

Name _____

Compare Fractions and Decimals

Essential Question How can you compare decimals, fractions, and mixed numbers on a number line?

UNLOCK the Problem REAL WORLD

The Tech Club compared the weights of three cell phones. Estéban's phone weighed 4.7 ounces. Jill's phone weighed $4\frac{3}{5}$ ounces. Mona's phone weighed 4.35 ounces. Who has the phone with the lightest weight?

You can use a number line to compare fractions and decimals.

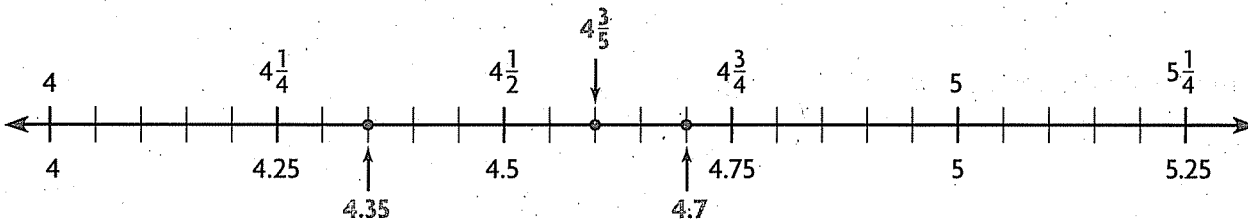
Remember: Greater values on a number line lie farther to the right.

- How can you identify the number with the least value?

Compare the values on a number line.

STEP 1 Locate some benchmarks.

- Benchmark decimals: 4, 4.25, 4.5, 4.75, 5...
- Benchmark mixed numbers: $4, 4\frac{1}{4}, 4\frac{1}{2}, 4\frac{3}{4}, 5...$



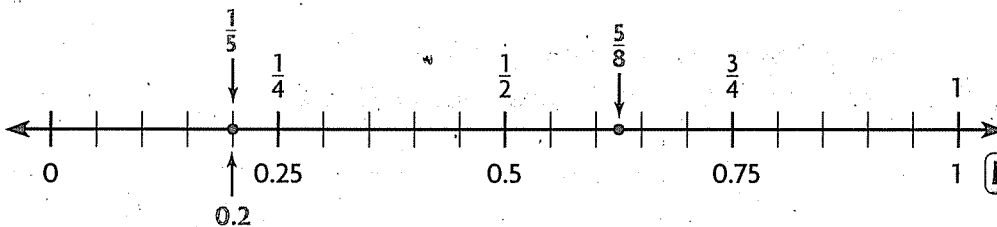
STEP 2 Mark the weight of each cell phone on the number line.

- Find the location of 4.7, $4\frac{3}{5}$, and 4.35.

Since $4.35 < 4\frac{3}{5} < 4.7$, Mona's phone is lightest.

Try This! Compare $\frac{1}{5}$, $\frac{5}{8}$, and 0.2. Which number has the greatest value?

- Mark each value on a number line.



The greatest number is _____. Explain how you decided.

Math Talk

Explain how you can tell that $\frac{1}{5}$ and 0.2 are equal.

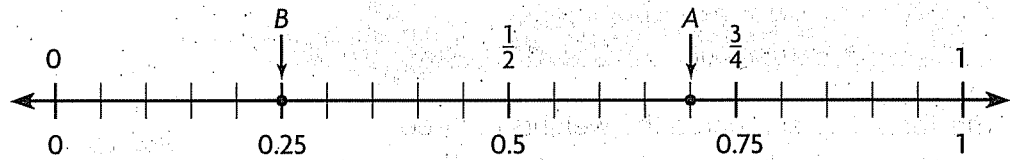
Share and Show



For 1–2, identify the points on the number line.
Then write the greater number.

1. point A as a decimal

2. point B as a fraction



_____ is greater.

Locate each number on a number line.
Then complete the sentence.

3. 0.55, $\frac{2}{5}$, 0.46

The number with the greatest value is _____.

On Your Own

Locate each number on a number line. Then complete the sentence.

4. 0.4, $\frac{3}{4}$, 0.15

The number with the greatest value is _____.

5. $2\frac{2}{3}$, 2.45, $2\frac{2}{5}$

The number with the least value is _____.

6. 3.95, $3\frac{5}{6}$, $3\frac{4}{5}$

The number with the greatest value is _____.

Problem Solving



7. Hannah made 0.7 of her free throws in a basketball game. Abra made $\frac{9}{10}$ of her free throws. Dena made $\frac{3}{4}$ of her free throws. Who was the best shooter? **Explain.**

Name _____

Order Fractions and Decimals

Essential Question How can you order decimals, fractions, and mixed numbers on a number line?

UNLOCK the Problem REAL WORLD

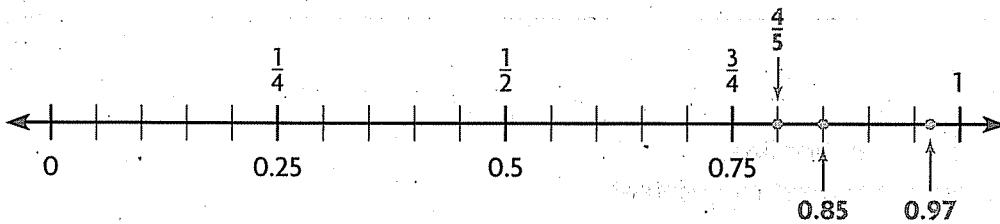
In tennis, Jocelyn's serve takes 0.97 of a second to reach her opponent. Dave's serve takes $\frac{4}{5}$ of a second. Monica's serve takes 0.85 of a second. Order the three serves from shortest to longest time.

- You want to order the times from shortest to longest. Should you read the numbers on the number line left to right or right to left?

Order the fractions and decimals on the number line.

STEP 1 Locate the benchmarks on the number line.

- Benchmark decimals: 0, 0.25, 0.5, 0.75, 1.
- Benchmark fractions: $0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1$.



STEP 2 Locate $0.97, \frac{4}{5}$, and 0.85 on the number line.

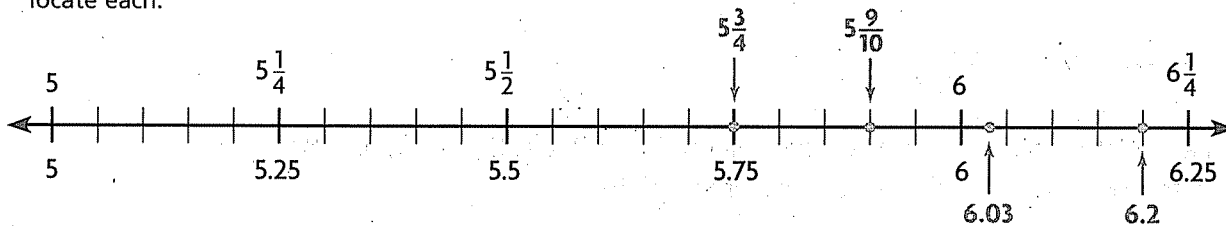
STEP 3 Order the fractions and decimals.

Remember: The point farthest to the left is the least value.

So, the times in order from shortest to longest are: $\frac{4}{5}, 0.85, 0.97$.

Try This! Order $6.03, 5\frac{9}{10}, 5\frac{3}{4}$, and 6.2 from greatest to least.

- Locate each fraction and decimal on the number line. Use benchmarks to help you locate each.



From the greatest to least: _____, _____, _____, _____

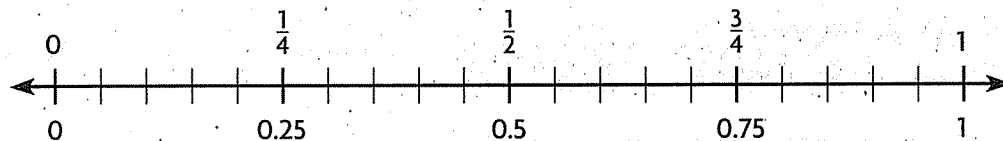
Math Talk How does the number line help you order numbers from greatest to least?

Share and Show



Locate each number on the number line.

Then write the numbers in order from least to greatest.



1. $\frac{3}{5}$, 0.54, 0.35

For 2–3, locate each set of numbers on a number line.

Then write the numbers in order from greatest to least.

2. 1.16, $1\frac{1}{4}$, 1.37, $1\frac{1}{10}$

3. $\frac{5}{8}$, 0.5, $\frac{2}{5}$, 0.78

On Your Own

For 4–5, locate each number on a number line.

Then write the numbers in order from least to greatest.

4. 0.6, $\frac{1}{2}$, $\frac{2}{3}$, 0.39

5. $7\frac{1}{4}$, 7.4, $7\frac{3}{4}$, 7.77

For 6–7, locate each number on a number line.

Then write the numbers in order from greatest to least.

6. $\frac{3}{10}$, 0.222, $\frac{3}{5}$, 0.53

7. 2.96, $3\frac{1}{5}$, 3.48, $3\frac{1}{4}$

Problem Solving



8. Judges in a skateboarding competition gave scores of 8.2, $8\frac{1}{3}$, $8\frac{4}{5}$, 8.44, and $8\frac{1}{5}$. Which two scores were closest to one another? **Explain.**

Name _____

Factor Trees

Essential Question How can you factor numbers using a factor tree?


UNLOCK the Problem REAL WORLD

Mr. Shu gives this puzzle to his math students.

“Write 24 as a product of factors that are prime. Remember that a prime number must be greater than 1 and can have only 1 and itself as factors.”

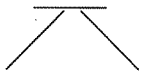
You can use a diagram called a **factor tree** to find the factors of a number.

- Give an example of a number greater than 1 that has only 1 and itself as factors.

 Use a factor tree to find the prime number factors that have a product of 24.

STEP 1

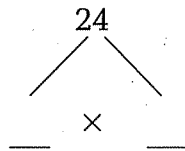
Write the number to be factored at the top of the factor tree.



STEP 2

Write it as a product of any two factors.

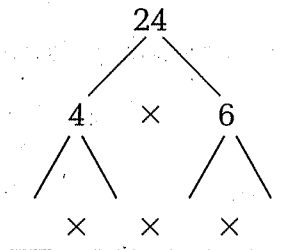
Think: $4 \times 6 = 24$



STEP 3

Write each factor as the product of two factors.

