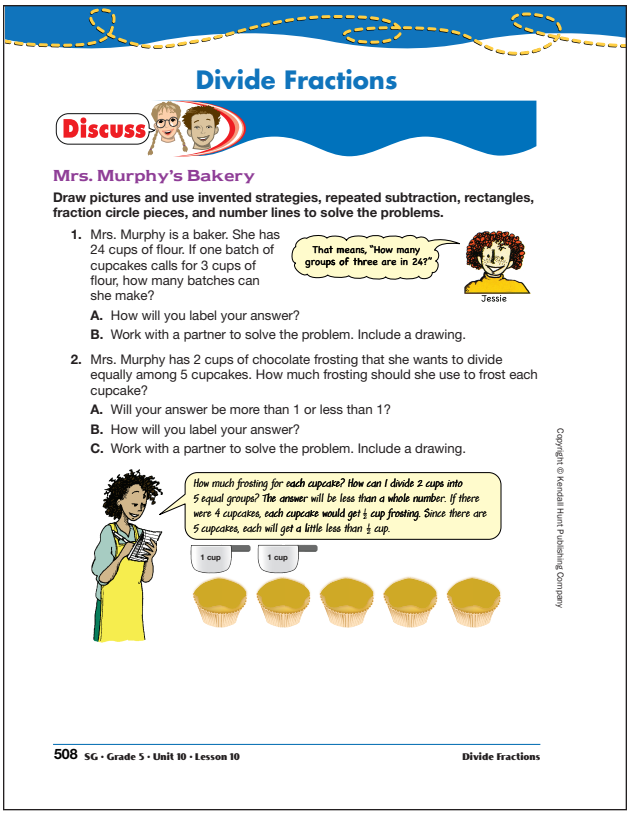


Divide Fractions

Discuss

Mrs. Murphy's Bakery

Draw pictures and use invented strategies, repeated subtraction, rectangles, fraction circle pieces, and number lines to solve the problems.

1. Mrs. Murphy is a baker. She has 24 cups of flour. If one batch of cupcakes calls for 3 cups of flour, how many batches can she make?

That means, "How many groups of three are in 24?"

Jessie

   A. How will you label your answer?
   B. Work with a partner to solve the problem. Include a drawing.

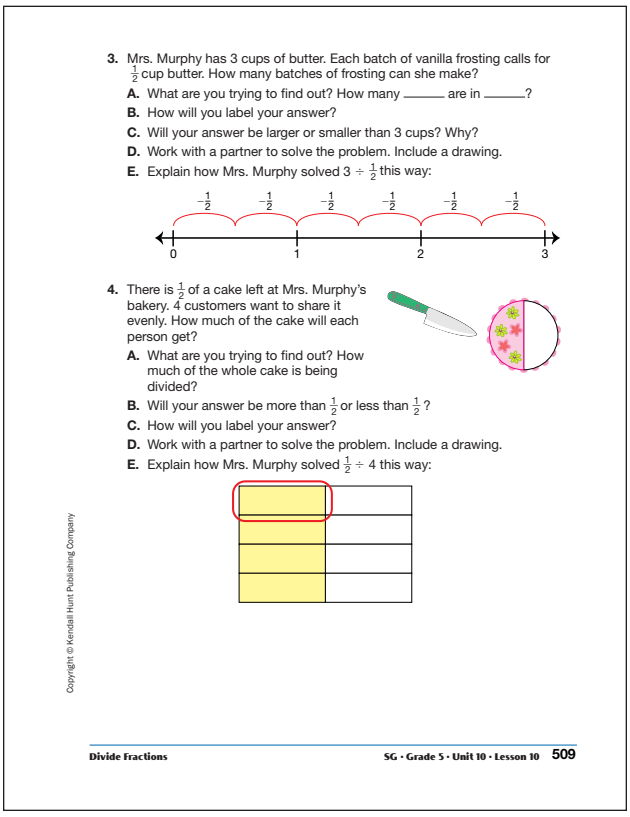
2. Mrs. Murphy has 2 cups of chocolate frosting that she wants to divide equally among 5 cupcakes. How much frosting should she use to frost each cupcake?
   A. Will your answer be more than 1 or less than 1?
   B. How will you label your answer?
   C. Work with a partner to solve the problem. Include a drawing.

