Home Link 7-14

NAME DATE TIME

Fraction Operations; Applications

Think back to how you learned to ride a bike as a child. What if you were allowed to practice only on a stationary bike rather than a real one? When you finally ventured out onto the neighborhood streets expecting to ride like a pro, you would probably be disappointed! Without an opportunity to apply what you learned to a real-world situation, you would never have to apply the brakes going down a hill or maneuver around a sharp curve. Likewise, if students aren't given a chance to apply what they learn in mathematics to real-world situations, it may seem to them like useless knowledge. To help make mathematics more meaningful to students, Unit 8 asks them to apply what they have learned throughout the year to real-world problems.

Fraction Operations

This year students have explored adding, subtracting, and multiplying fractions. In Unit 8 they will apply fraction and mixed-number operations to help them solve real-world problems involving the perimeter and area of rectangles and units of measure. For example, students will use the relationship between perimeter and area to find the missing side length of a fence or determine the fractional amounts of juice needed to make fruit punch.

Angle Applications

Angles play important roles in many real-life situations, including carpentry, measuring the angles of the sun, and many sports. Lesson 8-2 uses hockey to demonstrate real-world applications of students' knowledge of angles. For instance, when a hockey player wants to pass the puck and an opponent is blocking the path, the passer hits the puck off the boards at an angle, causing the puck to travel around the opponent. This is called "banking the puck." In Lesson 8-2 students also use what they have learned about angles to explore the role angles play in our field of vision, which is the angle that includes the area that can be seen without moving the head or eyes.

More Applications

In Lesson 8-4 students apply their knowledge of symmetry to quilting patterns and then create their own quilt based on specified numbers of lines of symmetry. In Lesson 8-5 students use real-world data about envelope sizes from the U.S. Postal Service to create line plots. They then answer questions about the data by adding and subtracting fractions. In Lesson 8-12 students use their knowledge of place value, addition, and subtraction to solve challenging puzzles called cryptarithms. In Lesson 8-13 students find equivalent names for numbers.

Please keep this Family Letter for reference as your child works through Unit 8.

Vocabulary

Important terms in Unit 8:

equivalent names Different ways of naming the same number. For example, $2 + 6$, $4 + 4$, $12 - 4$, $18 - 10$, $100 - 92$, $5 + 1 + 2$, eight, VIII, and 𝍸 /// are all equivalent names for 8.

fluid ounce (fl oz) A U.S. customary unit of volume or capacity equal to $\frac{1}{16}$ of a pint, or about 29.6 milliliters.

Do-Anytime Activities

To work with your child on concepts taught in this unit, try these activities:

1. Have your child complete number puzzles found in newspapers, magazines, or online. Discuss with your child how he or she found the solutions.
2. Ask your child to measure a rectangular object such as an envelope, notebook, or room in your home. Have him or her find both the perimeter and the area of the object and then compose a word problem about the measurements.
3. Ask your child to point out items that he or she believes are symmetrical. How many lines of symmetry are there in those items?
4. Have your child point out angles in your home and estimate their measures. Ask your child to add angles together or find missing angles based on these estimates.
5. Show your child a food or beverage container and have him or her locate the liquid volume and convert it to a smaller unit. For instance, a juice box might hold 1 cup of juice, which means it holds 8 fluid ounces of juice.

Building Skills through Games

In Unit 8 students play the following game to increase their understanding of numbers and the properties of numbers. For detailed instructions, see the *Student Reference Book*.

Name That Number See *Student Reference Book*, page 268. This game provides practice representing numbers in different ways, using any or all of the four operations: addition, subtraction, multiplication, and division.

As You Help Your Child with Homework

As your child brings assignments home, you may want to go over instructions together, clarifying them as necessary. The answers listed below will guide you through the Home Links in Unit 8.

