



5th Grade

Enrichment Booklet

ANSWER KEY

Chapters 1-10



Answers

Chapter 1 Whole Numbers and the Four Operations

Activity 1 Numbers to 10,000,000

- 1
 - a John's solution is incorrect. He mistook 2 millions for 2 hundred thousands, and 7 hundreds for 7 tens.
 - b Expanded form: $2,000,000 + 30,000 + 5,000 + 700 + 4$
Standard form: 2,035,704
Word form: two million, thirty-five thousand, seven hundred four
- 2 6,432,967
- 3 The rule is to add 4,020.
Answers vary. Example:
2,341,587 2,345,607 2,349,627
2,353,647 2,357,667



Answers

Activity 2 Multiplying by Tens, Hundreds, Thousands, and Powers of Tens

| | | | | | | | | | | | | | | | | |
|----------------|--|---|---|----------------|---|----------------|----------------|---|---|---|---|--|--|--|--|--|
| | | | | | | | 3. 1 | | | | | | | | | |
| | | | | | | 1. 1 | 2. 2 | | 3 | | 0 | | | | | |
| | | | | | | | | 3 | | 0 | | | | | | |
| | | | | | | 4. 1 | 9 | | 4 | | 0 | | | | | |
| 5. 6 | | | | | 4 | | | 6 | | 0 | | | | | | |
| 6. 5 | | 4 | 8 | 7. 7 | | 0 | | 0 | | 0 | | | | | | |
| 0 | | | | 5 | | 6 | | 0 | | 0 | | | | | | |
| 0 | | | | 0 | | 2 | | | | | | | | | | |
| | | | | 0 | | 0 | | | | | | | | | | |
| | | | | | | 0 | | | | | | | | | | |
| | | | | | | | | 0 | | | | | | | | |
| | | | | | | | | | | 0 | | | | | | |



Answers

Activity 3 Dividing by Tens, Hundreds, or Thousands

| | | | |
|---------|---------|---------|---|
| 1. 9 | | 2. 1 | |
| 3. 1 | 4. 3 | 6. 2 | |
| | 5. 7 | | 6 |



Answers

Activity 4 Multiplying and Dividing by 2-Digit Numbers Fluently

1 a

$$\begin{array}{r} \\ \\ 1,478 \\ \times \\ \hline 8,868 \\ 44,340 \\ \hline 53,208 \end{array}$$

- b Answers vary. Example:
 $1,478 \times 30 + 1,478 \times 6$
 $1,478 \times 40 - 1,478 \times 4$
 $1,478 \times (40 - 4)$

2 a

$$\begin{array}{r} \\ 45 \overline{)9,786} \\ \underline{90} \\ 78 \\ \underline{45} \\ 336 \\ \underline{315} \\ 21 \end{array}$$

- b Use the $\boxed{\text{ab/c}}$ key on your calculator to divide.
Quotient: 217; Remainder: 21

3

$$\begin{aligned} 2,500 - 85 &= 2,415 \\ 2,415 \div 750 &= 2,415 \div 75 \div 10 \\ &= 32 \frac{1}{5} \div 10 \\ &= 3 \text{ R } 165 \end{aligned}$$

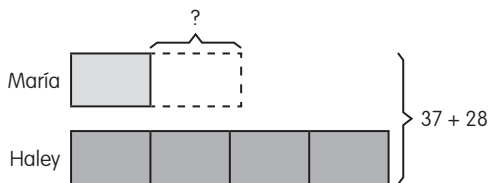
The greatest number of pallets of bricks that he can carry into the lift without triggering the alarm is 3.

Activity 5 Order of Operations

| | | | | |
|----------------|----------------|----------------|----------------|--|
| | | 2. 1 | | |
| 1. 3 | | 9 | | |
| 3. 2 | 4. 5 | 9 | 5. 2 | |
| | 0 | | 9 | |
| | 0 | | | |

Activity 6 Real-World Problems: Four Operations of Whole Numbers

1



$$5 \text{ units} = 37 + 28$$

$$= 65$$

$$1 \text{ unit} = 65 \div 5$$

$$= 13$$

$$28 - 13 = 15$$

María must give 15 magnets to Haley.

2 **Method 1**

$$\text{Maximum number of points} = 30 \times 5$$

$$= 150$$

Since he did not answer 1 question, 5 points were deducted. The maximum number of points that he could get was $150 - 5 = 145$. For every incorrect answer, he lost $5 + 2 = 7$ points.

| Number of Correct Answers | Number of Points |
|---------------------------|------------------|
| 30 | 150 |
| 29 | 145 |
| 28 | 138 |
| 27 | 131 |
| 26 | 124 |
| 25 | 117 |
| 24 | 110 |

Method 2

| Number of Correct Answers | Number of Wrong Answers | Number of Points |
|---------------------------|-------------------------|---------------------------------------|
| 25 | 4 | $25 \times 5 - 4 \times 2$ $= 117$ |
| 26 | 3 | $26 \times 5 - 3 \times 2$ $= 124$ |
| 24 | 5 | $24 \times 5 - 5 \times 2$ $= 110$ |

Logan had 24 correct answers.

3

$$\text{Cost of 1 fiction book} = \text{Cost of 3 magazines}$$

$$\text{Cost of 15 fiction books} = \text{Cost of } (3 \times 15 =) 45 \text{ magazines}$$

$$\text{Cost of 12 magazines and 15 fiction books} = \text{Cost of } (12 + 45 =) 57 \text{ magazines}$$

$$= \$1,026$$

$$\text{Cost of 1 magazine} = \$1,026 \div 57$$

$$= \$18$$

A magazine costs \$18.

Put On Your Thinking Cap!

- 1 Thinking skill: Deduction
Strategy: Make suppositions
9,876,420
- 2 Thinking skill: Deduction
Strategy: Make suppositions
2,046,789
- 3 Thinking skill: Deduction
Strategy: Make suppositions
 $9,876,420 - 2,046,789 = 7,829,631$
This is the greatest difference because the difference between another pair of numbers formed using the seven digits would be lesser.

Chapter 2 Fractions and Mixed Numbers

Activity 1 Fractions, Mixed Numbers, and Division Expressions

$$\begin{aligned} 1 \quad 2 \div 3 + 4 \div 9 &= \frac{2}{3} + \frac{4}{9} \\ &= \frac{6}{9} + \frac{4}{9} \\ &= \frac{10}{9} \\ &= 1\frac{1}{9} \end{aligned}$$

| | | |
|----------|------------------------------|-------------------------------|
| 2 | $\frac{1}{2} = 0.5$ | $\frac{3}{4} = 0.75$ |
| | $\frac{2}{5} = 0.4$ | $\frac{2}{7} = 0.285714285$ |
| | $\frac{7}{8} = 0.875$ | $\frac{2}{9} = 0.222222222$ |
| | $\frac{6}{11} = 0.545454545$ | $\frac{11}{12} = 0.916666666$ |

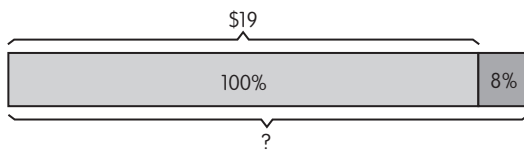
I would group the decimals into repeating and terminating decimals.

| | | | |
|----------|----------|-----------------------|-----------------------|
| 3 | a | $\frac{1}{9} = 0.111$ | $\frac{2}{9} = 0.222$ |
| | | $\frac{3}{9} = 0.333$ | $\frac{4}{9} = 0.444$ |

The repeating number in each decimal is the numerator in each fraction.

b $\frac{7}{9} = 0.778$

3 Total cost of meal = $\$13.10 + \5.90
 $= \$19$
 Combined tax = $5\% + 3\%$
 $= 8\%$



$100\% \rightarrow \$19$

$1\% \rightarrow \$19 \div 100$
 $= \$0.19$

$8\% \rightarrow \$0.19 \times 8$
 $= \$1.52$

Total cost of meal including taxes = $\$19 + \1.52
 $= \$20.52$

Since $\$20.52$ is greater than $\$20$, Ms. Wright is not able to pay with $\$20$.

Activity 2 Adding Unlike Fractions and Mixed Numbers

| Items | Total Mass (kg) |
|-------|---|
| A + B | $2\frac{2}{5} + \frac{10}{3} = \frac{12}{5} + \frac{10}{3}$ $= \frac{36}{15} + \frac{50}{15}$ $= \frac{86}{15}$ $= 5\frac{11}{15}$ |
| A + C | $2\frac{2}{5} + \frac{13}{5} = \frac{12}{5} + \frac{13}{5}$ $= \frac{25}{5}$ $= 5$ |
| A + D | $2\frac{2}{5} + 2\frac{3}{7} = \frac{12}{5} + \frac{17}{7}$ $= \frac{84}{35} + \frac{85}{35}$ $= \frac{169}{35}$ $= 4\frac{29}{35} \text{ (least)}$ |
| B + C | $\frac{10}{3} + \frac{13}{5} = \frac{50}{15} + \frac{39}{15}$ $= \frac{89}{15}$ $= 5\frac{14}{15}$ |

| | |
|-------|---|
| B + D | $\frac{10}{3} + 2\frac{3}{7} = \frac{10}{3} + \frac{17}{7}$ $= \frac{70}{21} + \frac{51}{21}$ $= \frac{121}{21}$ $= 5\frac{16}{21}$ |
| C + D | $\frac{13}{5} + 2\frac{3}{7} = \frac{13}{5} + \frac{17}{7}$ $= \frac{91}{35} + \frac{85}{35}$ $= \frac{176}{35}$ $= 5\frac{1}{35}$ |

Joseph can pick items A and D so that he will carry the least mass.

2 a Total distance = $99\frac{2}{3} + 100\frac{1}{3} + 99\frac{2}{5} + 100\frac{4}{5}$

$$= 99\frac{10}{15} + 100\frac{5}{15} + 99\frac{6}{15} + 100\frac{12}{15}$$

$$= 398\frac{10}{15} + \frac{5}{15} + \frac{6}{15} + \frac{12}{15}$$

$$= 398\frac{33}{15}$$

$$= 400\frac{3}{15}$$

$$= 400\frac{1}{5} \text{ m}$$

The total distance that will be covered by the four runners is $400\frac{1}{5}$ meters.

b Yes, Michael is correct. $\frac{2}{3}$ is greater than $\frac{2}{5}$, so the distance covered by Runner A is longer than Runner C.

3 **STEP 1** Compare the fractional part in each mixed number to the benchmarks 0, $\frac{1}{2}$, and 1.

$$\frac{7}{9} \text{ is about } 1. \quad \frac{4}{7} \text{ is about } \frac{1}{2}.$$

STEP 2 Round each mixed number and add.

$$3\frac{7}{9} \text{ is about } 4. \quad 4\frac{4}{7} \text{ is about } 4\frac{1}{2}.$$

$$4 + 4\frac{1}{2} = 8\frac{1}{2}$$

Activity 3 Subtracting Unlike Fractions and Mixed Numbers

- 1 a Convert the given fractions and mixed numbers to improper fractions with the same denominator.

$$2\frac{5}{6} = \frac{17}{6}$$

$$7\frac{1}{2} = \frac{45}{6}$$

$$4\frac{5}{6} = \frac{29}{6}$$

$$1\frac{1}{2} = \frac{9}{6}$$

Order the fractions from greatest to least:

$$\begin{array}{cccc} \frac{45}{6} & \frac{29}{6} & \frac{17}{6} & \frac{9}{6} \\ \curvearrowright & \curvearrowright & \curvearrowright & \\ -\frac{16}{6} & -\frac{12}{6} & -\frac{8}{6} & \end{array}$$

To find the last fraction, subtract $\frac{4}{6}$ from $\frac{9}{6}$.

$$\frac{9}{6} - \frac{4}{6} = \frac{5}{6}$$

- b From greatest to least, the fractions and mixed numbers are:

$$7\frac{1}{2} \quad 4\frac{5}{6} \quad 2\frac{5}{6} \quad 1\frac{1}{2} \quad \frac{5}{6}$$

- 2 It takes 5 minutes to fill the container, meaning $\frac{1}{5}$ of the container is filled in 1 minute. Likewise, it takes 6 minutes to empty the container, meaning $\frac{1}{6}$ of the container is drained out in 1 minute.

$$\begin{aligned} \frac{1}{5} - \frac{1}{6} &= \frac{6}{30} - \frac{5}{30} \\ &= \frac{1}{30} \end{aligned}$$

$\frac{1}{30}$ of the container is filled every minute.