How much frosting for each cupcake? How can I divide 2 cups into 5 equal groups? The answer will be less than a whole number. If there were 4 cupcakes, each cupcake would get ½ cup frosting. Since there are 5 cupcakes, each will get a little less than ½ cup.

1 cup 1 cup

508 SG • Grade 5 • Unit 10 • Lesson 10 Divide Fractions

***Student Guide* - Page 508**



3. Mrs. Murphy has 3 cups of butter. Each batch of vanilla frosting calls for $\frac{1}{2}$ cup butter. How many batches of frosting can she make?
   A. What are you trying to find out? How many _____ are in _____?
   B. How will you label your answer?
   C. Will your answer be larger or smaller than 3 cups? Why?
   D. Work with a partner to solve the problem. Include a drawing.
   E. Explain how Mrs. Murphy solved $3 \div \frac{1}{2}$ this way:

4. There is $\frac{1}{2}$ of a cake left at Mrs. Murphy's bakery. 4 customers want to share it evenly. How much of the cake will each person get?
   A. What are you trying to find out? How much of the whole cake is being divided?
   B. Will your answer be more than $\frac{1}{2}$ or less than $\frac{1}{2}$?
   C. How will you label your answer?
   D. Work with a partner to solve the problem. Include a drawing.
   E. Explain how Mrs. Murphy solved $\frac{1}{2} \div 4$ this way:

Divide Fractions SG • Grade 5 • Unit 10 • Lesson 10 509

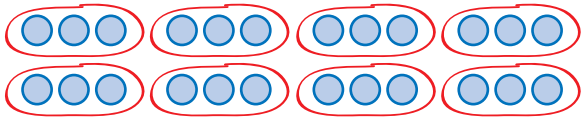
***Student Guide* - Page 509**

Student Guide

Divide Fractions (SG pp. 508–513)
Questions 1–30

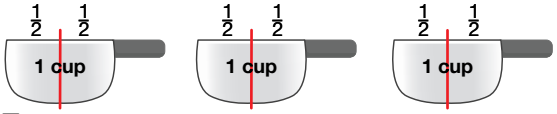
Drawings for Questions 1–16 will vary. Sample drawings are provided.

1. **A.*** batches
   B.* 8 batches;



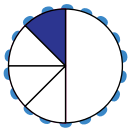
2. **A.*** less than 1
   B.* cups
   C.* $\frac{2}{5}$ cups;

3. **A.*** How many halves are in 3?
   B.* batches
   C.* The quotient will be larger than 3 because you are dividing the 3 cups of butter into smaller $\frac{1}{2}$ cups.
   D.* 6 batches;

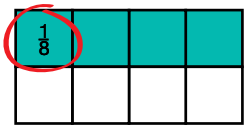


   E.* Mrs. Murphy used repeated subtraction on a number line to solve $3 \div \frac{1}{2}$. She took 6 backwards jumps of $\frac{1}{2}$.

4. **A.*** How much of the whole cake will each person get if $\frac{1}{2}$ of it is divided among 4?
   B.* less than $\frac{1}{2}$
   C.* cake
   D.* $\frac{1}{8}$ cake;

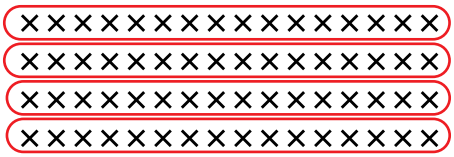


   E.* Mrs. Murphy divided a rectangle in half and then divided the half into four equal pieces. Each person would get $\frac{1}{8}$ of the whole cake.

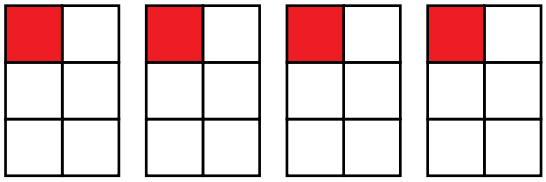


*Answers and/or discussion are included in the lesson.

