The McGraw-Hill Companies

8787 Orion Place
Columbus, OH 43240

February 16, 2011

Mr. Jeff Zaring
State Board of Education Administrator
Indiana Department of Education
Room 225 State House
Indianapolis, IN 46204

Dear Mr. Zaring,

McGraw-Hill Education is pleased to have the opportunity to provide comments on the Textbook Advisory Committee reviews, as well as detailed justifications as to why the Indiana State Board of Education should adopt Macmillan/McGraw-Hill *Math Connects* grades 3-5, *Glencoe Algebra 1* and *Glencoe Geometry*.

We fully support Indiana's goal of providing engaging, effective programs that capture the vision of the Common Core State Standards, including the Standards for Mathematical Practice. Our authors, editors, and educational consultants have carefully studied these standards, and we have attempted to address them in our Indiana submissions.

These high-quality programs deliver classroom-tested best practices that ensure students will understand mathematics and demonstrate appropriate mastery. Our curriculum is reflective of cross-disciplinary skills such as critical thinking and problem solving. The responses for each course offer examples of how each program addresses most significant reviewer concerns, as well as the feedback from the Charles A. Dana Center.

We respectfully request that the Indiana State Board of Education reconsider the non-recommended status of Macmillan/McGraw-Hill *Math Connects* grades 3-5, *Glencoe Algebra 1* and *Glencoe Geometry*. Please feel free to contact me if you have any questions or concerns.

Sincerely,

Lisa Carmona

Lisa Carmona
Vice President, PreK-12 Mathematics Editorial
McGraw-Hill School Education Group

Math Connects TO THE

100% ALIGNMENT

CCSS

COMMON

CORE

STATE

STANDARDS

Grade 5

Publisher Response to Textbook Review
Indiana's Education Roundtable, 2010

PUBLISHER	School Education Group a division of The McGraw-Hill Companies Inc.				
CONTACT	Jeff Whorley	**PHONE**	404-441-6444	**E-MAIL**	Jeff_Whorley@mcgraw-hill.com
TITLE	*Math Connects, Grade 5*				
AUTHOR(S)	Carter, Cuevas, Day, and Malloy				
EDITION	1st				
COPYRIGHT	2011				
ISBN	978-0-02-100995-4 and 978-0-02-114570-6 (supplement)				

SUMMARY

McGraw-Hill respectfully requests that the Indiana State Board of Education reconsider the non-recommended status of *Math Connects*, Grades 3-5, for the following reasons:

1. Overall, *Math Connects*, Grades 3-5 was rated moderate to strong in all categories of Important Mathematical Ideas, Skills and Procedures, and Mathematical Relationships. In addition, the Indiana Textbook Review Committee stated that all standards were well addressed throughout, and rated *Math Connects* a 4, the highest rating.
2. McGraw-Hill submitted a crucial supplement along with *Math Connects* to address the Common Core State Standards, which may not have been considered by the committee. The following chart provides additional references to the instructional materials in these supplements to fully address the Common Core State Standards. We have also suggested improvements that would further strengthen our coverage of the Common Core State Standards.
3. *Math Connects* received the highest possible rating (4) for each of the mathematical practices from the Indiana Textbook Review Committee. *Math Connects* earned a rating of **strong** for Important Mathematical Ideas for each grade.

Math Connects is a cohesive, comprehensive program that meets the needs of Indiana students and teachers. We believe it should be reconsidered for adoption.

IDENTIFICATION AND JUSTIFICATION

Publisher Respons..o Textbook Review
Indiana's Education Roundtable, 2010

STANDARDS FOR MATHEMATICAL PRACTICE	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
RATING	Strong by Indiana Textbook Review Committee, minimal by Charles A. Dana Center
OUR RESPONSE	The mathematical practices are embedded throughout *Math Connects* in practical, meaningful ways. A correlation to the mathematical practices can be found on page xvii of the Teacher Edition of *Math Connects to the Common Core Standards* supplement. ▪ Students are asked to make sense of problems throughout the program, but particularly in problem-solving skill lessons. *Math Connects* introduces and applies a four-step problem-solving plan. This method is used to look for entry points to a solution, explain mathematical relationships, and then check answers and verify reasonableness. (see pages 74-75) ▪ Students reason abstractly throughout the program. For instance, in Explore lessons, students decontextualize a situation using models, then show their ability to contextualize by applying abstractly to symbols (see pages 156-157). ▪ Students are able to construct viable arguments when they are asked to explain and justify their solutions. Frequent Talk About It and Writing in Math features provide opportunities for students to listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments. The H.O.T. Problems in every lesson present a variety of exercises such as Open Ended, Find the Error, Reasoning, Number Sense, Which One Does Not Belong?, and Writing in Math to address this practice (see page 161). ▪ Modeling with mathematics is applied in every lesson through engaging contexts from everyday life, society, and the workplace. Real-world examples and multiple real-world exercises ask students to make assumptions and approximations to solve problems. In addition, each chapter has a real-world problem-solving situation related to cross-curricular topics (see pages 130-131).

	▪ Core lessons on estimation, as well as Problem-Solving Investigations using an estimate or exact answer, address using appropriate tools strategically (see pages 64-67 and 74-75). Students routinely consider available tools when solving problems in this feature. ▪ Clear definitions within our program along with opportunities to communicate and explain are available (see pages 557-560). Talk About It, Writing in Math, H.O.T. Problems, and Problem-Solving Skill lessons ask students to check their work, state the meaning of the symbols they choose, and give carefully formulated explanations for their work. ▪ Students begin to understand the structure of mathematics by learning the properties of numbers. They are introduced to the properties beginning with whole numbers. This forms the basis of understanding the real number system. (see pages 108-111) ▪ Previous work with patterns is extended to include repeated reasoning in multiplication and division patterns. (see pages 254-257). Students also begin work with functions by making tables, identifying patterns, and graphing simple functions on the coordinate plane. (see pages 264-265)

COMMON CORE STATE STANDARD	**5.NF.4b** Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
RATING	2
OUR RESPONSE	Standard 5.NF.4b is addressed in Lesson IN 3 Multiply Fractions on pages IN10- IN14. It is also covered in the *Math Connects to the Common Core State Standards,* Grade 5 supplement, Lesson 13 Multiply Fractions.
COMMON CORE STATE STANDARD	**5.NF.5a** Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
RATING	2
OUR RESPONSE	Standard 5.NF.5a is addressed in Lesson 3-1 on pages 103-105, Lesson 3-3 on pages 112-115, and Lesson 3-4 on pages 116-118. It is also covered in the *Math Connects to the Common Core State Standards,* Grade 5 supplement, Lesson 14 Extend: Multiplication as Scaling.
COMMON CORE STATE STANDARD	**5.NF.5b** Explaining why multiplying a given number by a fraction greater than 1 results in a product

	greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.
RATING	2
OUR RESPONSE	Standard 5.NF.5b is addressed in Lesson 3-8 on pages 132-135 and Lesson IN 3 Multiply Fractions on pages IN10-IN14. It is also covered in the *Math Connects to the Common Core State Standards,* Grade 5 supplement, Lesson 14 Extend: Multiplication as Scaling.
COMMON CORE STATE STANDARDS	**5.NF.7a** Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.*
RATING	0
OUR RESPONSE	Standard 5.NF.7a is covered in the *Math Connects to the Common Core State Standards,* Grade 5 supplement, Lesson 16 Explore: Division with Fractions and Lesson 18 Divide Unit Fractions by Whole Numbers.
COMMON CORE STATE STANDARDS	**5.NF.7b** Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for $4 \div (1/5)$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$.*
RATING	0
OUR RESPONSE	Standard 5.NF.7b is covered in the *Math Connects to the Common Core State Standards,* Grade 5 supplement, Lesson 16 Explore: Division with Fractions and Lesson 17 Divide Whole Numbers by Unit Fractions.
COMMON CORE STATE STANDARDS	**5.NF.7c** Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share ½ lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*
RATING	0
OUR RESPONSE	Standard 5.NF.7c is covered in the *Math Connects to the Common Core State Standards,* Grade 5 supplement, Lesson 16 Explore: Division with Fractions, Lesson 17 Divide Whole numbers by Unit

	Fractions, and Lesson 18 Divide Unit Fractions by Whole Numbers.