Home Link 8-1

1. Team B's car; 27 cm
3. 180 cm
5. 2,833 R1
7. 715 R3

Home Link 8-2

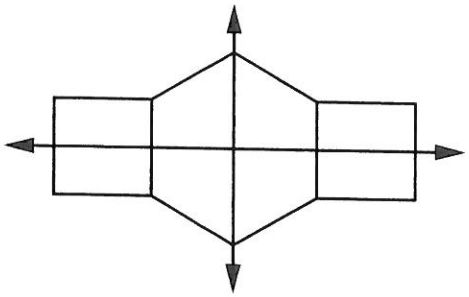
1. 165°; $82° + 83° = f$
3. 87°; $3° + w = 90°$
5. 137°; $180° - 43° = s$
7. $\frac{5}{3}$, or $1\frac{2}{3}$
9. $\frac{11}{5}$, or $2\frac{1}{5}$

Home Link 8-3

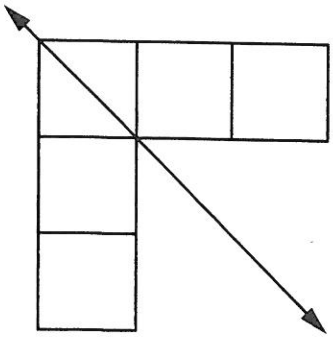
1. 60°; Sample answers: $30° + 30° = 60°$; The measure of each small white rhombus angle is 30°, so two of them make 60°.
3. 16,764
5. 4,888

Home Link 8-4

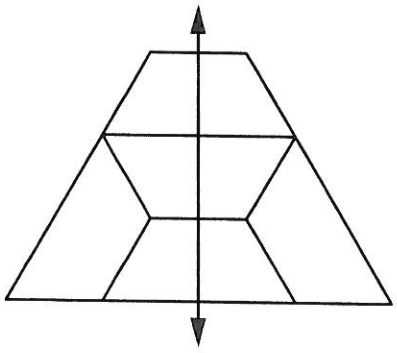
1.



3.

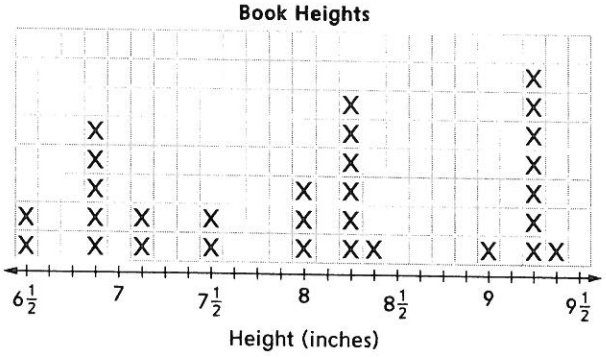


5. 1 line of symmetry;



7. $\frac{30}{6}$, or 5
9. $\frac{28}{10}$, or $2\frac{8}{10}$

Home Link 8-5



1. $2\frac{7}{8}$ in.
3. 1,172 R3

Home Link 8-6

1. $7\frac{2}{6}$ yd
3. Width = $\frac{12}{100}$ km
5. Width = $2\frac{3}{10}$ cm
7. $\frac{4}{3}$, or $1\frac{1}{3}$
9. $\frac{36}{5}$, or $7\frac{1}{5}$

Home Link 8-7

1. 3.26 kilograms; Sample answer: I thought about what number added to 4 would give me $7\frac{26}{100}$. First I added 3 to get 7. Then I added $\frac{26}{100}$ to get $7\frac{26}{100}$. Finally, $3 + \frac{26}{100} = 3\frac{26}{100} = 3.26$
3. 7.8 cm; Sample answer: $11.4 = 11\frac{4}{10}$ and $3.6 = 3\frac{6}{10}$; $11\frac{4}{10} = 10 + \frac{10}{10} + \frac{4}{10} = 10\frac{14}{10}$; $10\frac{14}{10} - 3\frac{6}{10} = 7\frac{8}{10} = 7.8$
5. 14,316
7. 2,016

Home Link 8-8

1. **a.** $4\frac{1}{12}$ square feet **b.** $12\frac{8}{12}$ feet
2. **a.** $5\frac{6}{12}$ square feet **b.** $6\frac{4}{12}$ feet
3. $8\frac{4}{10}$ square inches
5. $\frac{4}{6}$
7. $\frac{4}{10}$

