Math Distance Learning Packet

Grade 6

Student Version

Ratios

Name: _____

Study the example showing how to describe the relationship between two patterns. Then solve problems 1–6.

Example

The school store sells headbands for $2 each and T-shirts for $8 each. Write ordered pairs to compare the cost of headbands to T-shirts for 0, 1, 2, 3, 4, and 5 of each item.

Use a table to show the two numerical patterns.

Cost of Headbands ($)	Cost of T-shirts ($)	Ordered Pairs
0	0	(0, 0)
2	8	(2, 8)
4	16	(4, 16)
6	24	(6, 24)
8	32	(8, 32)
10	40	(10, 40)

The cost of headbands follows the rule "add 2."

0, 2, 4, 6, 8, 10

The cost of T-shirts follows the rule "add 8."

0, 8, 16, 24, 32, 40

Then write the corresponding terms as ordered pairs.

1 Use the rule "add 8" to find the cost of 6 T-shirts. Explain how you found your answer.

_____

_____

_____

_____

2 For each ordered pair in the table, how does the second number compare to the first number?

_____

3 If the cost of headbands is $20, what is the corresponding cost for T-shirts? _____

Vocabulary

corresponding terms numbers that are in the same place in two or more related patterns.

ordered pair a pair of numbers that locate a point on a coordinate plane.

Solve.

4 One pattern starts at 0 and follows the rule "add 2."
Another pattern starts at 0 and follows the rule
"add 5." Write the first 6 numbers in each pattern. How
do the terms in the first pattern compare to the
corresponding terms in the second pattern?

Show your work.

Solution: _____

5 Complete the table below. Then describe the
relationship between corresponding terms.

x	y	Ordered pairs (x, y)
0	0	
6	3	
12	6	

6 A shop sells matching hats and scarves. The scarves
cost 1.5 times as much as the hats. Write two patterns
that could represent the costs of 1, 2, 3, 4, and 5 hats
and scarves. List the first 5 terms of each pattern. Then
explain how to find the cost of 6 hats and scarves,
using the patterns you wrote.

Show your work.

Solution: _____

Compare Quantities Using Ratios

Study the example problem showing how to compare quantities using ratios. Then solve problems 1–8.

Example

A florist makes a bouquet using 4 roses, 5 carnations, and 3 daffodils. What is the ratio of roses to the total number of flowers in the bouquet?

Roses   Carnations   Daffodils

There are 4 roses in the bouquet.

The total number of flowers is $4 + 5 + 3 = 12$.

There are 12 flowers in the bouquet.

You can express the ratio "4 roses to 12 total flowers" as $\frac{4}{12}$, 4 : 12, or 4 to 12.

1 Write the ratio of carnations to daffodils in three different ways.

_____

2 What is the ratio of the total number of flowers to carnations? Write the ratio in three different ways.

_____

3 Describe a ratio in words about the flowers that compares one part of the bouquet to another part. Write the ratio in at least two different ways.

_____

_____

Solve.

Ben has a collection of 15 coins in quarters and dimes.
There are 7 quarters in the collection.

4 Write the ratio of quarters to dimes in at least two
different ways.

_____

5 Write the ratio of dimes to total number of coins in at
least two different ways.

_____

6 Describe a ratio in words about the coins that
compares the whole coin collection to one part of it.
Then write the ratio in at least two different ways.

_____

_____

_____

7 Is the ratio of quarters to dimes the same as the ratio
of dimes to quarters? Explain.

_____

_____

_____

_____

8 Pradip and Pam each have a plate of apple slices and
orange slices. The ratio of apple slices to the total
number of slices on Pradip's plate is 4 to 11. The ratio
of the total number of slices to orange slices on Pam's
plate is 13 : 6. Neither person has more than 20 total
slices. Who has more orange slices? Explain.

_____

_____

_____

_____

Ratios

Solve the problems.

1 Alicia has pencils and markers as shown in the tape diagram. Write the ratio of markers to pencils in three different ways.

Be sure the terms in each ratio are in the correct order.

| Pencils | | | | | | |

| Markers | | | | | | | |

_____

2 Kenny has 2 red marbles, 3 blue marbles, and 4 black marbles. Which ratio compares a part to the whole?

A 2 to 7

B 3 : 9

C 5 to 4

D 9 : 5

The whole in this problem is the total of the red, blue, and black marbles.

3 Mrs. Adams buys 4 bananas and 6 apples. Tell whether each statement is *True* or *False*.

a. The ratio of bananas to apples is 6 : 4. ☐ True ☐ False

b. The ratio of apples to total fruit is 10 to 6. ☐ True ☐ False

c. The ratio of bananas to total fruit is 4 to 10. ☐ True ☐ False

d. The ratio of total fruit to apples is $\frac{6}{10}$. ☐ True ☐ False

Does the ratio compare part to part or part to whole?

Solve.

4 For his exercise last weekend, Benito walked 5 miles and jogged 2 miles. What is the ratio of the miles walked to the total number of miles of exercise?

A 5 to 2   **C** 5 : 7

B 2 : 7   **D** 7 to 5

Elsa chose **A** as the correct answer. How did she get that answer?

Are you finding a ratio that compares part to part or part to whole?

_____

_____

_____

_____

5 The ratio of boys to girls in Mr. Smith's class is 3 : 2. Which statement is correct? Circle all that apply.

A For every 3 boys, there are 2 girls.

B For every 2 boys, there are 3 girls.

C There are exactly 5 students in Mr. Smith's class.

D The ratio of the number of boys in the class to the total number of students is 3 : 5.

E The ratio of the number of students in the class to the number of girls is 5 to 2.

Does the statement describing the ratio match the numerical ratio given in the problem?

6 Kelly buys a hat and gloves. The price of the hat is 4 times as much as the gloves. The hat costs $8. What is the ratio of the cost of the gloves to the total cost for both items?

Show your work.

How can you find the cost of the gloves?

Solution: _____

Name: _____

Prerequisite: How do you show division using fractions?

Study the example problem showing how to write a division problem as a fraction. Then solve problems 1–7.

Example

There are 3 bags of popcorn to divide equally among 2 students. How much popcorn will each student get?

There are 3 bags of popcorn for 2 students to share, which is $3 \div 2$.

Divide each of the 3 bags into 2 equal parts. Each student will get $\frac{1}{2}$ of each bag.

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

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

Each student will get $\frac{3}{2}$ bags of popcorn.

1 How many whole bags plus how many one-half bags of popcorn would each student get?

_____ whole bag(s) _____ one-half bag(s)
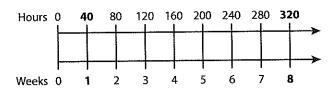
2 How can you combine your answers in problem 1 to write how many bags of popcorn each student will get as a mixed number?

_____

3 Nine yards of ribbon are cut into 8 equal pieces. What is the length of each piece of ribbon? Write a division expression to represent the problem and solve.

_____

Solve.

4 How could you model 5 students sharing 4 bags of popcorn equally? How much will each student get?

_____

_____

5 In a store, 60 cans of soup are arranged to be displayed in 10 equal rows. Why does the fraction $\frac{10}{60}$ not represent this situation? Explain.

_____

_____

_____

6 Emilio bakes 2 pies. He shares them equally among 3 friends. How much pie does each person get? Express your answer as a fraction.

Show your work.

Solution: _____

7 Isabel is making lemonade for a party with 12 guests. She wants to make equal servings that are least 2 cups each. She makes 7 quarts of lemonade. Does she have enough lemonade for each guest? (1 quart = 4 cups)

Show your work.

Solution: _____

_____

Name: _____

Find Unit Rates

Study the example showing how a double number line is used to find rate and unit rates. Then solve problems 1–6.

Example

The double number line below shows the relationship between the numbers of hours and weeks Linda works. Linda worked 320 hours in 8 weeks.

Hours 0 **40** 80 120 160 200 240 280 **320**

Weeks 0 **1** 2 3 4 5 6 7 **8**

The ratio of hours to weeks is 320 to 8.

The rate is 40 hours to 1 week. The unit rate is 40.

---

1 Choose a corresponding pair of numbers from the top and bottom number lines. Write a multiplication equation to show how the number of weeks and hours are related.

_____

2 Use words to describe the relationship between corresponding numbers of hours and weeks.

_____

_____

_____

3 Explain how you can use the answer to problem 2 to verify the unit rate is 40.

_____

_____

_____

_____

Vocabulary
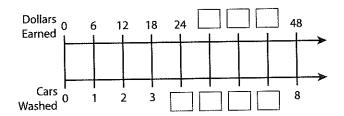
ratio compares two quantities.

rate compares the first quantity in a ratio to only one of the second quantity.

unit rate the number in a rate that is being compared to 1.

Solve.

Use the following situation to solve problems 4–5.

The double number line shows the relationship between dollars earned and cars washed at a school fundraiser. Students earned 48 dollars washing 8 cars. The ratio of dollars earned to cars washed is 48 : 8.

Dollars Earned: 0 6 12 18 24 □ □ □ 48

Cars Washed: 0 1 2 3 □ □ □ □ 8

4 What pattern do you see in the dollars earned? Use the pattern to complete the top number line.

_____

What pattern do you see in the number of cars washed? Use the pattern to complete the bottom number line.

_____

Explain how the patterns show the rate of dollars earned to cars washed.

_____

5 The unit rate comparing dollars earned to cars washed is 6. If the fundraiser earned $318, how many cars were washed? Explain.

_____

_____

6 There are 50 campers at day camp and 10 counselors. Write the ratio of campers to counselors as a fraction. Explain how to use equivalent fractions to write a related rate and unit rate. What does the unit rate tell you?

_____

_____

Name: _____
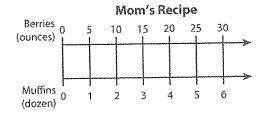
Study the example. Underline two parts that you think make it a particularly good answer and a helpful example.

Example
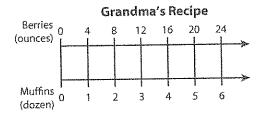
Mom's muffin recipe uses 10 ounces of berries for 2 dozen muffins. Grandma's muffin recipe uses 12 ounces of berries for 3 dozen muffins. Which recipe has more berries per dozen muffins? How many ounces of berries would you need to make 60 muffins of this recipe?
(1 dozen = 12 muffins)

Show your work. Use ratios, unit rates, models, and words to explain your thinking.

In Mom's recipe, the ratio of berries (ounces) to muffins (dozens) is 10 : 2. There are 5 ounces of berries per 1 dozen muffins. So the unit rate is 5.