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Mc Graw Hill **School Education Group**

Bids & Contracts
PreK-12

8787 Orion Place
Columbus, OH 43240

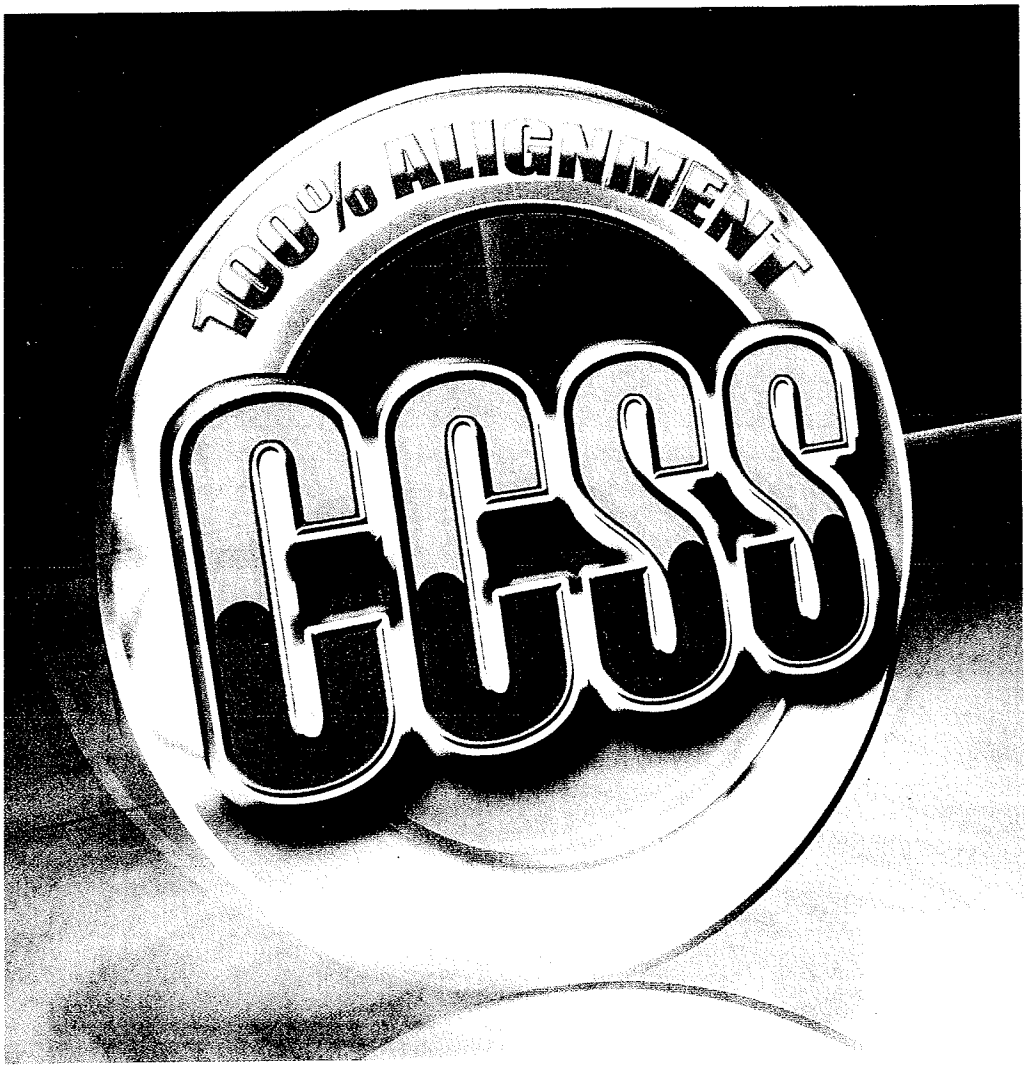
February 18, 2011

Dear Indiana Educational Reviewer:

In addition to our written comments, we are sending the following documents for your review:

- FedEx tracking information: The items required for review: core program and the new Common Core supplement. Per the memorandum dated September 16, 2010, we are providing proof of delivery for both pieces.
- *Math Connects to the Common Core State Standards,* Grades 3-5: These documents were part of our original submission (please see tracking information). Reviewers' comments appear to indicate this supplement may have been missed during the initial review.
- Log-in information to access our teacher materials for the *Math Connects to the Common Core* supplement.
    - Website: http://glencoe.com/sites/common_assets/ccss/ccss.html
    - Username: CCSS
    - Password: Benefits

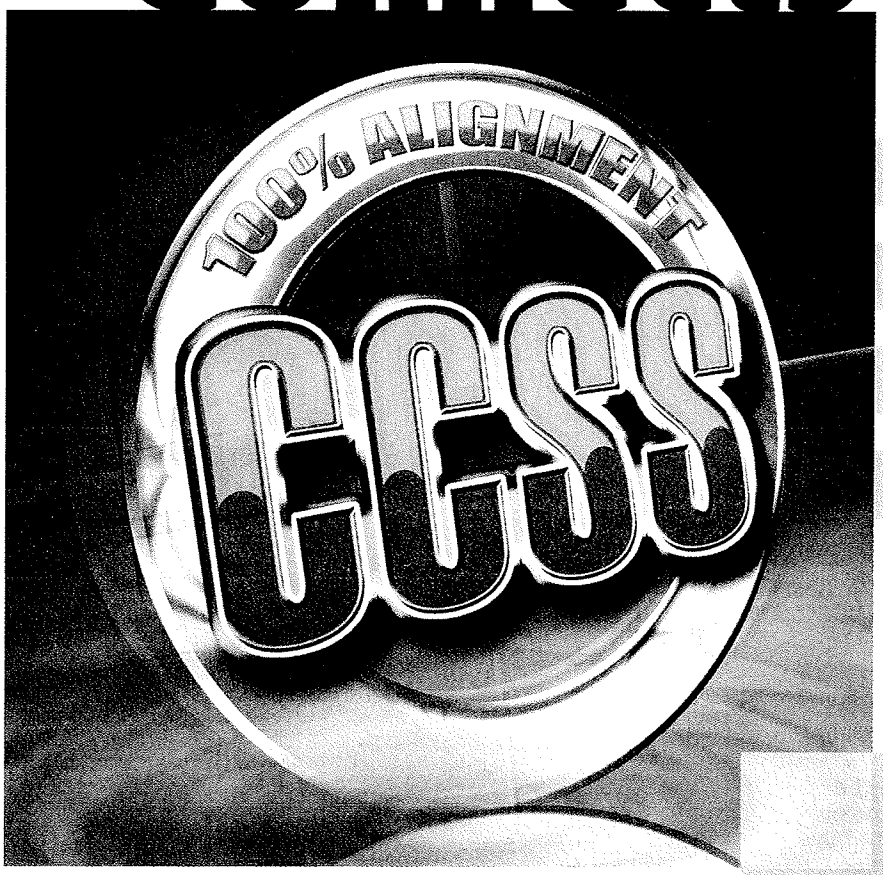
Thank you.



Mc Graw Hill

Math Connects

TO THE



COMMON

CORE

STATE

STANDARDS

Grade 3

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Columbus, OH 43240

ISBN: 978-0-02-114565-2
MHID: 0-02-114565-2

Printed in the United States of America.

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Common Core State Standards

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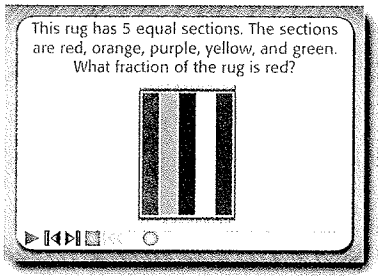

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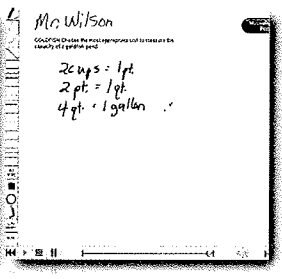
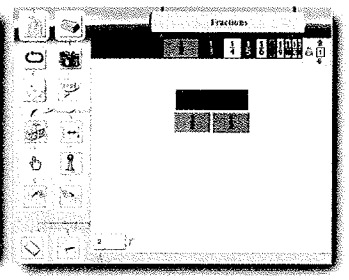


Online Student Edition



Lesson 1

Fractions as One Whole

Main Idea

I will write whole numbers as fractions.

Vocabulary

fraction

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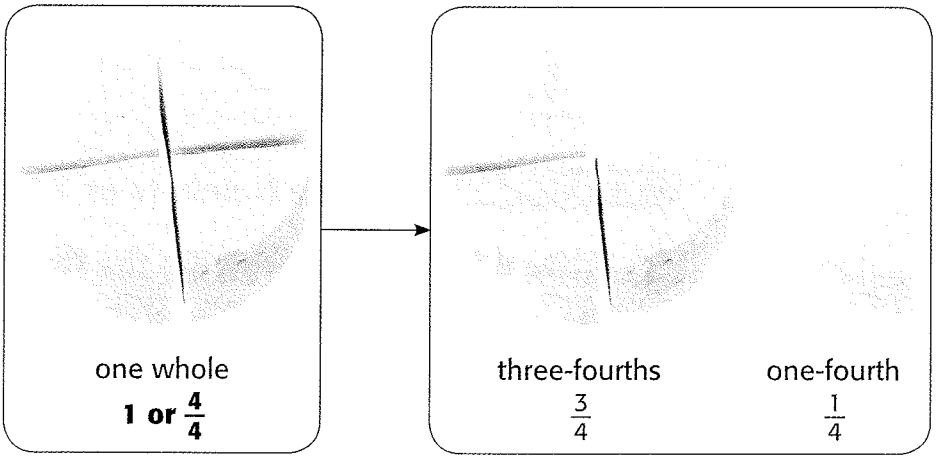
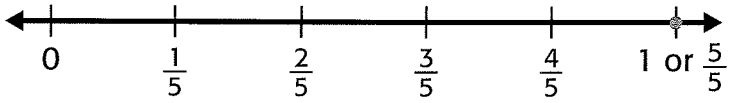
CCSS 3.NF.3.c

Whole numbers can be written as fractions. When the numerator is the same as the denominator, the fraction equals 1.