So, it will take 30 minutes to fill the container when the tap is running and the drain is opened.

- 3 **STEP 1** Compare the fractional part in each mixed number to the benchmarks 0, $\frac{1}{2}$, and 1.

$$\frac{9}{11} \text{ is about } 1. \qquad \frac{1}{12} \text{ is about } 0.$$

- STEP 2** Round each mixed number and subtract.

$$6\frac{9}{11} \text{ is about } 7. \qquad 1\frac{1}{12} \text{ is about } 1.$$

$$7 - 1 = 6$$

Activity 4 Real-World Problems: Fractions and Mixed Numbers

- 1 Van's grandmother is now $67 - 3 = 64$ years old. Since Van's age is $\frac{1}{8}$ of his grandmother's, he is now $64 \div 8 = 8$ years old.

| Number of Years | Van's Age | His grandmother's Age | Is Van's age $\frac{1}{5}$ of his grandmother's age? |
|-----------------|-----------|-----------------------|--|
| 0 | 8 | 64 | No |
| 1 | 9 | 65 | No |
| 2 | 10 | 66 | No |
| 3 | 11 | 67 | No |
| 4 | 12 | 68 | No |
| 5 | 13 | 69 | No |
| 6 | 14 | 70 | Yes |

Van's age will be $\frac{1}{5}$ of his grandmother's age in 6 years.

$$\begin{aligned} 2 \quad 3\frac{3}{4} + \frac{4}{5} + 2\frac{7}{10} &= 3\frac{15}{20} + \frac{16}{20} + 2\frac{14}{20} \\ &= 5\frac{15}{20} + \frac{16}{20} + \frac{14}{20} \\ &= 5\frac{45}{20} \\ &= 7\frac{5}{20} \\ &= 7\frac{1}{4} \end{aligned}$$

She traveled $7\frac{1}{4}$ kilometers in all.

$$\begin{aligned} 3 \quad \frac{3}{4} + 3\frac{1}{6} \\ &= 3\frac{9}{12} + \frac{2}{12} \\ &= 3\frac{11}{12} \end{aligned}$$

Dylan took $3\frac{11}{12}$ hours more than Farrah.

Put On Your Thinking Cap!

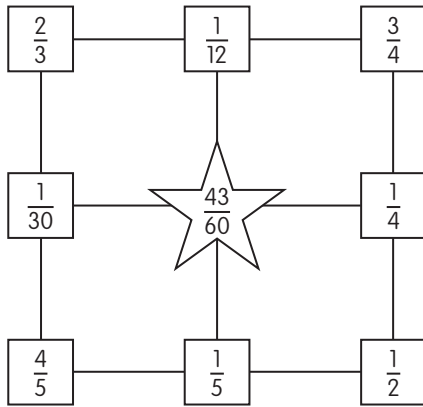
- 1 Thinking skill: Synthesizing (from parts to whole)
Strategy: Guess and check

a The fractions at the corners will be used twice. So, four fractions will be used twice.

$$\text{b } \frac{1}{30} + \frac{1}{4} = \frac{2}{60} + \frac{15}{60} \\ = \frac{17}{60}$$

$$\frac{1}{12} + \frac{1}{5} = \frac{5}{60} + \frac{12}{60} \\ = \frac{17}{60}$$

$$\text{Fraction to fill in the star} = 1 - \frac{17}{60} \\ = \frac{43}{60}$$



- 2 Thinking skill: Deduction
Strategy: Make suppositions

Method 1

Assume that she uses the water to fill up only the small tanks.

Capacity of 1 small tank
= $\frac{1}{3}$ capacity of a large tank

Capacity of 1 large tank
= Capacity of 3 small tanks

Capacity of 20 large tanks
= Capacity of 60 small tanks

Total number of small tanks that she will fill
= 60 + 15

= 75

Fraction of total amount of water she uses to fill all the small tanks = $\frac{15}{75}$

$$= \frac{1}{5}$$

Method 2

Assume that she uses the water to fill up only the large tanks.

Capacity of 1 small tank
= $\frac{1}{3}$ capacity of a large tank

Capacity of 15 small tanks
= Capacity of 5 large tanks

Total number of large tanks that she will fill
= 20 + 5

= 25

Fraction of total amount of water she uses to fill all the small tanks (or 5 large tanks)

$$= \frac{5}{25}$$

$$= \frac{1}{5}$$

She uses $\frac{1}{5}$ of the total amount of water to fill up all the small tanks.

Chapter 3 Multiplying and Dividing Fractions and Mixed Numbers

Activity 1 Multiplying Fractions by Whole Numbers

- 1 a His mistake was to divide 35 by 5. The common factor of the numerator 28 and the denominator 35 is 7.

$$\begin{aligned} \text{b } \frac{28}{35} \times 5 &= \frac{28 \div 7}{35 \div 7} \times 5 \\ &= \frac{4}{5} \times 5 \\ &= 4 \end{aligned}$$

- 2 Answers vary. Example:

$$\begin{aligned} 7\frac{7}{9} &= \frac{70}{9} \\ &= 10 \times \frac{7}{9} \\ &= 5 \times \frac{14}{9} \end{aligned}$$

3 Height of 1st rebound = $\frac{1}{4} \times 1,024$

= 256 cm

Height of 2nd rebound = $\frac{1}{4} \times 256$

= 64 cm

Height of 3rd rebound = $\frac{1}{4} \times 64$

= 16 cm

It will rebound 16 centimeters after three bounces.

Activity 2 Multiplying Proper Fractions

1 $\frac{7}{8} \times \frac{9}{10} = \frac{63}{80}$

The chimpanzee is $\frac{63}{80}$ meter tall.

$$\frac{\cancel{8}^7}{\cancel{8}^7} \times \frac{\cancel{9}^3}{\cancel{9}^3 \cancel{10}^2} = \frac{7}{10}$$

The cheetah is $\frac{7}{10}$ meter tall.

2 Fraction of participants who are children and completed the marathon = $\frac{1}{3} \times \frac{2}{5}$
 $= \frac{2}{15}$

Fraction of participants who are children and did not complete the marathon = $\frac{1}{4} \times \frac{1}{5}$
 $= \frac{1}{20}$

Fraction of participants who are children
 $= \frac{2}{15} + \frac{1}{20}$
 $= \frac{8}{60} + \frac{3}{60}$
 $= \frac{11}{60}$

$\frac{11}{60}$ of the participants were children.

3 a $\frac{1}{2}$ units²
b $\frac{1}{4}$ units²

$$1 \text{ unit} = \$270$$

$$4 \text{ units} = \$270 \times 4$$

$$= \$1,080$$

Ms. Howard's salary is \$1,080.

$$2 \text{ Remainder} = 1 - \frac{1}{5}$$

$$= \frac{4}{5}$$

$$\text{Mother} = \frac{1}{4} \times \frac{4}{5}$$

$$= \frac{1}{5}$$

$$\text{Sister} = \frac{1}{8} \times \frac{4}{5}$$

$$= \frac{1}{10}$$

$$\frac{4}{5} - \frac{1}{5} - \frac{1}{10} = \frac{1}{2}$$

$$2 \times \$250 = \$500$$

Ian won \$500.

$$3 \text{ Remainder} = 1 - \frac{1}{6}$$

$$= \frac{5}{6}$$

$$\frac{3}{5} \times \frac{5}{6} = \frac{1}{2}$$

$$\frac{1}{6} + \frac{1}{2} = \frac{1}{6} + \frac{3}{6}$$

$$= \frac{4}{6}$$

$$= \frac{2}{3}$$

$$1 - \frac{2}{3} = \frac{1}{3}$$

She had $\frac{1}{3}$ of her savings left after buying the two items.

Activity 3 Real-World Problems: Multiplying with Proper Fractions

$$1 \quad \frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12}$$

$$= \frac{7}{12}$$

$$\text{Remainder} = 1 - \frac{7}{12}$$

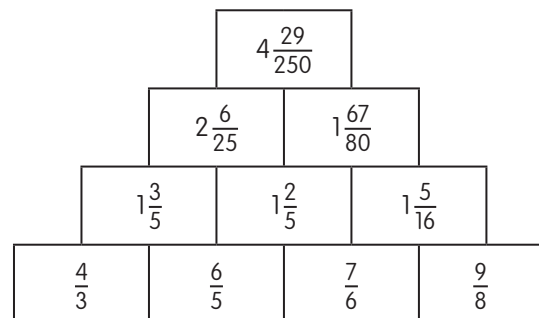
$$= \frac{5}{12}$$

$$1 - \frac{2}{5} = \frac{3}{5}$$

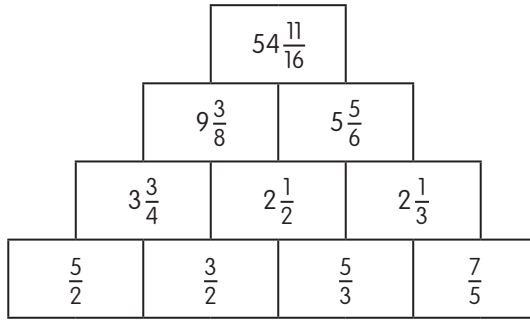
$$\frac{3}{5} \times \frac{5}{12} = \frac{1}{4}$$

Activity 4 Multiplying Improper Fractions by Fractions

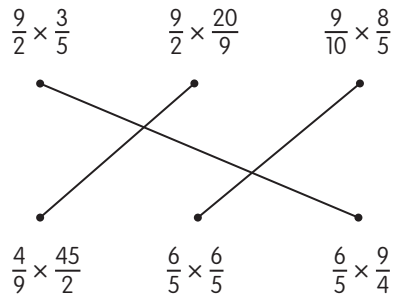
1



2



3



Activity 5 Multiplying Mixed Numbers and Whole Numbers

- 1 Card A has a greater value.

$$\begin{aligned}\frac{14}{5} \times \frac{3}{4} &= \frac{7}{5} \times 2 \times \frac{3}{4} \\ &= \frac{7}{5} \times \frac{6}{4}\end{aligned}$$

Compare $\frac{7}{5} \times \frac{6}{4}$ and $\frac{7}{5} \times \frac{7}{8}$.

$\frac{6}{4}$ is greater than 1 but $\frac{7}{8}$ is less than 1.

So, $\frac{14}{5} \times \frac{3}{4}$ is greater than $\frac{7}{5} \times \frac{7}{8}$.

2 $64 \div 5 = 12\frac{4}{5}$

$$12\frac{4}{5} \times 4 = 51\frac{1}{5}$$

The correct answer should be $51\frac{1}{5}$.

- 3 a Answers vary. Example:

$$3\frac{3}{4} \times 6 = 22\frac{1}{2}$$

Her arrows could have landed on the

$3\frac{3}{4}$ -point and 6-point rings.

- b Answers vary. Example:

$$2\frac{1}{2} \times 6 = 15$$

Her arrows could have landed on the

$2\frac{1}{2}$ -point and 6-point rings.