Mom's Recipe

Berries (ounces)	0	5	10	15	20	25	30

Muffins (dozen)	0	1	2	3	4	5	6

In Grandma's recipe, the ratio of berries (ounces) to muffins (dozens) is 12 : 3. There are 4 ounces of berries per 1 dozen muffins. So the unit rate is 4.

Grandma's Recipe

Berries (ounces)	0	4	8	12	16	20	24

Muffins (dozen)	0	1	2	3	4	5	6

The unit rate of 5 is greater than the unit rate of 4, so Mom's recipe has more berries per dozen.

60 muffins = 5 dozen muffins, so I would need 5×5 or 25 ounces of berries for 5 dozen muffins of Mom's recipe.

Where does the example . . .

- answer both parts of the problem?
- use words to explain?
- use numbers to explain?
- use models to explain?
- give details?

Solve the problem. Use what you learned from the model.

You buy 3 tickets for $48 total for the jazz concert on Friday night. Your friend buys 2 tickets for $36 total for the jazz concert on Saturday night. Your brother collected $96 from his friends to buy 6 tickets. Which night can they go to the concert? Did they buy the less expensive tickets? Explain.

Show your work. Use ratios, unit rates, models, and words to explain your thinking.

Where does the example...

• answer both parts of the problem?

• use words to explain?

• use numbers to explain?

• use models to explain?

• give details?

Equivalent Ratios

Name: _____

Study the example problem showing how to use ratios to compare two quantities. Then solve problems 1–6.

Example

Noelle buys 5 peaches, 3 bananas, and 4 oranges at a local fruit stand to make fruit punch. What is the ratio of the number of bananas to the number of peaches she bought?

A tape diagram can help you compare the quantities.

Peaches					

Bananas		

Oranges			

Total Fruit												

There are 3 bananas and 5 peaches.

The ratio of bananas to peaches can be written as 3 to 5, $3 : 5$, or $\frac{3}{5}$.

---

1 What is the ratio of peaches to oranges?

_____

2 What is the ratio of the number of bananas to the total number of pieces of fruit?

_____

3 Write a ratio in words to compare a whole to a part. Then write the ratio using numbers.

_____

_____

Vocabulary

ratio a comparison of two quantities.

Solve.

4 In Ellen's sixth-grade class, there are 14 boys and 11 girls. Write each ratio using numbers in two ways.

Number of girls to number of boys

_____

Number of boys to total number of students

_____

Total number of students to number of girls

_____

Number of boys to number of girls

_____

5 For every 4 miles that Pedro runs, he walks 3 miles. Tell whether each statement is *True* or *False*.

a. The ratio of miles walked to miles run is 4 : 3. ☐ True ☐ False

b. The ratio of miles walked to total miles is 3 : 7. ☐ True ☐ False

c. The ratio of miles run to total miles is 7 to 3. ☐ True ☐ False

d. The ratio of total miles to miles run is $\frac{7}{4}$. ☐ True ☐ False

e. The ratio of miles run to miles walked is 4 to 3. ☐ True ☐ False

6 For sixth-grade field day, 6 students in Alice's class are playing volleyball, 5 students are playing soccer, and 9 students are playing basketball. Alice said that the ratio of students playing volleyball to basketball was 6 : 9. Alex said that the ratio of students playing basketball to volleyball was $\frac{9}{6}$. Who is correct? Explain.

_____

_____

_____

_____

Name: _____

Study the example problem showing how to find equivalent ratios. Then solve problems 1–7.

Example

Elena uses 12 red beads to make 4 bracelets. How many red beads will Elena need to make 12 bracelets? How many red beads will Elena need to make 20 bracelets?

You can make a table showing the number of bracelets that can be made with different numbers of red beads. The pairs of numbers in each column show the ratio of red beads to bracelets. Notice the ratios are all equivalent.

Number of Red Beads	3	6	12	24	36	48	60	72
Number of Bracelets	1	2	4	8	12	16	20	24

The table shows Elena will need 36 red beads to make 12 bracelets. Elena will need 60 red beads to make 20 bracelets.

---

1 How many red beads will Elena need to make 16 bracelets?

_____

2 How many bracelets can Elena make with 24 red beads?

_____

3 Find the rate of red beads per bracelet. Explain how you found your answer.

_____

_____

4 James said that he would need 25 red beads to make 75 bracelets. Is he correct? How did he get that answer?

_____

_____

_____

Solve.

Use the following information to solve problems 5–7.

> The list below shows how many servings of different breakfast
> items that a restaurant expects to sell every 15 minutes:
>
> | | |
> |---|---|
> | Cups of coffee | 25 |
> | Glasses of orange juice | 10 |
> | Omelets | 6 |

5 How many glasses of orange juice does the restaurant
expect to sell in 1 hour?

Show your work.

Solution: _____

6 At this rate, how long will it take to sell 200 cups of coffee?

Show your work.

Solution: _____

7 The restaurant serves breakfast from 6:00 AM until
10:30 AM. They sell 6 omelets every 15 minutes. Should
the restaurant expect to sell more than or fewer than
100 omelets? Explain your answer.

_____

_____

_____

_____

_____

Name: _____

Graph Equivalent Ratios
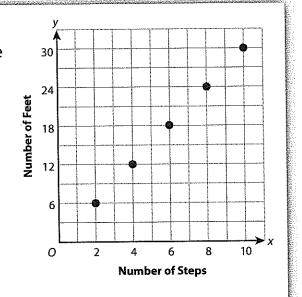
Study the example problem showing how to graph equivalent ratios. Then solve problems 1–10.

Example

The graph compares how far Jorge walks to how many steps he takes. How many feet does he walk in 6 steps? How many steps does Jorge take to walk 30 feet?

Each point on the graph can be represented by an ordered pair. The point represented by (6, 18) shows that Jorge takes 6 steps to walk 18 feet.

The ordered pair for 30 feet is (10, 30), which means that Jorge walks 30 feet in 10 steps.

Number of Steps

1. What ordered pair represents the number of steps Jorge takes to walk 24 feet?

   _____

2. Choose another point on the graph. Write the ordered pair and tell what it represents.

   _____

3. What ordered pair represents the number of feet Jorge walks in 3 steps?

   _____

4. Joan looks at the graph and says the number of steps is always 3 times the number of feet. Is she correct? Explain your answer.

   _____

   _____

Solve.

Use the following situation for problems 5–8.

To make a scarf, Jenny uses blue yarn and white yarn. The number of yards of blue yarn she uses is 4 times the number of yards of white yarn in each scarf.

5 Write four ratios to show the number of yards of white yarn to blue yarn for each scarf.

6 Are the ratios in problem 5 equivalent? Explain how you know.

_____

_____

7 Jenny wants to make a scarf that uses 24 yards of blue yarn. How many yards of white yarn will she need?

_____

8 If Jenny wants to keep the ratio of blue yarn to white yarn the same, can she make a scarf using 42 yards of blue yarn? If so, how much white yarn will she need? If not, why not?

_____

_____

_____

9 Adrianna can read 7 pages in 10 minutes. At this rate, how many pages can she read in 25 minutes?

_____

10 Max calculated that he could read at a rate of 2 pages per minute. Is he reading at a faster rate than Adrianna? Explain.

_____

_____

_____

Name: _____

Equivalent Ratios

Solve the problems.
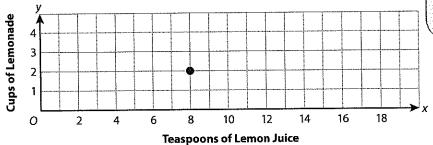
1 Kate, Mario, Sato, and Den each use a different recipe to make trail mix. Which recipe uses a different ratio of cups of raisins to cereal than the rest?

To find one ratio that's different, I need to find some that are equal to each other.

A Kate uses 3 cups of raisins for every 8 cups of cereal.

B Mario uses 4 cups of raisins for every 12 cups of cereal.

C Sato uses 6 cups of raisins for every 16 cups of cereal.

D Den uses 9 cups of raisins for every 24 cups of cereal.

2 The graph shows the number of teaspoons of lemon juice in cups of lemonade.

Which number is first in an ordered pair?

Teaspoons of Lemon Juice

Which ordered pair represents a ratio equivalent to the ratio of teaspoons of lemon juice to cups of lemonade shown by the point on the graph?

A (4, 16)   **C** (9, 3)

B (6, 1)   **D** (16, 4)

Oscar chose **A** as the correct answer. How did he get that answer?

_____

_____

Solve.

3 Rey buys 4 cards for $10. He plots the point (4, 10) on a graph. All cards are the same price. He wants to see how much it would cost to buy more cards. Tell whether each statement is *True* or *False*.

> *Be sure that you understand what Rey's ordered pair means.*

a. The point (6, 15) will be on the graph. ☐ True ☐ False

b. Rey buys 1 card for $3.50. ☐ True ☐ False

c. Rey buys 100 cards for less than $40. ☐ True ☐ False

d. The point (14, 35) will be on the graph. ☐ True ☐ False

4 Each table shows four ratios of boys to girls at different sporting events. Which tables show four equivalent ratios of boys to girls? Select all that apply.

> *What makes two ratios equivalent?*

A

3	5	9	12
5	7	15	20

C

45	25	10	5
18	10	4	2

B

3	4	7	11
12	16	28	44

D

200	150	100	50
50	40	30	20

5 Rosa earns $10 for every 3 hours that she works. Ralph earns $7 for every 2 hours that he works. Who earns more per hour? How much *more* does this person earn after 12 hours of work?

> *Be careful not to compare $10 to $7—these represent earnings for different numbers of hours.*

Show your work.

Solution: _____

_____

Solve Problems with Unit Rate

Name: _____

Study the example problem showing how to find equivalent ratios. Then solve problems 1–6.

Example

Ramon needs 12 oranges to make 3 glasses of juice. How many oranges does he need to make 5 glasses? How many oranges does he need to make 8 glasses?

You can make a table to show ratios of the number of oranges to the number of glasses of juice.

Number of Oranges	4	8	12	16	20	24	28	32
Number of Glasses	1	2	3	4	5	6	7	8

Ramon needs 20 oranges to make 5 glasses of juice.

Ramon needs 32 oranges to make 8 glasses of juice.

1 What ratio is given in the problem for the number of oranges to the number of glasses of juice?

_____

2 What is the unit rate? Explain what it means in this situation.

_____

_____

3 Explain how you can write equivalent ratios.

_____

_____

_____

_____

_____

Vocabulary

equivalent ratios two or more ratios that are equal to one another.

24 : 2, 36 : 3, 48 : 4

Solve.