Think: $2 \times 2 = 4$
and $2 \times 3 = 6$



STEP 4

Continue until each factor is a prime number.

Think: $2 \times 1 = 2$ and $3 \times 1 = 3$

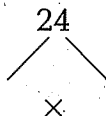
Write the factors that are prime numbers from least to greatest.

____ \times ____ \times ____ \times ____

So, $24 =$ _____

Try This! Make a different factor tree for 24.

- Is the product of factors the same as in the Example? **Explain.**



Math Talk

Explain how you can use factored numbers to find common factors.

Share and Show



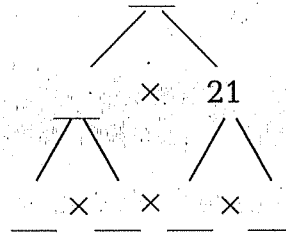
1. Use a factor tree to find the prime number factors that have a product of 210.

- Write 210 as a product of any two factors.

_____ = _____ × 21

- Write each factor as the product of factors.

10 = _____ × _____ 21 = _____ × _____



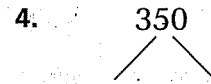
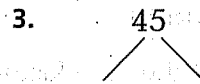
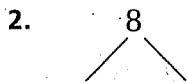
ERROR Alert

Remember to continue to factor a number if it has factors other than 1 and itself.

Now each factor has only _____ and itself as factors.

So, 210 = _____ × _____ × _____ × _____.

Use a factor tree to find the prime number factors.



On Your Own

Use a factor tree to find the prime number factors.



Problem Solving



Mr. Shu gave these problems to his math students. Solve.

8. Write 500 as a product of prime number factors. Each factor must be greater than 1 and can have only 1 and itself as factors.

9. Find a number that has four identical even factors. Each factor must be greater than 1 and can have only 1 and itself as factors.

Name _____

Model Percent

Essential Question How can you express real world quantities as percents and use them to solve problems?

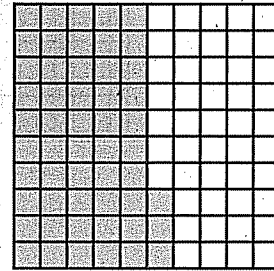
UNLOCK the Problem

Percent means "per hundred" or "out of 100." So, when you find percent you are finding a part of 100. Sixty percent, for example, means 60 out of 100. You can write percents using the percent symbol, %. So, 60 percent is written as 60%.

- What number is always compared in a percent?

Example 1 Name the percent that is shaded.

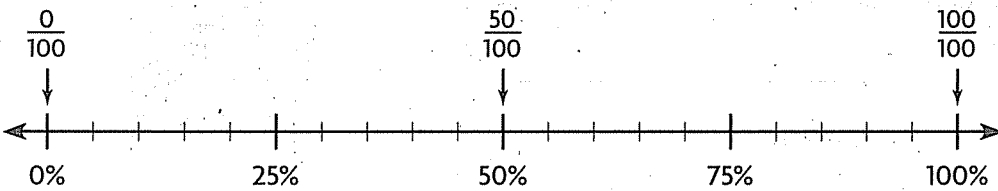
- 5 columns: $5 \times 10 = 50$.
- 3 squares: $3 \times 1 = 3$
- Total: $50 + 3 = 53$ out of 100, or 53 percent is shaded.



Example 2 Name the percent that is not shaded.

- 4 columns: $4 \times 10 = 40$.
- 7 squares: $7 \times 1 = 7$
- Total: $40 + 7 = 47$ out of 100, or 47 percent is not shaded.

Try This! Use the number line. Tell what these percents mean:
0 percent, 50 percent, 100 percent.



- 0 percent means _____ out of 100, or none of the total.
- 50 percent means _____ out of 100, or half of the total.
- 100 percent means _____ out of 100, or all of the total.

Math Talk

Which benchmark is 33% closest to? Explain how you know.

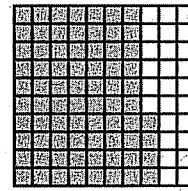
Share and Show



Use the diagram to write the percent.

1. How many whole columns and single squares are shaded?

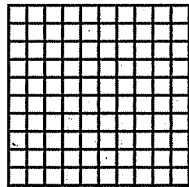
2. What percent is shaded?



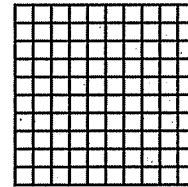
3. What percent is unshaded?

Shade the grid to show the percent.

4. 20 percent



5. 86 percent



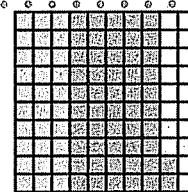
On Your Own

Use the diagram to write the percent.

6. light shading

7. dark shading

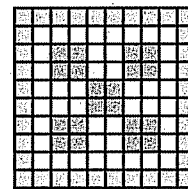
8. not shaded



9. not shaded

10. dark shading

11. light shading



Write the closest benchmark for the percent.

12. 48%

13. 94%

14. 4%

Problem Solving



15. In an election between Warren and Jorge, Warren declared victory because he received 58 percent of the vote. Is he correct? **Explain.**

Name _____

Relate Decimals and Percents**Essential Question** How can you express decimals as percents and percents as decimals?**UNLOCK the Problem** REAL WORLD

Decimals and percents are two ways of expressing the same number. You can write a percent as a decimal. You can also write a decimal as a percent.

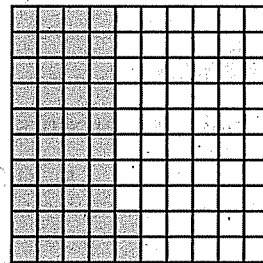
- In percent, the "whole" is 100. What is the "whole" in decimal form?

Example 1 Model 0.42. Write 0.42 as a percent.**STEP 1** Write the decimal as a ratio.

$$0.42 = 42 \text{ hundredths} = 42 \text{ out of } 100.$$

STEP 2 Make a model that shows 42 out of 100.**STEP 3** Use the model to write a percent.

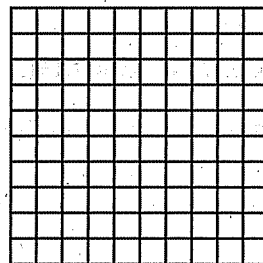
$$42 \text{ shaded squares} = \underline{42} \text{ percent, or } \underline{42}\%$$

**Example 2** Model 19 percent. Write 19% as a decimal.**STEP 1** Write the percent as a fraction.

$$19\% = \frac{19}{100}$$

STEP 2 Make a model that shows 19 out of 100.**STEP 3** Use the model to write a decimal.

$$19 \text{ shaded squares out of } 100 \text{ squares} = \underline{\hspace{2cm}}$$

**Math Talk**

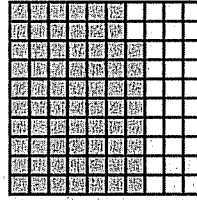
Suppose a store is having a 50% off sale. What does this mean?

Share and Show



Use the model. Complete each statement.

1a. $0.68 =$ _____ out of 100



1b. How many squares are shaded?

1c. What percent is shaded?

Write the percents as decimals.

2. 47 percent

3. 11 percent

On Your Own

Write the decimals as percents.

4. 0.20

5. 0.39

6. 0.44

7. 0.93

8. 0.07

9. 0.7

10. 0.06

11. 0.6

Write the percents as decimals.

12. 12 percent

13. 31%

14. 99 percent

15. 13 percent

16. 4 percent

17. 14 percent

18. 90 percent

19. 9%

Problem Solving




20. In basketball, Linda made 0.56 of her shots. What percent of her shots did Linda miss?

Name _____

Fractions, Decimals, and Percents**Essential Question** How can you convert between fractions, decimals, and percents?**UNLOCK the Problem** REAL WORLD

Every percent and decimal number can also be written as a fraction. All fractions can be written as decimals and percents. For example, $\frac{2}{5}$ of the songs in Bonnie's music collection are country songs. What percent of her song collection is country?

 Write the percent that is equivalent to $\frac{2}{5}$.

STEP 1 Set up the equivalent fraction with a denominator of 100.

$$\frac{2 \times ?}{5 \times ?} = \frac{\quad}{100}$$

STEP 2 Ask: By what factor can you multiply the denominator to get 100?

$$\frac{2 \times ?}{5 \times 20} = \frac{\quad}{100} \leftarrow \text{multiply the denominator by 20}$$

STEP 3 Multiply the numerator by the same factor, 20.

$$\frac{2 \times 20}{5 \times 20} = \frac{40}{100}$$

STEP 4 Write the fraction as a percent.

$$\frac{40}{100} = 40 \text{ percent}$$

So, $\frac{2}{5}$ equals 40 percent.**More Examples****A.** Write $\frac{8}{25}$ as a decimal.**STEP 1** Write an equivalent fraction with a denominator of 100.

$$\frac{8 \times 4}{25 \times 4} = \frac{32}{100} \leftarrow \text{multiply denominator and numerator by 4}$$

STEP 2 Write the fraction as a decimal.

$$\frac{32}{100} = 0.32$$

B. Write 90 percent as a fraction in simplest form.**STEP 1** Write 90% as a fraction.

$$90\% = \frac{90}{100}$$

STEP 2 Simplify.

$$90\% = \frac{90 \div 10}{100 \div 10} = \frac{9}{10}$$

Math Talk

How are 9% and 90% alike when written as decimals? How are they different?

Share and Show



Complete the steps to write $\frac{7}{20}$ as a percent.

1. By what factor should you multiply the denominator and numerator? _____

$$\frac{7 \times ?}{20 \times ?} = \frac{?}{100}$$

2. For $\frac{7}{20}$, what is an equivalent fraction with a denominator of 100? _____
3. What percent is equivalent to $\frac{7}{20}$? _____

Write a decimal, a percent, or a simplified fraction.

4. $\frac{1}{4}$ as a decimal _____

5. $\frac{3}{10}$ as a percent _____

6. 80% as a fraction _____

On Your Own

Write a decimal, a percent, or a simplified fraction.