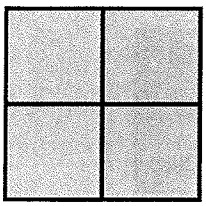
Key Concept Fractions as One Whole

$\frac{1}{1} = 1$ | $\frac{7}{7} = 1$ | $\frac{15}{15} = 1$ | $\frac{329}{329} = 1$

EXAMPLE One Whole as a Fraction

1 Write a fraction to describe the figure.

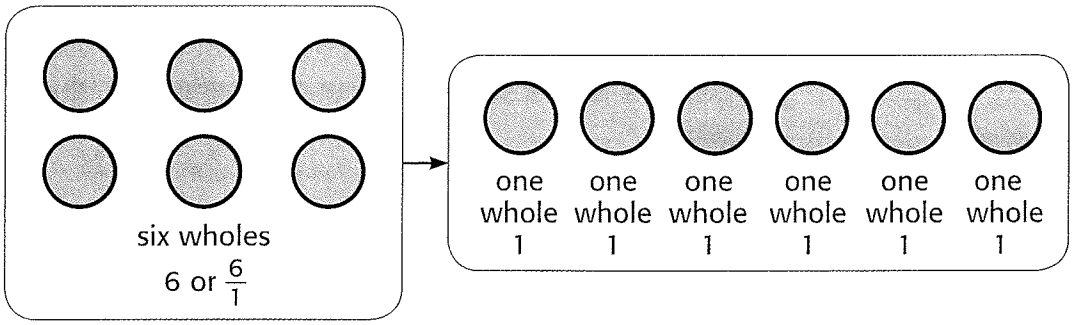
The figure shows one whole. It is divided into four equal parts, or four fourths.



$$\frac{\text{4 green parts}}{\text{4 total parts}} = \frac{4}{4}$$

So, the figure shows $\frac{4}{4}$.

When the denominator is 1, the numerator represents the number of wholes.



EXAMPLES Whole Numbers as a Fraction

2 Write a fraction to describe the figures.

The set of figures shows five wholes. Each whole is the same size.

So, the set of figures shows $\frac{5}{1}$.

3 Write 7 as a fraction.

A whole number can be written by writing the number of wholes as the numerator and 1 as the denominator.

$7 = \frac{7}{1}$

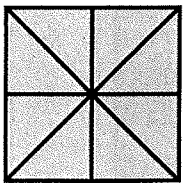
So, 7 can be written as $\frac{7}{1}$.

CHECK What You Know

Write a fraction to describe each figure or set of figures.

See Examples 1 and 2

1.



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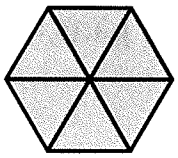

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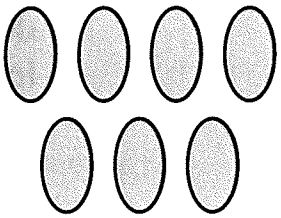


4. Write 4 as a fraction. See Example 3

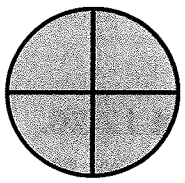
5. TALK MATH How can you tell whether $\frac{6}{1}$ is greater or less than 1?

Practice and Problem Solving

Write a fraction to describe each figure or set of figures.

See Examples 1 and 2

6.



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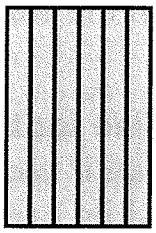

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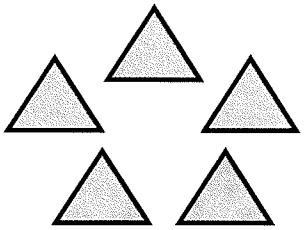

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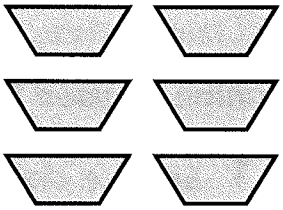

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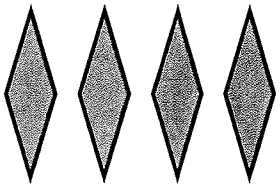

Write each number as a fraction. See Example 3

12. 8 **13.** 3 **14.** 5 **15.** 2

16. 9 **17.** 4 **18.** 7 **19.** 6

Solve.

20. Tim has $\frac{7}{1}$ magazines. He gave 4 of his magazines to Mike. How many magazines does Tim have left? Write this number as a fraction.

21. Leslie has $\frac{6}{1}$ magnets. Jolie has $\frac{3}{1}$ magnets. How many magnets do they have altogether? Write this number as a fraction.

H.O.T. Problems

22. OPEN ENDED Draw a picture that represents a whole number. Write a fraction that is greater than what the picture represents and a fraction that is less than what the picture represents.

23. WRITE MATH Write a fraction that is equivalent to 1 whole. Explain how you know it is equivalent.

Lesson 2

Time Intervals

Main Idea

I will determine the amount of elapsed time to solve problems.

Materials

2 student clocks

Vocabulary

elapsed time

Math Online

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CCSS 3.MD.1

To determine **elapsed time**, find the amount of time that passes from the start of an activity to the end of the activity.

Brooke got in line for the roller coaster at 12:20. It was 1:45 when it was her turn to ride. How much time elapsed while Brooke stood in line?

Explore Mini-Activity

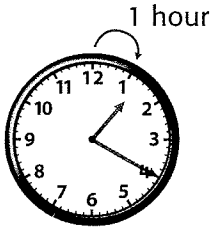
Determine Elapsed Time

Step 1 Set one clock to the start time. Write the time. Set the second clock to the end time. Write the time.

12:20

1:45

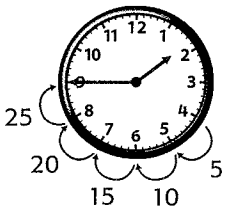
Step 2 Rotate the minute hand of the first clock. Every time the hand passes the start time, without passing the end time, count 60 minutes or one hour.



12:20

1:45

Step 3 Continue to rotate the minute hand until the time matches the end time. Count by fives. Then count on by ones, if needed.



12:20

1:45

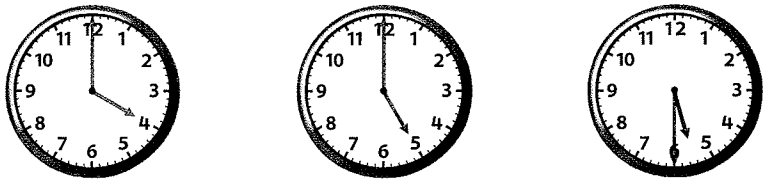
So, Brooke stood in line for 85 minutes or 1 hour and 25 minutes.

Remember

1 hour = 60 minutes

1 TRAVEL It takes Louisa one hour and 30 minutes to travel to her aunt's house. She leaves at 4:00 P.M. What time will she get to her aunt's house?

Add 1 hour and 30 minutes to 4:00 P.M.



4:00 → 5:00 → 5:30

+ 1 hour or 60 min + 30 minutes

So, Louisa will get to her aunt's house at 5:30 P.M.

2 CHOIR The clock shows the time June's choir practice started. It ended at 5:30 P.M. Find the elapsed time.

Find the elapsed time between 3:15 P.M. and 5:30 P.M.

3:15 → 4:15 → 5:15 → 5:30

1 hour + 1 hour + 15 minutes = 2 h 15 min

60 min + 60 min + 15 minutes = 135 min

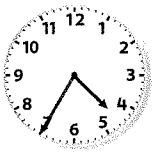
So, the elapsed time is 2 hours 15 minutes or 135 minutes.

CHECK What You Know

The following are movie times. Find the length of each movie.

See Examples 1 and 2

1. Start Time End Time



2. Start time End time

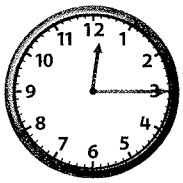
3. Jose's family went to the library at the time shown. How much time elapsed if they stayed until 4:00? See Examples 1 and 2

4. TALK MATH Lupe went to sleep at the time shown at the right and awoke at 6:30 A.M. Explain how to find how long Lupe slept. See Examples 1 and 2

Practice and Problem Solving

The following are times of baseball games. Find the length of each game. See Examples 1 and 2

5. Start Time End Time



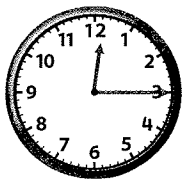
6. Start Time End Time

7. Tyrone went to the mall at 1:10. He left the mall at 4:05. How much time did he spend at the mall?

8. Serena went to the fair at 3:40. She left at 8:35. How much time did Serena spend at the fair?

Find each elapsed time. See Examples 1 and 2

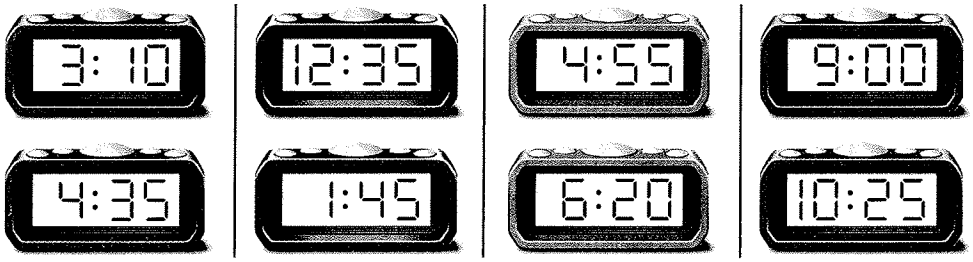
9. The clock shows when Malina began reading her book. It is 12:50 when she stops.



10. The clock shows when Chris went to the park. He stays until 5:15 P.M.

H.O.T. Problems

11. WHICH ONE DOESN'T BELONG? Which set of digital clocks does *not* show an elapsed time of 1 hour 25 minutes? Explain.



12. WRITE MATH Explain how working backward helps you find the amount of time elapsed.

Lesson 3

Solve Capacity Problems

Main Idea

I will solve problems about capacity.

Math Online

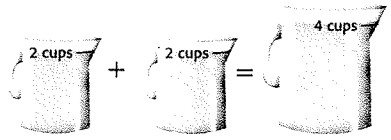
macmillanmh.com

CCSS 3.MD.2, 3.OA.3

You can solve addition, subtraction, multiplication, and division problems about capacity. Capacity can also be called *liquid volume*.