4 Nathan does push-ups for the same amount of time every day. He does 9 minutes of push-ups in 3 days. How many minutes of push-ups does Nathan do in 7 days? Make a table to show the relationship between the number of minutes and the number of days.

Show your work.

Solution: _____

5 Students are knitting scarves for a fund-raiser. Elaine can knit 4 scarves in 20 days. Mario can knit 2 more scarves than Elaine can in 40 days. What is the difference in the time it takes each of them to knit a scarf? Explain your answers.

Show your work.

Solution: _____

6 There are 24 total customers seated at 4 tables in a restaurant. Each table has the same number of customers. Tell whether each statement is *True* or *False*.

a. Multiply 24 by 4 to find the number of customers per table. ☐ True ☐ False

b. The unit rate for the number of customers per table is 6. ☐ True ☐ False

c. The ratio of customers to tables is 24 : 4. ☐ True ☐ False

d. If all the tables are the same size, a maximum of 30 customers can sit at 6 tables. ☐ True ☐ False

Unit Price

Study the example problem showing how to solve a problem about unit price. Then solve problems 1–7.

Example

All the comic books in a store are the same price. Vera buys 3 comic books for $7.50. How much do 5 comic books cost? How much do 8 comic books cost?

Divide 7.50 by 3 to find the unit price.

$7.50 \div 3 = 2.50$

The price per book is $2.50. You can use the unit price to make a table of equivalent ratios.

Cost ($)	2.50	5.00	7.50	10.00	12.50	15.00	17.50	20.00
Comic Books	1	2	3	4	5	6	7	8

The cost of 5 comic books is $12.50.

The cost of 8 comic books is $20.00.

1 How can you use multiplication to find the cost of 5 comic books?

_____

2 How can you use addition to find the cost of 8 comic books?

_____

3 Explain how to find the number of comic books you could buy with $25.00.

_____
_____
_____
_____

Solve.

Use the following situation to solve problems 4–7.

All of the used hardcover books at a yard sale are the same price. Hugo paid $4.50 for 6 books.

4 Explain how to find the unit price of the books.

_____

5 Hugo's friends bought used books at the yard sale. Sonia paid $2.25, John paid $6.00, and Keisha paid $3.75. How many books did each friend buy?

Show your work.

Solution: _____

6 Kim bought 10 used books at the yard sale. How much did she pay? Did you use addition or multiplication to solve this problem? Why?

_____

7 The price for the used paperback books at the yard sale was $0.25 less than for the hardcover books. How many more paperback books than hardcover books could someone buy with $3.00?

Show your work.

Solution: _____

Name: _____

Constant Speed
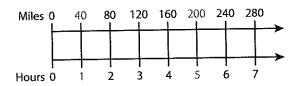
Study the example problem showing how to solve a problem about constant speed. Then solve problems 1–7.

Example

Kenja traveled 120 miles in 3 hours on a train. At this speed, how long will it take her to travel 200 miles?

The unit rate for miles per hour is 120 ÷ 3, or 40. Use the unit rate to make a double number line.

Miles 0   40   80   120   160   200   240   280

Hours 0   1   2   3   4   5   6   7

Divide 200 by 40.
200 ÷ 40 = 5

It will take Kenja 5 hours to travel 200 miles.
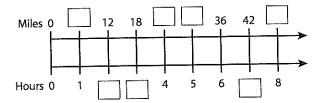
1 How many miles could Kenja travel in 1 hour. Is this the same number of hours it takes Kenja to travel 1 mile? Explain your answer.

_____

_____

_____

2 Explain how to use the unit rate for miles per hour to find how many miles Kenja can travel in 8 hours.

_____

3 Explain how to use the double number line to find how many hours it will take Kenja to travel 220 miles.

_____

_____

_____

Solve.

Use the following situation to solve problems 4–6.

Zachary exercises by jogging at a constant speed.
During one week, he jogged 36 miles in 6 hours.

4 Complete the double number line to show the relationship between the number of miles and the hours that Zachary jogs.

Miles 0 ☐ 12 18 ☐☐ 36 42 ☐

Hours 0 1 ☐☐ 4 5 6 ☐ 8

5 Explain how you found the number of hours it takes Zachary to jog 18 miles.

_____

_____

6 How many miles does Zachary jog in 4.5 hours? Explain how to use the double number line to find the answer.

_____

_____

7 Alyssa and Caleb both drove 210 miles to the beach in separate cars. They left at the same time. They both drove at a constant speed. Alyssa drove 105 miles in 3.5 hours. Caleb drove 168 miles in 4 hours. Who arrived earlier? How much earlier?

Show your work.

Solution: _____
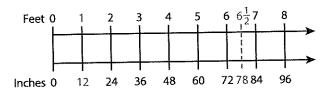
Study the example problem showing how to solve a problem involving conversion of measurement units. Then solve problems 1–6.

Example

Hannah needs 78 inches of ribbon to make a picture frame. She knows that there are 60 inches in 5 feet. How many feet of ribbon are in 78 inches?

You can find the unit rate and make a double number line. There are 60 inches in 5 feet, so there are $60 \div 5 = 12$ inches in 1 foot. The unit rate is 12.

Feet 0   1   2   3   4   5   6 $6\frac{1}{2}$ 7   8

Inches 0   12   24   36   48   60   72 78 84   96

Because the number of inches, 78, is halfway between 72 and 84, the number of feet must be halfway between 6 and 7 feet. There are $6\frac{1}{2}$ feet of ribbon in 78 inches.

1 Explain how to use the unit rate without the number lines to find how many feet of ribbon are in 48 inches.

_____

2 How many inches of ribbon are in 3 feet? Explain how to find the answer without using the number lines.

_____

3 What is the difference between using the unit rate to find how many feet are in a given number of inches and using the unit rate to find how many inches are in a given number of feet?

_____

_____

_____

Solve.
Use the following situation to solve problems 4–5.

Antonio measures items in his pocket. He knows there
are 50 millimeters in 5 centimeters. His key chain is
3.5 centimeters long. His library card is 80 millimeters long.

4 How many centimeters long is his library card? Explain
how to use the unit rate to find the answer.

_____

_____

_____

5 How many millimeters long is his key chain? Draw a
double number line to find the answer.

Show your work.

Solution: _____

6 Claire is measuring ingredients for recipes. She knows
that there are 12 cups in 6 pints. She also knows that
4 quarts equals 16 cups. Which has more cups, 5 pints
or 3 quarts? How many more cups?

Show your work.

Solution: _____

Name: _____

Solve Problems with Unit Rate

Solve the problems.

1 The double number line shows the relationship between the number of minutes and the number of pages that a printer prints. How many pages does the printer print in $4\frac{1}{2}$ minutes?
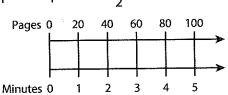
Where is $4\frac{1}{2}$ minutes located on the number line?

Pages 0   20   40   60   80   100

Minutes 0   1   2   3   4   5

A 80 pages   **B** 85 pages   **C** 90 pages   **D** 100 pages

2 A carpenter uses 65 shelves to make 13 bookcases. She uses the same number of shelves for each bookcase. Are 32 shelves enough to build 6 more bookcases?

What is the unit rate?

Show your work.

Solution: _____

3 The price of 6 pretzels is $5.10. Simon and Sofia bought 8 pretzels and shared the cost equally. How much did each person pay?

One calculation is not enough to solve this problem.

A $0.85   **C** $6.80

B $3.40   **D** $20.40

Jacob chose **C** as the correct answer. How did he get that answer?

_____

_____

Solve.

4 Michael drove 350 miles in 7 hours at a constant speed. Tell whether each statement is *True* or *False*.

How can you find a unit rate?

a. The unit rate for miles to hours is 50. ☐ True ☐ False

b. Michael drove 250 miles in 4 hours. ☐ True ☐ False

c. To find the number of miles Michael drove in 3 hours, multiply 3 by 50. ☐ True ☐ False

d. To find the number of hours it took Michael to drive 300 miles, divide 300 by 50. ☐ True ☐ False

5 Jorge says there are 198 inches in 5.5 yards. Is he correct? Explain your answer.

Show your work.

Do you know the unit rate for inches per foot? Do you know the unit rate for feet per yard?

Solution: _____

6 At Teen Tops, a package of 5 T-shirts costs $38. At Bargain City, a package of 4 T-shirts costs $34. Which statement is the most accurate?

Finding unit prices will help you choose the correct answer.

A Bargain City is the better buy because it sells T-shirts at $8.50 per T-shirt.

B Teen Tops is the better buy because the package has more T-shirts.

C Bargain City is the better buy because $34 is less than $38.

D Teen Tops is the better buy because it sells T-shirts at $7.60 per T-shirt.

Area of Polygons

Name: _____

Study the example problem showing how to multiply fractions using an area model. Then solve problems 1–7.
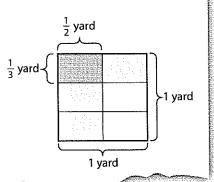
Example

Ben has a piece of plywood that measures 1 yard on each side.

He cuts the wood into 6 equal pieces. Each piece is $\frac{1}{3}$ yard wide and $\frac{1}{2}$ yard long. What is the area of each piece that Ben cuts?

You can use a model to help you understand the problem. Start by drawing a square that is 1 yard on each side and then divide it as described in the problem. Use your model to solve the problem.

area of one piece $= \frac{1}{2} \times \frac{1}{3} = \frac{1 \times 1}{2 \times 3} = \frac{1}{6}$

The area of each piece of plywood is $\frac{1}{6}$ square yard.
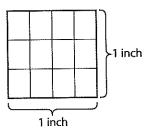
1 Explain how the product $\frac{1}{2} \times \frac{1}{3}$ relates to the model.

_____

_____

2 How many pieces do you need to cover $\frac{1}{2}$ square yard?
Explain how you know.

_____

_____

3 Suppose Ben cuts pieces that are $\frac{1}{3}$ yard wide but the area of each piece is $\frac{1}{12}$ square yard. What is the length of each piece? Explain how you know.

_____

_____

Solve.

Use the following situation to solve problems 4–5.

Isabel has a sticker that is $\frac{2}{3}$ inch wide and $\frac{1}{4}$ inch long.

4 Shade and label the area model to represent the area of the sticker.

1 inch

1 inch
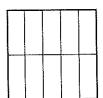
5 What is the area of the sticker?

Show your work.

Solution: _____
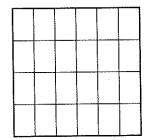
6 Fill in the missing numbers to make the equation true.
Then divide and shade the model to check your answer.

$$\frac{1}{5} \times \frac{\square}{\square} = \frac{1}{10}$$

7 A student uses this model to represent the product of two fractions. What are two possible fractions that the student could have been multiplying? Find the product of those two fractions, and shade the model to represent the product.