7. $\frac{1}{2}$ as a percent _____

8. $\frac{9}{10}$ as a decimal _____

9. $\frac{11}{20}$ as a percent _____

10. 75% as a fraction _____

11. $\frac{3}{5}$ as a percent _____

12. $\frac{9}{25}$ as a decimal _____

13. $\frac{29}{50}$ as a percent _____

14. $\frac{1}{20}$ as a percent _____

15. 4% as fraction _____

16. $\frac{4}{5}$ as a percent _____

17. $\frac{24}{25}$ as a decimal _____

18. $\frac{41}{50}$ as a percent _____

Problem Solving



19. Whitney has finished $\frac{9}{20}$ of her book. What percent of the book does Whitney still need to read?

20. Roger has completed $\frac{4}{25}$ of his math homework. What percent of his math homework does he still need to do?

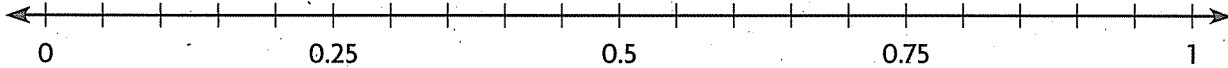
Name _____

✓ Checkpoint

Concepts and Skills

Locate each number on the number line. Then complete the sentence. (pp. P245–P246)

1. 0.4 , $\frac{3}{5}$, 0.35



The number with the least value is _____.

Write the numbers in order from least to greatest. (pp. P247–P248)

2. 0.4 , $\frac{3}{5}$, 0.55 , $\frac{1}{4}$

3. $\frac{3}{4}$, 0.7 , $\frac{1}{2}$, 0.1

Use a factor tree to find the prime number factors. (pp. P249–P250)



Write a decimal, a percent, or a simplified fraction. (pp. P251–P256)

7. 0.08 as a percent

8. $\frac{3}{5}$ as a decimal

9. 80% as a fraction

10. $\frac{13}{20}$ as a percent

Problem Solving

For 11–12, use the data in the table. (pp. P251–P256)

11. What percent of the apes in the Wild Country Zoo are orangutans?

12. One species makes up 40% of the apes in the zoo. Which species is it?

Apes in the Wild Country Zoo	
Species	Number
Bonobo	4
Chimpanzee	20
Gorilla	15
Orangutan	11
Total	50

Fill in the bubble or grid completely to show your answer.

13. Entries for the Lake Manatee Bass Fishing Contest are shown. First place is awarded to the contestant with the heaviest fish.

Lake Manatee Bass Contest	
Contestant	Weight of fish caught
George	6.25 pounds
Mia	$6\frac{2}{5}$ pounds
Harvey	$6\frac{1}{3}$ pounds

What is the correct order from first place to third place? (pp. P247–P248)

- (A) First: George, Second: Mia, Third: Harvey
 (B) First: Mia, Second: George, Third: Harvey
 (C) First: Mia, Second: Harvey, Third: George
 (D) First: Harvey, Second: Mia, Third: George
14. Ric used a factor tree to write 180 as a product of factors that are prime numbers. How many factors were in Ric's product? (pp. P249–P250)
- (A) 2
 (B) 3
 (C) 4
 (D) 5
15. On Monday, 6% of the students at Riverside School were absent. Written as a decimal, what portion of Riverside's students attended school that day? (pp. P253–P254)
- (A) 0.06
 (B) 0.6
 (C) 0.94
 (D) 9
16. The Hastings family drove $\frac{12}{25}$ of the distance to Yellowstone National Park on the first day of their vacation. What percent of the distance to the park remained for them to drive? (pp. P255–P256)
- (A) 12% (C) 48%
 (B) 13% (D) 52%

Name _____

Divide Fractions by a Whole Number

Essential Question How do you divide a fraction by a whole number?

UNLOCK the Problem REAL WORLD

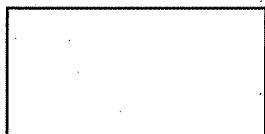
Four friends share $\frac{2}{3}$ of a quart of ice cream equally. What fraction of a quart of ice cream does each friend get?

- What operation will you use to solve the problem?

Divide. $\frac{2}{3} \div 4$

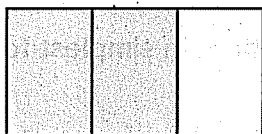
STEP 1

Let the rectangle represent 1 quart of ice cream. Divide it into thirds by drawing vertical lines. Shade 2 of the thirds.



STEP 2

Divide the rectangle into fourths by drawing horizontal lines. Shade $\frac{1}{4}$ of the $\frac{2}{3}$ already shaded.



STEP 3

The rectangle is now divided into _____ equal parts. Each part is _____ of the rectangle. Of the 12 equal parts, _____ parts are shaded twice. So, _____ of the rectangle is shaded twice.



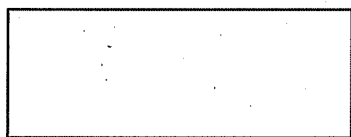
So, each friend gets _____ of a quart of ice cream.

Math Talk Explain why you divided the rectangle into fourths in Step 2.

Try This! Divide. $\frac{3}{4} \div 2$

STEP 1

Divide the rectangle into fourths. Shade 3 of the fourths.



STEP 2

Divide the rectangle into halves. Shade $\frac{1}{2}$ of the $\frac{3}{4}$ already shaded.



STEP 3

Of the 8 equal parts, _____ parts are shaded twice. So, _____ of the rectangle is shaded twice.



So, $\frac{3}{4} \div 2 =$ _____.

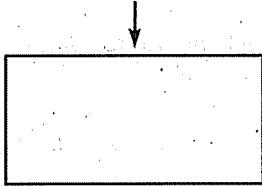
Share and Show



Complete the model to find the quotient. Write the quotient in simplest form.

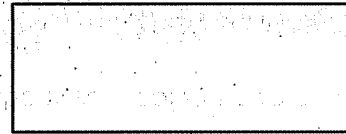
1. $\frac{5}{6} \div 2 =$ _____

Divide the rectangle into sixths.
Shade 5 of the sixths.

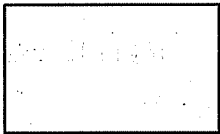


Divide the rectangle into halves. Shade $\frac{1}{2}$ of $\frac{5}{6}$.

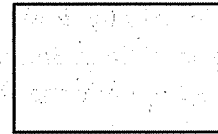
2. $\frac{3}{4} \div 3 =$ _____



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



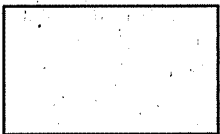
4. $\frac{3}{5} \div 2 =$ _____



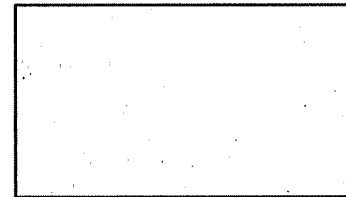
On Your Own

Complete the model to find the quotient. Write the quotient in simplest form.

5. $\frac{2}{5} \div 2 =$ _____



6. $\frac{5}{8} \div 3 =$ _____



Draw a model to find the quotient. Write the quotient in simplest form.

7. $\frac{4}{9} \div 2 =$ _____

8. $\frac{4}{5} \div 3 =$ _____

Problem Solving



9. Heather, Jocelyn, and Dane are each swimming one leg of a $\frac{9}{10}$ -mile race. They will divide the distance equally. How far will each team member swim?

Name _____

Ratios

Essential Question How can you express real world quantities as ratios?

UNLOCK the Problem REAL WORLD

Max sells bouquets of roses. There are 3 yellow roses and 2 red roses. What is the ratio of yellow to red roses?

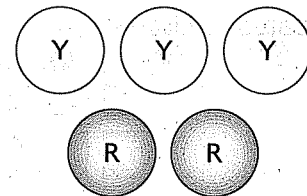
A ratio is a comparison of two numbers.

- A ratio is expressed by comparing one part to another, such as 4 feet to 20 toes, or 3 yellow roses to _____.

Activity

Materials ■ two-color counters

Model the data.



STEP 1 Use 3 counters with the yellow side up to represent yellow roses and 2 counters with the red side up to represent red roses.

STEP 2 Write the ratio of yellow to red roses.

- Ratios can be written in different ways.
3 to 2 or 3:2 or $\frac{3}{2}$ (as a fraction)

So, the ratio of yellow roses to red roses is 3 to 2, 3:2, or $\frac{3}{2}$.

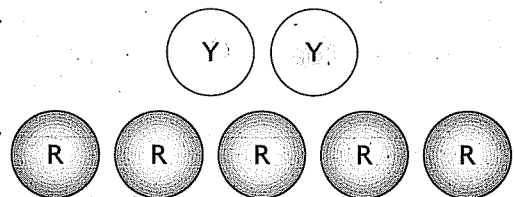
In the example above, you compared a part to a part. You can also use a ratio to compare a part to a whole or a whole to a part.

Try This! Show a ratio of red counters to total counters.

STEP 1 Count to find the number of red counters. _____

STEP 2 Count to find the total number of counters. _____

STEP 3 Write the ratio. _____



Math Talk How would the ratio change if you found the ratio of total counters to red counters?

Share and Show



Find the ratio of red counters to yellow counters.

1a. How many red counters are there?

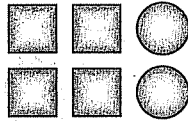


1b. How many yellow counters are there?

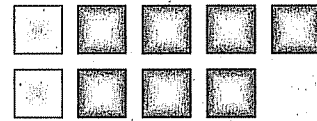
1c. What is the ratio of red to yellow counters?

Write the ratio.

2. squares to circles



3. total squares to dark squares



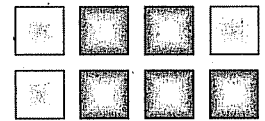
On Your Own

For 4–6, use the drawing to write the ratio.

4. dark to light

5. light to dark

6. light to total

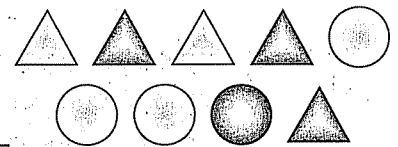


For 7–9, use the drawing to write the ratio.

7. triangles to circles

8. dark to light

9. total shapes to circles



For 10–12, write the ratio.

