will shift the decimal point another place to the left. I need to shift it two places in all. So 70.4 ∗ 18.6 = 1,309.44.

1. 81.3 ∗ 47.5 = ______________

2. 7.8 ∗ 215.6 = ______________

3. 0.57 ∗ 3.0 = ______________

4. 1,094.25 ∗ 22.6 = ______________

Practice

Solve. Show your work on the back of this page.

5. $\frac{1}{9} \div 5 =$ ________

6. $\frac{1}{2} \div 12 =$ ________

Checking Whether My Answer Makes Sense

Home Link 6-10

NAME DATE TIME

(1) Pizza by the Pan sold 4 dozen pizzas in the afternoon. That night, they sold 2.5 times as many pizzas as they did during the afternoon. How many pizzas did they sell in all that day? Show your work and check whether your answer makes sense. Show how you can tell that your answer makes sense.

SRB 7, 100, 125, 134

Practice

Divide. Show your work on the back of this page.

(2) $6 \div \frac{1}{3} =$ ________

(3) $10 \div \frac{1}{4} =$ ________

Dividing Decimals by Whole Numbers

Home Link 6-11

NAME DATE TIME

SRB 128, 137–139

For Problems 1 and 2:

- Make an estimate. Write a number sentence to record your estimate.
- Divide as if the dividend were a whole number. Show your work on the computation grid.
- Use your estimate to place the decimal point. Record your answer.

1. 10.8 / 6 = ?

   Estimate: ____________________

   10.8 / 6 = ________

2. 5.22 / 3 = ?

   Estimate: ____________________

   5.22 / 3 = ________

Practice

Multiply. Show your work.

3. $\frac{2}{5} * 30 =$ ________

4. $16 * \frac{1}{3} =$ ________

Dividing by Decimals

Home Link 6-12

NAME DATE TIME

SRB 128, 140–141

For Problems 1–3:

- Rewrite the problem as an equivalent problem that has a whole-number divisor. Be sure to multiply the dividend and divisor by the same number.
- Solve the equivalent problem using any method you wish. If you don't solve the problem mentally, show your work.
- Record your answer to the equivalent problem and the original problem.

One example is done for you.

Example: $2.8 \div 0.4 = ?$

Think: Multiplying 0.4 by 10 will give me a whole number, so I should also multiply 2.8 by 10 to make an equivalent problem.

$(2.8 * 10) \div (0.4 * 10) = 28 \div 4$

Equivalent problem: $28 \div 4 = ?$

Answer to equivalent problem: 7

$2.8 \div 0.4 =$ 7

1. $7.2 \div 0.6 = ?$

Equivalent problem: ______

Answer to equivalent problem: ______

$7.2 \div 0.6 =$ ______

2. $44 \div 0.5 = ?$

Equivalent problem: ______

Answer to equivalent problem: ______

$44 \div 0.5 =$ ______

3. $1.92 \div 0.16 = ?$

Equivalent problem: ______

Answer to equivalent problem: ______

$1.92 \div 0.16 =$ ______

Practice

Add. Show your work on the back of this page.

4. $6.48 + 9.34 =$ ______

Estimate: ______

5. $15.71 + 12.2 =$ ______

Estimate: ______

Interpreting Reaction-Time Data

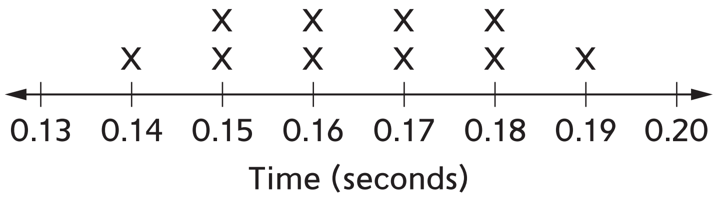
Home Link 6-13

NAME DATE TIME

Garrett tried the Grab-It Gauge experiment with his left hand. He recorded his results on the line plot below. Use the data to answer the questions.

SRB 121, 131, 247–248

Garrett's Left-Hand Reaction Times



1. Which time(s) came up most often for Garrett? ______________ sec

2. Write Garrett's reaction times in order from fastest to slowest.

   ____

3. What is the difference between Garrett's fastest time and his slowest time?

   ________ sec

4. What is Garrett's evened-out reaction time? Record your calculations.

   Expression: ______________________________

   ____

   Evened-out reaction time: ________ sec

5. What would you say is a typical reaction time for Garrett's left hand? Why?

   ____

   ____

   ____

Practice

Subtract. Show your work on the back of this page.

6. $5.63 - 2.19 =$ ____________

   Estimate: ____________

7. $44.12 - 3.85 =$ ____________

   Estimate: ____________