Name: _____
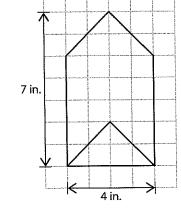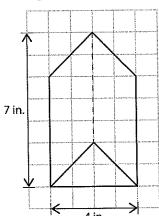
Study the example showing how to find the area of a figure by breaking it apart. Then solve problems 1–8.

Example
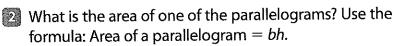
Karen drew the design shown at the right. How can she break apart her design in order to find its area?
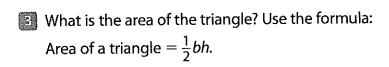
Karen can break the design it into two parallelograms and one triangle as shown below. Then, she can find the area of the two parallelograms and the triangle to find the total area of the design.

7 in.

7 in.

4 in.

4 in.
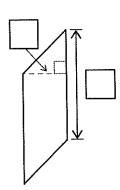
1 Label the dimensions of the triangle and one of the parallelograms from Karen's design.

2 What is the area of one of the parallelograms? Use the formula: Area of a parallelogram = bh.

_____

3 What is the area of the triangle? Use the formula:

Area of a triangle = $\frac{1}{2}bh$.

_____
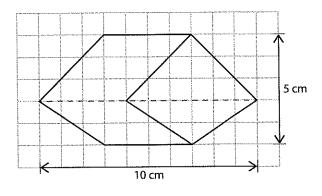
4 What is the area of the design? Explain how you know.

_____

_____

_____

Solve.

5 Brie and Lisa want to find the area of this figure. They agree to separate the figure as shown, but they disagree about what to do next. Lisa wants to add the areas of all four shapes in the figure. Brie wants to find the sum of the areas of one parallelogram and one triangle and then multiply that sum by 2. Who is correct? Explain.

5 cm

10 cm

_____

_____

_____
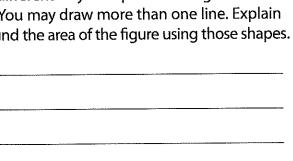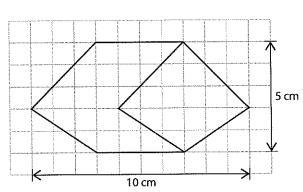
6 Draw each parallelogram and each triangle that you need to find the area of in problem 5. Then label the dimensions on each figure.

7 What is the area of the figure?

Show your work.

Solution: _____

8 Show a different way to separate the figure into shapes. You may draw more than one line. Explain how to find the area of the figure using those shapes.

5 cm

10 cm

_____

_____

_____

_____

Name: _____

Area of Trapezoids
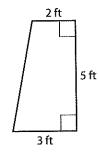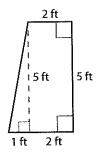
Study the example problem showing how to find the area of a trapezoid. Then solve problems 1–7.

Example

Roberta is making a sign in the shape of the trapezoid shown. What is the area of the sign?

Separate the trapezoid into a triangle and a rectangle, and label the dimensions as shown below. Then find the combined area of the triangle and the rectangle.

2 ft

5 ft

3 ft

2 ft

5 ft   5 ft

1 ft   2 ft

Area of a triangle $= \frac{1}{2}bh = \frac{1}{2}(1)(5) = 2.5$ square feet

Area of a rectangle $= bh = (2)(5) = 10$ square feet
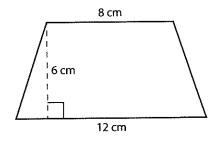
2.5 square feet $+$ 10 square feet $= 12.5$ square feet

The area of the sign is 12.5 square feet.

1 Why is the trapezoid separated into a triangle and a rectangle?

_____

_____

2 How do you find the base of the triangle?

_____

3 Which measure do you use to find both the area of the triangle and the area of the rectangle? Explain.

_____

Solve.

Use the trapezoid at the right to solve problems 4–6.

4 Draw lines to separate the trapezoid into a rectangle and two identical triangles. What are their dimensions?

_____

_____

8 cm

6 cm

12 cm
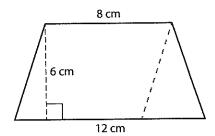
5 What is the area of the trapezoid?

Show your work.

Solution: _____

6 Nick says that if you separate the trapezoid into one parallelogram and one triangle, as shown, the area will change. Is he correct? Explain.

_____

_____

8 cm

6 cm

12 cm
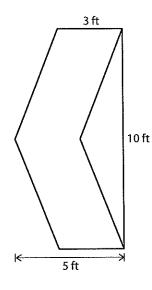
7 The area of a trapezoid is 30 square centimeters. The height is 4 centimeters. The shorter base measures 6 centimeters. What is the measure of the longer base? Draw a picture of the problem. Explain your thinking.

_____

_____

_____

_____

Name: _____

Area of Polygons

Solve the problems.

1 What is the area of the figure at the right? Explain how you found your answer.

Show your work.

3 ft

10 ft

5 ft

How can separating the figure into smaller shapes help you?

Solution: _____
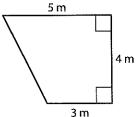
2 A kitchen floor has the shape of this trapezoid.

Tell whether each statement is *True* or *False*.

5 m

4 m

3 m

How do you find the area of a trapezoid?

a. The height of the trapezoid measures 5 meters. ☐ True ☐ False

b. You can separate the trapezoid into a triangle and a rectangle. ☐ True ☐ False

c. You can use the expression $(3 \cdot 4) + \left(\frac{1}{2} \cdot 2 \cdot 4\right)$ to find the area of the trapezoid. ☐ True ☐ False

d. The area is 12 square meters. ☐ True ☐ False

Solve.
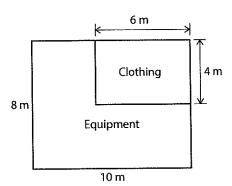
3 The floor plan for a sports store is shown below.

Which statement about the floor plan is true?
Select all that apply.

A The area of the equipment section is
80 square meters.

B The area of the clothing section is half the area of
the equipment section.

C The area of the equipment section is
56 square meters.

D The area of the equipment section is the area of
the store minus the area of the clothing section.

Peter chose **A** as a correct answer. How did he get that
answer?

_____

_____

> How can you use the area of the clothing section to find the area of the equipment section?

4 Students play table tennis in a rectangular room that
is 15 feet by 25 feet. There is 8 feet of floor space from
each end of the table to the wall and 5 feet from each
side of the table to the wall. What is the area of the floor
not covered by the table?

A 40 square feet

B 45 square feet

C 170 square feet

D 330 square feet

> You might want to draw a picture to help you.

Polygons in the Coordinate Plane

Name: _____

Study the example showing how to solve a measurement problem using a shape on a coordinate plane. Then solve problems 1–9.
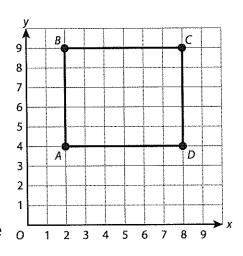
Example

Mr. Hiroshi plans to tile the floor of his family room. He draws a rectangle on the coordinate plane to represent the floor. What is the area of the floor in square units?

The area of a rectangle is length × width. You can count units to find the length and the width.

The length of $\overline{AB}$ is 5 units. The length of $\overline{BC}$ is 6 units. The area of rectangle ABCD is 5 × 6, or 30 square units.

You can also use ordered pairs to find the horizontal distance and the vertical distance between points on the coordinate plane.

1. Write the ordered pair for each point.

   A (_____) B(_____) C(_____) D(_____)

2. Explain how to use the x-coordinates of point A and point D to find the distance between the two points.

   _____

3. Explain how to use the y-coordinates of point C and point D to find the distance between the two points.

   _____

4. Find the lengths of these sides using the coordinates of their endpoints.

   $\overline{AD}$ _____ $\overline{CD}$ _____

5. What is the perimeter of rectangle ABCD? Explain how you found the perimeter.

   _____

   _____

Solve.

Use the shape on the coordinate plane to solve problems 6–8.

6 What are the coordinates of each point on the shape?

A(_____) B(_____) C(_____) D(_____)

E(_____) F(_____) G(_____) H(_____)

7 Find the area of the shape. Explain how you found your answer.

Show your work.

Solution: _____
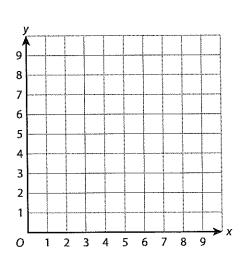
8 Find the perimeter of the shape.

Show your work.

Solution: _____

9 Use the coordinate plane to draw a rectangle with an area of 24 square units. Label the corners of the rectangle *W, X, Y,* and *Z.* Explain how you know that the area of the rectangle is 24 square units.

Name: _____
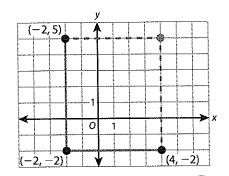
Find Missing Coordinates and Dimensions

Study the example problem showing how to find missing coordinates and dimensions of a rectangle. Then solve problems 1–9.

Example

Ms. Issa is planning to build a rectangular fishpond in her garden. A drawing shows three corners of the pond with coordinates (4, −2), (−2, −2), and (−2, 5). Where is the fourth corner?

You can graph the information given and then sketch the rectangle.

1 What are the coordinates of the fourth corner?

_____

2 How did you locate the fourth corner to sketch the rectangle?

_____

_____

_____
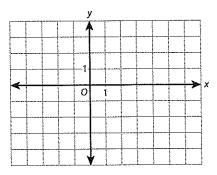
3 Explain how to use counting to find the distance between (−2, −2) and (4, −2).

_____

4 Explain how to use absolute value to find the distance between (−2, −2) and (−2, 5).

_____

_____

5 Explain how to find the area of the pond.

_____

_____

Solve.

Use the following situation to solve problems 6–8.

Mrs. Rockwell is buying a rectangular lot on which to build a new home. Three corners of the lot are at (5, −3), (−2, −3), and (−2, 2) on the coordinate plane.

6 Graph the three corners on the coordinate plane. What is the ordered pair for the fourth corner of the lot?

_____

7 What is the perimeter of the lot?

Show your work.

Solution: _____

8 Mr. Brown bought a lot that is half as long and twice as wide as Mrs. Rockwell's lot. How does the area of his lot compare to the area of Mrs. Rockwell's lot? Explain how you know.