10. weekdays to weekend days

11. weekend days to days in a week

12. days in a week to days in January

Problem Solving



13. The ratio of length to width in Gus's driveway is 13 yards to 4 yards. What is this ratio in feet? (Hint: 3 ft = 1 yd)

Name _____

Equivalent Ratios


Essential Question How can you determine if two ratios are equivalent?

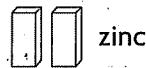
UNLOCK the Problem REAL WORLD

To make brass, you can mix 2 parts zinc to 3 parts copper, a ratio of 2 to 3. If you have 12 bars of copper and use them all, how many bars of zinc do you need to make brass?

- You know that each group of zinc to copper bars needed to make brass has a ratio of 2 to 3. How can you use this group to find an equivalent ratio?

Since ratios can be written as fractions, 2 to 3 can be written as $\frac{2}{3}$. Use what you know about equivalent fractions to find equivalent ratios.

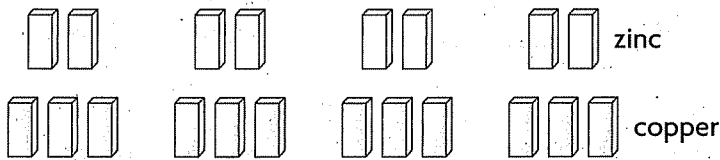
 Use a diagram to find an equivalent ratio.



STEP 1 Draw bars to represent a 2 to 3 ratio of zinc to copper.



STEP 2 Add groups until you have 12 bars of copper.



STEP 3 Count the zinc bars. Write an equivalent ratio.

There are 8 zinc bars. So, 2 to 3 is equivalent to the ratio 8 to 12.

Try This! Use equivalent ratios to find out if 6:8 is equivalent to 18:24.

STEP 1 Write the ratios as fractions.

$$6:8 = \frac{6}{8} \quad 18:24 = \frac{18}{24}$$

STEP 2 Write the fractions in simplest form. Then compare.

$$\frac{6 \div 2}{8 \div 2} = \frac{3}{4} \quad \frac{18 \div 6}{24 \div 6} = \frac{3}{4}$$

Both ratios equal $\frac{3}{4}$, so they are equivalent.

Math Talk

How does knowing how to simplify fractions help you decide whether two ratios are equivalent?

Share and Show



Are the ratios 3:5 and 12:20 equivalent?

1a. Write both ratios as fractions.

1b. Are both ratios in simplest form?

1c. Write both ratios in simplest form.

1d. Are the ratios equivalent?

Write *equivalent* or *not equivalent*.

2. 1 to 3 and 2 to 6

3. 3 to 7 and 12 to 21

On Your Own

Write the equivalent ratio.

4. 5 to 2 = _____ to 4

5. 3 to 6 = 7 to _____

6. 7:2 = _____ :6

7. 14 to 21 = _____ to 15

8. 6:10 = _____ :30

9. 8 to 9 = 40 to _____

Write *equivalent* or *not equivalent*.

10. 3:5 and 21:35

11. 4 to 3 and 36 to 24

12. 27:72 and 9:24

Problem Solving



13. Three of every 5 pizzas that Miggy's Pizza sells are cheese pizzas. Miggy's sold 80 pizzas today. How many of them would you expect were cheese?

Name _____

Rates

Essential Question How can you find rates and unit rates?


UNLOCK the Problem REAL WORLD

CONNECT You know how to write ratios to compare two quantities. A **rate** is a ratio that compares two quantities that have different units of measure. A **unit rate** is a rate that has 1 unit as its second term.

Rafael is shopping at a used book and music store. A sign advertises 4 CDs for \$12. What is the unit rate for the cost of 1 CD?

- What are the units of the quantities that are being compared?

- What operations can you use to write equivalent ratios?

 Write the rate in fraction form. Then find the unit rate.

STEP 1

Write the rate in fraction form to compare dollars to CDs.

$$\frac{\text{dollars}}{\text{CDs}} \longrightarrow \frac{12}{\square}$$

STEP 2

Divide to find an equivalent rate so that 1 is the second term.

$$\frac{12}{4} = \frac{12 \div \square}{4 \div \square} = \frac{\square}{1} \longleftarrow \text{unit rate}$$

So, the unit rate for CDs is _____ for 1 CD.

Math Talk Would it make sense to compare CDs to dollars to find a unit rate? Explain.

- **What if** the regular price of CDs is 5 for \$20? What is the unit rate for CDs at the regular price? **Explain** how you found your answer.

Share and Show



1. Find the unit rate of speed for 120 miles in 2 hours.

$$\begin{array}{l} \text{miles} \longrightarrow \\ \text{hours} \longrightarrow \end{array} \frac{120}{\square} = \frac{\square}{2} \div \frac{2}{\square} = \frac{\square}{\square}$$

The unit rate of speed is _____ per _____.

Find the unit rate.

- | | | |
|---------------------------------------|------------------------------------|---|
| 2. \$5.00 for 2 T-shirts

_____ | 3. 200 words in 4 min

_____ | 4. 150 mi on 10 gal of gas

_____ |
|---------------------------------------|------------------------------------|---|

On Your Own

Write the rate in fraction form.

- | | | |
|-----------------------------------|---------------------------------------|---------------------------------|
| 5. 90 words in 2 min

_____ | 6. \$1.20 for 6 goldfish

_____ | 7. \$0.05 per page

_____ |
|-----------------------------------|---------------------------------------|---------------------------------|

Find the unit rate.

- | | | |
|-----------------------------------|-----------------------------------|---|
| 8. \$208 for 4 tires

_____ | 9. 300 mi per 15 gal

_____ | 10. 240 people per 2 sq mi

_____ |
|-----------------------------------|-----------------------------------|---|

Problem Solving



11. An ice skating rink charges \$1.50 to rent ice skates for 30 minutes. What is the unit rate per hour for renting ice skates?

Name _____

Distance, Rate, and Time**Essential Question** How can you solve problems involving distance, rate, and time?**UNLOCK the Problem** REAL WORLD

You can use the formula $d = r \times t$ to solve problems involving distance, rate, and time. In the formula, d represents distance, r represents rate, and t represents time. The rate is usually a unit rate comparing distance to time, such as miles per hour.

Example 1

The winner of an automobile race drove 500 miles at an average speed of 150 miles per hour. How long did it take the winner to finish the race?

STEP 1

Write the formula.

$$d = r \times t$$

STEP 2Replace d with 500 and r with 150.

$$d = r \times t$$

$$500 = \boxed{} \times t$$

STEP 3Use what you know about inverse operations to find t .

$$500 \div \boxed{} = t$$

$$3\frac{1}{3} = t$$

- What word is used in place of rate?

- What are the given values?

- What is the unknown value?

So, it takes the winner _____ hours or _____ hours _____ minutes to complete the race.

Example 2

A race car driver traveled at an average speed of 120 miles per hour to finish a race in 2 hours. What was the length of the race?

STEP 1

Write the formula.

$$d = r \times t$$

STEP 2Replace r with 120 and t with 2.

$$d = r \times t$$

$$d = \boxed{} \times \boxed{}$$

STEP 3Multiply to solve for d .

$$d = 120 \times 2$$

$$d = \boxed{}$$

So, the race was _____ miles long.

Math Talk Why were different operations used in Step 3 of Examples 1 and 2?

Share and Show



1. A cyclist travels 45 miles in 3 hours.
What is the cyclist's speed?

Write the formula: $d = \square \times \square$

Replace d with _____.

Replace t with _____.

The rate is _____ miles per hour.

Use the formula $d = r \times t$ to solve. Include the units in your answer.

2. A train travels at an average speed of 80 miles per hour for 5 hours. How far does the train travel?

3. A horse travels at an average speed of 12 miles per hour. How long does it take the horse to travel 60 miles?

On Your Own

Use the formula $d = r \times t$ to solve. Include the unit in your answer.

4. A hiker travels at a speed of 3 miles per hour for 3 hours. How far does the hiker travel in that time?

5. A snail travels at a speed of 2 centimeters per minute. How long does the snail take to travel 30 centimeters?

6. A boat travels 6 miles in 24 minutes. What is the average speed of the boat?

7. $d = 320$ cm

$r =$ _____

$t = 8$ sec

8. $d =$ _____

$r = 50$ km per hr

$t = 6$ hr

9. $d = 150$ ft

$r = 20$ ft per min

$t =$ _____

Problem Solving



10. In an experiment, Ava found that it took a ball 5 seconds to roll down an 80-foot ramp. What is the average speed of the ball?

11. Jason's family is driving 1,375 miles to Grand Canyon National Park. They plan to drive at an average speed of 55 miles per hour. How long will they be driving to reach the park?

Name _____



Concepts and Skills

Draw a model to find the quotient. Write the quotient in simplest form. (pp. P259–P260)

1. $\frac{3}{4} \div 3$

2. $\frac{2}{3} \div 5$

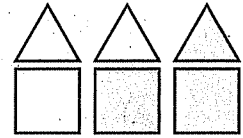
3. $\frac{3}{7} \div 2$

For 4–6, use the drawing to write the ratio. (pp. P261–P262)

4. squares to triangles

5. total to dark

6. triangles to total



Write the equivalent ratio. (pp. P263–P264)

7. 8 to 3 = _____ to 12

8. 2 to 6 = 4 to _____

9. 11:4 = _____ :16

Find the unit rate. (pp. P265–P266)

10. 45 visitors with 5 tour guides

11. 450 mi on 15 gal of gas

12. \$56 in 8 hr

Use the formula $d = r \times t$ to solve the problem. Include the units in your answer. (pp. P267–P268)

13. $d =$ _____

14. $d = 90$ ft

15. $d = 300$ mi

$r = 40$ km per hr

$r = 10$ ft per sec

$r =$ _____

$t = 3$ hr

$t =$ _____

$t = 4$ hr

Problem Solving **REAL WORLD**

Use the table for 16–17. (pp. P265–P268)

16. Fuel efficiency can be written as a rate comparing the distance driven to the gallons of gas used. What is the fuel efficiency of Car A written as a unit rate?

17. During the test, Car B was driven at the speed of 48 miles per hour. How long did the test take?

Fuel Test Results		
Car	Distance (in mi)	Gas (in gal)
A	308	14
B	288	12

Fill in the bubble completely to show your answer.