Home Link 8-9

1. $5\frac{1}{4}$ feet; Sample answer: $3 * 1\frac{3}{4} = (3 * 1) + (3 * \frac{3}{4}) = 3 + \frac{9}{4} = 3\frac{9}{4}$, or $5\frac{1}{4}$
2. Yes. Sample answer: $(5 * 1\frac{1}{2}) + (4 * 1\frac{3}{4}) = 5\frac{5}{2} + 4\frac{12}{4} = 7\frac{1}{2} + 7 = 14\frac{1}{2}$
3. $\frac{6}{6}$, or 1
5. $\frac{54}{100}$

Home Link 8-10

1. Rule: * 8

in (gallons)	out (pints)
2	16
$3\frac{1}{2}$	28
6	48
$7\frac{1}{4}$	58
10	80

3. **a.** Yes. Sample answer: The total amount of all the ingredients combined is 18 fluid ounces, so the smoothie will fit in the 24-fluid ounce glass.
   b. $\frac{3}{4}$ cup
   c. $2\frac{1}{4}$ cups orange juice; 12 fluid ounces cold water; 3 cups vanilla ice cream
   d. 54 fluid ounces
5. 1,859
7. 519

Home Link 8-11

1. **a.** $3\frac{1}{8}$ pounds; Sample answer: $(1\frac{1}{2} + \frac{1}{2}) + (\frac{3}{4} + \frac{1}{4}) + \frac{1}{8} = 2 + 1 + \frac{1}{8} = 3\frac{1}{8}$
   b. 50 ounces; Sample answer: One pound equals 16 ounces; $\frac{1}{8}$ of a pound = 2 ounces; so $(3 * 16) + 2 = 48 + 2 = 50$
   c. 2 packages; Sample answer: 1 of each size uses 50 ounces, so 2 of each size would use $2 * 50 = 100$ ounces. $100 > 80$, so 1 package isn't enough.
2. $1\frac{2}{8}$, or $1\frac{1}{4}$ pounds; Sample answer: $(\frac{1}{8} + \frac{1}{8}) + (\frac{1}{4} + \frac{3}{4}) = \frac{2}{8} + 1 = 1\frac{2}{8}$, or $1\frac{1}{4}$
3. 15,321
5. 2,146

Home Link 8-12

1. Sample answer: $973 + 51 = 1{,}024$
3. $80 * 64 = 5{,}120$
5. **a.** 27; $9 * 3 = 27$ **b.** $\frac{1}{3}$; $3 / 9 = \frac{1}{3}$
7. $4\frac{10}{8}$, or $5\frac{2}{8}$
9. $10\frac{181}{100}$, or $11\frac{81}{100}$

Home Link 8-13

1. Sample answers:

9,990
2,016 + 7,974
(1,427 * 7) + 1
1,665 * 6
9,000 + 900 + 90
13,558 − 3,568

3. Answers vary.
5. $3\frac{2}{4}$
7. $2\frac{8}{12}$

Multistep Number Stories

Home Link 8-1

NAME DATE TIME

SRB 26, 111-114

The fourth-grade students in Mr. Kennedy's class are investigating energy and motion. Students worked in teams to build two machines: a car that is propelled by a mousetrap and a boat that is propelled by balloons. Today the teams are competing to see which cars and boats go farthest.

Each car or boat gets 3 trials. The total distance from all 3 trials is used to determine which car or boat went farthest. Solve the number stories to help Mr. Kennedy's class compare the machines made by various teams.

(1) Team A's car went 173 cm on the first trial, 206 cm on the second trial, and 245 cm on the third trial. Team B's car went 217 cm on each of the three trials.

Which car went the farthest overall? _____

How much farther did it go? _____

(2) Team A's boat went 130 cm in all. Team B's boat went the same distance on all 3 trials and lost to Team A's boat by 7 cm.

How far did Team B's boat go on each trial? _____

(3) Team D's car went the same distance on each of its trials. Team C's car went exactly 1 cm farther in each trial than Team D's car. Team C's car went 543 cm in all.

How far did Team D's car go on each trial? _____

Practice

(4) $5{,}624 \div 8 =$ _____

(5) $8{,}500 \div 3 =$ _____

(6) $4\overline{)9{,}207}$

(7) $5\overline{)3{,}578}$

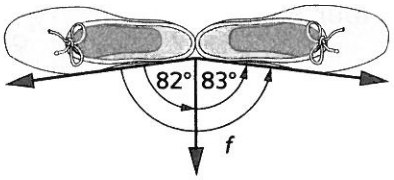
Finding Unknown Angle Measures

Home Link 8-2

NAME DATE TIME

Find the missing angle measures. For each problem, write an equation with a letter for the unknown to show how you found your answer.