Activity 6 Real-World Problems: Multiplying with Mixed Numbers

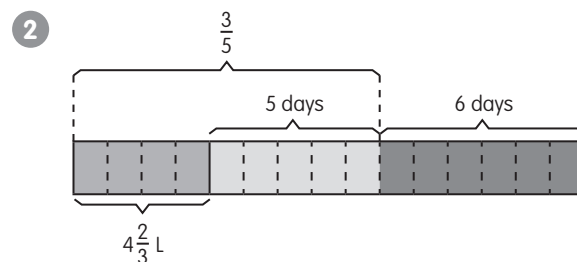
$$\begin{aligned} \textcircled{1} \quad \frac{8}{9} - \frac{2}{3} &= \frac{8}{9} - \frac{6}{9} \\ &= \frac{2}{9} \end{aligned}$$

$$2 \text{ units} = 2\frac{2}{3} \text{ L}$$

$$\begin{aligned} 1 \text{ unit} &= 2\frac{2}{3} \div 2 \\ &= 1\frac{1}{3} \text{ L} \end{aligned}$$

$$\begin{aligned} 9 \text{ units} &= 1\frac{1}{3} \times 9 \\ &= 12 \text{ L} \end{aligned}$$

The capacity of the bucket is 12 liters.



$$4 \text{ units} = 4\frac{2}{3} \text{ L}$$

$$\begin{aligned} 1 \text{ unit} &= 4\frac{2}{3} \div 4 \\ &= 1\frac{1}{6} \text{ L} \end{aligned}$$

$$\begin{aligned} 15 \text{ units} &= 1\frac{1}{6} \times 15 \\ &= 17\frac{1}{2} \text{ L} \end{aligned}$$

The chef ordered $17\frac{1}{2}$ liters of cooking oil.



$$1 \text{ unit of shrimp} + 1 \text{ unit of fish} = 52\frac{1}{4} \text{ lb}$$

$$\begin{aligned} 4 \text{ units of shrimp} + 4 \text{ units of fish} &= 52\frac{1}{4} \times 4 \\ &= 209 \text{ lb} \end{aligned}$$

$$261\frac{1}{4} - 209 = 52\frac{1}{4}$$

$$2 \text{ units of fish} = 52\frac{1}{4} \text{ lb}$$

$$\begin{aligned} 1 \text{ unit of fish} &= 52\frac{1}{4} \div 2 \\ &= 26\frac{1}{8} \text{ lb} \end{aligned}$$

$$\begin{aligned} 6 \text{ units of fish} &= 26\frac{1}{8} \times 6 \\ &= 156\frac{3}{4} \text{ lb} \end{aligned}$$

The weight of the fish that he has is $156\frac{3}{4}$ pounds.

Activity 7 Dividing Fractions and Whole Numbers

- 1 The answer is greater than the whole number.
Answers vary. Example:

$$\begin{aligned}5 \div \frac{3}{4} &= 5 \times \frac{4}{3} \\ &= \frac{20}{3} \\ &= 6\frac{2}{3}\end{aligned}$$

$6\frac{2}{3}$ is greater than 5.

- 2 Riley's answer is correct but Tomas' answer is incorrect.

Tomas found his answer by dividing the denominator by 4.

$$\begin{aligned}\frac{1}{6} \div 4 &= \frac{1}{6} \times \frac{1}{4} \\ &= \frac{1}{24}\end{aligned}$$

- 3 Answers vary. Example:
Cole and Alan shared a packet of nuts. Alan ate $\frac{2}{3}$ of the packet. If Alan ate 3 times the amount that Cole did, what fraction of the packet of nuts was left?

$$\begin{aligned}\text{Fraction eaten by Cole} &= \frac{2}{3} \div 3 \\ &= \frac{2}{9}\end{aligned}$$

$$\begin{aligned}\text{Fraction left over} &= 1 - \frac{2}{9} - \frac{2}{9} \\ &= 1 - \frac{2}{9} - \frac{6}{9} \\ &= \frac{1}{9}\end{aligned}$$

$$\begin{aligned}
 9\frac{11}{12} \div \frac{7}{12} &= \frac{119}{12} \div \frac{7}{12} \\
 &= \frac{119}{\cancel{12}^1} \times \frac{\cancel{12}^1}{7} \\
 &= 17
 \end{aligned}$$

$$17 + 3 = 20$$

She uses 20 balloons.

$$\begin{aligned}
 \textcircled{2} \quad 10 \div \frac{4}{5} &= 10 \times \frac{5}{4} \\
 &= \frac{50}{4} \\
 &= 12\frac{1}{2}
 \end{aligned}$$

$$12 + 2 = 14$$

He reports at 14 checkpoints.

$$\begin{aligned}
 \textcircled{3} \quad \text{a} \quad \frac{9}{10} \div \frac{1}{6} &= \frac{9}{10} \times 6 \\
 &= \frac{54}{10} \\
 &= \frac{27}{5} \\
 &= 5\frac{2}{5}
 \end{aligned}$$

There are $5\frac{1}{6}$ -m pieces.

b Answers vary. Example:

$$\frac{\cancel{2}^1}{5} \times \frac{1}{\cancel{2}^1} = \frac{1}{5}$$

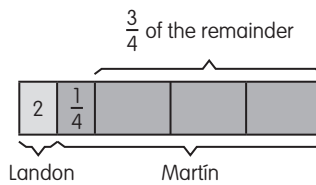
The length of the remaining ribbon is $\frac{1}{15}$ meter.

Activity 8 Real-World Problems: Multiplying and Dividing with Fractions

$$\begin{aligned}
 \textcircled{1} \quad 1\frac{3}{4} \div 3 &= \frac{7}{4} \div 3 \\
 &= \frac{7}{4} \times \frac{1}{3} \\
 &= \frac{7}{12}
 \end{aligned}$$

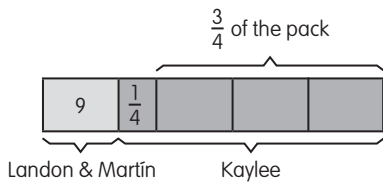
Put On Your Thinking Cap!

- 1 Thinking skill: Synthesizing (from parts to whole)
Strategy: Work backwards



$$\begin{aligned}\frac{1}{4} \text{ of the remainder} &= 2 + \frac{1}{4} \\ &= 2 \frac{1}{4}\end{aligned}$$

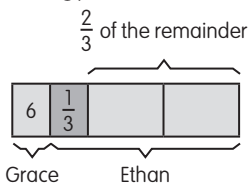
Martin and Landon shared $2 \frac{1}{4} \times 4 = 9$ chocolate bars.



$$\begin{aligned}\frac{1}{4} \text{ of the pack} &= 9 + \frac{1}{4} \\ &= 9\frac{1}{4}\end{aligned}$$

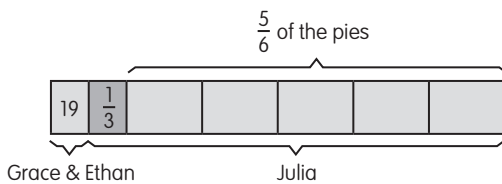
There are $9\frac{1}{4} \times 4 = 37$ chocolate bars in the pack at first.

- 2 Thinking skill: Synthesizing (from parts to whole)
Strategy: Work backwards



$$\begin{aligned}\frac{1}{3} \text{ of the remainder} &= 6 + \frac{1}{3} \\ &= 6\frac{1}{3}\end{aligned}$$

Ethan and Grace shared $6\frac{1}{3} \times 3 = 19$ pies.



$$\begin{aligned}\frac{1}{6} \text{ of the pies} &= 19 + \frac{1}{3} \\ &= 19\frac{1}{3}\end{aligned}$$

They shared $19\frac{1}{3} \times 6 = 116$ pies among themselves.

- 2 $2.073 - 2.049 = 0.024$
 2nd number: $2.145 - 0.024 = 2.121$
 3rd number: $2.121 - 0.024 = 2.097$
 7th number: $2.025 - 0.024 = 2.001$
 8th number: $2.001 - 0.024 = 1.977$
 Four numbers are missing from the pattern.

3

| | | |
|-------|------|-------|
| 1.515 | 3.04 | 1.045 |
| 2.25 | | 3.22 |
| 1.835 | 2.43 | 1.335 |

Chapter 4 Decimals

Activity 1 Understanding Thousandths

- 1 Answers vary. Example:
- a $\frac{3}{8}$ ones $\frac{0}{5}$ tenths
 $\frac{8}{85}$ hundredths $\frac{5}{85}$ thousandths
- b $\frac{0}{85}$ ones $\frac{30}{85}$ tenths $\frac{0}{85}$ hundredths
 $\frac{85}{85}$ thousandths
- c $\frac{3}{0}$ ones $\frac{0}{85}$ tenths
 $\frac{0}{85}$ hundredths $\frac{85}{85}$ thousandths

Activity 2 Comparing and Rounding Decimals

- 1 Answers vary. Example:
- STEP 1** Compare the ones.
2 ones are less than 5 ones.
2.693 and 2.617 are the lesser decimals.
- STEP 2** The ones and tenths are the same in 2.693 and 2.617.
So, compare the hundredths.
1 hundredth is less than 9 hundredths.
So, 2.617 is the least.
- STEP 3** The ones are the same in 5.514 and 5.809.
So, compare the tenths.
5 tenths are less than 8 tenths.
So, 5.809 is the greatest.
The order from least to greatest is:
2.617 2.693 5.514 5.809
- 2 Answers vary. Example:
- a If the digit in the thousandths place is less than 5, the digit in the hundredths place does not change. The digit in the thousandths place is then replaced with 0. So, 7.084 is the greatest possible number.
- b If the digit in the thousandths place is 5 or more, 1 is added to the digit in the hundredths place. The digit in the thousandths place is then replaced with 0. So, 7.075 is the least possible number.

3 If the digit in the thousandths place is less than 5, the number is rounded down.
So, 9.871, 9.872, 9.873, and 9.874 are rounded to 9.87 when rounded to the nearest hundredth.

If the digit in the thousandths place is 5 or more, the number is rounded up.
So, 9.865, 9.866, 9.867, 9.868, and 9.869 are rounded to 9.87 when rounded to the nearest hundredth.

Activity 3 Rewriting Decimals as Fractions and Mixed Numbers

1 $\frac{1}{11} = 0.09090909$

$$\frac{2}{11} = 0.18181818$$

$$\frac{3}{11} = 0.27272727$$

$$\frac{4}{11} = 0.36363636$$

2 The repeating number in the decimals are multiples of 9.

3 $\frac{8}{11} = 0.72727272$

$$\frac{9}{11} = 0.81818181$$

4 $\frac{1}{7} = 0.142857142$

$$\frac{2}{7} = 0.285714285$$

$$\frac{3}{7} = 0.428571428$$

$$\frac{4}{7} = 0.571428571$$

$$\frac{5}{7} = 0.714285714$$

$$\frac{6}{7} = 0.857142857$$

The decimals have the same 6 digits repeating in the same order, although they differ in the starting point. The repeating blocks are broken into two groups of 3 digits.

$$\text{Mass of 23 dimes} + 30.618 \text{ g} = 82.782 \text{ g}$$

$$\begin{aligned} \text{Mass of 23 dimes} &= 82.782 - 30.618 \\ &= 52.164 \text{ g} \end{aligned}$$

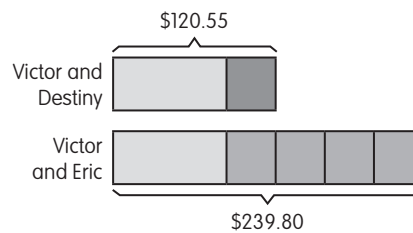
$$\begin{aligned} \text{Mass of 1 dime} &= 52.164 \div 23 \\ &= 2.268 \text{ g} \end{aligned}$$

$$\begin{aligned} \text{Mass of a quarter} &= 2.268 + 3.402 \\ &= 5.67 \text{ g} \end{aligned}$$

The mass of a quarter is 5.67 grams.

2 Thinking skill: Analyzing (from whole to parts)

Strategy: Draw a diagram



From the model,

$$\begin{aligned} 3 \text{ units} &= \$239.80 - \$120.55 \\ &= \$119.25 \end{aligned}$$

$$\begin{aligned} 1 \text{ unit} &= \$119.25 \div 3 \\ &= \$39.75 \end{aligned}$$

Destiny donated \$39.75.

$$\begin{aligned} 4 \text{ units} &= \$39.75 \times 4 \\ &= \$159 \end{aligned}$$

Eric donated \$159.

$$\$120.55 - \$39.75 = \$80.80$$

Victor donated \$80.80.

