Name _____ Date _____

7-1 Estimating Products

(pages 268–270)

1, 2, 31, 41

You can use **compatible numbers** to estimate products when multiplying fractions. Compatible numbers are easy to divide mentally.

EXAMPLES

A Estimate $\frac{1}{4} \times 13$.

$\frac{1}{4} \times 13$ means $\frac{1}{4}$ of 13.

$\frac{1}{4} \times 12 = \underline{\ ?\ }$ *For 13, the nearest multiple of 4 is 12. 4 and 12 are compatible numbers because $12 \div 4 = 3$.*

$\frac{1}{4} \times 12 = 3$, so the product of $\frac{1}{4}$ and 13 is about 3.

B Estimate $\frac{2}{3} \times 17$.

$\frac{1}{3} \times 18 = 6$ *For 17, the nearest multiple of 3 is 18. $\frac{1}{3}$ of 18 is 6.*

$\frac{2}{3} \times 18 = 12$ *Since $\frac{1}{3}$ of 18 is 6, it follows that $\frac{2}{3}$ of 18 is 2×6 or 12.*

So, $\frac{2}{3} \times 17$ is about 12.

You can also estimate products by rounding fractions to 0, $\frac{1}{2}$, or 1, and by rounding mixed numbers to the nearest whole numbers.

Try These Together

Estimate each product.

1. Estimate $\frac{1}{5} \times 9$

HINT: For 9, what is the nearest multiple of 5?

2. Estimate $\frac{5}{6} \times 22$.

HINT: For 22, what is the nearest multiple of 6?

PRACTICE

Estimate each product.

3. $\frac{1}{5} \times 24$

4. $\frac{1}{6} \times 5$

5. $\frac{5}{8} \times 42$

6. $2\frac{1}{4} \times 3\frac{1}{3}$

7. $\frac{1}{10} \times \frac{5}{8}$

8. $6\frac{2}{3} \times 1\frac{4}{5}$

9. $\frac{4}{9} \times 14$

10. $3\frac{4}{5} \times 7\frac{1}{8}$

11. $4\frac{7}{9} \times 2\frac{1}{6}$

12. **Standardized Test Practice** Ann receives an allowance of \$10 a week. She spends about $\frac{2}{3}$ of her allowance on school lunches and about $\frac{1}{6}$ on entertainment. About how much does she have left?

A \$2 **B** \$0 **C** \$8 **D** \$1

Answers: Sample answers are given. 1. 2 2. 20 3. 5 4. 1 5. 25 6. 6 7. 0 8. 14 9. 7 10. 28 11. 10 12. A

7-2

Name _____ Date _____

Multiplying Fractions

(pages 273–276)

QCC 1, 2, 3, 7, 9, 31, 34, 41, 47

Use the following rules to multiply fractions.

Multiplying Fractions	To multiply fractions, multiply the numerators and multiply the denominators. Simplify if necessary.
Simplify Before You Multiply	You can simplify before you multiply fractions if the numerator of one fraction and the denominator of another fraction have a common factor.

EXAMPLES

Find each product.

A $\frac{1}{3} \times \frac{2}{5}$

$\frac{1}{3} \times \frac{2}{5} = \frac{1 \times 2}{3 \times 5}$ *To multiply fractions, multiply the numerators and the denominators*

$= \frac{2}{15}$ *You cannot simplify $\frac{2}{15}$.*

B $\frac{4}{7} \times \frac{3}{8}$

$\frac{4}{7} \times \frac{3}{8}$ *Estimate: $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$*

$= \frac{\cancel{4}^{1} \times 3}{7 \times \cancel{8}_{2}}$ *The GCF of 4 and 8 is 4. Divide both the numerator and denominator by 4 and then multiply.*

$= \frac{3}{14}$

Try These Together

Find each product.

1. $\frac{1}{2} \times \frac{3}{8}$

HINT: Multiply the numerators and the denominators.

2. $\frac{5}{6} \times \frac{3}{25}$

HINT: Simplify before you multiply.

PRACTICE

Find each product. Write in simplest form.