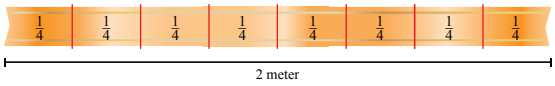
5. 16 tiles



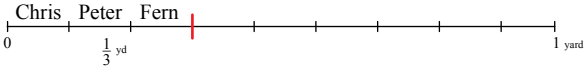
6. Each gets $\frac{4}{6}$ of a box



7. 8 pieces

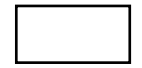


8. $\frac{1}{9}$ of a yard



9. 12 scoops

1 cup	1	2
	3	4
1 cup	1	2
	3	4
1 cup	1	2
	3	4



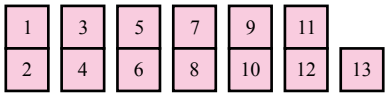
$\frac{1}{4}$ cup scoop

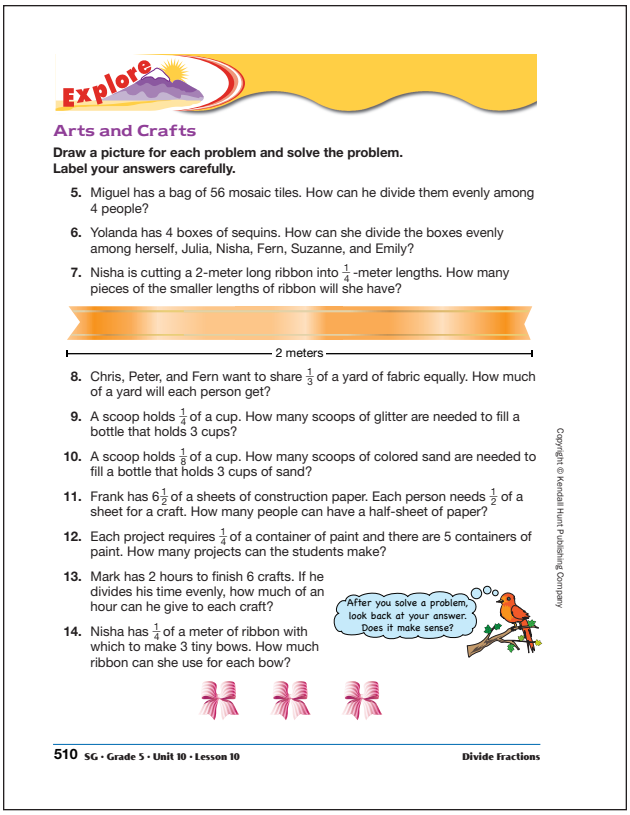
10. 24 scoops

1 cup	1	2	3	4
	5	6	7	8
1 cup	9	10	11	12
	13	14	15	16
1 cup	17	18	19	20
	21	22	23	24

$\frac{1}{8}$ cup scoop

11. 13 people





Explore

Arts and Crafts

Draw a picture for each problem and solve the problem. Label your answers carefully.

5. Miguel has a bag of 56 mosaic tiles. How can he divide them evenly among 4 people?
6. Yolanda has 4 boxes of sequins. How can she divide the boxes evenly among herself, Julia, Nisha, Fern, Suzanne, and Emily?
7. Nisha is cutting a 2-meter long ribbon into $\frac{1}{4}$-meter lengths. How many pieces of the smaller lengths of ribbon will she have?

2 meters

8. Chris, Peter, and Fern want to share $\frac{1}{3}$ of a yard of fabric equally. How much of a yard will each person get?
9. A scoop holds $\frac{1}{4}$ of a cup. How many scoops of glitter are needed to fill a bottle that holds 3 cups?
10. A scoop holds $\frac{1}{8}$ of a cup. How many scoops of colored sand are needed to fill a bottle that holds 3 cups of sand?
11. Frank has $6\frac{1}{2}$ of a sheets of construction paper. Each person needs $\frac{1}{2}$ of a sheet for a craft. How many people can have a half-sheet of paper?
12. Each project requires $\frac{1}{4}$ of a container of paint and there are 5 containers of paint. How many projects can the students make?
13. Mark has 2 hours to finish 6 crafts. If he divides his time evenly, how much of an hour can he give to each craft?
14. Nisha has $\frac{1}{4}$ of a meter of ribbon with which to make 3 tiny bows. How much ribbon can she use for each bow?

