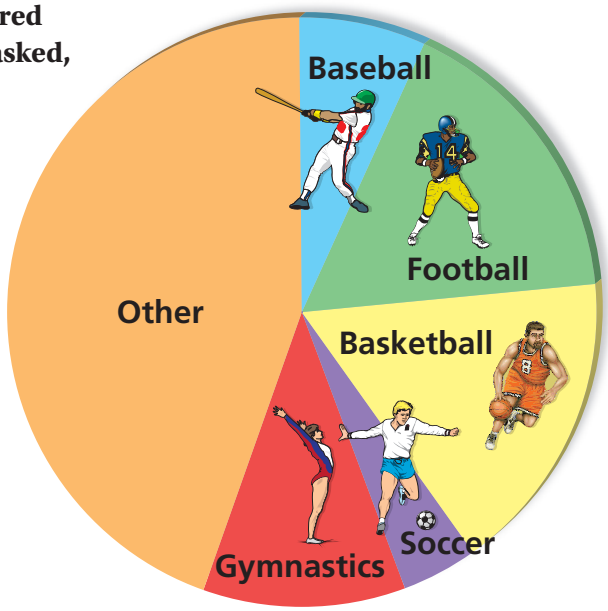
6.3 Circle Graphs

Learning Target: Use proportional reasoning to make and interpret circle graphs.

Success Criteria:
- I can find angle measures for sections of a circle graph.
- I can make circle graphs.
- I can interpret circle graphs.

Exploration 1 Reading and Making Circle Graphs

Work with a partner. Six hundred middle school students were asked, "What is your favorite sport?" The circle graph shows the results of the survey.

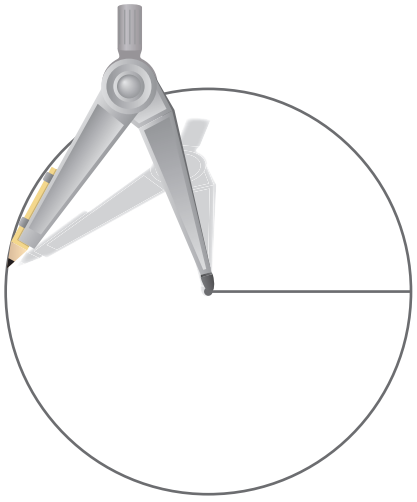


a. Find the angle measure (in degrees) of the section for football.

b. How many degrees are in a full circle?

c. Use your answers from parts (a) and (b) to find the number of students who said that football is their favorite sport. Explain your reasoning.

d. Conduct the same survey in your class and display the results in a circle graph.



e. Compare and contrast your circle graph with the circle graph given above.

2 MTR MAKE A CONNECTION
Explain how a circle graph shows data as parts of a whole.

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Data Analysis and Probability
MA.7.DP.1.4 Use proportional reasoning to construct, display and interpret data in circle graphs.

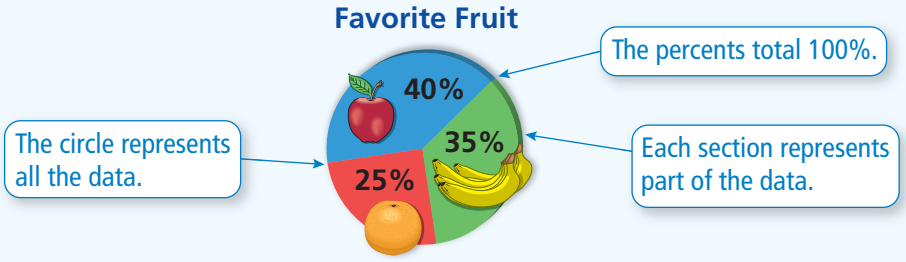
6.3 Lesson

Key Vocabulary
circle graph, *p. 302*

Key Idea

Circle Graphs

A **circle graph** displays data as sections of a circle. The sum of the angle measures in a circle graph is 360°.



Example 1 Making a Circle Graph

The table shows the results of a survey. Display the data in a circle graph.

Favorite Amusement Park	People
Disney World	25
Busch Gardens	15
Universal Studios	12
Marineland	8

Step 1: Find the total number of people.