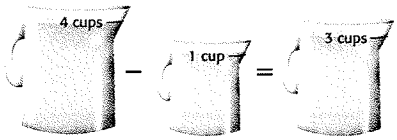
Key Concept Capacity Problems

Addition



2 cups + 2 cups = 4 cups

Subtraction

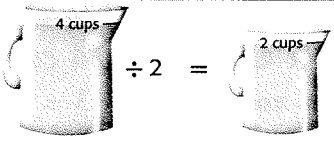


4 cups – 1 cup = 3 cups

Multiplication

1 cup × 3 = 3 cups

Division

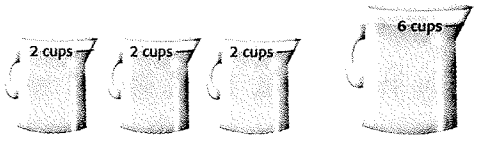


4 cups ÷ 2 = 2 cups

REAL-WORLD EXAMPLE Customary Capacity Problems

1 Find the capacity of the total amount of liquid shown in the containers.

There are 3 containers. Each container has 2 cups. So, you need to multiply 2 cups by 3.



2 cups × 3 = 6 cups

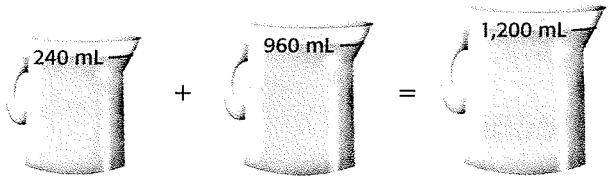
So, there are 6 cups of liquid.

You can also solve problems using metric units of capacity.

REAL-WORLD EXAMPLE Metric Capacity Problems

2 Emily has 240 mL of lemon juice. She needs to add 960 mL of water to make lemonade. How many milliliters of lemonade will she have in all?

You need to add 240 mL and 960 mL.



$$\begin{array}{r} 240 \\ +\ 960 \\ \hline 1{,}200 \end{array}$$

240 mL + 960 mL = 1,200 mL

So, Emily will have 1,200 mL of lemonade.

REAL-WORLD EXAMPLE Unknown Quantity

3 Eight containers each have the same amount of juice. There is a total of 24 cups of juice. How much juice is in each container? Write a number sentence to show the unknown quantity, or amount. Then solve.

You can use a symbol to show the unknown amount.

8 × ■ cups = 24 cups or 24 cups ÷ 8 = ■ cups

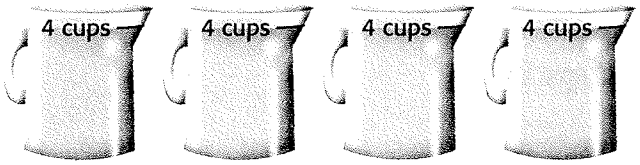
You know that 8 × 3 = 24 so 24 ÷ 8 = 3

So, there are 3 cups of juice in each container.

CHECK What You Know

Write a number sentence to solve. See Examples 1 and 2

1. Find the total capacity of the liquid shown in the containers below.



2. Mike has 134 mL of water in a vase. Suppose he adds the water shown below to the vase. How much water would be in the vase in all?

3. Ten cups of juice are divided equally in containers. Each has 5 cups. Write a number sentence to find the unknown number of containers. Then solve.

See Example 3

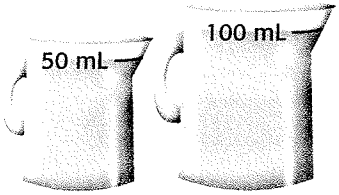
4. TALK MATH How did you know which operation to use to solve Exercise 1?

Practice and Problem Solving

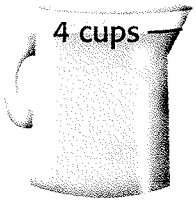
Write a number sentence to solve. See Examples 1 and 2

5. Find the total capacity of the liquid shown in the containers below.

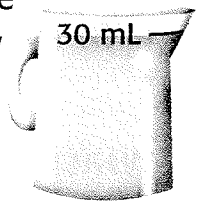
6. Find the total capacity of the liquid shown in the containers below.



7. How much liquid would be left if you poured out 3 cups?

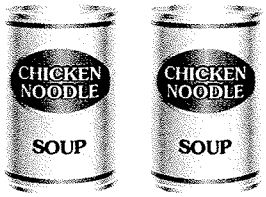


8. Suppose you pour this liquid into three containers so that each container has the same amount of liquid. How much liquid would be left in each container?

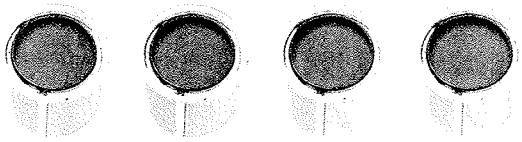


Write a number sentence to show the unknown amount. Then solve. See Example 3

9. George has the cans of soup shown. Each can has the same amount of soup. There are 4 cups of soup in all. How much soup is in each can?



10. Sue has the cans of paint shown. Each can has the same amount of paint. There are 8 gallons of paint altogether. How much paint is in each can?



Algebra Find each missing value.

11. 16 c ÷ ■ = 2 c

12. ■ gal + 22 gal = 142 gal

13. ■ mL × 4 = 36 mL

14. 132 L − ■ L = 43 L

15. Carlos has an aquarium that holds 81 liters of water. His bucket holds 9 liters of water. How many bucketfuls of water fit in the aquarium?

16. Lisa has a vase with 600 mL of water. If she pours out 254 mL of water, how much water will be left in the vase?

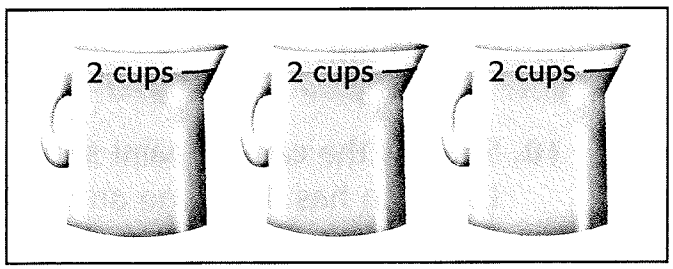
17. Tara has three buckets. Each bucket has 7 liters of water. How many liters of water does she have in all?

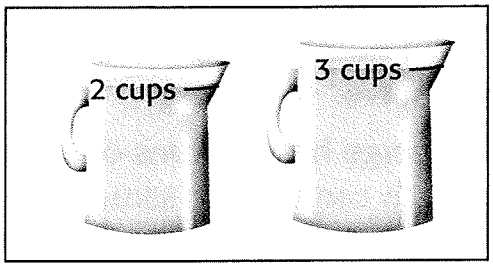
18. Sean's mother bought a gallon of milk. There are 16 cups in a gallon. If Sean and his brother each have two cups of milk a day, how many days will it take them to drink the entire container of milk?

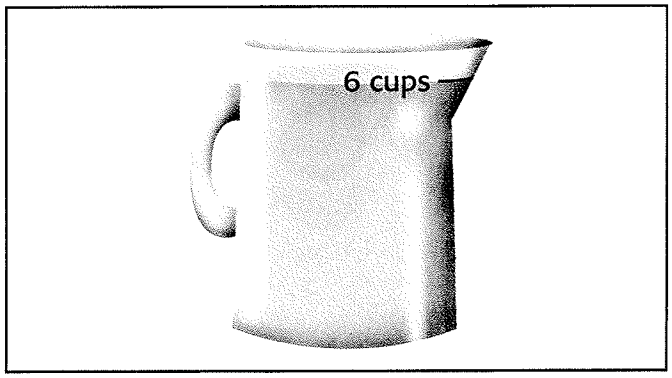
H.O.T. Problems

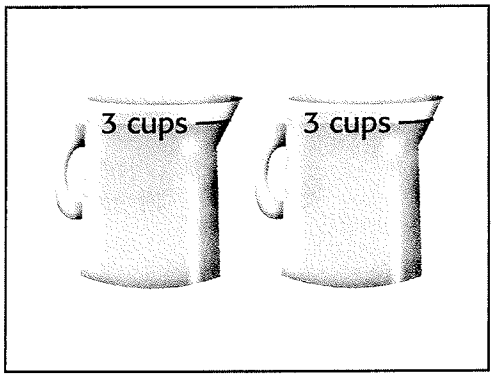
19. CHALLENGE A fish bowl holds 100 mL of water. Suppose the tank is full, and then half of the water is taken out to clean the bowl. Then, 30 mL of water is added back in. Then, half of that water is taken out. How many mL of water need to be added in order to fill the bowl?

20. WHICH ONE DOESN'T BELONG? Which set of containers does not belong? Explain.









21. OPEN ENDED Draw a picture to show a multiplication problem about capacity. Write a story to describe the picture.

22. WRITE MATH Explain why the units need to be the same when solving problems with capacity.

Lesson 4

Solve Mass Problems

Main Idea

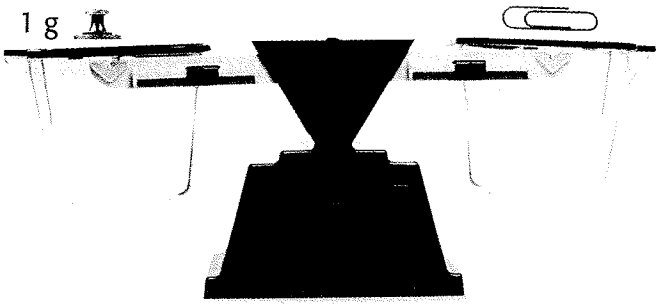
I will solve problems about mass.