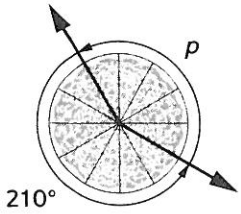
SRB 211-212

① 

°

f = _____

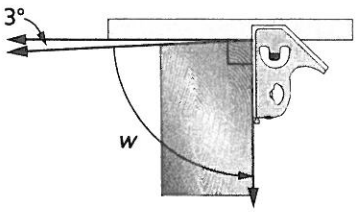
Equation: _____

② 

°

p = _____

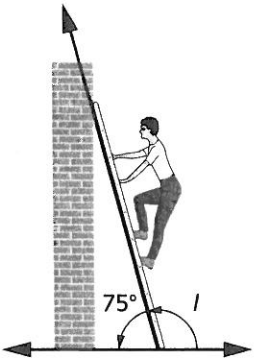
Equation: _____

③ 

°

w = _____

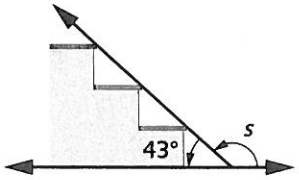
Equation: _____

④ 

°

l = _____

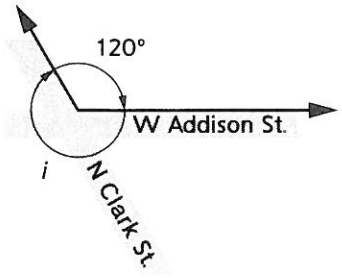
Equation: _____

⑤ 

°

s = _____

Equation: _____

⑥ 

°

i = _____

Equation: _____

Practice

⑦ $\frac{1}{3} + \frac{2}{3} + \frac{2}{3} =$ _____

⑧ $\frac{1}{4} + \frac{3}{4} + \frac{3}{4}$ _____

⑨ $\frac{4}{5} + \frac{4}{5} + \frac{3}{5} =$ _____

⑩ $\frac{5}{12} + \frac{3}{12} + \frac{7}{12} =$ _____

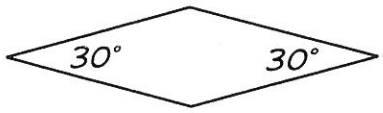
Finding Pattern-Block Measures

Home Link 8-3

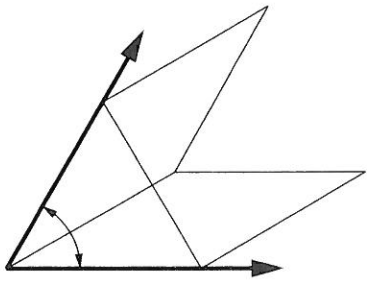
NAME DATE TIME

Molly is using pattern blocks to find angle measures of other pattern blocks. She knows that the measure of the small angle of a white rhombus is 30°.

SRB 211-212

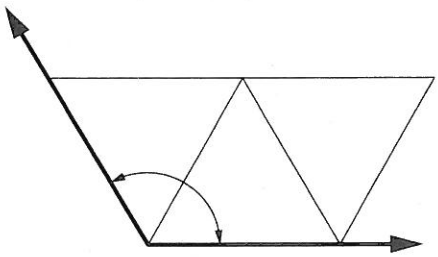


(1) Molly fills an angle of the green triangle with the small angles of white rhombuses. What is the measure of the triangle's angle? Explain how you know.



Angle measure: _____ °

(2) Molly fills a red trapezoid's large angle with angles of the green triangle. What is the measure of the red trapezoid's large angle? Explain how you know.



Angle measure: _____ °

Practice

(3) 5,588 * 3 = _____

(4) 9,037 * 5 = _____

(5) 52 * 94 = _____

(6) 83 * 77 = _____

Line Symmetry

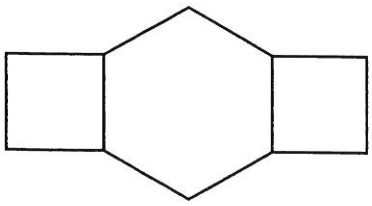
Home Link 8-4

NAME DATE TIME

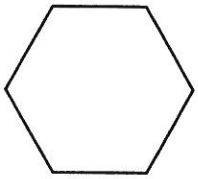
Use a straightedge to draw the lines of symmetry on each shape.