3. $\frac{1}{2} \times \frac{3}{4}$

4. $\frac{5}{8} \times \frac{2}{3}$

5. $\frac{2}{3} \times \frac{6}{8}$

6. $\frac{2}{3} \times \frac{1}{9}$

7. $\frac{3}{5} \times \frac{5}{12}$

8. $\frac{1}{3} \times \frac{9}{10}$

9. $\frac{1}{12} \times \frac{4}{5}$

10. $\frac{3}{7} \times \frac{4}{9}$

11. $\frac{3}{5} \times \frac{3}{4}$

12. **Standardized Test Practice** There are a dozen eggs in a carton. You use $\frac{1}{6}$ for an omelet. Your sister uses $\frac{1}{5}$ of the leftover eggs for a cake. How many eggs are left?

A 10 **B** 2 **C** 8 **D** 6

Answers: 1. $\frac{3}{16}$ 2. $\frac{1}{10}$ 3. $\frac{3}{8}$ 4. $\frac{5}{12}$ 5. $\frac{1}{2}$ 6. $\frac{2}{27}$ 7. $\frac{1}{4}$ 8. $\frac{3}{10}$ 9. $\frac{1}{15}$ 10. $\frac{4}{21}$ 11. $\frac{9}{20}$ 12. C

7-3

Name _____ Date _____

Multiplying Mixed Numbers (pages 277–279)

QCC 1, 5, 9, 31, 34, 41, 47

Use the following rules to multiply mixed numbers.

Multiplying Mixed Numbers	• Express mixed numbers as improper fractions. • Multiply the numerators and multiply the denominators.
Simplify Before You Multiply	After you express mixed numbers as improper fractions, check to see if the numerator of one fraction and the denominator of another fraction have a common factor. If they do, simplify before you multiply.

EXAMPLES

Find each product.

A $1\frac{1}{4} \times \frac{3}{4}$

Estimate: $1 \times 1 = 1$

$1\frac{1}{4} \times \frac{3}{4} = \frac{5}{4} \times \frac{3}{4}$ *Express $1\frac{1}{4}$ as an improper fraction.*

$= \frac{15}{16}$ *Multiply and then compare with your estimate.*

B $2\frac{2}{3} \times 5\frac{1}{2}$

$\frac{8}{3} \times \frac{11}{2}$ *Estimate $3 \times 5 = 15$ and then rewrite the mixed numbers as improper fractions.*

$= \frac{\cancel{8}^{4} \cdot 11}{3 \cdot \cancel{2}_{1}}$ *The GCF of 8 and 2 is 2. Divide both the numerator and denominator by 2 and then multiply.*

$= \frac{44}{3}$ or $14\frac{2}{3}$ *Rewrite as a mixed number and compare with your estimate.*

Try These Together

Find each product. Write in simplest form.

1. $\frac{4}{5} \times 3\frac{1}{5}$

HINT: Rewrite the mixed number as an improper fraction and multiply.

2. $1\frac{1}{3} \times 2\frac{3}{8}$

HINT: Simplify before you multiply.

PRACTICE

Find each product. Write in simplest form.

3. $4\frac{2}{3} \times 1\frac{1}{8}$

4. $3\frac{1}{3} \times 4\frac{1}{2}$

5. $1\frac{7}{9} \times 2\frac{1}{7}$

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

7. $2\frac{4}{9} \times 2\frac{7}{10}$

8. $2\frac{4}{5} \times 9\frac{1}{6}$

9. **Standardized Test Practice** It takes Julie $2\frac{1}{4}$ minutes to run once around a track. How long will it take her to run $8\frac{1}{2}$ laps?

A $19\frac{1}{8}$ minutes **B** $19\frac{1}{4}$ minutes **C** $18\frac{7}{8}$ minutes **D** $18\frac{3}{4}$ minutes

Answers: 1. $2\frac{14}{25}$ 2. $3\frac{1}{6}$ 3. $5\frac{1}{4}$ 4. 15 5. $3\frac{17}{21}$ 6. 6 7. $6\frac{3}{5}$ 8. $25\frac{2}{3}$ 9. A

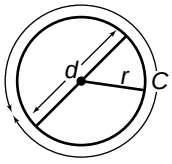
Name _____ Date _____

7-4 Circles and Circumferences

(pages 280–283)

QCC 1, 3, 4, 9, 20, 41, 47

A circle is a set of points in a plane, all of which are the same distance from a fixed point in the plane called the **center**.