Math Online

macmillanmh.com

CCSS 3.MD.2

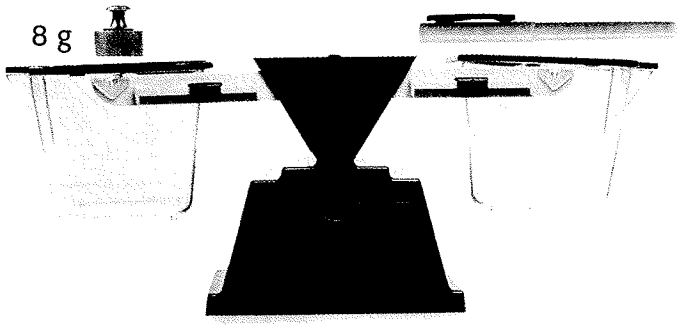
You can solve addition, subtraction, multiplication, and division problems about mass. A balance scale can be used to measure mass. On one side you can place the object whose mass you are measuring. On the other side, you can place weights measured in grams. When both sides are equal, you can see that the object has the same mass as the weights.



The balance scale shows that 1 paperclip has a mass of 1 gram.

REAL-WORLD EXAMPLE Solving Mass Problems with a Balance Scale

1 The balance scale shows the mass of one marker. What is the mass of 5 markers?



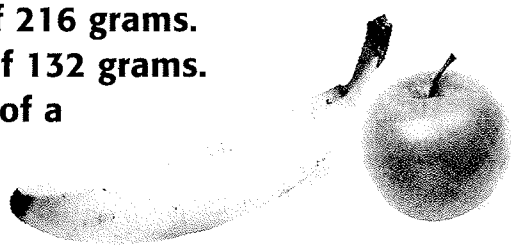
Each marker has a mass of 8 grams. So, you need to multiply 8 grams by 5.

8 grams $\times$ 5 = 40 grams

So, five markers have a total mass of 40 grams.

REAL-WORLD EXAMPLE Solving Mass Problems

2 An apple has a mass of 216 grams. A banana has a mass of 132 grams. What is the total mass of a banana and an apple?



You need to add to find the total mass.

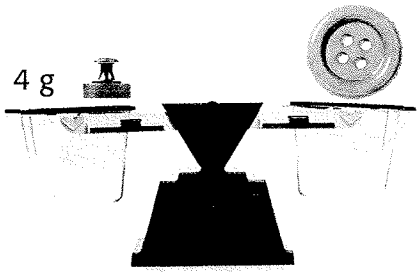
$$\begin{array}{r} 216 \\ +\ 132 \\ \hline 348 \end{array}$$

So, an apple and a banana have a total mass of 348 grams.

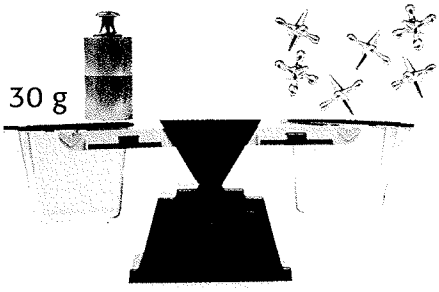
CHECK What You Know

Use the balance scale to solve. See Example 1

1. What is the mass of 9 buttons?



2. What is the mass of one jack?



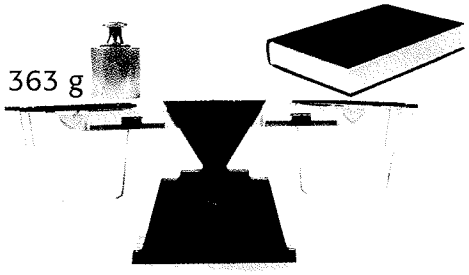
3. A student has a mass of 34 kilograms. An adult has a mass of 56 kilograms. What is the difference in mass between the student and the adult? See Example 2

4. TALK MATH How did you solve Exercise 2?

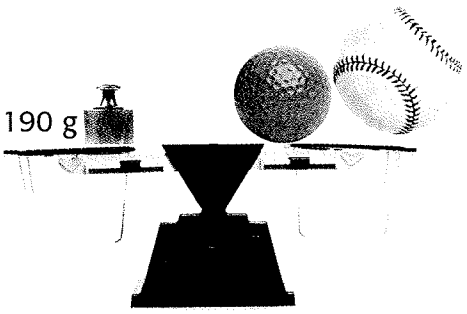
Practice and Problem Solving

Use the balance scale to solve. See Example 1

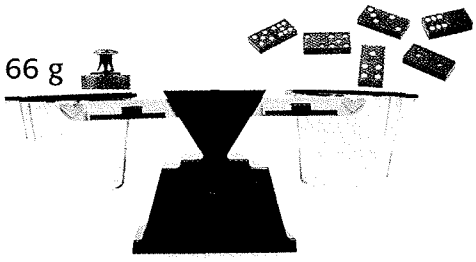
5. What is the mass of two books?



6. The golf ball has a mass of 45 grams. What is the mass of the baseball?



7. What is the mass of one domino?



Solve. See Example 2

8. A toy has a mass of 12 grams. What is the total mass of 6 of these toys?

9. A balance scale shows that two rocks have a total mass of 732 grams. When one of the rocks is removed, the balance scale shows that the remaining rock is 428 grams. What is the mass of the rock that was removed from the scale?

Algebra

10. ■ g × 9 = 63 grams

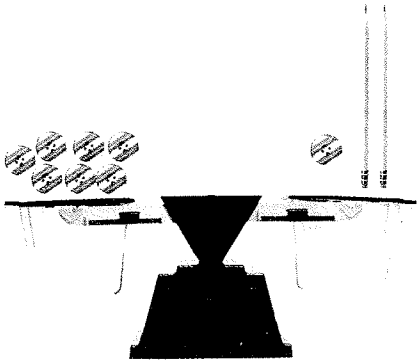
11. 392 kg + ■ kg = 523 kg

12. 932 g − ■ grams = 149 g

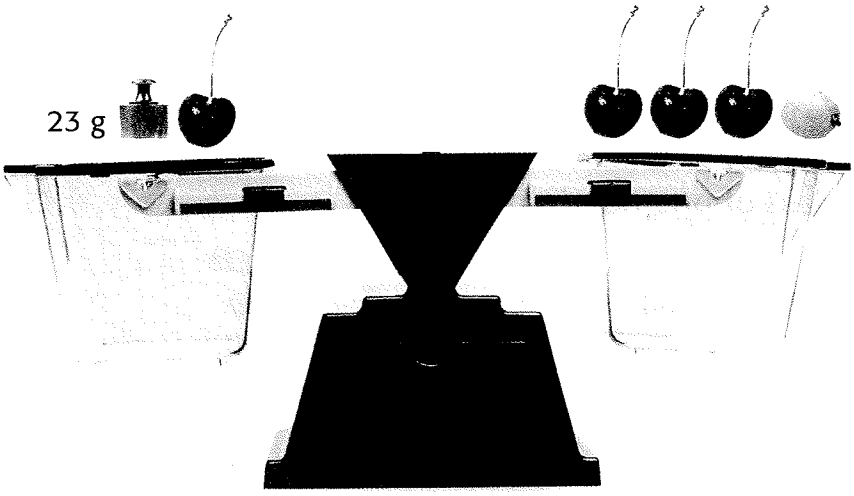
13. 60 kg ÷ ■ = 5 kg

H.O.T. Problems

14. CHALLENGE One button has a mass of 3 grams. What is the mass of one pencil?



15. WHICH ONE DOESN'T BELONG? The mass of each cherry shown below is 8 grams. Use the balance scale below to find the sentence that does not belong. Explain.



the mass of 1 cherry = the mass of one grape + 1 gram
the mass of 2 cherries = 16 grams
the mass of 1 cherry = the mass of one grape
the mass of 1 cherry + 4 grams = 12 grams

16. WRITE MATH Write a problem about mass. Have a classmate solve the problem. Check their work.

Lesson 5

Gather Measurement Data

Main Idea

I will gather measurement data in fractions of an inch and display it in a line plot.

Math Online

macmillanmh.com

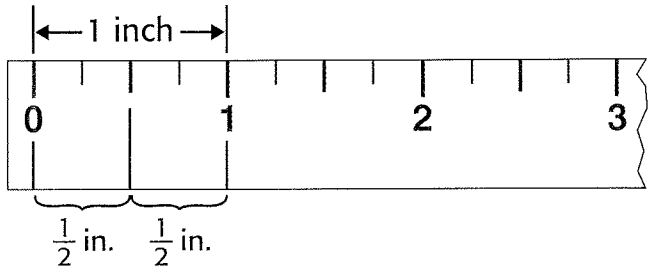
CCSS 3.MD.4

You can gather measurement data by finding the length of several objects. The data collected can be useful.

REAL-WORLD EXAMPLE **Measurement Data**

1 Gather, Organize, and Display Data

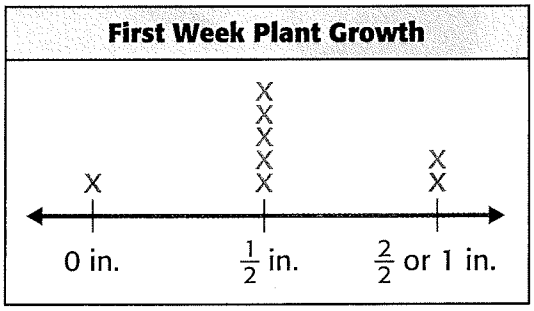
Step 1 Marilyn measured plant growth to the nearest half inch.



Step 2 Marilyn organized the data she collected in a tally chart.