SRB 238

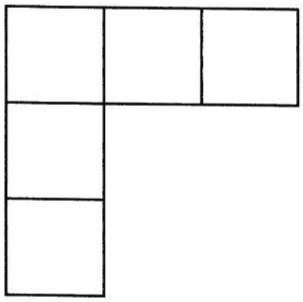
① Draw 2 lines of symmetry.



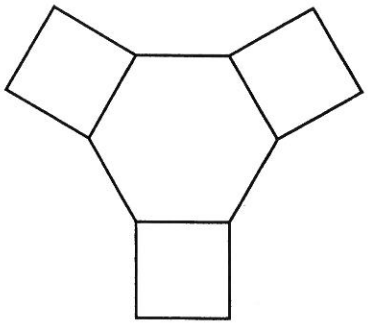
② Draw 6 lines of symmetry.



③ Draw 1 line of symmetry.

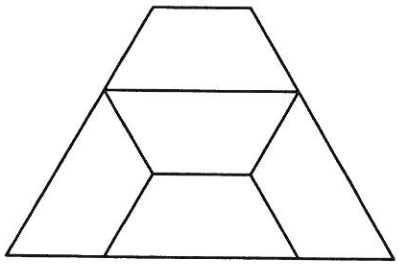


④ Draw 3 lines of symmetry.



⑤ How many lines of symmetry does this shape have? _____

Draw the line(s) of symmetry.



⑥ Draw your own shape. Show the lines of symmetry. Be sure your shape includes at least 1 right angle.

Practice

⑦ $6 * \frac{5}{6} =$ _____

⑧ $3 * \frac{3}{8} =$ _____

⑨ $4 * \frac{7}{10} =$ _____

⑩ $6 * \frac{4}{12} =$ _____

Designing a Bookcase

Home Link 8-5

NAME DATE TIME

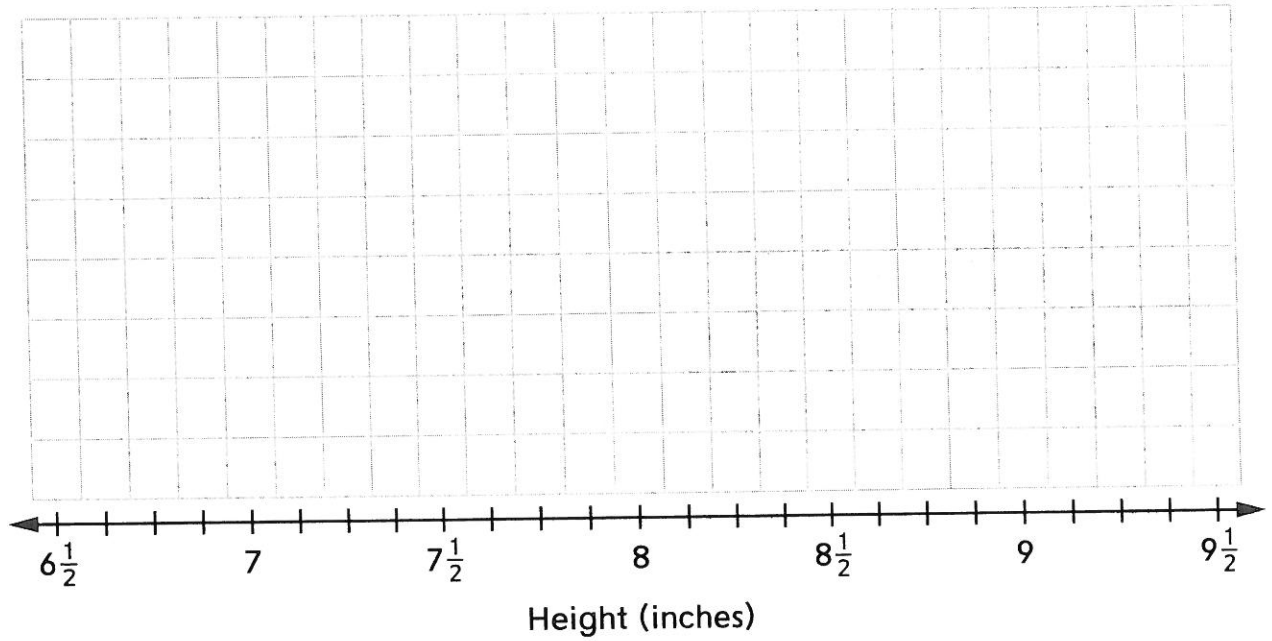
Nicholas is building a bookcase. To help with the design, he measured the height of each of his books to the nearest $\frac{1}{8}$ inch. His measurements are given below.