Circle Definitions 	• The distance from the center of a circle to any point on the circle is called the **radius (*r*)**. • The distance across the circle through the center is called the **diameter (*d*)**. The diameter of a circle is twice the length of its radius. • The **circumference (*C*)** is the distance around the circle. • The circumference of a circle is always a little more than three times its diameter. The exact number of times is represented by the Greek letter π (pi). The decimal 3.14 and the fraction $\frac{22}{7}$ are used as approximations for π.
Finding the Circumference	The circumference of a circle is equal to π times the diameter or π times twice its radius. $C = \pi d$ or $C = 2\pi r$

EXAMPLE

Find the circumference of a circle with a diameter of $2\frac{1}{2}$ in.

$C = \pi d$

$\approx \frac{22}{7} \cdot 2\frac{1}{2}$ *Replace π with $\frac{22}{7}$ and d with $2\frac{1}{2}$.*

$\approx \frac{22}{7} \cdot \frac{5}{2}$ *Write $2\frac{1}{2}$ as an improper fraction.*

$\approx \frac{11}{7} \cdot \frac{5}{1}$ *Divide 2 and 22 by the GCF, 2.*

$\approx \frac{55}{7}$ or $7\frac{6}{7}$ *Multiply and rewrite as a mixed number.*

PRACTICE

Find the circumference of each circle described below. For fractions, use $\frac{22}{7}$ for π. For decimals and whole numbers, use 3.14 for π.

1. $d = 8$ in.

2. $r = 4\frac{1}{6}$ ft

3. $r = 6$ m

4. $d = 1.4$ m

5. $r = \frac{9}{10}$ in.

6. $d = 2\frac{1}{2}$ ft

7. $r = 5\frac{2}{3}$ in.

8. $d = 10$ cm

9. **Standardized Test Practice** The Sacagawea Golden Dollar coin has a radius of $13\frac{1}{4}$ mm. What is its circumference?

A $41\frac{9}{14}$ mm **B** $83\frac{2}{7}$ mm **C** $26\frac{1}{2}$ mm **D** $79\frac{1}{2}$ mm

Answers: 1. 25.12 in. 2. $26\frac{4}{21}$ ft 3. 37.68 m 4. 4.396 m 5. $5\frac{23}{35}$ in. 6. $7\frac{6}{7}$ ft 7. $35\frac{13}{21}$ in. 8. 31.4 cm 9. B

Name _____ Date _____

7-5 Dividing Fractions (pages 285–288)

QCC 1, 2, 9, 10, 34, 41, 42, 47

Any two numbers whose product is 1 are called **reciprocals**. For example, $\frac{1}{2}$ and 2 are reciprocals because $\frac{1}{2} \cdot 2 = 1$. You use reciprocals when you divide by fractions.

Dividing Fractions	To divide by a fraction, multiply by its reciprocal.

EXAMPLES

A Find the reciprocal of $\frac{2}{3}$.

Since $\frac{2}{3} \cdot \frac{3}{2} = 1$, the reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$.

B Find $\frac{4}{5} \div \frac{1}{3}$.

$\frac{4}{5} \div \frac{1}{3} = \frac{4}{5} \times \frac{3}{1}$ *Multiply by the reciprocal of $\frac{1}{3}$.*

$= \frac{12}{5}$ or $2\frac{2}{5}$ *Multiply the numerators and denominators. Rewrite the improper fraction as a mixed number.*

Try These Together

1. Find the reciprocal of $\frac{2}{7}$.

HINT: What times $\frac{2}{7}$ equals 1?

2. Find $\frac{7}{8} \div \frac{3}{4}$.

HINT: Multiply by the reciprocal. Simplify before you multiply.

PRACTICE

Find each quotient. Write in simplest form.

3. $\frac{1}{8} \div \frac{1}{2}$ **4.** $5 \div \frac{3}{4}$ **5.** $\frac{3}{5} \div \frac{4}{5}$

6. $\frac{1}{14} \div \frac{1}{7}$ **7.** $\frac{1}{7} \div \frac{1}{8}$ **8.** $\frac{9}{10} \div \frac{2}{5}$

Solve each equation. Write the solution in simplest form.