After you solve a problem, look back at your answer. Does it make sense?

510 SG • Grade 5 • Unit 10 • Lesson 10 Divide Fractions

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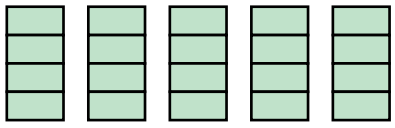
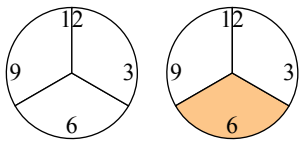
***Student Guide* - Page 510**

12. 20 projects

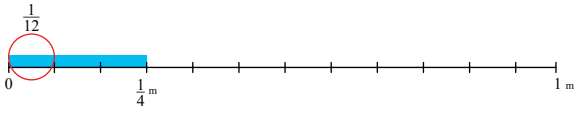


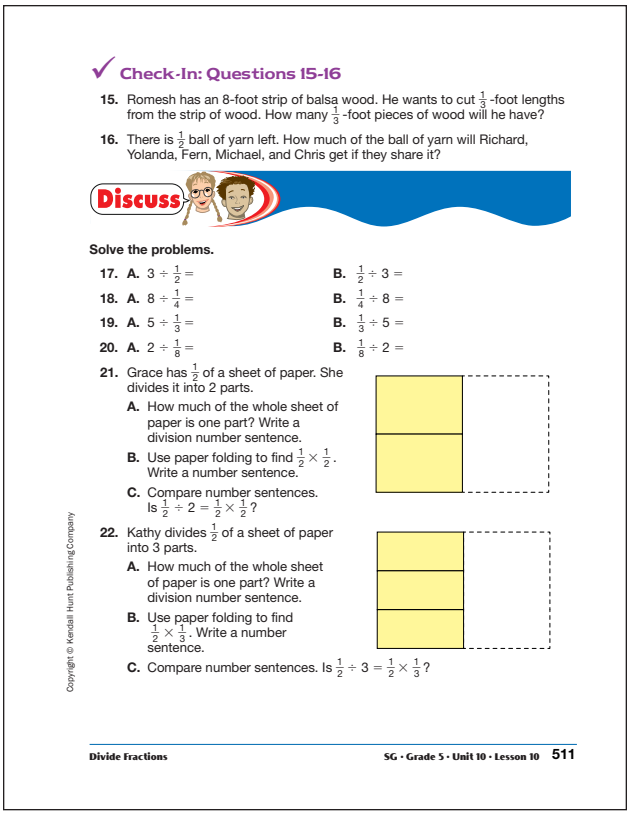
4 + 4 + 4 + 4 + 4 = 20

13. $\frac{1}{3}$ of an hour



14. $\frac{1}{12}$ of a meter





✓ Check-In: Questions 15-16

15. Romesh has an 8-foot strip of balsa wood. He wants to cut $\frac{1}{3}$-foot lengths from the strip of wood. How many $\frac{1}{3}$-foot pieces of wood will he have?

16. There is $\frac{1}{2}$ ball of yarn left. How much of the ball of yarn will Richard, Yolanda, Fern, Michael, and Chris get if they share it?

Discuss

Solve the problems.