SRB 215-216

$6\frac{1}{2}$, $9\frac{1}{4}$, $7\frac{1}{8}$, $7\frac{1}{2}$, 8, $6\frac{7}{8}$, $9\frac{1}{4}$, $9\frac{1}{4}$, $9\frac{1}{4}$, $9\frac{1}{4}$, $9\frac{1}{4}$, $8\frac{1}{4}$, 8, $8\frac{1}{4}$, $8\frac{3}{8}$,
$6\frac{1}{2}$, $7\frac{1}{8}$, 9, $6\frac{7}{8}$, $9\frac{3}{8}$, $6\frac{7}{8}$, $7\frac{1}{2}$, 8, $8\frac{1}{4}$, $9\frac{1}{4}$, $6\frac{7}{8}$, $6\frac{7}{8}$, $8\frac{1}{4}$, $8\frac{1}{4}$, $8\frac{1}{4}$

Plot the data set on the line plot below.

Book Heights



Use the completed line plot to answer the questions below.

(1) What is the difference in height between the tallest and shortest books? _____ in.

(2) Nicholas wants the space between the shelves to be $\frac{7}{8}$ inch taller than his tallest book.

a. How far apart should he make the shelves? _____ in.

b. If the thickness of the wood he uses for the shelves is $\frac{5}{8}$ inch, what will be the total height of each shelf? (*Hint:* The total height is the thickness of one piece of wood plus the distance between shelves.) _____ in.

Practice

(3) 8,207 ÷ 7 → _____

(4) 7,109 ÷ 8 → _____

Perimeters and Missing Measures

Home Link 8-6

NAME DATE TIME

SRB 164, 175, 200

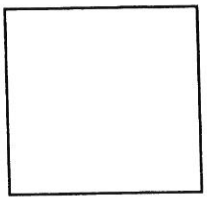
Use a formula to find the perimeter of each rectangle. Show your work in the space provided.

① Length = $3\frac{3}{6}$ yd

Width = $\frac{1}{6}$ yd

Perimeter: _____ yd

② Length = $5\frac{1}{12}$ ft



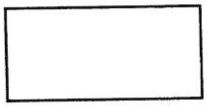
Width = $4\frac{11}{12}$ ft

Perimeter: _____ ft

For each rectangle, find the unknown side measure.

③ Perimeter: $\frac{74}{100}$ kilometer

Length = $\frac{25}{100}$ km



Width = _____ km

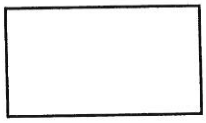
④ Perimeter: 10 inches

Length = $4\frac{3}{8}$ in.

Width = _____ in.

⑤ Perimeter: $12\frac{8}{10}$ centimeters

Length = $4\frac{1}{10}$ cm

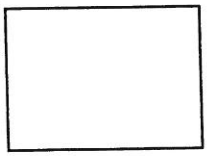


Width = _____ cm

Try This

⑥ Perimeter: $16\frac{1}{2}$ ft

Length = _____ ft



Width = $3\frac{1}{2}$ ft

Practice

⑦ $2 * \frac{2}{3} =$ _____

⑧ $5 * \frac{3}{4} =$ _____

⑨ $9 * \frac{4}{5} =$ _____

⑩ $8 * \frac{6}{12} =$ _____

Decimal Number Stories

Home Link 8-7

NAME DATE TIME

Solve each number story. Write your answer as a decimal.
Show how you found your answer.