Plant Growth	
0 in.	I
$\frac{1}{2}$ in.	~~IIII~~
$\frac{2}{2}$ or 1 in.	II

Step 3 Marilyn made a line plot to show the data she collected. What is the most frequent length the plants grew?

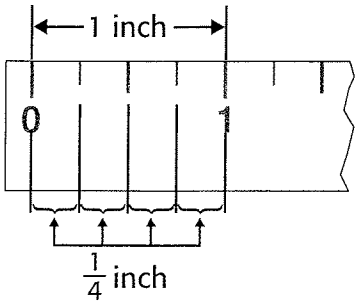


There are more Xs above the half-inch mark on the number line.

So, more plants grew $\frac{1}{2}$ inch the first week.

You can also measure objects to the nearest quarter inch. This allows you to be even more precise with your measurement.

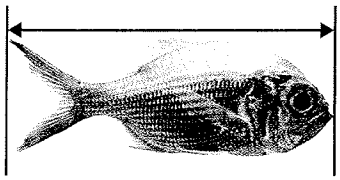
Count the spaces, not the lines. There are four $\frac{1}{4}$ **inches** in 1 inch.



REAL-WORLD EXAMPLE

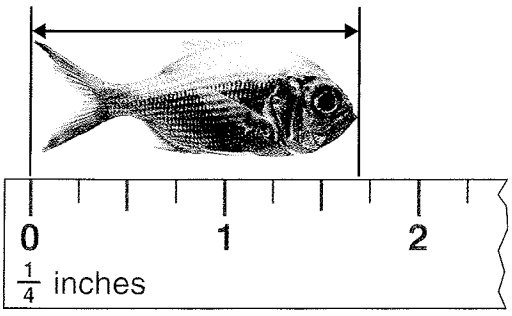
Measurement Data to the Quarter Inch

2 Measure the length to the nearest quarter inch.



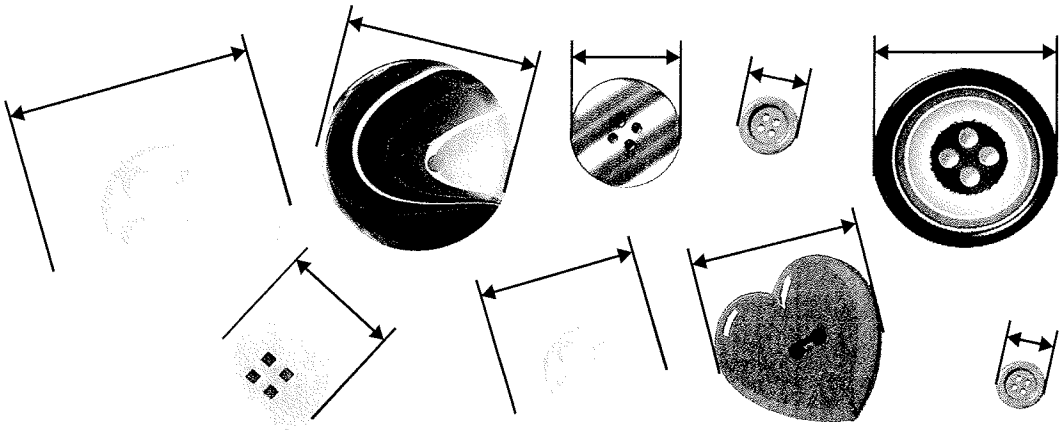
Step 1 Estimate the length of the rockfish to the nearest $\frac{1}{4}$ inch.

Step 2 Measure to find the nearest $\frac{1}{4}$-inch mark at the other end of the fish. How close was your estimate to the actual length? To the nearest $\frac{1}{4}$ inch, this fish is $1\frac{3}{4}$ inches in length.



✓ CHECK What You Know

1. Measure the buttons below to the nearest half inch. Organize the data in a tally chart, and then display it in a line plot. See Example 1

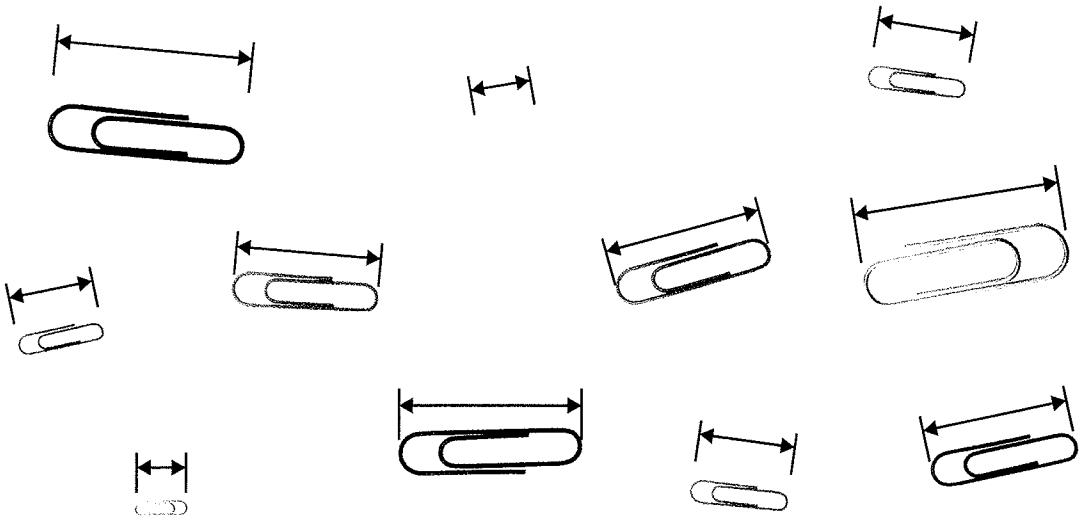


2. In what kind of a real-world situation could the data you collected in Exercise 1 be useful?

3. TALK MATH How different would the data be if the measurements taken in Exercise 1 were to the nearest inch, instead of half inch?

Practice and Problem Solving

4. Measure the selection of paper clips to the nearest quarter inch. Organize the data in a tally chart, and then display it in a line plot. See Example 1



5. Which length of paper clips are shown the least?

6. What do the numbers on your line plot represent?

For Exercises 7–8, gather the measurement data, organize it in a tally chart, and then display it in a line plot. See Example 1

7. Measure several friends' pencils to the nearest inch. What is the difference in length between the longest and shortest pencil?

8. Measure to the nearest $\frac{1}{4}$ inch, 12 small objects in your classroom that are 2 inches or shorter in length.

9. Write a question about the data you collected in Exercise 7. Ask a classmate to answer it.

10. Write an *answer* for the data you collected in Exercise 8. Ask a classmate to write a *question* for the answer.

H.O.T. Problems

11. OPEN ENDED How are a ruler and the number line of a line plot similar?

12. WRITE MATH Explain how you know which numbers to put on the number line of a line plot.

Lesson 6

Explore Use a Formula to Find Area

Main Idea

I will explore the formula for area.

Math Online

macmillanmh.com

You have found the area of figures by counting the square units. A **formula** can also be used to find area.

ACTIVITY

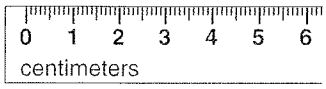
CCSS 3.MD.7.a

Find a formula for area.

Materials

centimeter cubes

centimeter ruler



sticky notes

box

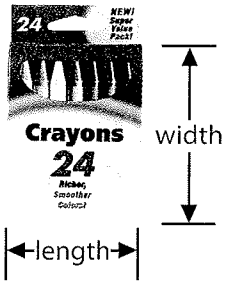
Step 1 Make a table.

Copy the table below to record your findings.

Object	Length	Width	Area
sticky note			
box			
book			

Step 2 Measure the length and width of each object.

Use the centimeter ruler to measure the length and width of each object.



Step 3 Find the area of each object.

Cover each object with the centimeter cubes. Then count the cubes to find the area.

Step 4 Use a formula to find the area.

Use the data to find how length and width relate to area.

Think About It

1. What operation can you use with the length and width to equal the area?
2. What is the formula for the area of a rectangle?

Lesson 7

Find the Area of Rectangles

Main Idea

I will use the area formula to find the area of rectangles.

Vocabulary

square units

formula

Math Online

macmillanmh.com

CCSS 3.MD.7.b, 3.MD.7.c

Area is the number of square units needed to cover a region or figure without any overlap. It is measured in **square units**. To find the area, you can count the square units, or you can use a **formula**. The formula for the area of a rectangle is length times width. $A = \ell \times w$

REAL-WORLD EXAMPLE

1 **The Perez family wants to put a sandbox in their backyard. The length is 12 ft. The width is 5 ft. What is the area of the bottom of the sandbox?**

One Way: Formula

Multiply the length by the width to find the area.

A = length × width

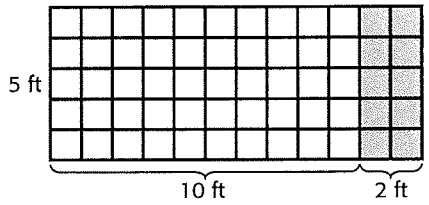
$A = \ell \times w$

A = 12 ft × 5 ft

A = 60 square ft

Another Way: Distributive Property

You can break the rectangle into two parts so that the numbers are easier to multiply. Find the areas of both parts, and then add the parts together.



A = 12 ft × 5 ft

A = (10 ft × 5 ft) + (2 ft × 5 ft)

A = (50 square feet) + (10 square feet)

A = 60 square feet

You can also see that there are 60 squares.

So, the area of the sandbox is 60 square feet.

When finding the area of a large object, you may want to use the area formula instead of counting squares.

EXAMPLE Area of a Rectangle

2 **PHOTOS Judie is hanging the photo at the right on a wall. How much wall space will the photo need?**

Use the area formula.