_____

_____

_____

9 Nadim wants to build a square pen for his rabbits. He plots two corners on a coordinate plane at (3, −3) and (−3, 3). Abe says that he should plot another corner at (3, 3). Does this make sense? Explain why or why not.

_____

_____

_____

_____

Find Area on a Coordinate Plane
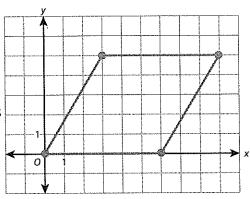
Study the example problem showing how to find the area of a polygon on a coordinate plane. Then solve problems 1–7.

Example

A floor plan for a building shows corners of the building at (0, 0), (6, 0), (9, 5), and (3, 5). What is the shape of the floor of the building? How can you find the area of the floor?

You can graph the information given and connect the points to find the shape of the floor. The connected points form a parallelogram, so the floor is a parallelogram.

You can find the area of the floor by multiplying its base times its height since it is a parallelogram.
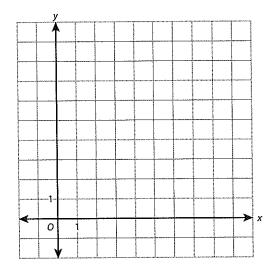
1 What is the base length of the parallelogram in the example? How did you find the base length?

_____

2 What is the height of the parallelogram in the example? How did you find the height?

_____

3 Find the area.

_____

4 Katerine divided the parallelogram into two congruent triangles and a rectangle in order to find its area. Does her method work? If so, show that it works. If not, explain why not.

_____

_____

_____

_____

Solve.

Use the following situation to solve problems 5–6.

Madeline plotted these points to represent the corners of a vegetable garden: (0, 0), (6, 0), (3, 7).

5 Draw the shape on the coordinate plane. What shape is the garden? Find the area of the garden.

Show your work.

Solution: _____

_____
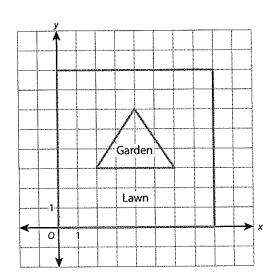
6 Suppose Madeline uses (6, 7) rather than (3, 7) as the third corner for her garden. How will that change the shape of the garden? How will the areas of the two gardens compare?

_____

_____

7 A flower garden and the lawn around it are shown on the coordinate plane. What is the area of the lawn?

Show your work.

Solution: _____

Name: _____
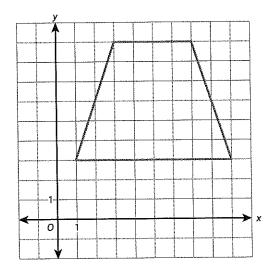
Polygons in the Coordinate Plane

Solve the problems.

1 Find the area of the trapezoid.

Show your work.

How can you separate this trapezoid into different shapes?

Solution: _____
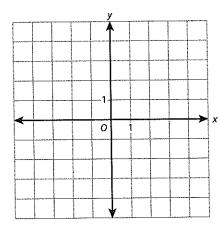
2 Three corners of a rectangular park are located at $(-3, 1)$, $(4, 1)$, and $(4, -2)$.

How does plotting points for the three corners help you find the point for the fourth corner?

Part A

What are the coordinates of the fourth corner?

_____

Part B

What is the perimeter of the park? Explain how you found your answer.

_____

_____

Solve.

3 Keaton drew a parallelogram on a coordinate plane. Two vertices of the parallelogram were located at (1, 1) and (1, 7). The area of the parallelogram is 18 square units. Tell whether each statement is *True* or *False*.

What is the formula for the area of a parallelogram?

a. The x-coordinate of the other two vertices of the parallelogram could be −2. ☐ True ☐ False

b. The x-coordinate of the other two vertices of the parallelogram could be 4. ☐ True ☐ False

c. The parallelogram must be a square. ☐ True ☐ False

d. The perimeter of this parallelogram could be 18 units. ☐ True ☐ False

4 Gianna plotted these points and then connected the points in order from *J* to *N* and then back to *J* to show the shape of her room. Draw the room on the coordinate plane. What is the area of Gianna's room?

What shapes do you see when you plot and connect the points?

J(1, 0) K(1, 6) L(9, 6) M(9, 3) N(6, 3)

Show your work.

Solution: _____

Nets and Surface Area
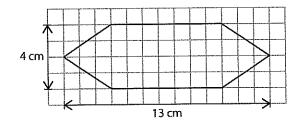
Name: _____
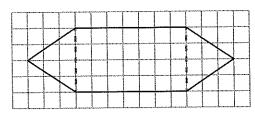
Study the example problem showing how to find the area of a polygon. Then solve problems 1–8.
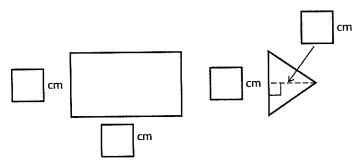
Example

Gary drew a picture of a nameplate that he plans to make. He wants to find the area of the nameplate. How could Gary break apart the figure to find its area?

4 cm

13 cm

Gary separates the figure he drew into two triangles and a rectangle.

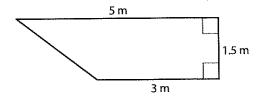1 Label the dimensions of the rectangle and one of the triangles.

☐ cm

☐ cm

☐ cm

☐ cm

☐ cm

2 What is the area of the rectangle?

_____

3 What is the area of the triangle?

_____

4 What is the area of the nameplate? Write an equation to show your solution.

_____

Solve.

Use the trapezoid to solve problems 5–6.
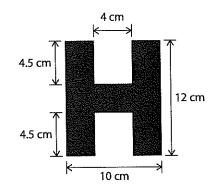
5 Separate the trapezoid into figures whose areas you can find. Label the dimensions.

6 What is the area of the trapezoid?
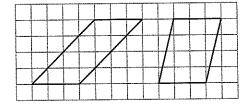
Show your work.

5 m
1.5 m
3 m

Solution: _____

7 Hector drew three rectangles to show the letter H on his notebook. Use the rectangles to find the area of the letter he drew.

Show your work.

4 cm
4.5 cm
4.5 cm
12 cm
10 cm

Solution: _____

8 Pat says that the parallelograms below do not have the same area. Is she correct? Explain.

Name: _____

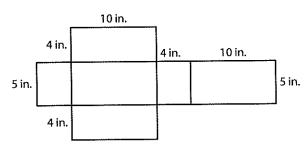## Surface Area of a Rectangular Prism

Study the example showing how to find the surface area of a rectangular prism. Then solve problems 1–8.

Example

Kanene wants to know how much wrapping paper she needs to cover this box. How much wrapping paper does she need?
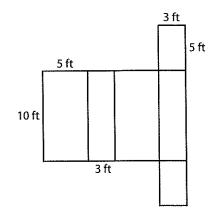
You can use a net to help you solve the problem.

10 in.

4 in.

4 in.   10 in.

5 in.   5 in.

4 in.

1 Complete the table to find the area of each face.

Face	Length (in.)	Width (in.)	Area (sq in.)
Top	10	5	
Bottom			
Front			
Back			
Right side			
Left side			

2 Which pairs of faces have the same areas?

_____

3 What is the surface area of the box? Use your answer to problem 2 to write an equation.

_____

4 What is the relationship between the surface area of a rectangular prism and the area of each face?

_____

Solve.

5 Carl drew this net for a wooden shed that he will build. He wants to protect the wood against the weather by using a sealant on all of the outside surfaces, including the bottom. Will a container of sealant that covers 200 square feet be enough to protect the outside surfaces?
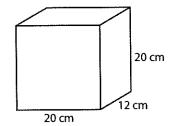
Show your work.

3 ft

5 ft

5 ft

10 ft

3 ft

Solution: _____

6 Susana is making a small box. The 20-cm by 20-cm front of the box will be glass. The other faces will be wood. How much wood does Susana need to make the box?
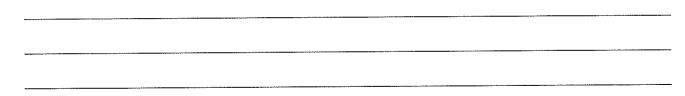
Show your work.

20 cm

20 cm

12 cm

Solution: _____

7 The surface area of a cube is 216 square meters. What is the height of the cube? Explain.

_____

_____

8 Mike says that if he doubles each dimension of any rectangular prism, the surface area also doubles. Is Mike correct? Give an example to support your answer.
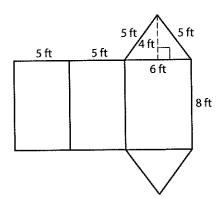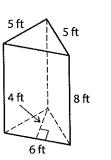
_____

_____

_____

_____

Name: _____

Study the example showing how to find the surface area of a triangular prism. Then solve problems 1–7.

Example

What is the surface area of the triangular prism shown?

You can draw and label a net of the prism to help you.

5 ft 5 ft
4 ft
5 ft   5 ft
6 ft
8 ft

5 ft 5 ft
4 ft
8 ft
6 ft

1. Complete the table to find the area of each face.

Face	Base (ft)	Height (ft)	Area (sq ft)
Triangle	6	4	
Triangle			
Rectangle			
Rectangle			
Rectangle			

2. Why do the rectangular faces have different areas?
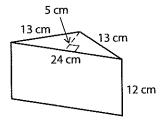
_____

_____

_____

3. What is the surface area of the triangular prism? Write two equations to represent the surface area.
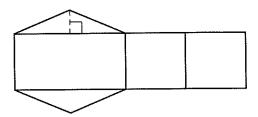
_____

Solve.

Use the following situation to solve problems 4–6.

Jane is decorating a paperweight in the shape of a triangular prism. The diagram shows its dimensions.

5 cm
13 cm
13 cm
24 cm
12 cm

4 Label the net of the triangular prism to show the dimensions of the faces.

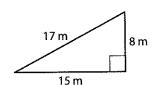**5** What is the surface area of the paperweight?

Show your work.

Solution: _____

6 Amad used the expression $2\left(\frac{1}{2} \cdot 24 \cdot 5\right) + 3(13 \cdot 12)$ to find the surface area of the paperweight. What is wrong with his expression? Correct Amad's mistake.

_____

_____

_____

7 The picture shows the dimensions of one base of a triangular prism. The height of the prism is 2 meters. What is the surface area of the triangular prism? Explain how to find the answer.

17 m
8 m
15 m

_____

_____

_____
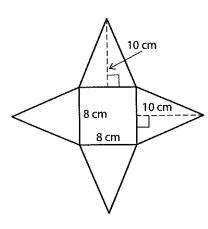
_____

Name: _____

Surface Area of a Pyramid

Study the example problem showing how to find the surface area of a pyramid. Then solve problems 1–8.