9. $p = \frac{1}{3} \div \frac{3}{4}$ **10.** $q = \frac{5}{8} \div \frac{1}{6}$ **11.** $n = \frac{4}{9} \div \frac{1}{5}$

12. $d = \frac{2}{9} \div \frac{3}{4}$ **13.** $z = \frac{1}{2} \div \frac{1}{16}$ **14.** $s = \frac{4}{5} \div \frac{3}{8}$

15. **Standardized Test Practice** After the initial fee of \$2.00, a taxi ride costs \$0.25 per $\frac{1}{5}$ mile. How much would a 4 mile cab ride cost, including the initial fee?

A \$5.00 **B** \$3.00 **C** \$20.00 **D** \$7.00

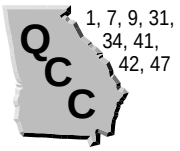
Answers: 1. $\frac{7}{2}$ 2. $1\frac{1}{6}$ 3. $\frac{1}{4}$ 4. $6\frac{2}{3}$ 5. $\frac{3}{4}$ 6. $\frac{1}{2}$ 7. $1\frac{1}{7}$ 8. $2\frac{1}{4}$ 9. $\frac{4}{9}$ 10. $3\frac{3}{4}$ 11. $2\frac{2}{9}$ 12. $\frac{8}{27}$ 13. 8 14. $2\frac{2}{15}$ 15. D

7-6

Name _____ Date _____

Dividing Mixed Numbers

(pages 289–291)



When you divide mixed numbers, first rewrite the mixed numbers as improper fractions. Then divide as you would with a fraction—by multiplying by the reciprocal.

EXAMPLES

A Find the reciprocal of $4\frac{1}{5}$.

$4\frac{1}{5} = \frac{21}{5}$ *Rewrite as an improper fraction.*

Since $\frac{21}{5} \times \frac{5}{21} = 1$, *the reciprocal of* $4\frac{1}{5}$ *is* $\frac{5}{21}$.

B Find $2\frac{2}{3} \div 3\frac{1}{2}$.

$2\frac{2}{3} \div 3\frac{1}{2} = \frac{8}{3} \div \frac{7}{2}$ *Rewrite mixed numbers as improper fractions.*

$= \frac{8}{3} \times \frac{2}{7}$ *Multiply by the reciprocal.*

$= \frac{16}{21}$

Try These Together

1. Find the reciprocal of $1\frac{5}{7}$.

HINT: Rewrite the mixed number as an improper fraction.

2. Find $3\frac{3}{5} \div 8\frac{1}{5}$.

HINT: Rewrite the mixed numbers as improper fractions. Multiply by the reciprocal.

PRACTICE

Write each mixed number as an improper fraction. Then write its reciprocal.

3. $7\frac{1}{6}$ **4.** $3\frac{1}{2}$ **5.** $1\frac{7}{8}$ **6.** $2\frac{4}{9}$

7. $5\frac{3}{5}$ **8.** $6\frac{1}{8}$ **9.** $2\frac{5}{8}$ **10.** $1\frac{4}{7}$

Find each quotient. Write in simplest form.

11. $2\frac{2}{5} \div 1\frac{1}{11}$ **12.** $3\frac{1}{6} \div \frac{1}{3}$ **13.** $1\frac{2}{3} \div 4$

14. $4\frac{1}{3} \div \frac{6}{7}$ **15.** $\frac{2}{5} \div 1\frac{1}{12}$ **16.** $3\frac{1}{10} \div 2\frac{1}{5}$

17. $2\frac{4}{9} \div 1\frac{1}{9}$ **18.** $4\frac{1}{2} \div 2\frac{2}{5}$ **19.** $2\frac{1}{8} \div \frac{1}{2}$

20. **Standardized Test Practice** A sand mosaic requires $\frac{1}{4}$ cup of sand per project. If there are $3\frac{3}{4}$ cups of sand available, how many mosaics can be completed?