A = length × width

A = 7 inches × 5 inches

A = 35 square inches

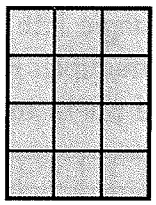
The photo will need 35 square inches of wall space.

CHECK What You Know

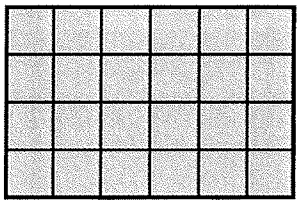
Find the area of each rectangle. See Examples 1 and 2

1.

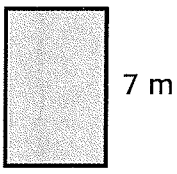
2.



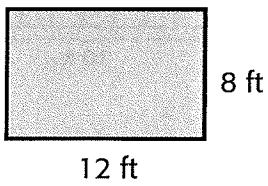
3.



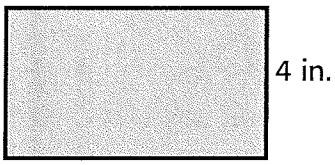
4.



5.



6.



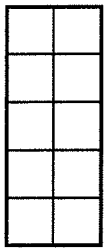
7. Mrs. Cole is buying a cover for her swimming pool. The pool's sides are 12 and 9 feet in length. What must be the area of the pool cover?

8. **TALK MATH** How would you find the area of a rectangle that has sides that are 18 and 32 units long? Explain.

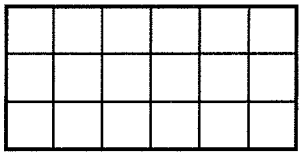
Practice and Problem Solving

Find the area of each rectangle. See Examples 1 and 2

9.



10.



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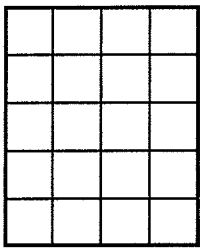

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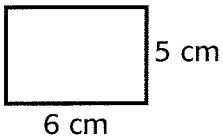

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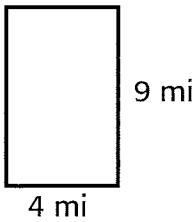
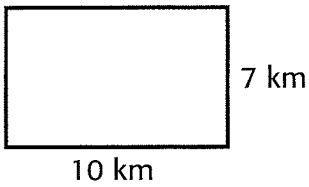


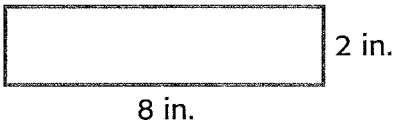
14.



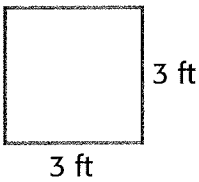
15. Ricky's computer monitor is a rectangle. The side lengths are 12 and 8 inches. What is the area of the monitor?

16. A rectangular garden is 4 meters by 6 meters. A bag of soil covers 12 square meters and costs $7. Find the total cost of covering the garden with soil.

17. Steve drew a rectangle that has a length of 7 inches and a width of 3 inches. Sarah drew the rectangle below. Which rectangle has a greater area?



18. Tiles cost $8 per square foot. How much will it cost to tile the table top shown below?



H.O.T. Problems

19. OPEN ENDED Draw a rectangle with an area of 24 square units.

20. WRITE MATH Explain why two rectangles could each have an area of 12 square units, but have different lengths and widths.

Lesson 8

Identify Categories of Quadrilaterals

Main Idea

I will categorize quadrilaterals by the attributes they share.

Vocabulary

rhombus
parallelogram
trapezoid

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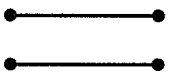
CCSS 3.G.1

All quadrilaterals have 4 sides and 4 angles.

Some quadrilaterals have two sets of sides that are parallel, or equal distance apart.



parallel line segments

These quadrilaterals are called parallelograms.

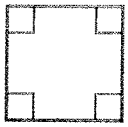
parallelogram

- opposite sides are the same length and are parallel
- opposite angles are the same

Key Concept Quadrilaterals

square

- 4 sides of equal length
- opposite sides are parallel
- 4 right angles

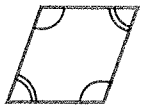


rectangle

- opposite sides of equal length.
- opposite sides are parallel
- 4 right angles

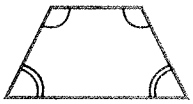
rhombus

- 4 sides of equal length
- opposite sides are parallel
- opposite angles are the same



trapezoid

- one pair of parallel sides



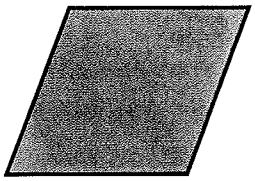
The square, rectangle, and rhombus are quadrilaterals that are also parallelograms.

The trapezoid is a quadrilateral but is *not* a parallelogram. Explain why.

The shared attributes of quadrilaterals help categorize, or group, them into smaller categories.

EXAMPLE Describe and Categorize Shapes

1. **Use the shape's attributes. Categorize the shape in as many ways as possible by describing it as a square, rectangle, rhombus, trapezoid, quadrilateral, or parallelogram.**



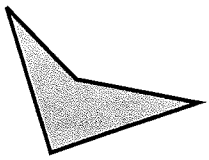
The shape has 4 sides of equal length. Its opposite sides are parallel. Its opposite angles are the same.

So, the shape is a rhombus, quadrilateral, and parallelogram.

EXAMPLE Draw Quadrilaterals

2. **Draw a quadrilateral that does not belong in any other category.**

The shape has four sides. Opposite sides are not equal length or parallel. Its opposite angles are not the same.



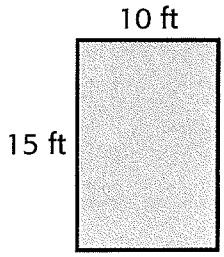
This is a quadrilateral and does not belong in any other category.

CHECK What You Know

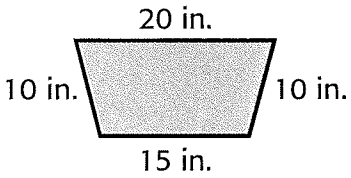
Categorize each shape in as many ways as possible. See Examples 1 and 2

square rectangle rhombus trapezoid parallelogram quadrilateral

1.



2.



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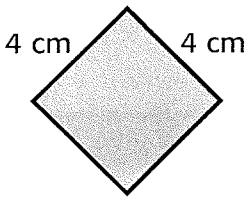


4. Kaila is thinking of a quadrilateral. Its opposite sides are parallel and the same length. There are four right angles. Draw and name the quadrilateral. See Example 1 and 2

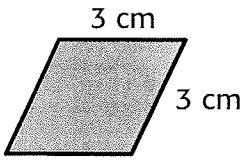
5. TALK MATH Describe how a square and a rectangle are alike and different.

Practice and Problem Solving

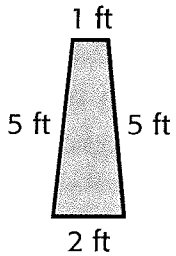
Categorize each shape in as many ways as possible. See Examples 1 and 2

square rectangle rhombus trapezoid parallelogram quadrilateral

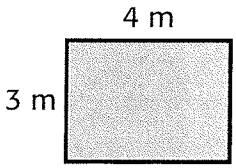
6.



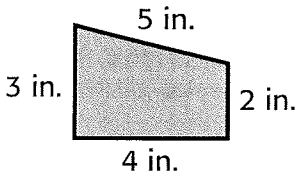
7.



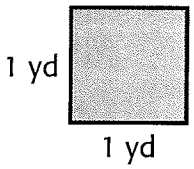
8.



9.



10.



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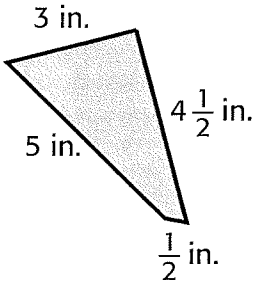


Draw each quadrilateral. See Example 2

12. Draw a quadrilateral that does not belong to any category of quadrilaterals.

13. Draw a shape that is a quadrilateral but is not a parallelogram.

Draw and name each quadrilateral. See Example 2

14. This quadrilateral has two pairs of parallel sides of the same length and no right angles.

15. This quadrilateral has opposite sides that are parallel and four right angles. Two sides are longer than the other two sides.

H.O.T. Problems

16. OPEN ENDED Draw and identify a quadrilateral that has opposite sides that are the same length and opposite angles that are the same.

17. WRITE MATH Describe how a parallelogram and a square are alike and how they are different.

Lesson 1

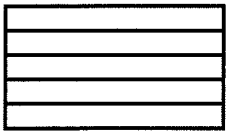
Name _____ Date _____

Homework Practice

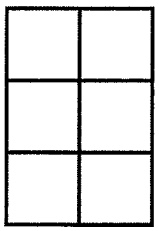
Fractions as One Whole

Write a fraction to describe each figure.

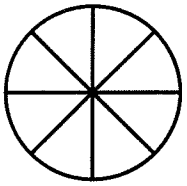
1. _____



2. _____

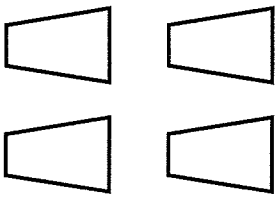


3. _____

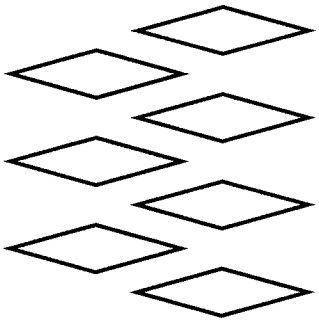


Write a fraction to describe each set of figures.