18. To make fruit punch for a party, Alison used 3 quarts of pineapple juice and 2 gallons of orange juice. There are 4 quarts in a gallon. What is the ratio of pineapple to orange juice in quarts? (pp. P261–P262)

(A) 3 to 2
 (B) 3 to 5
 (C) 3 to 8
 (D) 8 to 3

19. Three out of every 10 pairs of skis sold by Snow Sports are cross-country skis. Snow Sports sold 450 pairs of skis during the winter season. How many of the skis were likely to have been cross-country skis? (pp. P263–P264)

(A) 443
 (B) 135
 (C) 45
 (D) 30

20. At Greentree Elementary School, there are 72 fifth graders in 3 classrooms. What unit rate describes this situation? (pp. P265–P266)

(A) $14\frac{2}{5}$ fifth graders per class
 (B) 18 fifth graders per class
 (C) 24 fifth graders per class
 (D) 216 fifth graders per class

21. Eduardo rides his bicycle for 6 hours. What was Eduardo's average speed if he rides a distance of 84 miles? Use the formula $d = r \times t$. (pp. P267–P268)

(A) 504 mi per hr
 (B) 90 mi per hr
 (C) 78 mi per hr
 (D) 14 mi per hr

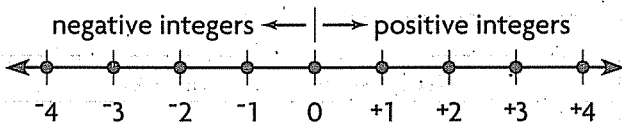
Name _____

Understand Integers

Essential Question How can you use positive and negative numbers to represent real world quantities?

UNLOCK the Problem REAL WORLD

Connect You have used a number line to show 0 and whole numbers. You can extend the number line to the left of 0 to show the **opposites** of the whole numbers. For example, the opposite of +3 is -3. Any whole number or the opposite of a whole number is called an **integer**.



Negative integers are written with a negative sign, -. Positive integers are written with or without a positive sign, +.

- How can you tell whether a number is an integer or not?

Example 1

The temperature in Fairbanks, Alaska, was 37 degrees below zero. Write an integer to represent the situation.

STEP 1 Decide whether the integer is positive or negative.

The word _____ tells me that the integer is _____.

STEP 2 Write the integer: _____.

So, the temperature in Fairbanks was _____ degrees.

Example 2

The Koala Bears gained 11 yards on a football play. Write an integer to represent the situation. Then, tell what 0 represents in that situation.

STEP 1 Decide what positive integers and negative integers represent.

Positive integers represent yards _____.

Negative integers represent yards _____.

STEP 2 Decide what 0 represents.

So, 0 means yards were neither _____

nor _____.

Math Talk Identify some words that might tell you that an integer is negative.

Share and Show



Write an integer to represent the situation.

1. a loss of \$25

The word *loss* represents an integer that is

_____.

The integer that represents the situation

is _____.

2. 73 degrees above zero _____

3. 200 feet below sea level _____

4. a profit of \$76 _____

Write an integer to represent the situation. Then, tell what 0 represents.

Situation	Integer	What Does 0 Represent?
5. The passenger jet flew at an altitude of 34,000 feet.		
6. Zack lost 45 points on his first turn.		
7. Craig was 20 minutes early for his appointment.		

On Your Own

Write an integer to represent the situation.

8. the temperature went up 2 degrees _____

9. 11 feet below sea level _____

10. an increase of 37 students _____

11. 15 seconds before rocket liftoff _____

Write an integer to represent the situation. Then, tell what 0 represents.

Situation	Integer	What Does 0 Represent?
12. Amelia earned \$1,200 in one week.		
13. The coal was 2 miles below ground level.		
14. The alarm clock rang 5 minutes early.		

Problem Solving



15. Gina withdrew \$600 from her checking account to pay for her new guitar. What integer can you write to represent the withdrawal? What does 0 represent?

Name _____

Write and Evaluate Expressions

Essential Question How can you write and evaluate expressions?

UNLOCK the Problem REAL WORLD

Montel hires Shea to buy some tools for him at the hardware store. Montel will pay Shea \$5 more than the cost of the tools she buys.

- A. How can you represent this payment as an expression?
- B. How can you use the expression to calculate what Montel will pay Shea?

 Write an expression for what Montel will pay.

STEP 1 Choose a variable and explain what it stands for.

Let c equal the cost of the tools.

STEP 2 Write a word expression.

\$5 more than the cost.

STEP 3 Replace the word expression with an addition expression using c .

$5 + c$

So, an expression that tells how much Montel owes Shea is

$5 + c$

- The problem states that Montel will pay \$5 *more than* cost. What operation do the words *more than* suggest?

5 dollars more than the cost

$5 + c$



Try This! If the tools cost a total of \$18, how much will Montel pay Shea?

Evaluate the expression $5 + c$ for $c = 18$.

STEP 1 Write the expression. _____

STEP 2 Replace c with _____. $5 +$ _____

STEP 3 Add to evaluate. $5 + 18 =$ _____

So, Montel will pay Shea _____.

Math Talk

What key words might tell you that you need to use addition in a word problem?

Share and Show



Write an expression.

Tallahassee's temperature is 15 degrees less than the temperature in Miami.

1a. What operation does the phrase *less than* suggest?

1c. Write an expression for Tallahassee's temperature. Let m stand for the temperature in Miami.

1b. Write a word expression:

1d. Evaluate the expression for Tallahassee's temperature for $m = 90$.

Evaluate each expression for the value given.

2. $b - 45$ for $b = 70$

3. $13 + a$ for $a = 40$

On Your Own

Write an expression.

4. Zeke has some tropical fish, f . Dean gave Zeke 5 new fish. How many fish does Zeke have now?

5. Myra had some candles, c . She used up 12 of them. How many candles does Myra have now?

Evaluate each expression for the value given.

6. $s - 18$ for $s = 80$

7. $49 + k$ for $k = 31$

8. $w \times 6$ for $w = 13$

9. $60 \div n$ for $n = 20$

10. $t \times 12$ for $t = 8$

11. $r - 25$ for $r = 110$

Problem Solving



12. Keith is 2 inches shorter than his sister. If s represents his sister's height, what expression can you write that represents Keith's height?

Name _____

Understand Inequalities

Essential Question How can you use inequalities to solve problems?

UNLOCK the Problem REAL WORLD

Every morning, Bobbi's Hot Bagels makes a special claim. All bagels Bobbi's sells will be warm and less than 9 minutes old. What **inequality** can you write to represent in whole minutes how old Bobbi's bagels are?

- What clue words tell you that this problem involves an inequality?

An inequality is a number sentence that compares two unequal quantities and uses the symbols $<$, $>$, \leq , or \geq .



Write an inequality using a variable.

STEP 1 Write the inequality in words.

time \longrightarrow is less than \longrightarrow 9

STEP 2 Replace *time* with the variable *t*.

$t \longrightarrow$ less than \longrightarrow 9

STEP 3 Replace the words *less than* with a *less than* ($<$) symbol.

$t < 9$

Try This! Graph the solutions on the number line. Of 3, 6, 9, and 12, which numbers are solutions for $t < 9$?

STEP 1 In $t < 9$, replace *t* with 3.

$$t < 9$$

Repeat the process for $t = 6, 9, 12$.

$$3 < 9 \longleftarrow \text{true}$$

STEP 2 Identify the values that make $t < 9$ true.

$$6 < 9 \longleftarrow \text{true}$$

True values are solutions: $t = 3, 6$.

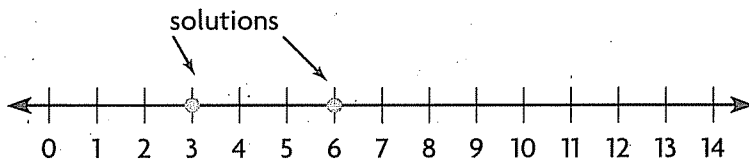
$$9 < 9 \longleftarrow \text{false}$$

False values are not solutions: $t \neq 9, 12$.

$$12 < 9 \longleftarrow \text{false}$$

STEP 3 Graph the solutions on a number line.

Graph true values with filled circles.



Math Talk

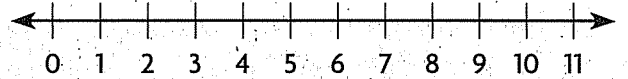
How does the answer for the problem change if the inequality is "*t* is less than or equal to 9"?

Share and Show



Of 2, 5, and 8, which numbers are solutions for the inequality $x \geq 5$?
Graph the solutions on the number line.

1a. Replace x with 2. True or false?

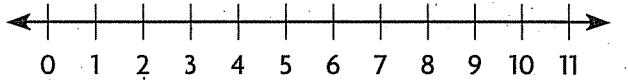


1b. Replace x with 5. True or false?

1c. Replace x with 8. True or false?

Show two solutions for the inequality on a number line.

2. $a < 6$



On Your Own

Of 7, 10, and 13, which numbers are solutions for the inequality?

3. $m > 8$

4. $b \leq 10$

5. $c < 15$

Of 0, 4, 6, and 11, which numbers are solutions for the inequality?

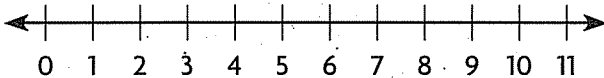
6. $d \geq 8$

7. $r < 1$

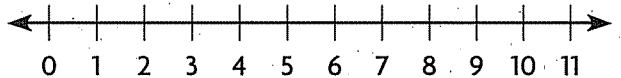
8. $s > 4$

Show two solutions for the inequality on a number line.

9. $n \leq 6$



10. $x > 2$



Problem Solving



11. For her birthday party, Dina wants to invite at least 8 guests but not more than 12 guests. How many guests might she have? Name all of the possibilities.