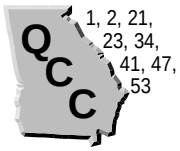
A 9 **B** 12 **C** 15 **D** 18

Answers: 1. $\frac{7}{12}$ 2. $\frac{18}{41}$ 3. $\frac{43}{6}$, $\frac{6}{43}$ 4. $\frac{7}{2}$, $\frac{2}{7}$ 5. $\frac{15}{8}$, $\frac{8}{15}$ 6. $\frac{22}{9}$, $\frac{9}{22}$ 7. $\frac{28}{5}$, $\frac{5}{28}$ 8. $\frac{49}{8}$, $\frac{8}{49}$ 9. $\frac{21}{8}$, $\frac{8}{21}$ 10. $\frac{11}{7}$, $\frac{7}{11}$ 11. $2\frac{1}{5}$ 12. $9\frac{1}{2}$ 13. $\frac{5}{12}$ 14. $5\frac{1}{18}$ 15. $\frac{24}{65}$ 16. $1\frac{9}{22}$ 17. $2\frac{1}{5}$ 18. $1\frac{7}{8}$ 19. $4\frac{1}{4}$ 20. C

Name _____ Date _____

7-7 Changing Customary Units

(pages 292–294)



The table below lists the most commonly used customary units, and the information you need in order to change them from one unit to another.

Customary Units of Capacity	1 cup (c) = 8 fluid ounces (fl oz) 1 pint (pt) = 2 cups 1 quart (qt) = 2 pints 1 gallon (gal) = 4 quarts
Customary Units of Weight	1 pound (lb) = 16 ounces (oz) 1 ton (T) = 2,000 pounds
Changing Customary Units of Capacity and Weight	• Determine whether you are changing from smaller to larger units or from larger to smaller units. • To change from smaller to larger units, divide. To change from larger to smaller units, multiply.

EXAMPLES

A 3 qt = _?_ pt

Think: Each quart equals 2 pints.

3 × 2 = 6 *Multiply to change from a larger unit (qt) to a smaller unit (pt).*

3 qt = 6 pt

B 8 c = _?_ qt

Think: Each quart equals 2 pints and each pint equals 2 cups. You need to divide twice.

8 ÷ 2 = 4 *Divide to change from cups to pints.*

4 ÷ 2 = 2 *Divide to change from pints to quarts.*

8 c = 2 qt

Try These Together

1. 6 T = _?_ lb

HINT: You are changing from larger to smaller units.

2. 48 fl oz = _?_ pt

HINT: You are changing from smaller to larger units.

PRACTICE

Complete.

3. 4 qt = _?_ pt

4. 18 fl oz = _?_ c

5. 4 gal = _?_ qt

6. 8 qt = _?_ c

7. 36 oz = _?_ lb

8. 5 lb = _?_ oz

9. 10 T = _?_ lb

10. 17 pt = _?_ gal

11. 16 qt = _?_ pt

12. **Standardized Test Practice** An ice cream sundae has 1 cup of ice cream. How many gallons of ice cream would you need to make 64 ice cream sundaes?

A 4 gal **B** 2 gal **C** 6 gal **D** 8 gal

Answers 1. 12,000 2. 3 3. 8 4. $2\frac{1}{4}$ 5. 16 6. 32 7. $2\frac{1}{4}$ 8. 80 9. 20,000 10. $2\frac{1}{8}$ 11. 32 12. A

7-8

Name _____ Date _____

Sequences (pages 298–300)

QCC 1, 3, 4, 21, 41, 43, 46, 47, 51

A **sequence** is a list of numbers in a specific order. For example, the numbers 3, 6, 9, 12, 15 are a sequence. In this sequence, notice that 3 is added to each number. The next number in the sequence is 15 + 3, or 18. There are also sequences in which you find the numbers by multiplying by the same number.

EXAMPLES

Find the next number in each sequence.

A 13, 18, 23, 28, …

In this sequence, 5 is added to each number. The next number is 28 + 5, or 33.

B 5, 10, 20, 40, …

Each number in this sequence is multiplied by 2. The next number is 40 × 2, or 80.

Try These Together

Find the next number in each sequence.

1. 63, 59, 55, 51, …

HINT: What number is subtracted from each number in the sequence?

2. $2\frac{1}{2}$, 5, $7\frac{1}{2}$, 10, …

HINT: What number is added to each number in the sequence?

PRACTICE

Find the next two numbers in each sequence.

3. 114, 57, $28\frac{1}{2}$, …

4. $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, …

5. 14, $16\frac{1}{2}$, 19, …

6. 2, 16,128, …

7. $\frac{1}{4}$, $1\frac{1}{4}$, $6\frac{1}{4}$, …

8. 31, 34, 37, …

Find the missing number in each sequence.