SRB 166-167

(1) An Olympic men's shot put weighs 7.26 kilograms. An Olympic women's shot put weighs 4 kilograms. How much more does the men's shot put weigh than the women's shot put?

_____ kilograms

(2) The recipe for homemade glue calls for 0.5 liter of skim milk, 0.09 liter of vinegar, and 0.06 liter of water. When you combine the ingredients, how much liquid will you have?

_____ liter

(3) Ben cut a piece of string 11.4 cm long. Then he cut 3.6 cm off of it. How long is the string now?

_____ cm

Try This

(4) What is the answer to Problem 3 in milliliters? _____ milliliters

Practice

(5) 3,579 * 4 = _____

(6) 2,904 * 6 = _____

(7) 36 * 56 = _____

(8) 47 * 72 = _____

Area and Perimeter

Home Link 8-8

NAME DATE TIME

SRB 175-204

Solve the problems below.

① The Murphy family bought two rectangular dog beds for their pets. Fluffy's bed was 3 feet by $1\frac{9}{12}$ feet. Pete's bed was 4 feet by $2\frac{4}{12}$ feet.

a. How much more area does Pete's bed have than Fluffy's?

Answer: _____ square feet

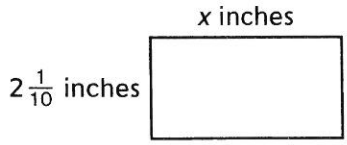
b. What is the perimeter of Pete's bed? Answer: _____ feet

② The Cho family bought two rectangular cat beds for their cats. George's bed is 2 feet by $1\frac{2}{12}$ feet. Sammie's bed is 2 feet by $1\frac{7}{12}$ feet.

a. What is the total area of these two beds? Answer: _____ square feet

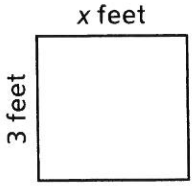
b. What is the perimeter of George's bed? Answer: _____ feet

③ Perimeter: $12\frac{2}{10}$ inches



Area: _____ square inches

④ Area: $9\frac{3}{8}$ square feet



Width: _____ feet

Practice

⑤ $\frac{5}{6} - \frac{1}{6} =$ _____

⑥ $\frac{8}{8} - \frac{3}{8} =$ _____

⑦ $\frac{9}{10} - \frac{5}{10} =$ _____

⑧ $\frac{11}{12} - \frac{5}{12} =$ _____

Using Doghouse Dimensions

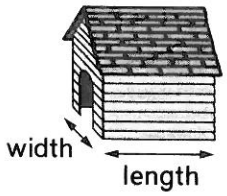
Home Link 8-9

NAME DATE TIME

Dan and Diane's Doghouse Dynasty builds doghouses to order. They can change the length and width for doghouses, but they always build them to have the same height. Solve the number stories about doghouses built to certain widths and lengths based on the information given in the table. Use drawings or equations to show how you solved each problem.

SRB 162, 175

Custom Doghouse Dimensions		
Size	**Length (in feet)**	**Width (in feet)**
Extra small	$3\frac{1}{4}$	$1\frac{1}{3}$
Small	$3\frac{1}{2}$	$1\frac{1}{2}$
Medium	4	$1\frac{3}{4}$
Large	$4\frac{1}{4}$	$1\frac{5}{6}$
Extra large	$4\frac{5}{6}$	2



(1) Mrs. Swift ordered 3 medium-size doghouses. What will their combined width be?

_____ feet

(2) Kisa's Kennel has a space that is 18 feet wide in which they want to place doghouses side by side. If they order 5 small and 4 medium doghouses, will they all fit in the space? _____

Practice

(3) $2 * \frac{3}{6} =$ _____

(4) $5 * \frac{7}{10} =$ _____

(5) $9 * \frac{6}{100} =$ _____

(6) $7 * \frac{8}{12} =$ _____

Liquid Measurement and Fractions

Home Link 8-10

NAME DATE TIME

Complete the "What's My Rule?" tables and state the rules.

SRB 196-197

① Rule: _____

in (gallons)	out (pints)
2	16
$3\frac{1}{2}$	
	48
$7\frac{1}{4}$	
	80

② Rule: _____

in (quarts)	out (cups)
3	12
$4\frac{1}{2}$	
	32
$9\frac{3}{4}$	
$12\frac{1}{4}$	

Use this recipe for a Creamsicle Smoothie to solve the problems below.