Put On Your Thinking Cap!

1 Thinking skill: Comparing
Strategy: Simplify the problem

$$\text{Mass of a quarter} = \text{Mass of a dime} + 3.402 \text{ g}$$

$$\text{Mass of 14 dimes} + \text{Mass of 9 quarters}$$

$$= \text{Mass of 14 dimes} + \text{Mass of 9 dimes}$$

$$+ 9 \times 3.402 \text{ g}$$

$$= \text{Mass of 23 dimes} + 30.618 \text{ g}$$

Chapter 5 Four Operations of Decimals

Activity 1 Adding Decimals

$$\begin{array}{r} 1 \quad \boxed{4.23} \\ + 2.54 \\ \hline 6.77 \end{array}$$

$$\begin{array}{r} 2 \quad \boxed{3.21} \\ + 0.74 \\ \hline 3.95 \end{array}$$

$$\begin{array}{l} 3 \quad 2.43 + 2.57 = 5 \\ \quad 2.36 + 2.73 = 5.09 \end{array}$$

$$\begin{array}{l} 4 \quad 2.36 + 2.43 + 2.73 = 7.52 \\ \quad 2.43 + 2.54 + 2.57 = 7.54 \\ \quad 2.43 + 2.54 + 2.73 = 7.7 \\ \quad 2.54 + 2.57 + 2.73 = 7.84 \end{array}$$

Activity 2 Subtracting Decimals

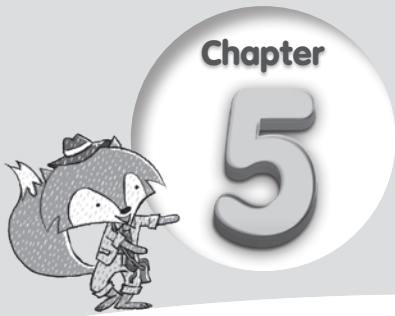
$$\begin{array}{r} 16.46 \\ - 9.12 \\ \hline 7.34 \end{array}$$

$$\begin{array}{r} 23.86 \\ - 10.94 \\ \hline 12.92 \end{array}$$

$$\begin{array}{r} 18.75 \\ - 1.22 \\ \hline 17.53 \end{array}$$

$$\begin{array}{cccccccc} 6.93 & 7.05 & 7.28 & 7.62 & 8.07 & 8.63 & 9.3 & 10.08 \\ \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \\ +0.12 & +0.23 & +0.34 & +0.45 & +0.56 & +0.67 & +0.78 & \end{array}$$

There are 3 more numbers in the pattern that are less than 10.



Enrichment

Four Operations of Decimals

Activity 3 Multiplying Decimals

Solve. Show your work.

- 1 Compare the value of 1.456×3 and 4.63 . Which is less?

- 2 A grandfather clock takes 8.25 seconds to chime 4 times at 4 o'clock. How long does it take for the clock to chime 7 times at 7 o'clock?

- 3 Write 0.4×9 in five different ways.

Activity 4 Multiplying by Tens, Hundreds and Thousands

$$\begin{aligned} \textcircled{1} \quad 0.92 \times 60 &= 0.92 \times 6 \times 10 \\ &= 5.52 \times 10 \\ &= 55.2 \end{aligned}$$

or

$$\begin{aligned} 0.92 \times 60 &= 0.92 \times 10 \times 6 \\ &= 9.2 \times 6 \\ &= 55.2 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad 0.734 \times 4,000 &= 0.734 \times 4 \times 1,000 \\ &= 2.936 \times 1,000 \\ &= 2,936 \end{aligned}$$

or

$$\begin{aligned} 0.734 \times 4,000 &= 0.734 \times 1,000 \times 4 \\ &= 734 \times 4 \\ &= 2,936 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad 0.875 \times 10^3 &= 0.875 \times 10 \times 10 \times 10 \\ &= 0.875 \times 1,000 \\ &= 875 \end{aligned}$$

Activity 5 Dividing Decimals

1 a $0.76 \div 8 = 0.095$

b $1.85 \div 5 = 0.37$

2 a $7.8 \div 33 = 0.236363636$
 ≈ 0.24

b $68.49 \div 27 = 2.536666667$
 ≈ 2.54

3 The decimals in question 1 are exact decimals. The decimals in question 2 have recurring patterns.

Activity 6 Dividing by Tens, Hundreds and Thousands

$$\begin{aligned} 1 \quad 8.76 \div 60 &= 8.76 \div 10 \div 6 \\ &= 0.876 \div 6 \\ &= 0.146 \end{aligned}$$

or

$$\begin{aligned} 8.76 \div 60 &= 8.76 \div 6 \div 10 \\ &= 1.46 \div 10 \\ &= 0.146 \end{aligned}$$

$$\begin{aligned} 2 \quad 637.2 \div 900 &= 637.2 \div 100 \div 9 \\ &= 6.372 \div 9 \\ &= 0.708 \end{aligned}$$

or

$$\begin{aligned} 637.2 \div 900 &= 637.2 \div 9 \div 100 \\ &= 70.8 \div 100 \\ &= 0.708 \end{aligned}$$

3 $4,480 \div 7,000 = 4,480 \div 1,000 \div 7$
 $= 4.48 \div 7$
 $= 0.64$

or

$4,480 \div 7,000 = 4,480 \div 7 \div 1,000$
 $= 640 \div 1,000$
 $= 0.64$

Activity 7 Estimating Decimals

- 1 Yes, his answer is reasonable.
62.87 is nearer to 63 than 56.
So, $62.87 \div 7$ is about $63 \div 7 = 9$.

2 a $47.81 \approx 49$ $14.34 \approx 12$
 $49 \div 7 = 7$ $12 \div 6 = 2$
 $7 - 2 = 5$

b $47.81 \approx 47.6$ $14.34 \approx 14.4$
 $47.6 \div 7 = 6.8$ $14.4 \div 6 = 2.4$
 $6.8 - 2.4 = 4.4$

c $47.81 \div 7 - 14.34 \div 6 = 6.83 - 2.39$
 $= 4.44$

The difference found by rounding the dividends to the nearest tenth is closer to the actual difference because the rounded dividends are nearer to the actual dividends.

3 Amount of protein in 3 muffins = 3×3.99
 $\approx 3 \times 4$
 $= 12$ g

Amount of protein in a cup of milk = 7.22 g
 ≈ 7 g

Amount of protein from the last food item
 $= 34 - 12 - 7$
 $= 15$ g

If she had some eggs, the nearest estimation

$= 2 \times 6.75$

$\approx 2 \times 7$

$= 14$ g

If she had some wheat cereal, the nearest

estimation = 3×4.85

$\approx 3 \times 5$

$= 15$ g

So, he ate 3 cups of wheat cereal.

2 $49 \text{ kg} - 36 \text{ kg} = 13 \text{ kg}$
 $= 13,000 \text{ g}$
 $13,000 \div 500 = 26$
It will be 26 weeks until the mass of sugar left is 36 kilograms.

3 $400 \text{ m} = 40,000 \text{ cm}$
 $40,000 \div 850 = 40,000 \div 10 \div 85$
 $= 4,000 \div 85$
 $= 47.05882353$
 ≈ 47
It will take him 47 seconds to complete the sprint.

Activity 8 Converting Metric Units

1 $5 \text{ kg} = 5,000 \text{ g}$
 $5,000 \div 85 = 58 \text{ R } 70$
The maximum number of apples that he can send is 58.

Activity 9 Real-World Problems: Decimals

- 1 $7 \times 4.25 = 29.75$
He uses 29.75 yards of fabric to sew 7 identical dresses.
 $39 > 29.75$
He has enough fabric to sew 7 identical dresses.
 $39 - 29.75 = 9.25$
 $9.25 - 4.25 = 5$
 $5 - 4.25 = 0.75$
He can make 2 more dresses of the same size.
- 2 $20.15 + 29.8 + 31.76 + 3 \times 0.12 = 82.07$
 $1 \text{ m} = 100 \text{ cm}$
 $100 - 82.07 = 17.93$
The length of the log left is 17.93 centimeters.
- 3 a $16 \times 29.75 = 476$
The total mass of the 16 cartons of goods is 476 kilograms.
 $476 + 61.8 = 537.8 < 540$
Yes, the elevator can carry all the 16 cartons of goods and Mr. Adams.
- b $540 - 78.9 = 461.1$
 $476 > 461.1$
 $476 - 29.75 = 446.25$
 $16 - 1 = 15$
The greatest number of cartons that Mr. Nelson can carry into the elevator is 15.

Put On Your Thinking cap!

- 1 Thinking skill: Synthesizing (from parts to whole)

Strategy: Work backwards

$$\$11.85 + \$3.15 = \$15$$

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

$$1 \text{ unit} = \$15$$

$$4 \text{ units} = \$15 \times 4 \\ = \$60$$

$$8 \text{ units} = \$60$$

$$1 \text{ unit} = \$60 \div 8 \\ = \$7.50$$

$$15 \text{ units} = \$7.50 \times 15 \\ = \$112.50$$

She had \$112.50 at first.

- 2 Thinking skill: Deduction

Strategy: Look for patterns

When you multiply decimals by 10, 100, and 1,000, the decimal point moves 1, 2, and 3 places to the right respectively (since 10 has 1 zero, 100 has 2 zeros, and 1,000 has 3 zeros).

Division is the opposite operation of multiplication. When you divide decimals by 10, 100, and 1,000, the decimal point moves 1, 2, and 3 places to the left respectively.

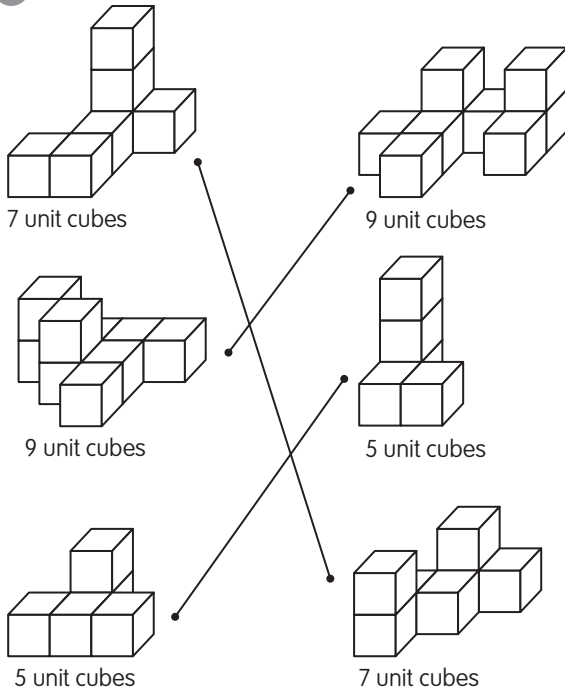


Answers

Chapter 6 Volume

Activity 1 Building Solids Using Unit Cubes

1



2

a $3 \times 2 \times 2 = 12$

12 cubes can be used to fill Box A completely.

b $4 \times 1 \times 2 = 8$

8 cubes can be used to fill Box B completely.

c Answers vary. Example:

$12 > 8$. Filled Box A occupies more space than filled Box B. So, filled Box A has a greater volume.

3

5 unit cubes are needed to fill the middle layer.

7 unit cubes are needed to fill the top layer.

$5 + 7 = 12$

12 more unit cubes are needed to form the smallest possible rectangular prism.



Answers

b least possible length = 4 in.
least possible width = 5 in.
least possible height = 4 in.
 $4 \times 5 \times 4 = 80$
The least possible volume of the piece of wood is 80 cubic inches.

2 a $9 \times 4 \times 6 = 216$
The volume of the rectangular prism is 216 cubic centimeters.

b $6 \times 6 \times 6 = 216$
The edge of the cube is 6 centimeters long.