Example

What is the surface area of the pyramid?
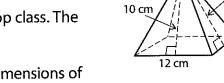
You can draw and label a net to help you.

1 Complete the table to find the area of each face.

Face	Base (cm)	Height (cm)	Area (sq cm)
Triangle	8	10	
Triangle			
Triangle			
Triangle			
Square			
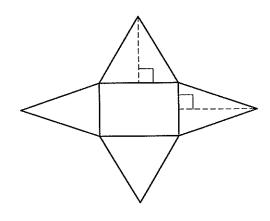
2 Describe the number of faces and their shapes.

_____

3 Use formulas to explain how to find the area of each face.

_____

_____

4 What is the surface area of the pyramid? Write an equation to represent the surface area.

_____

Solve.

Use the following situation to solve problems 5–7.

Marcos is making a pyramid in his wood shop class. The base of the pyramid is a rectangle.

10 cm   12 cm   8 cm   12 cm

5 Label the net of the pyramid with the dimensions of the faces.

6 What is the surface area of the pyramid?

Show your work.

Solution: _____

7 Yolanda used the expression $\left(\frac{1}{2} \cdot 12 \cdot 10\right) + \left(\frac{1}{2} \cdot 8 \cdot 12\right) +$ $(12 \cdot 8)$ to find the surface area of the pyramid. What is wrong with the expression? Correct Yolanda's mistake.

_____

_____

8 The surface area of a pyramid is 540 square inches. Its base is a square with a side length of 10 inches. What is the height of one of the triangular faces of the pyramid? Explain how to find the answer.
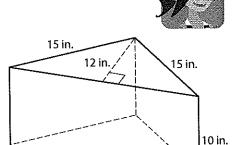
_____

_____

_____

_____

_____

Name: _____

Solve the problems.

1. Rita keeps her craft supplies in a container without a top. The container is a triangular prism. Rita plans to cover the outside of the container with decorative paper. How much paper does she need?

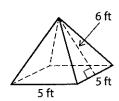*How many faces should you include in your calculations?*

Show your work.

15 in.

12 in.

15 in.

10 in.

18 in.

Solution: _____

2. Look at the pyramid below.

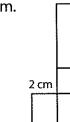*What do you need to know to find the surface area of a pyramid?*

6 ft

5 ft

5 ft

Tell whether each statement about the pyramid is *True* or *False*.

a. The area of each triangular face is 30 square feet.   ☐ True ☐ False

b. The surface area of the pyramid is 85 square feet.   ☐ True ☐ False

c. A net of the pyramid would have three triangular faces.   ☐ True ☐ False

d. The area of the base is 25 square feet.   ☐ True ☐ False
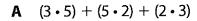
Solve.

3 The net represents a rectangular prism. Which expression represents the surface area? Select all that apply.

3 cm

5 cm

2 cm

5 cm

How do you find the surface area of a rectangular prism?

A $(3 \cdot 5) + (5 \cdot 2) + (2 \cdot 3)$
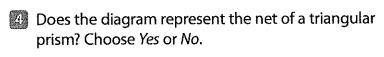
B $15 + 15 + 6 + 6 + 10$

C $2(3 \cdot 5) + 2(3 \cdot 2) + 2(2 \cdot 5)$

D $2(10) + 2(6) + 2(15)$

Horus chose **A** as the correct answer. How did he get that answer?

_____

4 Does the diagram represent the net of a triangular prism? Choose *Yes* or *No*.

How many faces on a triangular prism are triangles?

a.

☐ Yes   ☐ No

b.

☐ Yes   ☐ No

c.

☐ Yes   ☐ No
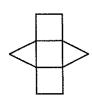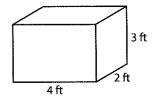
5 Design your own pyramid. Describe your pyramid, and then choose its dimensions and find its surface area.

_____

_____

Volume

Name: _____

Study the example problem showing how to use formulas to find the volume of a rectangular prism. Then solve problems 1–8.

Example

Some building supplies are stored in a container that is 4 feet long, 2 feet wide, and 3 feet high. What is the volume of the container?

Use the formula.

Volume = length $\times$ width $\times$ height

Volume = $4 \times 2 \times 3 = 24$

The volume is 24 cubic feet.

3 ft
2 ft
4 ft

1 What part of the formula represents the area of the base of the container?

_____

2 Use your answer to problem 1 to write another formula for finding the volume of a rectangular prism.

Volume = _____ $\times$ height

3 Use the new formula to find the volume of a container that is 6 feet long, 5 feet wide, and 7 feet high.

area of the base = _____ $\times$ _____

area of the base = _____ square feet

Volume = _____ $\times$ _____
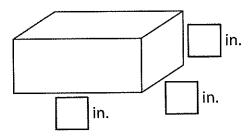
Volume = _____ cubic feet

4 If you know the volume of a rectangular prism and the area of the base, how can you find the height?

_____

_____

_____

Solve.

5 Some sewing supplies are stored in a container that is 5 inches tall, 7 inches wide, and 12 inches long.

   a. Label the picture of the box with its dimensions.

   b. What is the volume of the box?

   Show your work.

in.

in.

in.

Solution: _____
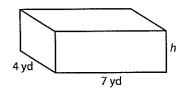
6 The base of a rectangular prism is 40 centimeters long and 5 centimeters wide. The height of the prism is 2 centimeters. Write two different equations that represent the volume of the prism.

_____

7 The volume of the prism shown is 84 cubic yards. What is the height of the prism?

Show your work.

4 yd

7 yd

h

Solution: _____

8 Shawn's teacher said that the volume of a rectangular prism is 64 cubic centimeters. Shawn said that he has enough information already to find the width. Is this correct? If not, explain why not. Otherwise, give the width and explain your thinking.

_____

_____

_____

Name: _____

Fractional Dimensions
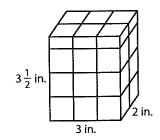
Study the example problem showing how to find the volume of a rectangular prism whose dimensions are not all whole numbers. Then solve problems 1–6.
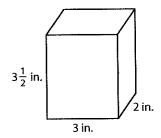
Example

A food storage container is a rectangular prism that is 3 inches long, 2 inches wide, and 4 inches tall. The granola in the container is $3\frac{1}{2}$ inches deep. What is the volume of the granola?

You can sketch the amount of granola in the container and label its dimensions. You can also model the volume with 1-inch unit cubes.

$3\frac{1}{2}$ in.   2 in.   3 in. $3\frac{1}{2}$ in.   2 in.   3 in.

The volume of the granola is 21 cubic inches.

1 Look at the model. How many whole cubes can you make with the half cubes in the top layer? Explain.

_____

2 Use your answer to problem 1 to explain how the model shows that the volume of the granola in the container is 21 cubic inches?

_____

3 Use the formula $V = lwh$ to find the volume of the granola in the container.

_____

Solve.

4 A school locker is $\frac{3}{4}$ foot wide, $1\frac{1}{2}$ feet deep, and 6 feet tall. What is the volume of the locker? Draw a picture and label the dimensions.

Show your work.

Solution: _____

5 Kylie has two full containers of trail mix, one that is red and one that is blue. The red container is 4 inches long, 5 inches wide, and $2\frac{3}{4}$ inches tall. The blue container is $2\frac{2}{3}$ inches long, 7 inches wide, and 3 inches tall. Which container holds more trail mix?

Show your work.

Solution: _____

6 The height of a rectangular prism is half its width. The width of the prism is $\frac{1}{3}$ of its length. If the width of the prism is 3 centimeters, what is the volume?

_____

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Name: _____

Study the example problem showing how to find one dimension of a rectangular prism whose dimensions are not all whole numbers. Then solve problems 1–6.

Example

A walkway is made up of rectangular blocks. The volume of a block is 255 cubic inches. The width is 10 inches and the height is 2 inches. What is the length of a block?

You can sketch the block and label it with the given information. Then you can use the formula $V = l \times w \times h$ to find the value of l.

$$V = l \times w \times h$$

$$255 = l \times 10 \times 2$$

$$255 = l \times 20$$

$$12\frac{3}{4} = l$$

10 in.   2 in. l
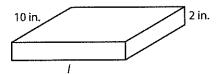
The length of a block is $12\frac{3}{4}$ inches.

1 What operation was used on the equation $255 = l \times 20$ to find the length l?

_____

2 Another block has a volume of 180 cubic inches. The area of the base is 72 square inches. What is the height of the block? Use the formula $V = Bh$ to find the answer.

_____

3 A third block that is 5 inches high has a volume of 165 cubic inches. The width is $5\frac{1}{2}$ inches. Is the length the smallest dimension? Explain.

_____

_____

Solve.

4 The owner of a gift shop keeps holiday decorations in a rectangular box that has a volume of 30 cubic feet. The length of the box is 4 feet and the height is 2.5 feet. What is the width of the box? Draw a picture and label the dimensions.

Show your work.

Solution: _____

5 Vicky and Jim have a lawn care business. Jim keeps equipment in a shed that has a volume of 66 cubic feet. The length of his shed is 5 feet and the width is $2\frac{1}{5}$ feet. Vicky keeps equipment in another shed that has a volume of 63 cubic feet. The length of her shed is 4 feet and the width is $2\frac{1}{4}$ feet. They want to store a new lawn mower in the taller shed. Which shed will they use?

Show your work.

Solution: _____

6 The base of a rectangular prism is a square. The height of the prism is half the length of one edge of the base. The volume of the rectangular prism is 13.5 cubic units. What are the dimensions of the prism?

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Name: _____

Volume

Solve the problems.

1 Is the volume of a rectangular prism with the given dimensions less than, equal to, or greater than 24 cubic meters? Mark an X in the correct column.

Dimensions	Less than	Equal to	Greater than
5 m, $1\frac{1}{2}$ m, 3 m			
3 m, 4 m, 2 m			
5 m, 2 m, $2\frac{1}{2}$ m			

What is the formula for the volume of a rectangular prism?

2 The volume of a rectangular gift box is 98 cubic inches. The height is 4 inches and the width is $3\frac{1}{2}$ inches. What is the length of the gift box?

Show your work.

Sketching the prism is a good way to organize the information.

Solution: _____

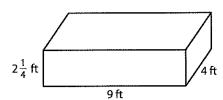**3** The volume of a cube is 125 cubic centimeters. A rectangular prism with three different whole-number dimensions has the same volume. What are the dimensions of the rectangular prism?

_____

Could finding factors of 125 help you solve the problem?

Solve.