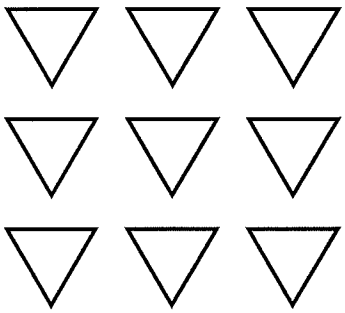
4. _____



5. _____



6. _____



Solve.

7. Robert had 14 crayons. He used 8 crayons to draw a picture. How many crayons were not used to draw a picture? Write this number as a fraction.

_____

8. Toni has $\frac{33}{1}$ eggs. If she cracks 16 of them, how many will she have left?

_____

9. Draw a picture that represents $\frac{6}{1}$.

10. Draw a picture that represents $\frac{4}{4}$.

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Lesson 2

Name _____ Date _____

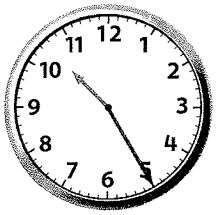
Homework Practice

Time Intervals

The following are times of activities. Find the length of each activity.

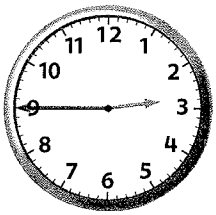
1. Start: 6:15 End: 7:50 _____
2. Start: 4:45 End: 8:00 _____
3. Start: 10:10 End: 12:05 _____
4. Start: 3:30 End: 9:05 _____

Find each elapsed time.

5. 

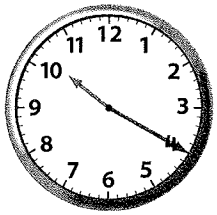
What time will it be in 45 minutes?

_____

6. 

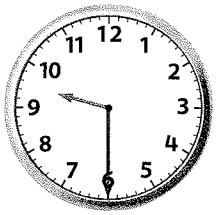
What time will it be in 4 hours and 15 minutes?

_____

7. 

What time will it be in 9 hours and 10 minutes?

_____

8. 

What time will it be in 3 hours and 50 minutes?

_____

Spiral Review

Use any strategy to solve each problem.

9. Pumpkins cost $2 each. Erika paid the cashier $10 and received $6 in change. How many pumpkins did Erika buy?

_____

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Lesson 3

Name _____ Date _____

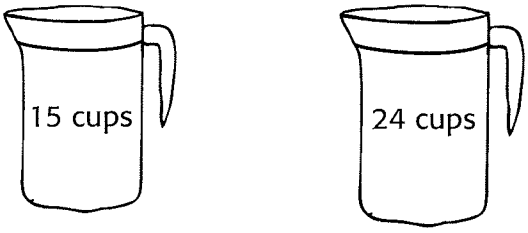
Homework Practice

Solve Capacity Problems

Solve.

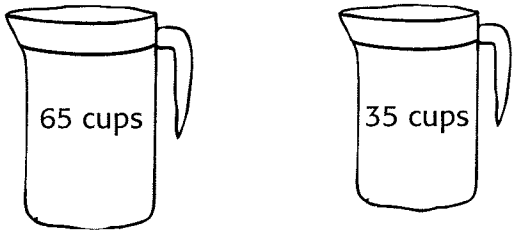
1. Find the total capacity of the liquid shown in the containers below.

_____



2. Find the total capacity of the liquid shown in the containers below.

_____



3. Janine is making fizzy fruit punch for her party. She mixes 19 cups of fruit juice with 6 cups of soda. How many cups of punch will she make? _____

4. Dominique took 6 liters of water to her soccer practice. The team drank the amount shown below. How much water did she have left? _____

5. Franklin has a cooler that will hold 20 liters of sports drink. How many 2 liter bottles of sports drink will he need to buy to fill the cooler?

_____

6. Trina is helping her dad paint their house. They need 2 gallons of paint for each room. There are 6 rooms in the house. How many gallons of paint do they need?

_____

Algebra Find each missing value.

7. 18 c ÷ ■ = 6 c

8. ■ gal + 41 gal = 153 gal

9. ■ mL × 7 = 56 mL

10. 129 L − ■ L = 13 L

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Lesson 4

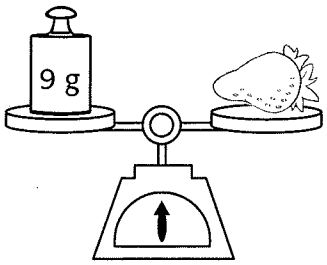
Name _____ Date _____

Homework Practice

Solve Mass Problems

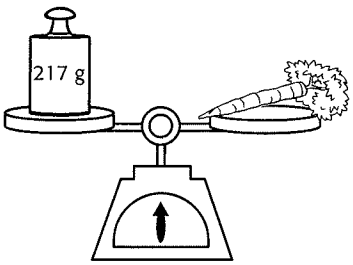
1. What is the mass of 6 strawberries?

_____



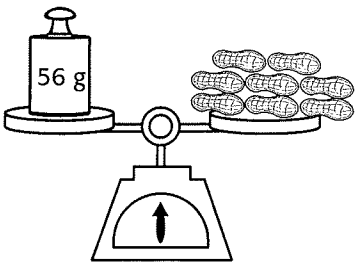
2. What is the mass of two carrots?

_____



3. What is the mass of one peanut?

_____



4. A bakery sold a large blueberry muffin that has a mass of 137 grams and a small blueberry muffin that has a mass of 88 grams. What is the difference of mass between the large muffin and the small muffin?

_____

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Lesson 5

Name _____ Date _____

Homework Practice

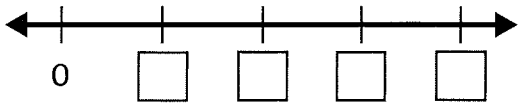
Gather and Display Measurement Data

Represent the following data in a tally chart; then in a line plot.

1. The data represents the length of a handful of broken pretzel sticks in fractions of an inch:

$$\frac{1}{4}, \frac{2}{4}, \frac{2}{4}, \frac{3}{4}, \frac{1}{4}, \frac{3}{4}, \frac{2}{4}, \frac{3}{4}, \frac{1}{4}, \frac{4}{4}, \frac{1}{4}, \frac{2}{4}$$

_____



Solve.

2. For which two lengths are there the same number of pretzel sticks? How do you know?

_____

_____

_____

_____

3. Do more or less than half of the pretzel sticks measure half of an inch or shorter? Explain.

_____

_____

_____

_____

4. Write your own question for the data in the line plot above. Then answer it.

_____

_____

Homework Practice

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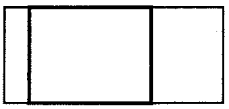
Lesson 7

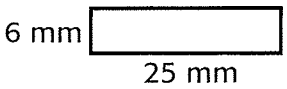
Name _____ Date _____

Homework Practice

Find the Area of Rectangles

Find the area of each rectangle.

1. 

2. 

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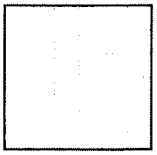
Use the grid to draw each of the following rectangles. Then find the area.

3. length: 2 units; width: 6 units



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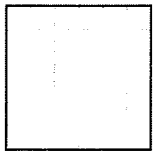
4. length: 3 units; width: 4 units



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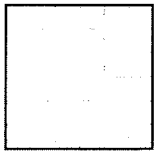
5. length: 5 units; width: 3 units



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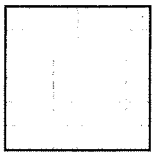
6. length: 4 units; width: 6 units



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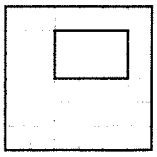
Spiral Review

Find the area of each figure.

7. 

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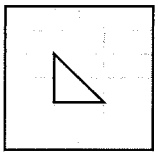
8. 

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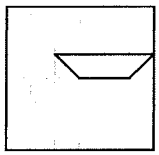
9. 

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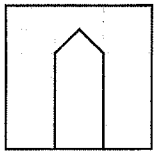
10. 

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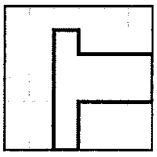
11. 

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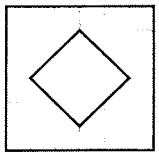
12. 

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Name _____ Date _____

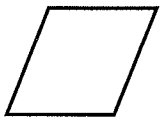
Homework Practice

Identify Categories of Quadrilaterals

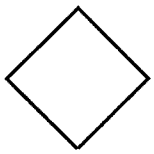
Check the boxes to categorize each shape in as many ways as possible.

1.

- ☐ quadrilateral
- ☐ parallelogram
- ☐ square
- ☐ rectangle
- ☐ rhombus
- ☐ trapezoid

2. 

- ☐ quadrilateral
- ☐ parallelogram
- ☐ square
- ☐ rectangle
- ☐ rhombus
- ☐ trapezoid

3. 

- ☐ quadrilateral
- ☐ parallelogram
- ☐ square
- ☐ rectangle
- ☐ rhombus
- ☐ trapezoid

Complete the table. Check the attributes that describe each shape every time.

	Four sides	Four right angles	Sides all the same length	Both pairs of opposite sides are equal length	Both pairs of opposite sides are parallel
4. Quadrilateral					
5. Parallelogram					
6. Square					
7. Rectangle					
8. Rhombus					
9. Trapezoid					

Solve.

10. Draw a quadrilateral that is a parallelogram but is not a rectangle.

11. Draw a quadrilateral that is not a parallelogram.

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