$\frac{3}{4}$ cup orange juice 4 fluid ounces cold water 1 cup vanilla ice cream

Combine all ingredients.

③ **a.** Will this recipe fit in a glass that holds 24 fluid ounces? _____

Explain your thinking. _____

_____

b. About how many more cup(s) of smoothie could fit in the glass? _____ cup(s)

c. Frank wants to triple the recipe. How much of each ingredient will he need?

_____ orange juice

_____ cold water

_____ vanilla ice cream

d. After tripling the recipe, how much smoothie will Frank have? _____ fluid ounces

Practice

④ 3,560 ÷ 3 → _____

⑤ 9,295 ÷ 5 → _____

⑥ $7\overline{)8{,}210}$

⑦ $9\overline{)4{,}671}$

Planning a Cookout

Home Link 8-11

NAME DATE TIME

The Whispering Lakes Neighborhood Association is having a hamburger cookout. Each family can choose whether to order the hamburgers or bring their own. Use the information in the table to solve the number stories. Use drawings, tables, or equations to show what you did.

Size of Hamburger	Weight of One Hamburger Patty (lb)
Small	$\frac{1}{8}$
Medium	$\frac{1}{4}$
Large	$\frac{1}{2}$
Jumbo	$\frac{3}{4}$
King of the Burgers	$1\frac{1}{2}$

SRB 190-191

(1) **a.** What is the combined weight of 1 of each size hamburger?

_____ pounds

b. How many ounces is that?

_____ ounces

c. Mrs. Ward found 80-ounce packages of hamburger on sale. If she needs to make 2 of each size hamburger, how many packages of meat will she need to buy?

_____ packages

(2) The Finch family ordered 2 small hamburgers, 1 medium hamburger, and 1 jumbo hamburger. How many pounds of hamburger meat does the neighborhood association need to buy for this family?

_____ pounds

Practice

(3) 5,107 * 3 = _____

(4) 4,794 * 6 = _____

(5) 74 * 29 = _____

(6) 93 * 48 = _____

Number-Tile Computations

Home Link 8-12

NAME DATE TIME

Cut out the 0–9 number tiles at the bottom of the page. Use them to help you solve the problems. Each of the 20 tiles can only be used once.

SRB 92-95

(1) Use odd-numbered tiles 1, 3, 5, 7, and 9 to make the largest sum.

$$\square\square\square + \square\square = \underline{\qquad}$$

(2) Use even-numbered tiles 0, 2, 4, 6, and 8 to make the smallest difference.

$$\square\square\square - \square\square = \underline{\qquad}$$

(3) Use number tiles 0, 4, 6, and 8 to make the largest product.

$$\square\square * \square\square = \underline{\qquad}$$

(4) Use number tiles 1, 2, 5, and 7 to make the smallest whole-number quotient. The answer may have a remainder.

$\square\square\square / \square \rightarrow$ _____

(5) Answer the following questions using only the unused tiles and any operation. Write number sentences to show your work.

a. What is the largest answer you can find? _____

$\square \_\_ \square = \_\_$

b. What is the smallest answer you can find? _____

$\square \_\_ \square = \_\_$

Practice

(6) $4\frac{3}{5} + 3\frac{4}{5} =$ _____

(7) $1\frac{5}{8} + 3\frac{5}{8} =$ _____

(8) $2\frac{9}{12} + 4\frac{5}{12} =$ _____

(9) $5\frac{89}{100} + 5\frac{92}{100} =$ _____

0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9

Many Names for Numbers

Home Link 8-13

NAME DATE TIME

Write five names in each box below. Use as many different kinds of numbers (such as whole numbers, fractions, decimals) and different operations (+, −, ∗, ÷) as you can. SRB 33

①

9,990

②

32.68

Make up your own name-collection boxes.

③

④

Practice

⑤ $5\frac{1}{4} - 1\frac{3}{4} =$ _____

⑥ $4\frac{3}{10} - 2\frac{7}{10} =$ _____

⑦ $6\frac{7}{12} - 3\frac{11}{12} =$ _____

⑧ $8\frac{1}{6} - 4\frac{5}{6} =$ _____