17. **A.** $3 \div \frac{1}{2} =$ **B.** $\frac{1}{2} \div 3 =$

18. **A.** $8 \div \frac{1}{4} =$ **B.** $\frac{1}{4} \div 8 =$

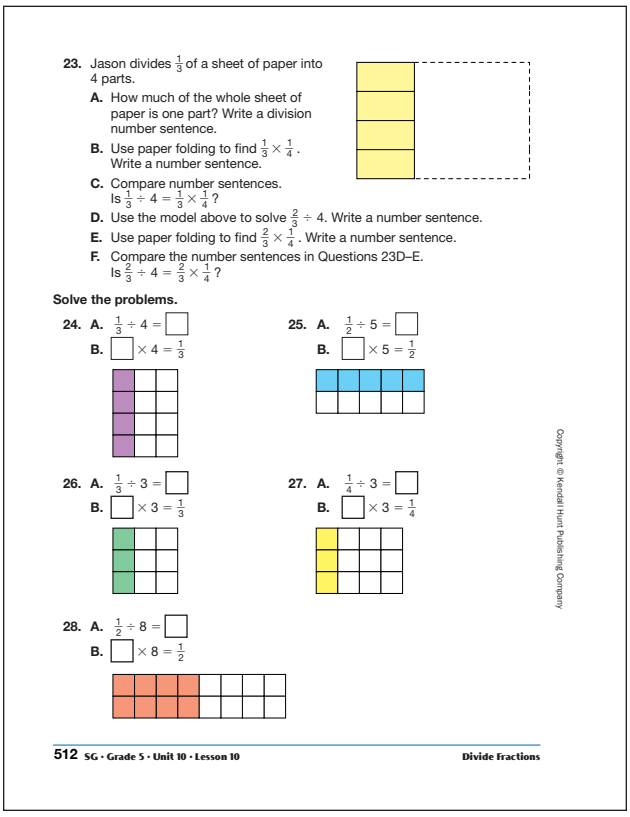
19. **A.** $5 \div \frac{1}{3} =$ **B.** $\frac{1}{3} \div 5 =$

20. **A.** $2 \div \frac{1}{8} =$ **B.** $\frac{1}{8} \div 2 =$

21. Grace has $\frac{1}{2}$ of a sheet of paper. She divides it into 2 parts.
   - **A.** How much of the whole sheet of paper is one part? Write a division number sentence.
   - **B.** Use paper folding to find $\frac{1}{2} \times \frac{1}{2}$. Write a number sentence.
   - **C.** Compare number sentences. Is $\frac{1}{2} \div 2 = \frac{1}{2} \times \frac{1}{2}$?

22. Kathy divides $\frac{1}{2}$ of a sheet of paper into 3 parts.
   - **A.** How much of the whole sheet of paper is one part? Write a division number sentence.
   - **B.** Use paper folding to find $\frac{1}{2} \times \frac{1}{3}$. Write a number sentence.
   - **C.** Compare number sentences. Is $\frac{1}{2} \div 3 = \frac{1}{2} \times \frac{1}{3}$?

***Student Guide* - Page 511**



23. Jason divides $\frac{1}{3}$ of a sheet of paper into 4 parts.
   - **A.** How much of the whole sheet of paper is one part? Write a division number sentence.
   - **B.** Use paper folding to find $\frac{1}{3} \times \frac{1}{4}$. Write a number sentence.
   - **C.** Compare number sentences. Is $\frac{1}{3} \div 4 = \frac{1}{3} \times \frac{1}{4}$?
   - **D.** Use the model above to solve $\frac{2}{3} \div 4$. Write a number sentence.
   - **E.** Use paper folding to find $\frac{2}{3} \times \frac{1}{4}$. Write a number sentence.
   - **F.** Compare the number sentences in Questions 23D–E. Is $\frac{2}{3} \div 4 = \frac{2}{3} \times \frac{1}{4}$?

Solve the problems.

24. **A.** $\frac{1}{3} \div 4 =$ ☐ **B.** ☐ $\times 4 = \frac{1}{3}$

25. **A.** $\frac{1}{2} \div 5 =$ ☐ **B.** ☐ $\times 5 = \frac{1}{2}$

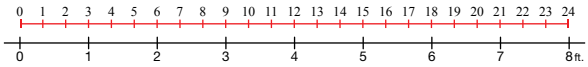
26. **A.** $\frac{1}{3} \div 3 =$ ☐ **B.** ☐ $\times 3 = \frac{1}{3}$

27. **A.** $\frac{1}{4} \div 3 =$ ☐ **B.** ☐ $\times 3 = \frac{1}{4}$

28. **A.** $\frac{1}{2} \div 8 =$ ☐ **B.** ☐ $\times 8 = \frac{1}{2}$

***Student Guide* - Page 512**

15.* 24 pieces



16. $\frac{1}{10}$ ball

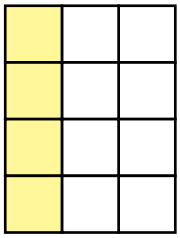
17. **A.*** $3 \div \frac{1}{2} = 6$ **B.*** $\frac{1}{2} \div 3 = \frac{1}{6}$