Name _____



Concepts and Skills

Write an integer to represent the situation. (pp. P271–P272)

1. a shark 125 feet below sea level _____ 2. a bank deposit of 300 dollars _____

Write an integer to represent the situation. Then, tell what 0 represents. (pp. P271–P272)

Situation	Integer	What Does 0 Represent?
3. a gain of 13 yards by a football team	_____	
4. a temperature of 25 degrees below zero	_____	

Write an expression. Then evaluate the expression for the value given. (pp. P273–P274)

5. Miki has n dollars. Dora has 3 more dollars than Miki. How many dollars does Dora have? Evaluate for $n = 14$.

6. Chip has s shells. Gina has 4 times as many shells as Chip. How many shells does Gina have? Evaluate for $s = 6$.

Of 1, 3, 4, and 8, which numbers are solutions for the inequality? (pp. P275–P276)

7. $a < 7$ 8. $b \geq 3$ 9. $c > 4$ 10. $d \leq 8$
- _____

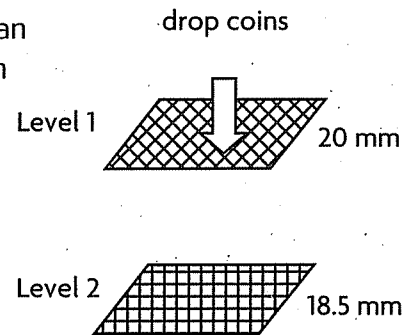
Problem Solving



Filters are set up to sort pennies, dimes, and nickels. A penny is 19 mm wide, a dime is 17.9 mm wide, and a nickel is 21 mm wide. Coins less than 20 mm wide will pass through the first level, and coins less than 18.5 mm wide will pass through the second level. (pp. P275–P276)

11. If you drop a large number of all 3 coins from above, which coins will be caught at Level 1? Which coins will pass through?

12. Which coins will be caught at Level 2? Which coins will pass through?



Fill in the bubble completely to show your answer.

13. The lowest temperature ever recorded in North Dakota was 60 degrees below zero Fahrenheit. Which integer represents the temperature? (pp. P271–P272)
- (A) 0
 - (B) 60
 - (C) -60
 - (D) -0
14. In football, a team receives 3 points for each field goal it makes. Which expression shows the number of points a team will receive for making f field goals? (pp. P273–P274)
- (A) $3 + f$
 - (B) $3 \times f$
 - (C) $f - 3$
 - (D) $f \div 3$
15. The elevation of Central City is 84 feet above sea level. Which integer is the opposite of 84? (pp. P271–P272)
- (A) 48
 - (B) $+84$
 - (C) -48
 - (D) -84
16. Uncle Louie is at least 1 inch shorter than Miriam, and at least 2 inches taller than Jeffrey. Jeffrey's height is 64 inches. Miriam is not more than 5 inches taller than Jeffrey. Which answer choice could be Uncle Louie's height? (pp. P275–P276)
- (A) 65 inches
 - (B) 67 inches
 - (C) 69 inches
 - (D) 70 inches

Name _____

Polygons on a Coordinate Grid

Essential Question How can you plot polygons on a coordinate grid?

Connect You have learned to plot points on a coordinate grid. You can use that skill to plot polygons on a coordinate grid.

UNLOCK the Problem REAL WORLD

Camille is designing an indoor greenhouse on a coordinate grid. The floor of the greenhouse is a polygon. The vertices of the polygon can be graphed using the coordinates shown in the table. Plot and describe the floor of the greenhouse.

x	y
10	1
2	6
2	1
6	10
10	6

- What do x and y represent in the table?

Plot the polygon on a coordinate grid.

STEP 1 Write ordered pairs.

Use each row of the table to write an ordered pair.

(10, 1), (2, _____), (_____, _____),

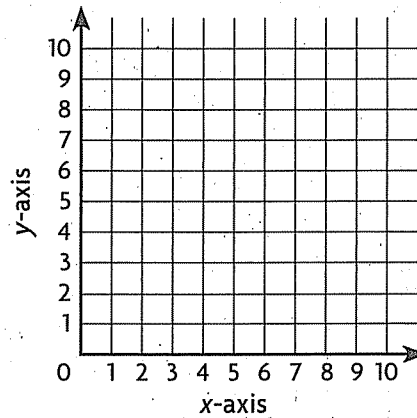
(_____, _____), (_____, _____).

STEP 2 Graph a point for each pair on the coordinate grid.

STEP 3 Connect the points.

So, the floor of the greenhouse is a _____.

- **What if** the greenhouse floor had only four of the five vertices given in the table and did not include (6, 10). What would the shape of the floor be? _____



- A parallelogram on a coordinate grid has vertices at (3, 4), (6, 1), and (8, 4). What are the coordinates of the fourth vertex? **Explain** how you found the answer.

Math Talk

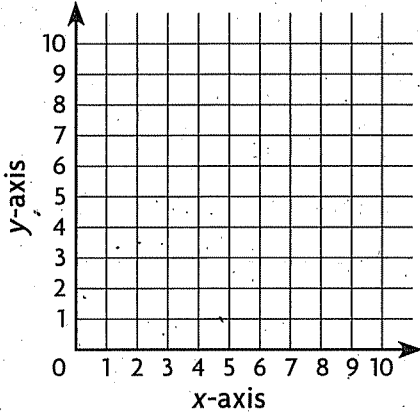
Suppose you know the vertices of a polygon. How can you identify what type of polygon it is without plotting the vertices on a coordinate grid?

Share and Show

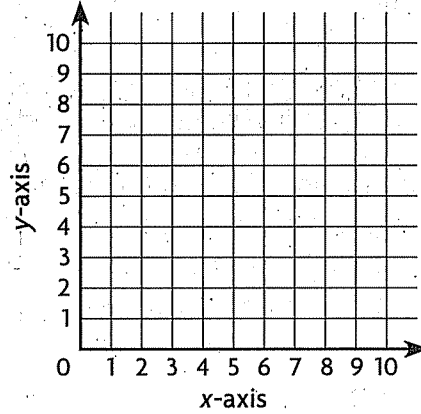


Plot the polygon with the given vertices on a coordinate grid.
Identify the polygon.

1. $(9, 6), (1, 7), (3, 1)$



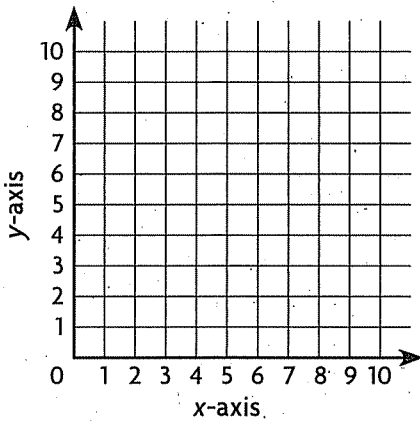
2. $(1, 6), (8, 4), (1, 4), (8, 6)$



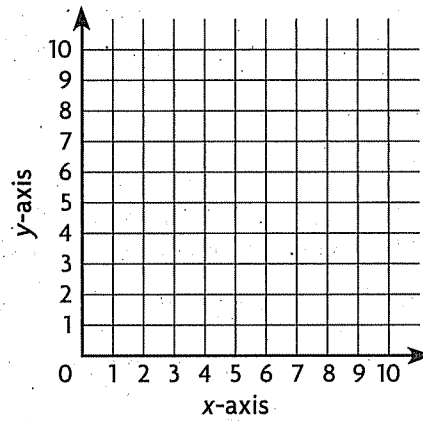
On Your Own

Plot the polygon with the given vertices on a coordinate grid.
Identify the polygon.

3. $(2, 10), (10, 2), (10, 10), (2, 2)$



4. $(10, 4), (2, 10), (3, 1), (8, 0), (7, 10), (1, 7)$



Problem Solving



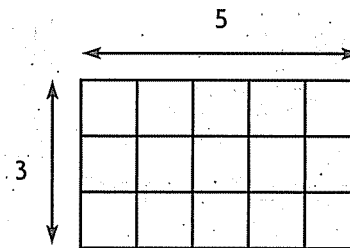
5. A football field is a rectangle measuring 300 ft by 160 ft. Each unit on a coordinate grid represents 1 foot. $(0, 0)$ and $(0, 160)$ are two of the coordinates of a football field drawn on the grid. What are the coordinates of the other two vertices?

Name _____

Area of a Parallelogram

Essential Question How can you find the area of a parallelogram?

Connect You have learned that the area of a rectangle with base b and height h is $A = b \times h$. The rectangle shown has a base of 5 units and a height of 3 units. So, its area is $A = 5 \times 3 = 15$ square units. You can use what you have learned about the area of a rectangle to find the area of a parallelogram.



UNLOCK the Problem REAL WORLD

The souvenir stand at Mighty Grasshopper basketball games sells parallelogram-shaped pennants. Each pennant has a base of 12 inches and a height of 5 inches.

Activity Find the area of the parallelogram.

Materials ■ grid paper ■ scissors

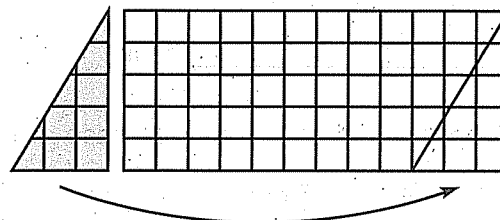
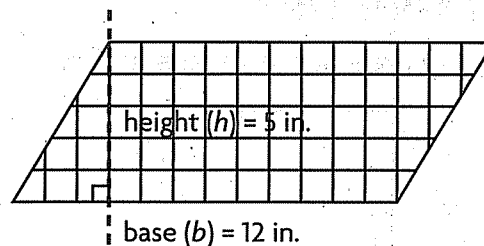
STEP 1 Draw the parallelogram on grid paper and cut it out.

STEP 2 Cut along the dashed line to remove a right triangle.

STEP 3 Move the right triangle to the right side of the parallelogram to form a rectangle.

STEP 4 The base of the rectangle measures _____ inches.
 The height of the rectangle measures _____ inches.
 The area of the rectangle is
 $12 \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$ square inches.

• Explain why the area of the parallelogram must equal the area of the rectangle.



So, the area of a pennant is
 _____ \times _____ = _____ square inches.

Math Talk Explain how to find the area of a parallelogram if you know the base and the height of the figure.

Share and Show

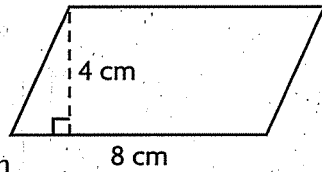


Find the area of the parallelogram.