3 Answers vary. Example:
Volume of Cube A = $5 \times 5 \times 5$
 $= 125 \text{ ft}^3$
Volume of Cube B = $10 \times 10 \times 10$
 $= 1,000 \text{ ft}^3$
 $1,000 \div 125 = 8$
Both Lauren and Owen are incorrect.
The volume of Cube B is 8 times the volume of Cube A.

Activity 2 Understanding and Measuring Volume

- 1 a** 1st layer (bottom): 4 cubes
2nd layer: 4 cubes
3rd layer: 4 cubes
4th layer (top): 1 cube
 $4 + 4 + 4 + 1 = 13$
The volume of the solid is 13 cubic inches.



Answers

Activity 3 Real-World Problems: Volume of Rectangular Prisms

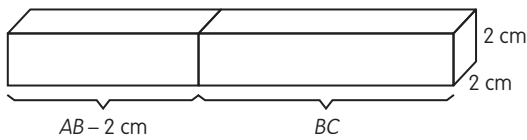
- Answers vary. Example:
Let the edge length of Container B be 1 unit.
The base area of Container B is
 $1 \times 1 = 1$ square unit.
The base area of Container A is
 $2 \times 2 = 4$ square units.
If Container A and Container B have the same height, Container A will have 4 times the capacity of container B using the formula $V = B \times h$. But since the height of Container B is twice the height of Container A, Container A has $4 \div 2 = 2$ times the capacity of container B. So, Aiden uses Container A.
- Volume of water in Tank A at first
 $= 40 \times 20 \times 30$
 $= 24,000 \text{ in}^3$
Combined base area
 $= 40 \times 20 + 25 \times 8$
 $= 1,000 \text{ in}^2$
 $24,000 \div 1,000 = 24$
The height of water in each tank is 24 inches.

- 3 Volume of water needed to fill the tank
 $= \left(1 - \frac{2}{3}\right) \times 60 \times 20 \times 30$
 $= 12,000 \text{ cm}^3$
 $= 12 \text{ L}$
 $6 - 2 = 4$
Water fills the tank at a rate of 4 liters per hour.
 $12 \div 4 = 3$
It takes 3 hours to fill the tank completely.

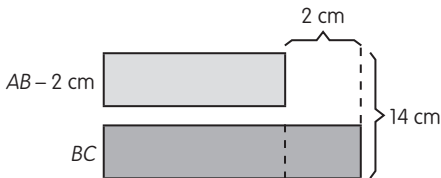
The volume of cement needed is 270 square feet.
 Since $270 < 400$, Ms. Cook has enough cement to build the stand.

Activity 4 Real-World Problems: Volume of Composite Solids

- 1 The solid can be split and combined to form the rectangular prism as shown below.



Length of new rectangular prism
 $= 56 \div (2 \times 2)$
 $= 14 \text{ cm}$



$$\begin{aligned} 2 \text{ units} &= 14 - 2 \\ &= 12 \text{ cm} \\ 1 \text{ unit} &= 12 \div 2 \\ &= 6 \text{ cm} \\ 6 + 2 &= 8 \end{aligned}$$

The length of \overline{AB} is 8 cm.

- 2 Answers vary. Example:
- Eric added the volume of two overlapping rectangular prisms to find the volume of the solid. He should split the solid into two rectangular prisms that do not overlap.
 - Volume of solid $= 7 \times 2 \times 3 + 3 \times 2 \times (9 - 3)$
 $= 42 + 36$
 $= 78 \text{ cm}^3$
- 3 $90 \div 2 = 45$
 Each row can seat 45 people.
 $45 \times 2 = 90$
 The width of the stand is 90 feet.
 Volume of the concrete stand
 $= 3 \times 90 \times 2 + 3 \times 90 \times 2$
 $= 1,080 \text{ ft}^2$
 $1,080 \div 4 = 270$

PUT ON YOUR THINKING CAP!

- 1 Thinking skill: Spatial visualization
Strategy: Solve part of the problem

Answers vary. Example:

- a Audrey should not divide the capacity of the container by the volume of each brick to find the greatest number of bricks the container can fit. Since the dimension of 45 centimeters is not divisible by 20, 10, or 6, the container cannot be filled completely by any number of bricks.
- b $120 \div 20 = 6$
6 bricks can be placed along the length of the container.
 $40 \div 10 = 4$
4 bricks can be placed along the height of the container.
 $45 \div 6 = 7 \text{ R } 3$
7 bricks can be placed along the width of the container.
 $6 \times 4 \times 7 = 168$
Since 165 is less than 168, the container can fit 165 bricks.

- 2 Thinking skill: Deduction
Strategy: Use a formula

Answers vary. Example:

$$\begin{aligned}\text{Height of Tank A} &= 6 \times 2 \\ &= 12 \text{ inches} \\ \text{Height of Tank B} &= 4 \div 2 \times 3 \\ &= 6 \text{ inches}\end{aligned}$$

$$12 \div 6 = 2$$

The height of Tank A is twice the height of Tank B. By using the formula $V = B \times h$, the base area of Tank B must be twice the base area of Tank A for both tanks to have the same capacity.

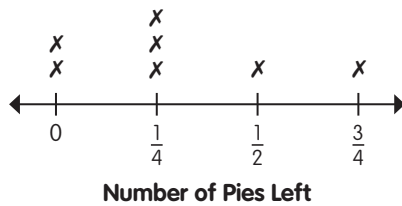
Chapter 7 Line Plots and the Coordinate Plane

Activity 1 Making and Interpreting Line Plots

1 a

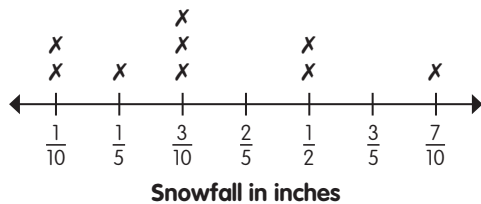
| | | | | |
|---------------------|---|---------------|---------------|---------------|
| Number of Pies Left | 0 | $\frac{1}{4}$ | $\frac{1}{2}$ | $\frac{3}{4}$ |
| Number of weeks | 2 | 3 | 1 | 1 |

Each \times represents 1 day.



- b Total number of pies left
- $$= 2 \times 0 + 3 \times \frac{1}{4} + 1 \times \frac{1}{2} + 1 \times \frac{3}{4}$$
- $$= 0 + \frac{3}{4} + \frac{1}{2} + \frac{3}{4}$$
- $$= 2$$
- $$2 \div 7 = \frac{2}{7}$$
- $\frac{2}{7}$ of a pie was left each day.

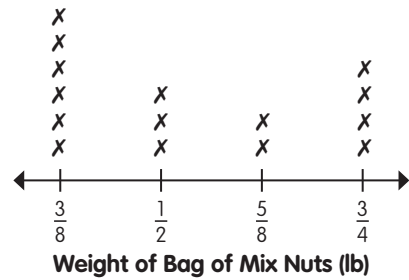
- 2 a Each \times represents 1 day.



- b $2\frac{4}{5} - \left(2 \times \frac{1}{10} + 1 \times \frac{1}{5} + 3 \times \frac{3}{10} + 7 \times \frac{1}{10}\right)$
- $$= 2\frac{4}{5} - \left(\frac{2}{10} + \frac{2}{10} + \frac{9}{10} + \frac{7}{10}\right)$$
- $$= 2\frac{4}{5} - 2$$
- $$= \frac{4}{5}$$
- $$\frac{4}{5} \div 2 = \frac{2}{5} \times \frac{1}{2}$$
- $$= \frac{2}{5}$$

The correct fraction was $\frac{2}{5}$.

- 3 a Each \times represents 1 bag of mixed beans.



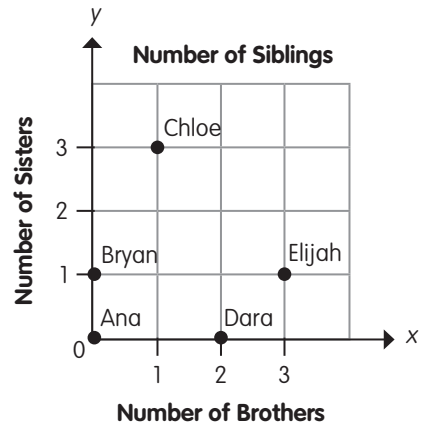
- b Total weight of $\frac{3}{8}$ lb-bags = $6 \times \frac{3}{8}$
- $$= 2\frac{1}{4} \text{ lb}$$
- Total weight of $\frac{1}{2}$ lb-bags = $3 \times \frac{1}{2}$
- $$= 1\frac{1}{2} \text{ lb}$$
- Total weight of $\frac{5}{8}$ lb-bags = $2 \times \frac{5}{8}$
- $$= 1\frac{1}{4} \text{ lb}$$
- Total weight of $\frac{3}{4}$ lb-bags = $4 \times \frac{3}{4}$
- $$= 3 \text{ lb}$$

The $\frac{3}{4}$ pound-bags sold have the greatest total weight. The total weight is 3 pounds.

- c Total weight of all bags = $2\frac{1}{4} + 1\frac{1}{2} + 1\frac{1}{4} + 3$
- $$= 8 \text{ lb}$$
- $$3 \div 8 = \frac{3}{8}$$
- The fraction is $\frac{3}{8}$.

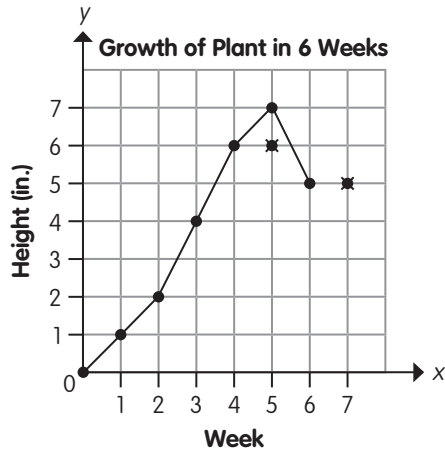
Activity 2 Graphing on a Coordinate Plane

1 a



- b $3 - 1 = 2$
Elijah has 2 more brothers than Chloe.
- c They have the same number of brothers and different number of sisters.
- d They have the same number of sisters and different number of brothers.

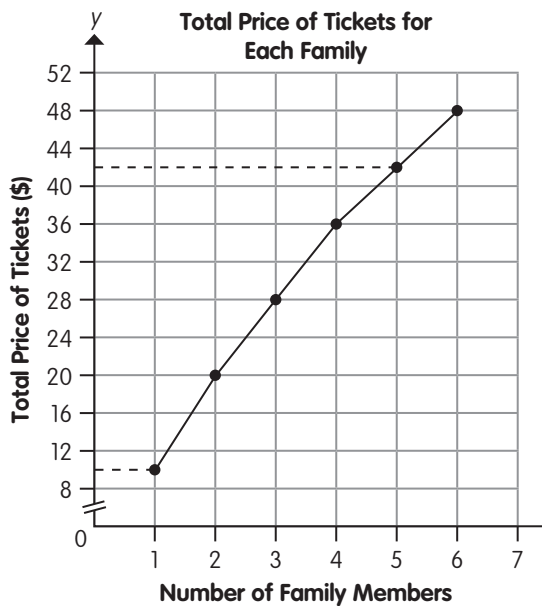
2 a



- b Answers vary. Example:
The plant might start to wilt after week 5.

3 a (1, 10), (2, 20), (3, 28), (4, 36), (5, 42), (6, 48)

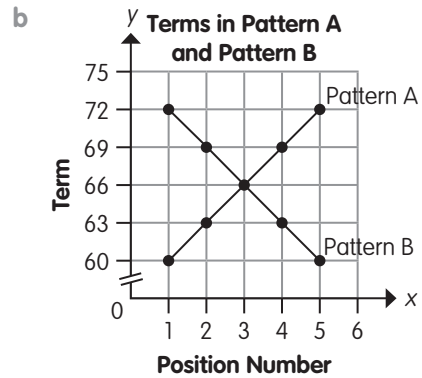
b



- c There are 5 family members in the Hall family.