18. **A.*** $8 \div \frac{1}{4} = 32$ **B.*** $\frac{1}{4} \div 8 = \frac{1}{32}$

19. **A.*** $5 \div \frac{1}{3} = 15$ **B.*** $\frac{1}{3} \div 5 = \frac{1}{15}$

20. **A.*** $2 \div \frac{1}{8} = 16$ **B.*** $\frac{1}{8} \div 2 = \frac{1}{16}$

21.



A. $\frac{1}{2} \div 2 = \frac{1}{4}$ sheet

B. $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

C. Yes, $\frac{1}{2} \div 2 = \frac{1}{2} \times \frac{1}{2}$. Both equal $\frac{1}{4}$.

22. **A.** $\frac{1}{2} \div 3 = \frac{1}{6}$ sheet

B. $\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$

C. Yes, $\frac{1}{2} \div 3 = \frac{1}{3} \times \frac{1}{2}$. Both equal $\frac{1}{6}$.

23. **A.*** $\frac{1}{3} \div 4 = \frac{1}{12}$ sheet

B.* $\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$

C.* Yes, $\frac{1}{3} \div 4 = \frac{1}{3} \times \frac{1}{4}$. Both equal $\frac{1}{12}$.

D. $\frac{2}{3} \times 4 = \frac{2}{12}$ or $\frac{1}{6}$

E. $\frac{2}{3} \times \frac{1}{4} = \frac{2}{12}$ or $\frac{1}{6}$

F. Yes, $\frac{2}{3} \div 4 = \frac{2}{3} \times \frac{1}{4}$. Both equal $\frac{2}{12}$ or $\frac{1}{6}$.

24. **A.*** $\frac{1}{3} \div 4 = \mathbf{\frac{1}{12}}$

B.* $\mathbf{\frac{1}{12}} \times 4 = \frac{1}{3}$

25. **A.*** $\frac{1}{2} \div 5 = \mathbf{\frac{1}{10}}$

B.* $\mathbf{\frac{1}{10}} \times 5 = \frac{1}{2}$

26. **A.** $\frac{1}{3} \div 3 = \mathbf{\frac{1}{9}}$

B. $\mathbf{\frac{1}{9}} \times 3 = \frac{1}{3}$

27. **A.** $\frac{1}{4} \div 3 = \mathbf{\frac{1}{12}}$

B. $\mathbf{\frac{1}{12}} \times 3 = \frac{1}{4}$

28. **A.** $\frac{1}{2} \div 8 = \mathbf{\frac{1}{16}}$

B. $\mathbf{\frac{1}{16}} \times 8 = \frac{1}{2}$

***Answers and/or discussion are included in the lesson.**

29. A. $1 \div \frac{1}{2} = \mathbf{2}$ $\quad 2 \times \frac{1}{2} = \mathbf{1}$

B.* $1 \div \frac{1}{3} = \mathbf{3}$ $\quad 3 \times \frac{1}{3} = \mathbf{1}$

C. $1 \div \frac{1}{4} = \mathbf{4}$ $\quad 4 \times \frac{1}{4} = \mathbf{1}$