9. 4, _?_, 36, 108

10. 59, _?_, 50, $45\frac{1}{2}$

11. $\frac{1}{4}$, $2\frac{1}{2}$, _?_, 250

12. $\frac{1}{8}$, $\frac{5}{8}$, _?_, $1\frac{5}{8}$

13. 5, 20, 35, _?_

14. _?_, 90, 62, 34

15. **Standardized Test Practice** Team A is playing Team B in a baseball game. By the end of the fifth inning, how many total outs has each team gotten? (There are 3 outs per inning per team.)

A 18 **B** 25 **C** 15 **D** 12

Answers: 1. 47 2. $12\frac{1}{2}$ 3. $14\frac{1}{4}$, $7\frac{1}{8}$ 4. $\frac{1}{2}$, 1 5. $21\frac{1}{2}$, 24 6. 1024, 8192 7. $31\frac{1}{4}$, $156\frac{1}{4}$ 8. 40, 43 9. 12 10. $54\frac{1}{2}$ 11. 25 12. $1\frac{1}{8}$ 13. 50 14. 118 15. C

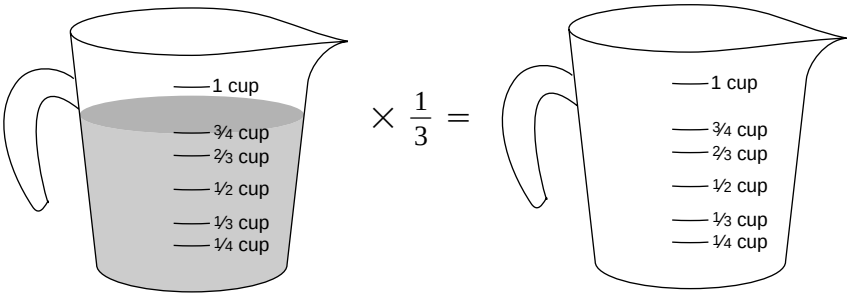
Name _____ Date _____

Chapter 7 Review

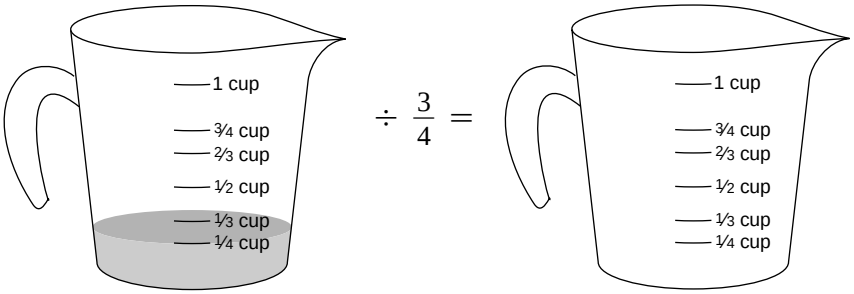
Chef's Secret

Chefs often have to change the amounts of ingredients that they use in their recipes when they change the size of the recipes. Help Chef Ramirez change the amounts shown in the measuring cups below. Shade in the new amounts in the empty measuring cups.

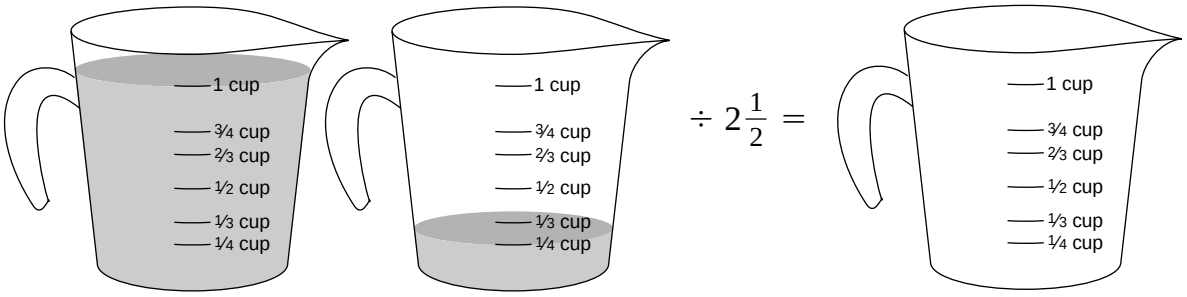
1.



2.



3.



Answers are located on p. 109.