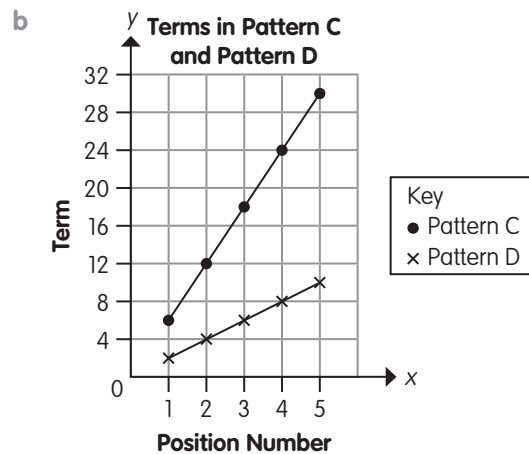
Activity 3 Number Patterns and Graphs

- 1 a Pattern A: 60, 63, 66, 69, 72 ...
 Pattern B: 72, 69, 66, 63, 60 ...



- c Answers vary. Example:
 The sum is always 132.
- d Answers vary. Example:
 The line graph would be a horizontal line with a y-value of 132.

- 2 a 1st term of Pattern D = $6 \div 3$
 $= 2$
 2nd term of Pattern C = 4×3
 $= 12$
 3rd term of Pattern D = $18 \div 3$
 $= 6$
 4th term of Pattern C = 8×3
 $= 24$
 5th term of Pattern D = $30 \div 3$
 $= 10$
 Pattern C: 6, 12, 18, 24, 30 ...
 Pattern D: 2, 4, 6, 8, 10 ...



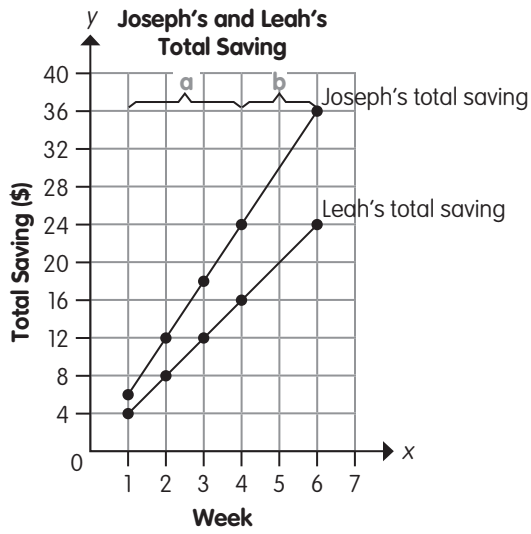
- c Rule for Pattern C: Add 6 to each term to get the next term.
 Rule for Pattern D: Add 2 to each term to get the next term.

3 a

| Week | 1 | 2 | 3 | 4 |
|-----------------------|---|----|----|----|
| Joseph's Total Saving | 4 | 8 | 12 | 16 |
| Leah's Total Saving | 6 | 12 | 18 | 24 |

Rule: Add 4

Rule: Add 6

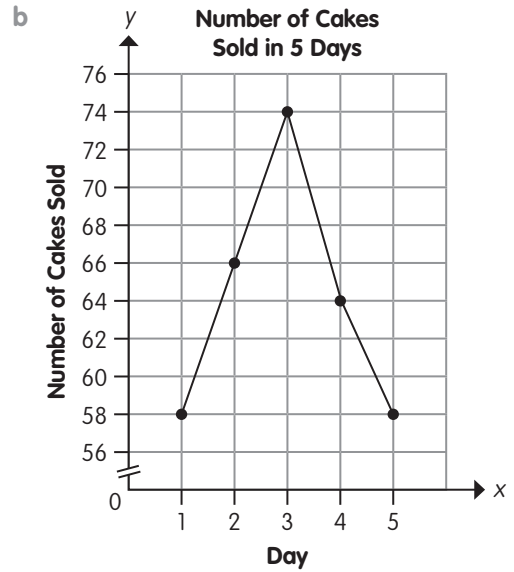


b $36 - 24 = 12$
Joseph saves \$12 more than Leah after six weeks.

PUT ON YOUR THINKING CAP!

1 Thinking Skill: Synthesizing (from parts to whole)
Strategy: Solve part of the problem

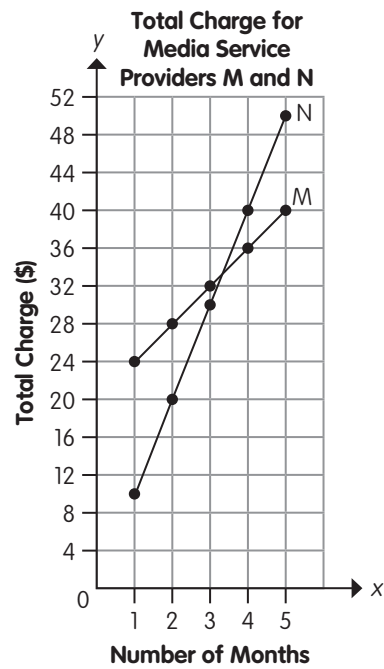
- a Answers vary. Example:
Ms. Campbell sold the most cakes on Day 3.
 $74 - 16 = 58$
She sold 58 cakes on Day 1 and on Day 5.
 $58 + 8 = 66$
She sold 66 cakes on Day 2.
 $58 + 6 = 64$
She sold 64 cakes on Day 4.
The ordered pairs are: (1, 58), (2, 66), (3, 74), (4, 64), and (5, 58).



2 Thinking Skill: Identifying patterns and relationships
Strategy: Look for patterns

a

| Number of Months of Subscription | 1 | 2 | 3 | 4 | 5 |
|----------------------------------|----|----|----|----|----|
| Total Charge for M (\$) | 24 | 28 | 32 | 36 | 40 |
| Total Charge for N (\$) | 10 | 20 | 30 | 40 | 50 |



b 3, 4, $2\frac{1}{2}$, 20

Chapter 8 Polygons

Activity 1 Classifying triangles

- 1 Answers vary. Example:
Since \overline{AC} is a line of symmetry, $AB = AD$ and $AB = BD$. Triangle ABD has 3 congruent sides. So, it is an equilateral triangle.
Since \overline{AC} is a line of symmetry, $BC = DC$. Triangle BCD has 2 congruent sides. So, it is an isosceles triangle.
Triangle ABC has 3 sides of different lengths. So, it is a scalene triangle.

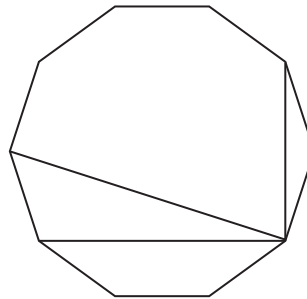
- 2 Answers vary. Example:
 $m\angle PSQ + 30^\circ = 90^\circ$
So, $m\angle PSQ = 90^\circ - 30^\circ$
 $= 60^\circ$
 $m\angle PQS + 120^\circ = 180^\circ$
So, $m\angle PQS = 180^\circ - 120^\circ$
 $= 60^\circ$
Since $PQ = QS$, $m\angle QPS = m\angle PSQ = 60^\circ$.
All three angles in triangle PQS are 60° .
So, triangle PQS is an equilateral triangle.

- 3 Answers vary. Example:
 $m\angle FGH + 130^\circ = 180^\circ$
So, $m\angle FGH = 180^\circ - 130^\circ$
 $= 50^\circ$
 $m\angle FHG + 95^\circ = 180^\circ$
So, $m\angle FHG = 180^\circ - 95^\circ$
 $= 85^\circ$
 $m\angle GFH + 135^\circ = 180^\circ$
So, $m\angle GFH = 180^\circ - 135^\circ$
 $= 45^\circ$
All angle measures in triangle FGH are less than 90° . So, triangle FGH is an acute triangle.
All angle measures in triangle FGH are not equal. So, Triangle FGH is a scalene triangle.

- c A parallelogram with at least one right angle can only be drawn as a square or a rectangle with four right angles. So, it is not possible to draw a parallelogram with exactly one right angle.
- d A trapezoid can only be drawn with at least two right angles. So, it is not possible to draw a trapezoid with exactly one right angle.

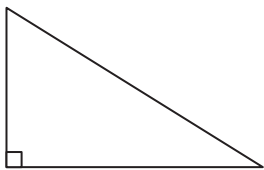
2 She is incorrect.
 Answers vary. Example:
 The polygon on the left has eight congruent sides. Not all angles in the polygon are congruent. So, it is an octagon but not a regular octagon.
 The polygon on the right has eight sides. All angles in the polygon are congruent but not all sides are congruent. So, it is an octagon but not a regular octagon.

- 3 a The polygon is a regular decagon.
- b Answers vary.
 Example:



Activity 2 Classifying Polygons

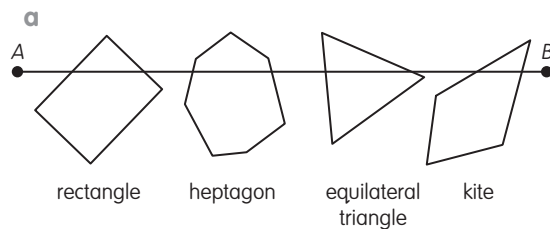
- 1 Answers vary. Example:
 - a A square has four right angles. It is not possible for it to have exactly one right angle.
 - b A right triangle has exactly one right angle.



So, it is possible for a triangle to have exactly one right angle.

PUT ON YOUR THINKING CAP!

- 1 Thinking skill: Classifying
Strategy: Solve part of the problem
Answers vary. Example:



- b A rectangle has four right angles. Only the first figure from the left has a right angle. So, it must be the rectangle.
An equilateral triangle has three angles that are 60° . Only the third figure from the left has an angle of 60° . So, it must be the equilateral triangle.

The second figure from the left has 2 sides shown and 2 sides partially shown.

At least 1 more line has to be drawn to form a polygon. It cannot be a kite since a kite has only 4 sides. So, it must be the heptagon with 7 sides.

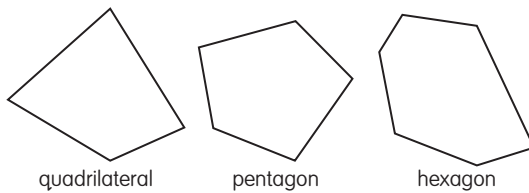
The fourth figure from the left must be the kite.

- 2** Thinking skill: Identifying patterns and relationships.

Strategy: Look for patterns.

- a** Answers vary.

Example:



The sum of angle measures in the quadrilateral is 360° .

The sum of angle measures in the pentagon is 540° .

The sum of angle measures in the hexagon is 720° .

- b** Answer varies. Example:
Each additional side of a polygon increases the sum of angle measures by 180° .
- c** $720^\circ + 180^\circ + 180^\circ + 180^\circ = 1,260^\circ$
The sum of angle measures in a nonagon is $1,260^\circ$.

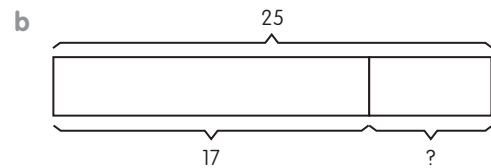
Chapter 9 Ratio

Activity 1 Finding Ratios

- 1 Answers vary. Example:
- A pencil case contains 8 red pens and blue pens in all. A possible ratio of the number of blue pens to the number of red pens is 2 : 6.
 - A ruler is 17 centimeters long. A roll of fabric is 23 meters long. The ratio of the length of the ruler to the length of the roll of fabric is 17 : 2,300.
 - A card album can hold 4 cards on each page. Lily fills 1 page with 4 basketball cards and 4 pages with 16 baseball cards. The ratio of the number of basketball cards to the number of baseball cards is 1 : 4.