D. $1 \div \frac{1}{5} = \mathbf{5}$ $\quad 5 \times \frac{1}{5} = \mathbf{1}$

E. $1 \div \frac{1}{10} = \mathbf{10}$ $\quad 10 \times \frac{1}{10} = \mathbf{1}$

F. $1 \div \frac{1}{100} = \mathbf{100}$ $\quad 100 \times \frac{1}{100} = \mathbf{1}$

30. A. $1 \div 2 = \mathbf{\frac{1}{2}}$ $\quad \frac{1}{2} \times 2 = \mathbf{1}$

B. $1 \div 3 = \mathbf{\frac{1}{3}}$ $\quad \frac{1}{3} \times 3 = \mathbf{1}$

C. $1 \div 4 = \mathbf{\frac{1}{4}}$ $\quad \frac{1}{4} \times 4 = \mathbf{1}$

D. $1 \div 5 = \mathbf{\frac{1}{5}}$ $\quad \frac{1}{5} \times 5 = \mathbf{1}$

E. $1 \div 10 = \mathbf{\frac{1}{10}}$ $\quad \frac{1}{10} \times 10 = \mathbf{1}$

F. $1 \div 100 = \mathbf{\frac{1}{100}}$ $\quad \frac{1}{100} \times 100 = \mathbf{1}$

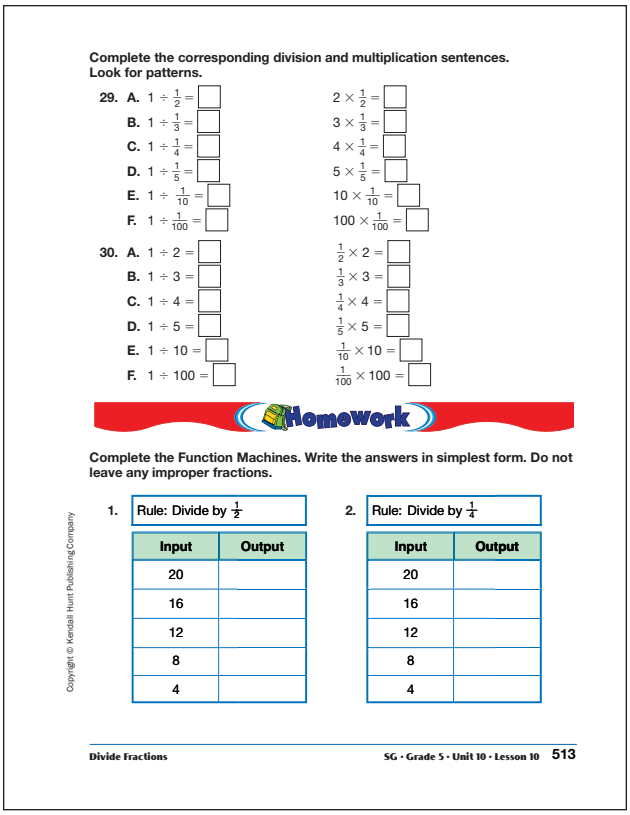
Homework (SG pp. 513–514)
Questions 1–9

1. Rule: Divide by $\frac{1}{2}$

Input	Output
20	10
16	8
12	6
8	4
4	2

2. Rule: Divide by $\frac{1}{4}$

Input	Output
20	5
16	4
12	3
8	2
4	1



Complete the corresponding division and multiplication sentences.
Look for patterns.

29. A. $1 \div \frac{1}{2} = \square$ $\quad 2 \times \frac{1}{2} = \square$
B. $1 \div \frac{1}{3} = \square$ $\quad 3 \times \frac{1}{3} = \square$
C. $1 \div \frac{1}{4} = \square$ $\quad 4 \times \frac{1}{4} = \square$
D. $1 \div \frac{1}{5} = \square$ $\quad 5 \times \frac{1}{5} = \square$
E. $1 \div \frac{1}{10} = \square$ $\quad 10 \times \frac{1}{10} = \square$
F. $1 \div \frac{1}{100} = \square$ $\quad 100 \times \frac{1}{100} = \square$

30. A. $1 \div 2 = \square$ $\quad \frac{1}{2} \times 2 = \square$
B. $1 \div 3 = \square$ $\quad \frac{1}{3} \times 3 = \square$
C. $1 \div 4 = \square$ $\quad \frac{1}{4} \times 4 = \square$
D. $1 \div 5 = \square$ $\quad \frac{1}{5} \times 5 = \square$
E. $1 \div 10 = \square$ $\quad \frac{1}{10} \times 10 = \square$
F. $1 \div 100 = \square$ $\quad \frac{1}{100} \times 100 = \square$

Homework

Complete the Function Machines. Write the answers in simplest form. Do not leave any improper fractions.