4 Tell whether each statement about the rectangular prism is *True* or *False*.

$2\frac{1}{4}$ ft   4 ft   9 ft

Which two dimensions identify the base of a rectangular prism?
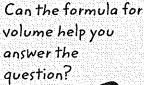
a. The base is a square. ☐ True ☐ False

b. The volume of the rectangular prism is 81 cubic feet. ☐ True ☐ False

c. The area of the base is 36 square feet. ☐ True ☐ False

d. If you doubled the height, the volume would also double. ☐ True ☐ False

5 A rectangular prism has a volume of 52 cubic meters, a length of 12 meters, and a width of $2\frac{1}{6}$ meters. Which expression could you use to find the height of the rectangular prism? Select all that apply.

Can the formula for volume help you answer the question?

A $52 \div 26$

C $52 + 12 + 2\frac{1}{6}$

B $52 \times 12 \times 2\frac{1}{6}$

D $52 \div \left(12 \times 2\frac{1}{6}\right)$

6 The length of a rectangular prism is 5 feet. The width is 2.4 feet and the height is 8 feet. What is the volume of the rectangular prism?

What operation do you use to find volume?

A 12 cubic feet

C 40 cubic feet

B 15.4 cubic feet

D 96 cubic feet

Olivia chose **A** as the correct answer. How did she get that answer?

_____

_____

Display Data on Dot Plots, Histograms, and Box Plots

Name: _____

Study the example showing how to find the mean, median, and mode of a data set. Then solve problems 1–6.

Example

The weights, in pounds, of nine small dogs at a dog park are 26, 28, 20, 20, 22, 30, 28, 14, and 28. Find the mean, median, and mode of the weights.

To find the mean, add the values and divide by the number of values.

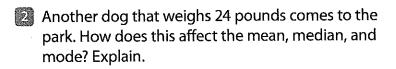$26 + 28 + 20 + 20 + 22 + 30 + 28 + 14 + 28 = 216$

$216 \div 9 = 24$

To find the median, list the data points in order. The number in the middle is the median.

14, 20, 20, 22, **26**, 28, 28, 28, 30

To find the mode, look for the most common number.

14, 20, 20, 22, 26, **28, 28, 28,** 30

---

1 Why is the mean less than the median?

_____

_____

2 Another dog that weighs 24 pounds comes to the park. How does this affect the mean, median, and mode? Explain.

_____

_____

_____

_____

Vocabulary

mean is the average of the values in a data set.

median is the middle number in a data set.

mode is the number that appears most often in a data set.

7, 9, 10, 13, 15, 15, 15

The mean is 12.

The median is 13.

The mode is 15.

Solve.

Use the following situation to solve problems 3–5.

A group of sixth-grade students did sit-ups for one minute. The number of sit-ups that each student did is shown below.

62, 60, 56, 52, 63, 55, 58

3 Does the data set have a mode? Explain.

_____

4 What is the mean of the data set? What does it tell you about the situation?

_____

_____

5 A group of seventh-grade students also did sit-ups for one minute. They did the same mean number of sit-ups in one minute as the sixth graders did, but they did a total of 522 sit-ups. How is this possible? Explain.

_____

_____

_____

6 Claire and Gina kept track of the number of hours that they practiced each week for an ice skating competition. On average, who practiced more?

Claire: 12, 8, 10, 7, 8, 5, 8, 10, 12, 8

Gina: 10, 6, 12, 6, 10, 6, 10, 12, 6, 10

Show your work.

Solution: _____

Name: _____

Histograms

Study the example showing how to display data in a histogram. Then solve problems 1–9.

Example

Fifteen students were asked how much money they spent, to the nearest whole dollar, in the school cafeteria one week. Their responses are shown below. Display the data in a histogram.
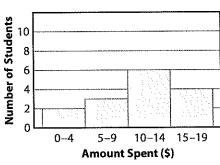
2, 3, 5, 6, 9, 11, 11, 12, 12, 12, 14, 15, 15, 17, 19

First, choose the intervals you want to use and then make a table of the data using your intervals. Then use the table to make a histogram.

School Cafeteria

Amount Spent ($)	Number of Students
0–4	2
5–9	3
10–14	6
15–19	4

School Cafeteria

---

1 Do the table or the histogram show any individual data values? Explain.

_____

2 What does the height of a bar in a histogram represent?

_____

3 The histogram at the right shows the data from above organized into larger intervals. What advantage might there be to using smaller rather than larger intervals in a histogram?
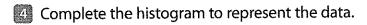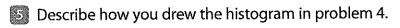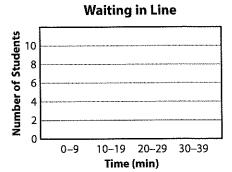
_____

_____

School Cafeteria

Solve.

Use the situation below to solve problems 4–8.

The times, rounded to the nearest whole minute, that thirteen students waited in line to buy a ticket to a new movie are shown below.

5, 5, 6, 6, 6, 9, 9, 9, 12, 14, 31, 34, 38

Waiting in Line

4 Complete the histogram to represent the data.

5 Describe how you drew the histogram in problem 4.

_____

_____

6 Is there a bar above every interval? Explain why or why not.

_____

_____

7 Can you use the histogram to tell how many students waited in line for less than 15 minutes? Explain.

_____

_____

8 Look at the data set at the top of the page again. If the histogram had twice as many intervals, what would it show about the spread of the data that is not shown in the histogram that you made?

_____

9 The ages of nineteen people in a walkathon are shown below. Make a histogram of the ages. Choose intervals for the x-axis and a scale for the y-axis and label both axes.

8, 8, 9, 9, 10, 10, 10, 11, 11, 12,
14, 15, 16, 20, 20, 25, 25, 25, 28

Name: _____

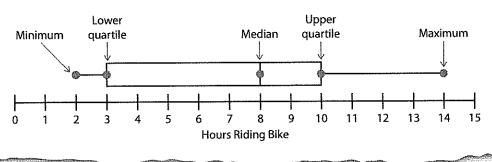**Study the example showing how to display data in a box plot. Then solve problems 1–8.**

Example

Fifteen students were asked how many hours they spent one week riding their bikes. Here are their responses, in order from least to greatest. Display the data in a box plot.

2, 3, 3, 3, 4, 5, 6, 8, 8, 9, 9, 10, 11, 12, 14

To display the data in a box plot, you need to find five values: the minimum, the maximum, the median, the lower quartile, and the upper quartile.

The minimum is the least value, 2. The maximum is the greatest value, 14. The median, 8, is the middle number. The lower quartile, 3, is the middle number of all values less than the median. The upper quartile, 10, is the middle number of all values greater than the median.

Hours Riding Bike

1 What do the lines that extend from the ends of the rectangular box represent?

_____

_____

_____

2 The interquartile range (IQR) is the difference between the upper and lower quartiles. What is the IQR for the data? What does it represent?

_____

_____

Solve.

Use this situation for problems 3–8.

A meteorologist reported the number of inches of snow that fell in each of nine weeks.

2, 3, 3, 4, 5, 6, 6, 6, 9
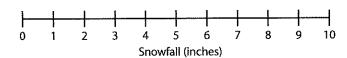
3 What are the minimum and maximum values in the data set?

_____

4 What is the median? _____

5 What are the lower quartile and the upper quartile? Explain how to find both values.

_____

_____

_____

6 Use your answers to problems 3–5 to draw a box plot using the given number line.

```
├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤
0   1   2   3   4   5   6   7   8   9   10
           Snowfall (inches)
```

7 Omar says that the length of the rectangular box in the box plot represents the IQR. Is Omar's statement correct? Explain. What is the IQR?

_____

_____

_____

8 Would you use the range or the IQR to describe the spread of this data? Explain.

_____

_____

Name: _____

Study the example showing how to display and analyze data in a dot plot, histogram, and box plot. Then solve problems 1–6.
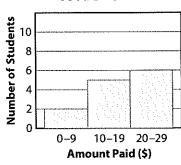
Example

The amounts of money that 13 students paid for used DVDs are shown below, in dollars. The price of each DVD is $5.

25, 15, 5, 20, 10, 25, 10, 15, 20, 20, 10, 20, 5
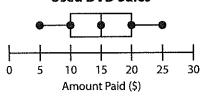
You can display the data in a dot plot, histogram, and box plot.

Used DVD Sales

Amount Paid ($)

Used DVD Sales

Amount Paid ($)

Used DVD Sales

Amount Paid ($)
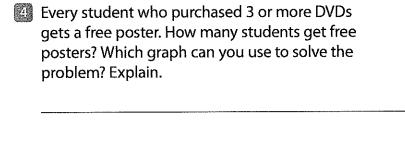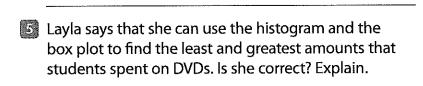
1️⃣ Which graph is easiest to use to find the median amount that students paid? Explain.

_____

_____

2️⃣ Which graph would you use if you wanted to know how many students spent less than $10? Explain.

_____

_____

3️⃣ Which graph shows the amount of money that the most number of students spent? Explain.

_____

_____

Solve.

The situation below and the three graphs at the right are from the example problem on the previous page. Use them to solve problems 4–5.

The amounts of money, in dollars, that 13 students paid for used DVDs are listed below and represented in the graphs. The price of each DVD is $5.
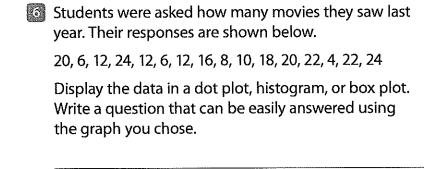
25, 15, 5, 20, 10, 25, 10, 15, 20, 20, 10, 20, 5

4 Every student who purchased 3 or more DVDs gets a free poster. How many students get free posters? Which graph can you use to solve the problem? Explain.

_____

_____

_____

_____

5 Layla says that she can use the histogram and the box plot to find the least and greatest amounts that students spent on DVDs. Is she correct? Explain.

_____

_____

_____

_____

6 Students were asked how many movies they saw last year. Their responses are shown below.

20, 6, 12, 24, 12, 6, 12, 16, 8, 10, 18, 20, 22, 4, 22, 24

Display the data in a dot plot, histogram, or box plot. Write a question that can be easily answered using the graph you chose.

_____

_____

Used DVD Sales

Amount Paid ($)

Used DVD Sales

Number of Students

0–9   10–19   20–29
Amount Paid ($)

Used DVD Sales

Amount Paid ($)

Display Data on Dot Plots, Histograms, and Box Plots

Solve the problems.