- Isaac collects as many dimes as nickels. He packs all the dimes into 1 bag and all the nickels evenly into 2 bags. The ratio of the number of dimes to the number of nickels Isaac has is 1 : 1.

- 2 a Sergio drew the part-whole model incorrectly. A whole should represent all cookies in the jar, one part should represent the number of oatmeal cookies, and the other part should represent the number of banana cookies. 17 should be subtracted from instead of added to 25 to find the number of banana cookies. The number of banana cookies should then be compared to the number of oatmeal cookies instead of the total number of cookies to find the ratio.



$$25 - 17 = 8$$

There are 8 banana cookies in the jar.

The ratio of the number of banana cookies to the number of oatmeal cookies in the jar is 8 : 17.

- 3 Answers vary. Example:

- $36 \div 4 = 9$
 There are 9 playlists of English songs.
 $24 \div 4 = 6$
 There are 6 playlists of Spanish songs.
 $9 + 6 = 15$
 There are 15 playlists in all.
 Since the number of songs in each playlist is the same, the ratio 9 : 6 can be used to represent the number of English songs to the number of Spanish songs.
- $36 \div 6 = 6$
 There will be 6 playlists of English songs.
 $24 \div 6 = 4$
 There will be 4 playlists of Spanish songs.
 $6 + 4 = 10$
 There will be 10 playlists in all.
 The ratio of the number of English songs to the number of Spanish songs will be 6 : 4.
- Yes. There can be 3 playlists of English songs and 2 playlists of Spanish songs with 12 songs saved in each playlist.

Activity 2 Equivalent Ratios

1 Answers vary. Example:

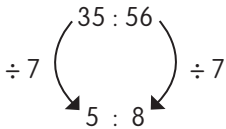
STEP 1 Divide 32 by 8 to find the common factor for the first two ratios.
 $32 \div 8 = 4$

STEP 2 Multiply 3 by 4 to get the first term in the second ratio.
 $3 \times 4 = 12$
 So, $3 : 8 = 12 : 32$.

STEP 3 Divide 27 by 3 to find the common factor for the first and third ratio.
 $27 \div 3 = 9$

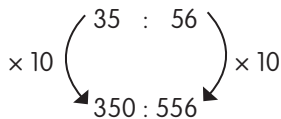
STEP 4 Multiply 8 by 9 to get the second term in the third ratio.
 $8 \times 9 = 72$
 So, $3 : 8 = 27 : 72$.
 $3 : 8 = 12 : 32 = 27 : 72$.

2 Answers vary. Example:
 Use division to find an equivalent ratio of $35 : 56$.
 Divide each term by the common factor, 7.



An equivalent ratio of $35 : 56$ is $5 : 8$.

Use multiplication to find an equivalent ratio of $35 : 56$.



An equivalent ratio of $35 : 56$ is $350 : 560$.

Since 5 and 8 do not have a common factor other than 1, the ratio $5 : 8$ is in simplest form.

3
 $12 : 15$ is $4 : 5$ in simplest form.

| | Equivalent Ratio | Sum | <60? |
|-----|------------------|-----|------|
| | 4 : 5 | 9 | Yes |
| × 2 | 8 : 10 | 18 | Yes |
| × 3 | 12 : 15 | 27 | Yes |
| × 4 | 16 : 20 | 36 | Yes |
| × 5 | 20 : 25 | 45 | Yes |
| × 6 | 24 : 30 | 54 | Yes |
| × 7 | 28 : 35 | 63 | No |

The possible pairs of paper clips and binders are:
 4 and 5; 8 and 10; 12 and 15; 16 and 20;
 20 and 25; 24 and 30.

Activity 3 Comparing Three Quantities

- 1 Disagree
Answers vary. Example:
Two ratios are equivalent if the simplest forms of both ratios are the same.

$$\begin{array}{ccc} 6 & : & 12 & : & 9 \\ \downarrow & & \downarrow & & \downarrow \\ \textcircled{\div 3} & & \textcircled{\div 3} & & \textcircled{\div 3} \\ \downarrow & & \downarrow & & \downarrow \\ 2 & : & 4 & : & 3 \end{array}$$

2 : 4 : 3 is the simplest form of 6 : 12 : 9.

$$\begin{array}{ccc} 4 & : & 8 & : & 6 \\ \downarrow & & \downarrow & & \downarrow \\ \textcircled{\div 2} & & \textcircled{\div 2} & & \textcircled{\div 2} \\ \downarrow & & \downarrow & & \downarrow \\ 2 & : & 4 & : & 3 \end{array}$$

2 : 4 : 3 is the simplest form of 4 : 8 : 6.
Since the ratios 6 : 12 : 9 and 2 : 4 : 3 have the same simplest form 2 : 4 : 3, they are equivalent ratios.

2

$$\begin{array}{ccc} 3 & : & 4 & : & 6 \\ \downarrow & & \downarrow & & \downarrow \\ \textcircled{\times 4} & & \textcircled{\times 4} & & \textcircled{\times 4} \\ \downarrow & & \downarrow & & \downarrow \\ 12 & : & 16 & : & 24 \end{array}$$

A possible combination is 12 knives, 16 spoons, and 24 forks.

$$\begin{array}{ccc} 3 & : & 4 & : & 6 \\ \downarrow & & \downarrow & & \downarrow \\ \textcircled{\times 3} & & \textcircled{\times 3} & & \textcircled{\times 3} \\ \downarrow & & \downarrow & & \downarrow \\ 9 & : & 12 & : & 18 \end{array}$$

A possible combination is 9 knives, 12 spoons, and 18 forks.

$$3 : 4 : 6$$

$$\begin{array}{ccc} \downarrow & \downarrow & \downarrow \\ \textcircled{\times 2} & \textcircled{\times 2} & \textcircled{\times 2} \\ \downarrow & \downarrow & \downarrow \\ 6 & : & 8 & : & 12 \end{array}$$

A possible combination is 6 knives, 8 spoons, and 12 forks.

- 3** a Answers vary. Example:

$$3 : 6 : 9$$

$$\begin{array}{ccc} \downarrow & \downarrow & \downarrow \\ \textcircled{\div 3} & \textcircled{\div 3} & \textcircled{\div 3} \\ \downarrow & \downarrow & \downarrow \\ 1 & : & 2 & : & 3 \end{array}$$

At present, it is possible for Adam to be 1 year old, Bailey to be 2 years old, and Camila to be 3 years old. After 3 years, Adam would be 4 years old, Bailey would be 5 years old, and Camila would be 6 years old. The new ratio would be 3 : 4 : 5.

$$6 : 9 : 12$$

$$\begin{array}{ccc} \downarrow & \downarrow & \downarrow \\ \textcircled{\div 3} & \textcircled{\div 3} & \textcircled{\div 3} \\ \downarrow & \downarrow & \downarrow \\ 2 & : & 3 & : & 4 \end{array}$$

2 : 3 : 4 is the simplest form of 6 : 9 : 12. 3 : 4 : 5 and 2 : 3 : 4 are not equivalent ratios. So, Zane's method is incorrect.

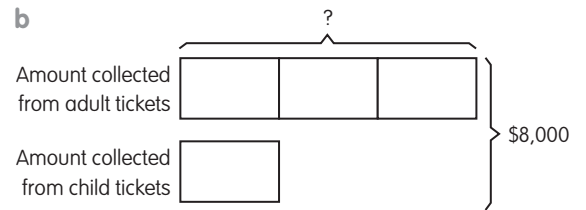
- b** Yes

Answer varies. Example:

At present, it is possible for Adam to be 3 year old, Bailey to be 6 years old, and Camila to be 9 years old. After 3 years, Adam would be 6 years old, Bailey would be 9 years old, and Camila would be 12 years old. So, it is possible for the ratio of their ages after three years to be 6 : 9 : 12.

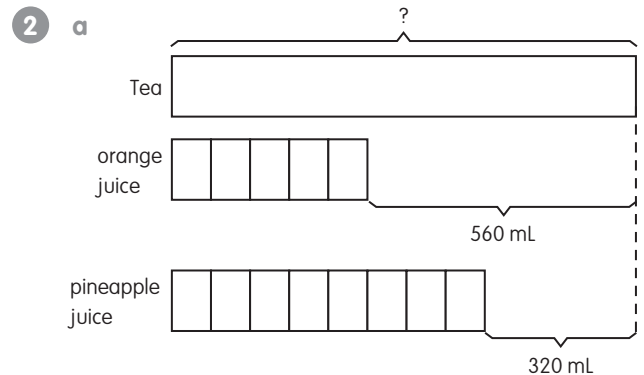
Activity 4 Solving Word Problems

- 1 a Answers vary. Example:
 Since the ratio of the price of an adult ticket to the price of a child ticket is 2 : 1, the amount collected from 2 child tickets is the same as the amount collected from 1 adult ticket.
 Suppose the sale of 1 adult ticket is collected from every 2 children, the ratio of the amount collected from the sale adult tickets to the amount collected from the sale of child tickets will be $3 : 2 \div 2 = 3 : 1$.



$$\begin{aligned}
 3 + 1 &= 4 \\
 4 \text{ units} &= \$8,000 \\
 1 \text{ unit} &= \$8,000 \div 4 \\
 &= \$2,000 \\
 3 \text{ units} &= \$2,000 \times 3 \\
 &= \$6,000
 \end{aligned}$$

\$6,000 is collected from the sale of adult admission tickets.

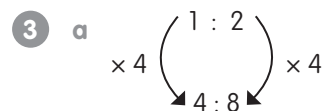


$$\begin{aligned}
 3 \text{ units} &= 560 - 320 \\
 &= 240 \text{ mL} \\
 1 \text{ unit} &= 240 \div 3 \\
 &= 80 \text{ mL} \\
 320 \div 80 &= 4 \text{ units} \\
 4 + 8 &= 12
 \end{aligned}$$

The ratio of the amount of tea to the amount of orange juice to the amount of pineapple juice in the fruit punch is 12 : 5 : 8.

b Total = $12 + 5 + 8$
 $= 25$ units
 $2.5 \text{ L} = 2,500 \text{ mL}$
 $25 \text{ units} = 2,500 \text{ mL}$
 $1 \text{ unit} = 2,500 \div 25$
 $= 100 \text{ mL}$
 $12 \text{ units} = 100 \times 12$
 $= 1,200 \text{ mL}$
 $= 1.2 \text{ L}$

The guest should use 1.2 L of tea.



An equivalent ratio of 1 : 2 is 4 : 8.
 In the model for Class B, Tristan uses 4 units to represent the number of girls and 8 units to represent the number of boys.

b Total number of units for Class A = $7 + 5$
= 12

Total number of units for Class B = $4 + 8$
= 12

Both classes have the same total. Since both classes also have the same number of pupils, each unit represents the same number of pupils.

c Total number of units for girls = $7 + 4$
= 11

Total number of units for boys = $5 + 8$
= 13

The ratio of the total number of girls to the total number of boys is 11: 13.

PUT ON YOUR THINKING CAP!

- 1 a Thinking skill : Analyzing (from whole to parts)

Strategy : Simplify the problem

The second term in 1 : 4 and the first term in 6 : 5 represent the number of oranges.

$$4 \times 3 = 12$$

$$6 \times 2 = 12$$

12 is a common multiple of 4 and 6.

$$\begin{array}{ccc} & 1 : 4 & \\ \times 3 \swarrow & & \searrow \times 3 \\ & 3 : 12 & \end{array}$$

The ratio of the number of pears to the number of oranges is 3 : 12.

$$\begin{array}{ccc} & 6 : 5 & \\ \times 2 \swarrow & & \searrow \times 2 \\ & 12 : 10 & \end{array}$$

The ratio of the number oranges to the number of apples is 12 : 10.

For every 12 oranges, there are 3 pears and 10 apples.

So, the ratio of the number of pears to the number of oranges to the number apples is 3 : 12 : 10.