1. Rule: Divide by $\frac{1}{2}$

Input	Output
20	
16	
12	
8	
4	

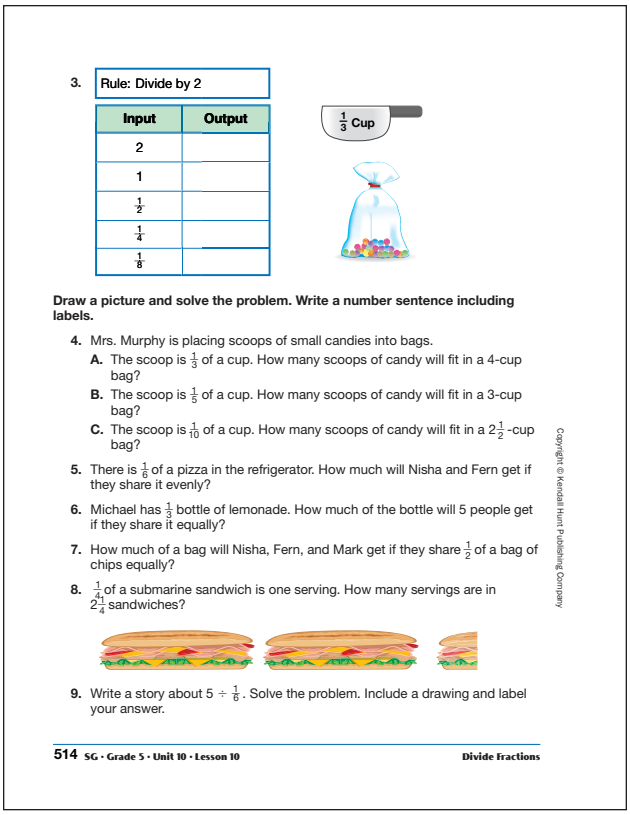
2. Rule: Divide by $\frac{1}{4}$

Input	Output
20	
16	
12	
8	
4	

Divide Fractions SG • Grade 5 • Unit 10 • Lesson 10 513

***Student Guide* - Page 513**

*Answers and/or discussion are included in the lesson.



3. Rule: Divide by 2

Input	Output
2	
1	
$\frac{1}{2}$	
$\frac{1}{4}$	
$\frac{1}{8}$	

Draw a picture and solve the problem. Write a number sentence including labels.

4. Mrs. Murphy is placing scoops of small candies into bags.
   - **A.** The scoop is $\frac{1}{3}$ of a cup. How many scoops of candy will fit in a 4-cup bag?
   - **B.** The scoop is $\frac{1}{5}$ of a cup. How many scoops of candy will fit in a 3-cup bag?
   - **C.** The scoop is $\frac{1}{10}$ of a cup. How many scoops of candy will fit in a $2\frac{1}{2}$-cup bag?
5. There is $\frac{1}{6}$ of a pizza in the refrigerator. How much will Nisha and Fern get if they share it evenly?
6. Michael has $\frac{1}{3}$ bottle of lemonade. How much of the bottle will 5 people get if they share it equally?
7. How much of a bag will Nisha, Fern, and Mark get if they share $\frac{1}{2}$ of a bag of chips equally?
8. $\frac{1}{4}$ of a submarine sandwich is one serving. How many servings are in $2\frac{1}{4}$ sandwiches?

9. Write a story about $5 \div \frac{1}{6}$. Solve the problem. Include a drawing and label your answer.

***Student Guide* - Page 514**

3. Rule: Divide by 2

Input	Output
2	1
1	$\frac{1}{2}$
$\frac{1}{2}$	$\frac{1}{4}$
$\frac{1}{4}$	$\frac{1}{8}$
$\frac{1}{8}$	$\frac{1}{16}$

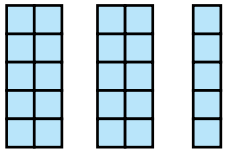
4. A. 12 scoops

1	2	3	4	5	6
7	8	9	10	11	12

B. 15 scoops

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15

C. 25 scoops



$10 + 10 + 5 = 25$

5. Each girl will get $\frac{1}{12}$ of a pizza.

6. $\frac{1}{15}$ bottle

7. Each child will get $\frac{1}{6}$ bag.

8. 9 servings

9. Stories will vary. Sample story:

Ana had 5 feet of ribbon. She cut it into $\frac{1}{6}$- foot lengths. She had 30 smaller ribbons when she was done.