1 The following data represents the number of people who live in each of nine houses on a certain street: 8, 3, 3, 10, 5, 8, 6, 8, and 2. Use the partial number line to make a box plot of the data.
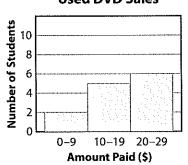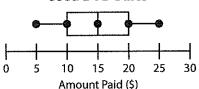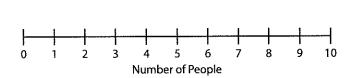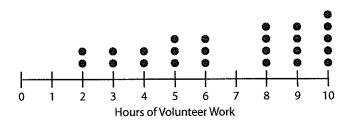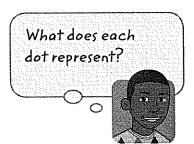
> *Remember that a box plot is a five-number summary.*

```
├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤
0   1   2   3   4   5   6   7   8   9   10
```
Number of People

2 Students recorded how many hours of volunteer work they did one month. The dot plot shows the data.

> *What does each dot represent?*

```
                              ●
                   ●      ●   ●
           ●   ●   ●      ●   ●
   ●   ●   ●   ●   ●      ●   ●
   ●   ●   ●   ●   ●      ●   ●
├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤
0   1   2   3   4   5   6   7   8   9   10
```
Hours of Volunteer Work

Which of the following statements about the dot plot is true? Select all that apply.

A There is a cluster of data points around 8, 9, and 10.

B The mode of the data set is 8.

C The total number of students is 25.

D The range of the dot plot is 10.

Richard chose **D** as a correct answer. How did he get that answer?

_____

_____

Solve.

3 The box plot represents the number of inches of rainfall in one city during each of the last 12 months.

What information does a box plot show?

Rainfall

Rain (inches)

Can the box plot be used to answer the question? Choose *Yes* or *No*.

a. What is the median rainfall? ☐ Yes ☐ No

b. In how many months was the rainfall 6 inches or more? ☐ Yes ☐ No

c. What is the greatest amount of rainfall in the data set? ☐ Yes ☐ No

d. What is the IQR? ☐ Yes ☐ No

4 Students were asked how much money, to the nearest whole dollar, they spent on entertainment in one month. A total of 28 students responded. Nineteen students spent $20 or more. Twenty-five students spent $10 or more. Nine students spent between $30 and $39. No one spent more than $39. Draw a histogram that represents the data.

Make a list of the intervals and the number in each interval first.

Analyze Numerical Data

Name: _____

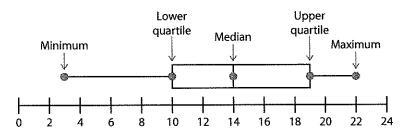**Study the example showing how to display data in a box plot. Then solve problems 1–7.**

Example

Fishermen recorded the lengths, in inches, of fifteen fish that they caught on a fishing trip: 22, 14, 15, 3, 9, 20, 20, 11, 9, 10, 18, 19, 10, 12, 15. Make a box plot of the data.

First, order the lengths from shortest to longest.

3, 9, 9, 10, 10, 11, 12, 14, 15, 15, 18, 19, 20, 20, 22

The minimum is the least value, 3. The maximum is the greatest value, 22. The median, 14, is the middle number. The lower quartile, 10, is the middle number of all values less than the median. The upper quartile, 19, is the middle number of all values greater than the median.

1. What is the interquartile range (IQR) of the data? Does the IQR include outliers? What does the IQR tell you about the fish lengths?

_____

_____

2. What is the range of the data? Does the range include outliers? What does the range tell you about the fish lengths?

_____

_____

Vocabulary

box plot a five-number summary that includes the minimum, the lower quartile, the median, the upper quartile, and the maximum.
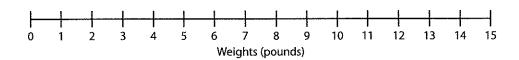
lower quartile the middle number of all values less than the median.

upper quartile the middle number of all values greater than the median.
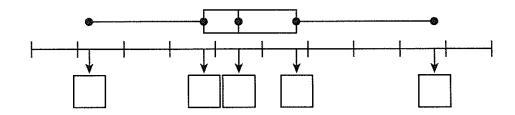
Solve.

3 The number of pounds that each kitten or cat at an animal rescue center weighs is listed below. Display the data in a box plot.

1, 1, 2, 3, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 6, 8, 8, 10, 12

```
├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤
0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
                        Weights (pounds)
```

4 What are the lower quartile, the upper quartile, and the IQR for the data in problem 3?

_____

5 Explain what the box that you drew in the box plot in problem 3 represents in terms of the weights.

_____

_____

6 Tomas listed the amounts that he deposited in his savings account each week for 15 weeks. Write the correct amount in each box below the box plot.

$25, $32, $32, $35, $35, $35, $35, $38, $40, $40, $43, $43, $44, $45, $55

```
        ●────────┌───┬───┐────────────────●
                 │   │   │
├───┼───┼───┼───┼┼───┼───┼───┼───┼───┼───┼┼───┤
     ↓            ↓   ↓       ↓             ↓
   ┌───┐        ┌───┬───┐   ┌───┐         ┌───┐
   │   │        │   │   │   │   │         │   │
   └───┘        └───┴───┘   └───┘         └───┘
```

7 In problem 6, what do the lines to the right and to the left of the rectangular box in the box plot represent?

_____

_____

_____

Name: _____

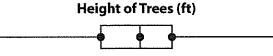**Study the example showing how the IQR measures variability. Then solve problems 1–7.**
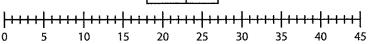
Example

The heights of trees, in feet, in a city park are listed below.

3, 13, 16, 18, 19, 21, 21, 23, 25, 25, 27, 27, 31, 33, 43

What does the IQR tell you about the variability of the heights?

Draw a box plot to help you visualize the quartile values.

Height of Trees (ft)

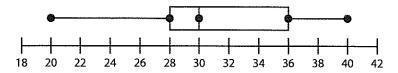The IQR is 27 − 18 = 9. It tells me that the middle 50% of the heights of the trees are in the 9-foot range between 18 feet and 27 feet.

1 What is the median of this data? What does the median tell you about the heights of the trees?

_____

_____

2 Are there any outliers in this data set? If so, what are they? Explain.

_____

_____

3 Explain why the median and IQR are not affected by outliers.

_____

_____

_____

Solve.

Use the following situation and box plot to solve problems 4–7.

The speeds of cars, in miles per hour, along a neighborhood street were recorded and are shown in the box plot.

4 Can you tell from the box plot whether any one of the cars was traveling at a speed of 34 miles per hour?

_____

_____

_____

5 Does the box plot show the number of car speeds that were recorded? Explain.

_____

_____

_____

6 What is the range of data shown in the box plot? What is the IQR? Explain why it might be more helpful to use the IQR rather than the range to describe this data set.

_____

_____

_____

7 Write a question about the distribution of car speeds that you can answer by looking at the box plot. Answer your question.

_____

_____

_____

Name: _____

Use Mean Absolute Deviation

Study the example showing how to analyze data using the mean absolute deviation. Then solve problems 1–8.

Example

The table shows the number of points scored by a basketball team during the first 10 games of the season.

66	53	48	68	71
42	56	55	49	58

The mean of this data set is 56.6. Make a table to help you find the mean absolute deviation (MAD) of the data.

The mean absolute deviation (MAD) of a data set can help you understand the variability of the data in the set. To help you find the MAD, make a table that shows the data values in the set, their deviations from the mean, and the absolute values of those deviations.

Data Value	66	53	48	68	71	42	56	55	49	58
Deviation from Mean	9.4	−3.6	−8.6	11.4	14.4	−14.6	−0.6	−1.6	−7.6	1.4
Absolute Deviation	9.4	3.6	8.6	11.4	14.4	14.6	0.6	1.6	7.6	1.4

1 Look at the table. Explain how the deviation from the mean was calculated for the data values 66 and 53. Why is one deviation positive and the other negative?

_____

_____

2 What is the MAD of the data values in the example? Explain how you found the MAD.

_____

_____

3 What does the MAD tell you about the number of points scored?

_____

_____

> ### Vocabulary
>
> **mean absolute deviation (MAD)** average distance between each data value and the mean. It describes how spread out the data is.

Solve.

Use the data in the table to solve problems 4–8.

Price of Laptop Computers ($)				
390	230	290	350	270
340	320	890	220	400

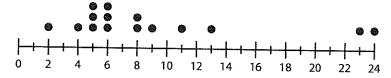**4** What is the mean of this data?

Show your work.

Solution: _____

5 What does the mean tell you about the prices of the computers?

_____

6 What is the MAD of this data?

Show your work.

Solution: _____

7 What does the MAD tell you about the prices of the computers? Does the MAD tell you that there is a lot of variability in the prices or not?

_____

_____

_____

8 Which data value from the table would you delete to make the greatest change possible to the MAD? Explain.

_____

_____

Name: _____

Analyze Numerical Data

Solve the problems.

1 The dot plot shows the number of books that some sixth graders read last month. Find the mean and the median.

What does each dot on the plot represent?

Number of Books Read

Show your work.

Solution: _____

2 In problem 1, is the mean or the median a better measure of center? Explain.

How do outliers affect the measures of center?
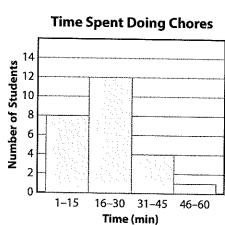
_____

_____

3 The histogram shows the time, to the nearest whole minute, that some students spend each week doing chores. How many students spend more than $\frac{1}{2}$ hour doing chores?

A 4   **C** 12

B 5   **D** 20

How many values are in each interval?

Time Spent Doing Chores

Solve.

4 The box plot shows the amount of money raised by some students for a school fund-raiser. Tell whether each statement is *True* or *False*.

What are the five numbers represented in a box plot?

25 30 35 40 45 50 55 60 65 70 75 80 85
Money ($)

a. The variability of the middle 50% of the money raised is less than the variability of the lower 25%.   ☐ True   ☐ False

b. The box plot shows that 80 students raised money.   ☐ True   ☐ False

c. If the $30 value is replaced by a $50 value, the IQR will be the same.   ☐ True   ☐ False

5 What is the IQR in problem 4? What does it tell you about the data values in the box plot?

In the box plot, what does the rectangular box represent?

_____

_____

_____

6 Josh recorded the amount of time, in minutes, that he exercised during the first 10 days of the month.

30, 45, 25, 25, 35, 5, 40, 35, 30, 20

The mean of the data is 29. Find the MAD of the data. What does the MAD tell you?

What does mean absolute deviation measure?

Show your work.

Solution: _____

_____