- b $6 \times 3 = 18$ $9 \times 2 = 18$
18 is a common multiple of 6 and 9.

$$\begin{array}{ccc} & 1 : 6 & \\ \times 3 \swarrow & & \searrow \times 3 \\ & 3 : 18 & \end{array}$$

$$\begin{array}{ccc} & 9 : 7 & \\ \times 2 \swarrow & & \searrow \times 2 \\ & 18 : 14 & \end{array}$$

The ratio of the number of pears to the number of oranges to the number apples on Tuesday morning is 3 : 18 : 14.

- 2 Thinking skill : Comparing

Strategy : Make suppositions

Use equivalent ratios to find the ratio of the greatest amount needed for each material.

$$\begin{array}{ccc} & 3 : 2 : 1 & \\ \times 6 \swarrow & & \searrow \times 6 \\ & 18 : 12 : 6 & \end{array}$$

If Mr. Harris uses all 18 cubic meters of gravel, he will need 4 more cubic meters of sand and 1 more cubic meter of cement.

$$\begin{array}{ccc} & 3 : 2 : 1 & \\ \times 4 \swarrow & & \searrow \times 4 \\ & 12 : 8 : 4 & \end{array}$$

If Mr. Harris uses all 8 cubic meters of sand, he will have 6 cubic meters of gravel and 1 cubic meter of cement left.

$$12 + 8 + 4 = 24$$

The greatest combined volume of the three materials he can use to make concrete is 24 cubic meters.

Check:

$$\begin{array}{ccc} & 3 : 2 : 1 & \\ \times 5 \swarrow & & \searrow \times 5 \\ & 15 : 10 : 5 & \end{array}$$

If Mr. Harris uses all 5 cubic meters of cement, he will have 3 cubic meters of gravel left and will need 2 more cubic meters of sand.

Chapter 10 Percent

Activity 1 Percent

- 1
 - a 23% of the square grids have black counters.
 - b 13% of the square grids have white counters.
 - c $100\% - 23\% - 13\% = 64\%$
64% of the square grids do not have counters.

2 Total mass of fruit = $36 + 24 + 15 + 25$
= 100 kg

Total mass of apples and bananas = $24 + 15$
= 39 kg

39 out of 100 kilograms are apples and bananas.

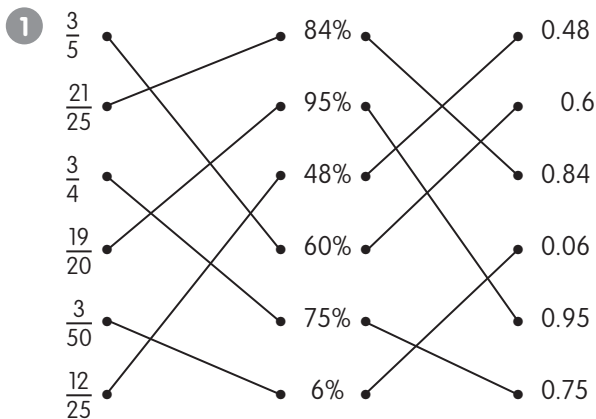
The total mass of apples and bananas as a percent of the total mass of the fruit he has is 39%.

3 1 meter = 100 centimeters

$100 - 62 - 12 = 26$

26 out of 100 centimeters of ribbon are left.

The percent of ribbon he has left is 26%

Activity 2 Fractions, Decimals, and Percents

- 2 a Answers vary. Example:
Julia could have mistaken 8 hundredths as 8 tenths.
- $\frac{4}{50}$ is not in simplest form. She should divide the numerator and denominator by 4 instead of 2.

b $8\% = \frac{8}{100} = 0.08$ $8\% = \frac{8}{100 \div 4} = \frac{2}{25}$

8% is 0.08 as decimal and $\frac{2}{25}$ as a fraction in simplest form.

3 a $\frac{7}{8} = \frac{7}{8} \times 100\%$
 $= \frac{700}{8}\%$
 $= 87\frac{1}{2}\%$ or 87.5%

b $\frac{19}{40} = \frac{19}{40} \times 100\%$
 $= \frac{1,900}{40}\%$
 $= \frac{95}{2}\%$
 $= 47\frac{1}{2}\%$ or 47.5%

- c $100 \div 8 = 12.5$
To express a proper fraction with denominator 8 as a percent, multiply the numerator and denominator by 12.5.
 $100 \div 40 = 2.5$
To express a proper fraction with denominator 40 as a percent, multiply the numerator and denominator by 2.5.

d $\frac{5}{8} \times \frac{12.5}{12.5} = \frac{62.5}{100}$
 $= 62.5\%$

e $\frac{37}{40} \times \frac{2.5}{2.5} = \frac{92.5}{100}$
 $= 92.5\%$

Activity 3 Percent of a Quantity

$$\begin{aligned} \textcircled{1} \quad 75\% \text{ of } 176 &= \frac{75}{100} \times 176 \\ &= 132 \end{aligned}$$

$$\begin{aligned} \frac{132}{264} &= \frac{1}{2} \times 100\% \\ &= 50\% \end{aligned}$$

75% of 176 has the same value as 50% of 264.

$$\begin{aligned} 2 \quad 30\% \text{ of } 2,740 &= \frac{30}{100} \times 2,740 \\ &= 822 \end{aligned}$$

$$\begin{aligned} 20\% &= \frac{20}{100} \\ &= \frac{1}{5} \end{aligned}$$

$$\begin{aligned} 822 \div \frac{1}{5} &= 822 \times 5 \\ &= 4,110 \end{aligned}$$

30% of 2,740 has the same value as 20% of 4,110.

$$\begin{aligned} 3 \quad 40\% \text{ of } 1,780 &= \frac{40}{100} \times 1,780 \\ &= 712 \end{aligned}$$

$$\begin{aligned} 25\% &= \frac{25}{100} \\ &= \frac{1}{4} \end{aligned}$$

$$\begin{aligned} 712 \div \frac{1}{4} &= 712 \times 4 \\ &= 2,848 \end{aligned}$$

25% of 2,848 has the same value as 40% of 1,780.

$$\begin{aligned} 4 \quad 0.185 \text{ kg} &= 0.185 \times 1,000 \\ &= 185 \text{ g} \end{aligned}$$

$$\begin{aligned} 100\% &\rightarrow 185 \text{ g} \\ 1\% &\rightarrow 185 \div 100 \\ &= 1.85 \text{ g} \\ 28\% &\rightarrow 1.85 \times 28 \\ &= 51.8 \text{ g} \end{aligned}$$

28% of 0.185 kilogram is 51.8 grams.

$$\begin{aligned} 5 \quad 100\% &\rightarrow 960 \text{ mL} \\ 1\% &\rightarrow 960 \div 100 \\ &= 9.6 \text{ mL} \end{aligned}$$

$$\begin{aligned} 85\% &\rightarrow 9.6 \times 85 \\ &= 816 \text{ mL} \end{aligned}$$

$$\begin{aligned} 816 \text{ mL} &= 816 \div 1,000 \\ &= 0.816 \text{ L} \end{aligned}$$

85% of 960 milliliters is 0.816 liter.

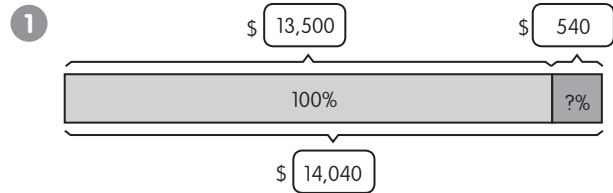
$$\begin{aligned} 6 \quad 20\% &= \frac{20}{100} \\ &= \frac{1}{5} \end{aligned}$$

$$\begin{aligned} 0.376 \text{ km} &= 0.376 \times 1,000 \\ &= 376 \text{ m} \end{aligned}$$

$$\begin{aligned} 376 \div \frac{1}{5} &= 376 \times 5 \\ &= 1,880 \end{aligned}$$

20% of 1,880 meters is 0.376 kilometer.

Activity 4 Real-World Problems: Percent



$$\$14,040 - \$13,500 = \$540$$

The bank pays \$540 at the end of the year if the amount deposited at the beginning of the year was \$13,500.

$$\$13,500 \rightarrow 100\%$$

$$\$1 \rightarrow 100 \div 13,500$$

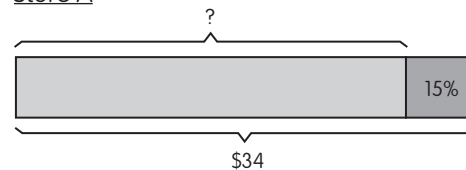
$$= \frac{1}{135}\%$$

$$\$540 \rightarrow = \frac{1}{135} \times 540$$

$$= 4\%$$

The percent interest the bank pays is 4%.

2 Store A



$$100\% \rightarrow \$34$$

$$1\% \rightarrow \$34 \div 100$$

$$= \$0.34$$

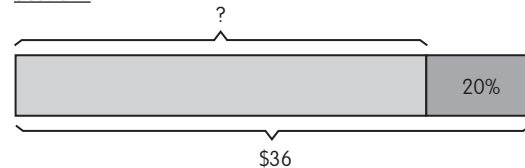
$$15\% \rightarrow \$0.34 \times 15$$

$$= \$5.10$$

$$\$34 - \$5.10 = \$28.90$$

The shirt costs \$28.90 in Shop A after discount.

Store B



$$100\% \rightarrow \$36$$

$$1\% \rightarrow \$36 \div 100$$

$$= \$0.36$$

$$20\% \rightarrow \$0.36 \times 20$$

$$= \$7.20$$

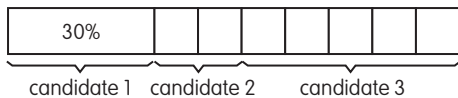
$$\$36 - \$7.20 = \$28.80$$

The shirt costs \$28.80 in Store B after discount.

Since \$28.80 is less than \$28.90, Hayden should buy the shirt from Store B.

PUT ON YOUR THINKING CAP!

- 1 Thinking skill: Synthesizing (from parts to whole)
Strategy: Draw a diagram



$$100\% - 30\% = 70\%$$

The other two candidates received 70% of the votes in all.

$$2 + 5 = 7$$

$$70\% \rightarrow 7 \text{ units}$$

$$1\% \rightarrow 7 \div 10 \\ = \frac{1}{10} \text{ unit}$$

$$30\% \rightarrow \frac{1}{10} \times 30$$

$$= 3 \text{ units}$$

Difference in units between the highest and the 2nd highest number of votes = $5 - 3$

$$= 2$$

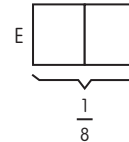
$$\text{Total number of units} = 3 + 2 + 5 \\ = 10$$

$$1 \text{ unit} = 58$$

$$10 \text{ units} = 58 \times 10 \\ = 580$$

580 votes were cast.

- 2 Thinking skill: Synthesizing (from parts to whole)
Strategy: Draw a diagram



Let 1 unit represent $\frac{\text{area of triangle C}}{\text{area of whole figure}}$.

Total number of units representing total area of A, B, C, D and E

$$\frac{\text{area of whole figure}}{\text{area of whole figure}}$$

$$= 4 + 4 + 1 + 1 + 2$$

$$= 12$$

$$2 \text{ units} = \frac{1}{8}$$

$$1 \text{ unit} = \frac{1}{8} \div 2$$

$$= \frac{1}{8} \times \frac{1}{2}$$

$$= \frac{1}{16}$$

$$12 \text{ units} = \frac{1}{16} \times 12$$

$$= \frac{12}{16}$$

$$= \frac{3}{4}$$

$$\frac{\text{total area of F and G}}{\text{area of whole figure}} = 1 - \frac{3}{4}$$

$$= \frac{1}{4}$$

Since F and G have the same area,

$$\frac{\text{total area of F}}{\text{area of whole figure}} = \frac{1}{4} \div 2$$

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

$$= \frac{1}{8}$$

$$\frac{1}{8} = \frac{1}{8} \times 100\%$$

$$= \frac{100}{8}\%$$

$$= 12.5\%$$

Square G is 12.5% of the figure.