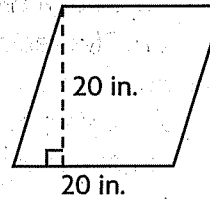
1. $A = b \times h$

$A = 8 \times 4$

$A = \underline{\hspace{2cm}}$ sq cm

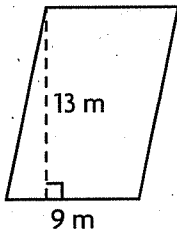


2.



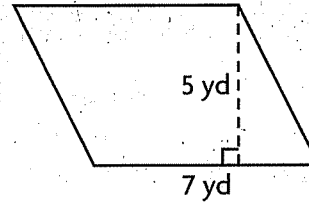
$A = \underline{\hspace{2cm}}$ sq in.

3.



$A = \underline{\hspace{2cm}}$ sq m

4.

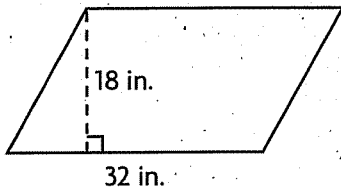


$A = \underline{\hspace{2cm}}$ sq yd

On Your Own

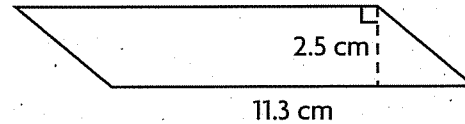
Find the area of the parallelogram.

5.



$A = \underline{\hspace{2cm}}$ sq in.

6.



$A = \underline{\hspace{2cm}}$ sq cm

7. base = 0.6 cm

height = 0.15 cm

$A = \underline{\hspace{2cm}}$ sq cm

8. base = 1.8 m

height = 2.9 m

$A = \underline{\hspace{2cm}}$ sq m

9. base = $\frac{1}{2}$ ft.

height = $\frac{3}{8}$ ft

$A = \underline{\hspace{2cm}}$ sq ft

10. base = $4\frac{1}{4}$ in.

height = 20 in.

$A = \underline{\hspace{2cm}}$ sq in.

Problem Solving



11. Carla made a border for her garden using parallelogram-shaped tiles. Each piece had a base of 4 in. and a height of $2\frac{1}{2}$ in. She used 85 tiles. What was the total area of the border?

Name _____

Median and Mode**Essential Question** How can you describe a set of data using median and mode?

The **median** of a set of data is the middle value when the data are written in order. For example, a baseball team scored 6, 2, 6, 0, and 3 runs in five games. The median is 3 runs: 0, 2, **3**, 6, 6.

If there is an even number of data items, the median is the sum of the two middle items divided by 2.

The **mode** of a data set is the data value or values that occur most often. A data set may have no mode, one mode, or several modes. The mode of the data set of baseball runs is 6.

UNLOCK the Problem REAL WORLD

For the Science Fair, Ronni grew 9 sweet pea plants under different conditions. Here are the plants' heights, in centimeters: 11, 13, 6, 9, 15, 7, 9, 17, 12.

What are the median and mode of the data?

**Find the median and mode.****STEP 1** Order the heights from least to greatest.

6, 7, _____, _____, _____, _____, _____, _____, _____

STEP 2 Circle the middle value.

So, the median is _____ centimeters.

STEP 3 Identify the data value that occurs most often. _____ occurs two times.

So, the mode is _____ centimeters.

Math Talk

Give an example of a data set with two modes.

Try This! Find the median and mode of the numbers: 8, 11, 13, 6, 4, 3.**STEP 1** Order the numbers from least to greatest.

_____, _____, _____, _____, _____, 13

STEP 2 There is an even number of data items, so divide thesum of the two middle items by 2. $\frac{6 + \underline{\quad}}{2} = \frac{\underline{\quad}}{2} = \underline{\quad}$

So, the median is = _____.

STEP 3 _____ data value appears more than once.

So, the data set has _____ mode.

Share and Show



Find the median and the mode of the data.

1. puppies' weights (pounds): 8, 3, 5, 3, 2, 6, 3

Order the weights: _____

The median, or middle value, is _____ pounds

The mode, or most common value, is _____ pounds.

3. numbers of 3-point baskets made:

2, 0, 5, 4, 5, 2, 5, 2

median: _____ 3-point baskets

mode: _____ 3-point baskets

2. numbers of students in math classes:

25, 21, 22, 18, 23, 24, 25

median: _____ students

mode: _____ students

4. movie ticket prices (\$):

8, 8, 6, 8, 7, 6, 8, 10, 8, 6

median: \$ _____

mode: \$ _____

On Your Own

Find the median and the mode of the data.

5. ages of first 10 U.S. presidents when inaugurated:

57, 61, 57, 57, 58, 57, 61, 54, 68, 51

median: _____ years

mode: _____ years

6. weights of rock samples (pounds):

39, 28, 21, 47, 40, 33

median: _____ pounds

mode: _____ pounds

7. lengths of humpback whale songs (minutes):

25, 29, 31, 22, 33, 31, 26, 22

median: _____ minutes

mode: _____ minutes

8. Sascha's test scores:

90, 88, 79, 97, 100, 97, 92, 88, 85, 92

median: _____

mode: _____

Problem Solving



9. Adrian recorded the daily high temperatures the first two weeks of July.

What were the median and mode of her data?

median: _____ °F

mode: _____ °F

Daily High Temperatures (°F)						
101	99	98	96	102	101	98
101	98	95	100	102	98	102

Name _____

Finding the Average**Essential Question** How can you find the average of a set of values?

An average of a set of data can be found by finding the sum of the group of numbers from the data and then dividing by the number of addends.

For example, if Anne scores 21 points, 22 points, and 17 points in 3 different basketball games, she scores an average of 20 points per game. This is because $21 + 22 + 17 = 60$, and $60 \div 3$, the total number of points divided by the number of games, is 20.

UNLOCK the Problem REAL WORLD

Jonathon and Pilar are practicing to be a juggling team. The table shows the number of seconds they were able to keep 4 balls in the air without making a mistake. What was the average number of seconds they were able to juggle?

Trial	Seconds
a	32
b	8
c	62
d	55
e	13

- How many trials did they record?

 **Find the average of the times.**

STEP 1 Find the sum of the seconds. $32 + 8 + 62 + 55 + 13 = 170$

STEP 2 How many numbers did you add? 5 numbers

STEP 3 Divide the sum by the number of addends.
$$\begin{array}{r} 34 \\ 5 \overline{)170} \end{array}$$

So, the average time that Jonathon and Pilar kept 4 balls in the air was 34 seconds per trial.

Try This! Find the average of 61, 99, 106, 3, 44, and 89.

STEP 1 Find the sum.

$$61 + 99 + 106 + 3 + 44 + 89 = \underline{\hspace{2cm}}$$

STEP 2 Divide the sum by the number of addends.

$$402 \div 6 = \underline{\hspace{2cm}}$$

So, the average of 61, 99, 106, 3, 44, and 89 is .

Math Talk

Use the jugglers' average time per trial. What might you expect of them in their next trial?

Share and Show



Tommy's basketball scoring record is shown for this month. What was the average number of points that Tommy scored per game?

1a. Find the sum of the points Tommy scored.

Game	1	2	3	4	5	6	7	8
Points	24	11	31	14	9	21	18	8

1b. How many numbers did you add to find the sum in Exercise 1?

1c. Divide the sum by the number of games. What is the average number of points per game?

Find the average of the set of numbers.

2. 6, 9, 14, 4, 12

3. 44, 55, 33, 22, 40, 40

On Your Own

Find the average of the set of numbers.

4. 4, 8, 12, 14, 15, 19

5. 28, 20, 31, 17

6. 100, 140, 60, 120, 180

7. 17, 91, 49, 73, 115, 27

8. 5, 8, 13, 4, 22, 6, 0, 5, 9

9. 637, 492, 88, 743

10. 2,439; 801; 1,508; 0

11. 13, 12, 11, 13, 15, 13, 19, 22, 13, 19

12. 78, 61, 51, 99, 8, 112, 76, 32, 59

13. Find the average temperature.

Day	1	2	3	4	5	6	7
Temperature (°F)	48	59	38	53	61	61	44

Problem Solving



14. In the temperature table above, suppose the temperature for the next 2 days was 70 degrees. By how much would this change the average temperature over the entire period?

Name _____

Histograms

Essential Question How can you use a histogram to organize data?



Activity The table below shows the ages of the members of a bicycle club. Make a **histogram** of the data. A histogram is a bar graph that shows how often data occur in intervals.

Math Idea

In a histogram, the bars touch because they represent continuous intervals.

Ages of Members in a Bicycle Club

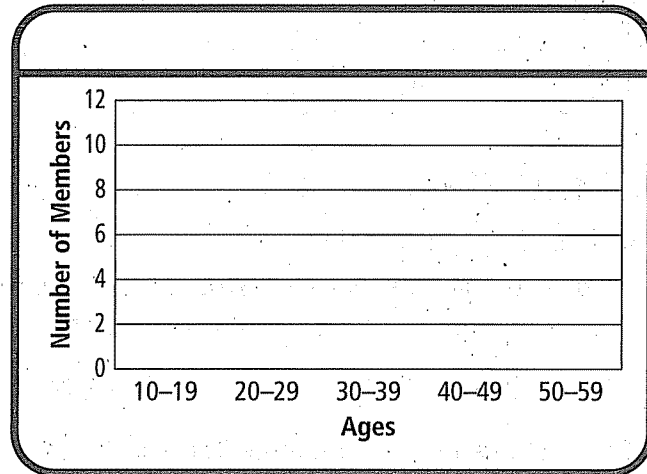
34	38	29	41	40	35	50	20	47	22	19	21	18	17
26	30	41	43	52	45	28	25	39	24	23	25	50	59

STEP 1 Make a frequency table with intervals of 10. Fill in the frequencies.

STEP 2 Choose an appropriate scale and interval for the vertical axis, and list the intervals on the horizontal axis. Label each axis.

STEP 3 Draw a bar for each interval. Give the histogram a title.

Ages	Tally	Frequency
10-19		
20-29		
30-39		
40-49		
50-59		



- **What if** you changed the histogram to show four age groups with 12-year intervals?

How would the histogram change?

Math Talk

Explain how a histogram and a bar graph with categories are different.

Share and Show



For 1–3, use the data below.

The number of vacation days that each employee of a company took last summer is given below.

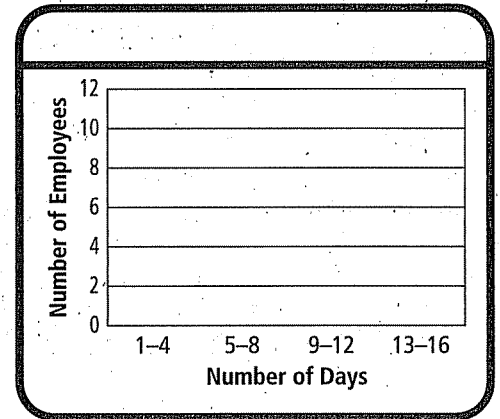
2, 5, 6, 11, 3, 5, 7, 8, 10, 1, 4, 6, 10, 5, 12, 15, 6, 8, 7, 14

1. Start at 1 day and use 4 days for each interval. List the intervals.

2. Complete the frequency table.

Number of Days	Tally	Frequency
1–4		
5–8		
9–12		
13–16		

3. Complete the histogram.



On Your Own

For 4–6, use the data below.

The number of minutes that each student in Mrs. Green’s class spent on homework last night is given below.

45, 30, 55, 35, 50, 48, 60, 38, 47, 56, 40, 39, 55, 65, 49, 34, 35

4. Start at 30 and use 10-minute intervals for the data. List the intervals.

5. Make a frequency table of the data.
6. Make a histogram of the data.

Problem Solving



7. The number of words per minute that one class of students typed is given below.

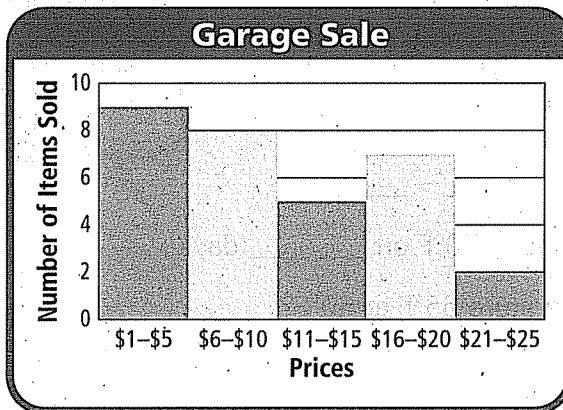
30, 45, 28, 35, 48, 37, 41, 44, 34, 29, 25, 32, 40, 45, 39, 49

What are reasonable intervals for the data?

Name _____

Analyze Histograms**Essential Question** How can you analyze data in a histogram?**UNLOCK the Problem** REAL WORLD

The histogram shows the number of items sold at a garage sale within each price range.

**ERROR Alert**

Remember to read the intervals. For some questions, you may need to combine data from two or more intervals in order to answer the question.

**How many of the items sold cost \$6 to \$10?**

- Find the interval labeled \$6-\$10.
- Find the frequency.
- The bar for \$6-\$10 shows that _____ items were sold.

So, _____ of the items sold cost \$6 to \$10.

**How many of the items sold cost \$16 to \$25?**

- Find the frequencies for the intervals labeled \$16-\$20 and \$21-\$25.
- The bar for \$16-\$20 shows that _____ items were sold. The bar for \$21-\$25 shows that _____ items were sold.
- Add the frequencies.

$$7 + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

So, _____ of the items sold cost \$16 to \$25.

Math Talk

Explain why you cannot tell from the histogram the total amount of money that was made during the garage sale.

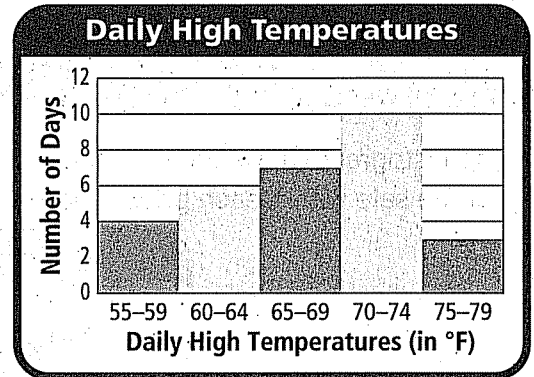
Share and Show



For 1–3, use the histogram at the right.

1. The histogram shows the number of days in one month whose temperatures were within each temperature range. On how many days was the temperature at or above 70°F?

- List the bars that represent temperatures at or above 70°F.
_____ and _____
- The frequency for interval 70–74 is _____, and the frequency for interval 75–79 is _____.
- Add the frequencies. _____ + _____ = _____



The daily high temperature was at or above 70°F on _____ days.

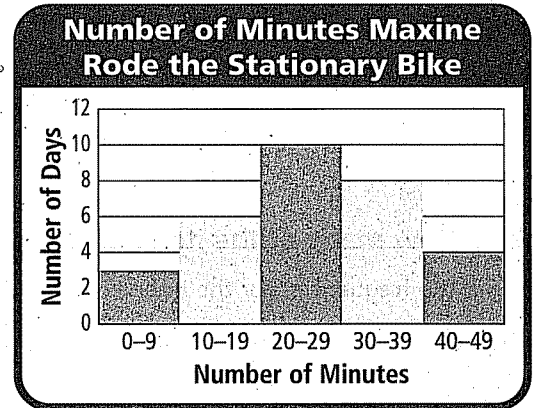
- On how many days was the temperature 65°F to 69°F?

- On how many days was the temperature less than 65°F?

On Your Own

For 4–5, use the histogram at the right.

- Which interval has the greatest frequency? _____
- How many days did Maxine ride the stationary bike for 30 or more minutes? _____



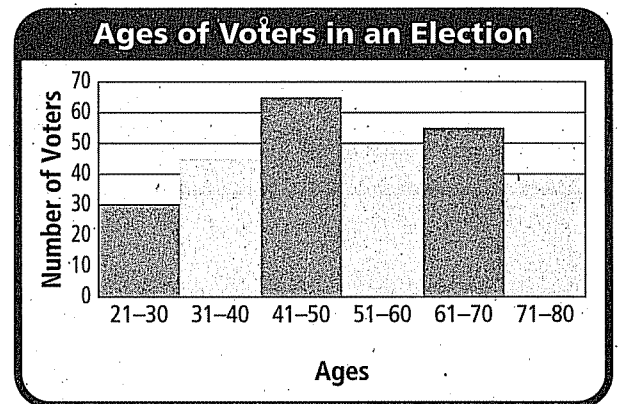
Problem Solving



For 6–7, use the histogram at the right.

- How many people voted in the election?

- How many more voters were there from ages 41–50 than from ages 21–30?



Name _____

✓ Checkpoint

Concepts and Skills

1. Plot and identify the polygon with vertices at $(4, 0)$, $(8, 7)$, $(4, 7)$, and $(8, 0)$. (pp. P279–P280)

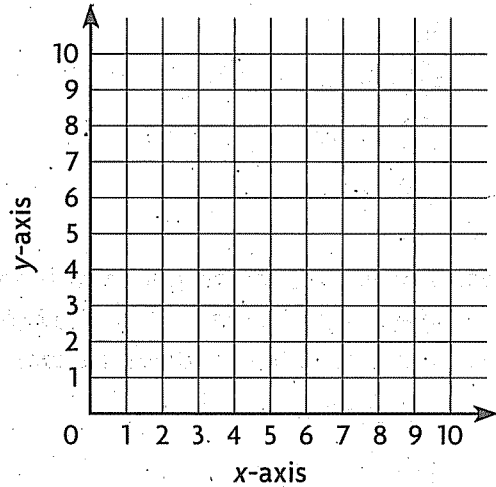
2. A parallelogram has a base of 8.5 cm and a height of 6 cm. What is the area of the parallelogram? (pp. P281–P282)

3. Find the median and mode of Erin's math scores: 93, 88, 85, 93, 100, 94, 85, 89. (pp. P283–P284)

median _____ mode _____

4. Find the average of the following temperatures: 59°F , 66°F , 59°F , 67°F , 54°F , 64°F , 72°F . (pp. P285–P286)

average _____



For 5–7, use the data below. (pp. P287–P290)

The math test scores for Miss Jackson's class are given below.

88, 94, 86, 78, 65, 83, 71, 74, 92, 73,
95, 71, 100, 98, 68, 85, 81, 93, 89, 84

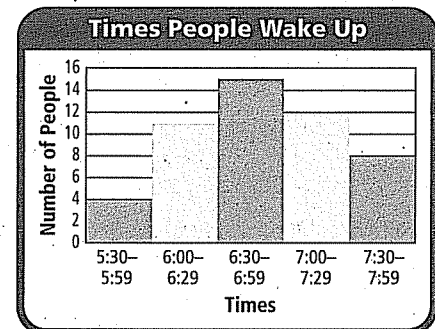
5. Make a histogram for the data using intervals of 10.
6. Which interval has the greatest frequency?

7. How many students received grades greater than 80? _____

Problem Solving **REAL WORLD**

For 8–9, use the histogram. The histogram shows the times that people wake up in the morning. (pp. P287–P290)

8. How many people were surveyed? _____
9. How many more people surveyed wake up between 6:30 and 6:59 than between 7:30 and 7:59?



Fill in the bubble completely to show your answer.

10. On a map of the town of Barton, City Hall Park has three of its four vertices at (15, 0), (5, 0), and (15, 9). City Hall Park is a rectangle. What are the coordinates of the park's fourth vertex? (pp. P279–P280)

- (A) (5, 9)
- (B) (9, 5)
- (C) (5, 15)
- (D) (9, 15)

11. A window at an art gallery is shaped like a parallelogram. The base measures 1.2 meters and the height measures 0.8 meters. What is the area of the window? (pp. P281–P282)

- (A) 0.48 sq m
- (B) 0.96 sq m
- (C) 1.92 sq m
- (D) 2.0 sq m

12. The ages of the members of the Chess Club are given below. What is the median age? (pp. P283–P284)

13, 9, 10, 9, 14, 13, 8, 9

- (A) 9
- (B) 9.5
- (C) 10
- (D) 10.5

13. The histogram shows the ages of runners in a half-marathon. How many runners are between the ages of 21 and 40? (pp. P289–P290)

- (A) 24
- (B) 30
- (C) 42
- (D) 54