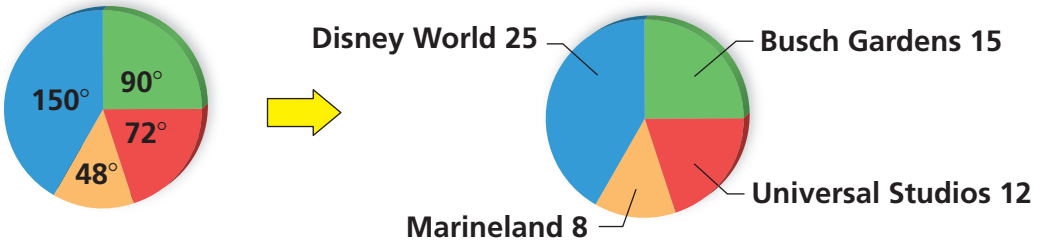
$$25 + 15 + 12 + 8 = 60$$

Step 2: Write and solve a proportion to find the angle measure for each section of the graph.

1 MTR HELP A CLASSMATE
How can you help a classmate understand where to begin when writing proportions to find the angle measures for the circle graph?

Disney World	Busch Gardens	Universal Studios	Marineland
$\frac{25}{60} = \frac{x}{360°}$	$\frac{15}{60} = \frac{x}{360°}$	$\frac{12}{60} = \frac{x}{360°}$	$\frac{8}{60} = \frac{x}{360°}$
$150° = x$	$90° = x$	$72° = x$	$48° = x$

Step 3: Use a protractor to draw the angle measures found in Step 2 on a circle. Then label the sections.



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Try It

1. The table shows the dog and cat ownership among teachers in a school. Display the data in a circle graph.

Kind of Pet	Dogs only	Cats only	Both	Neither
Teachers	15	20	5	10

Example 2 Using a Circle Graph

Protecting the Environment

A survey asked students to name the most important thing people can do to protect the environment. The results are shown in the circle graph. You survey 50 more students. How many do you expect to say *Plant trees*?

The circle graph shows that 24 of the students surveyed said *Plant trees*. The total number of students surveyed is $42 + 24 + 12 + 18 + 24 = 120$. To predict how many of the 50 additional students will say *Plant trees*, write and solve a proportion.

$\frac{24}{120} = \frac{x}{50}$ Write a proportion.

$10 = x$ Multiply each side by 50.

▶ So, you can expect 10 more students to say *Plant trees*.

Try It

2. **WHAT IF?** You survey 40 more students. How many do you expect to say *Recycle*?

In-Class Practice

1 I don't understand yet. 2 I can do it with help. 3 I can do it on my own. 4 I can teach someone else.

3. The table shows the results of a survey of Little Havana residents in Miami. Display the data in a circle graph. When you survey 80 more residents, how many do you expect to say Calle Ocho is their favorite attraction?

Favorite Attraction	Walk of Fame	Calle Ocho	Tower Theater Miami	Other
Percent	25%	35%	10%	30%

4 MTR

4. **WHICH ONE DOESN'T BELONG** Which one does *not* belong with the other three? Explain your reasoning.

$360°$ 100% 1 $\frac{1}{2}$

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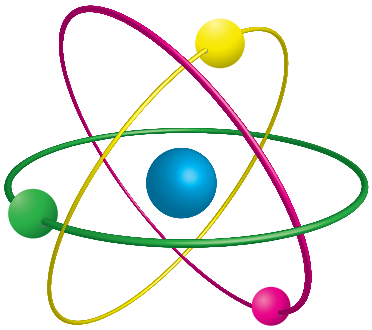
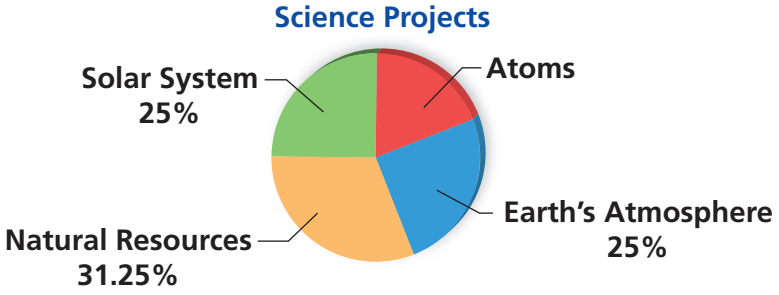
Example 3 Modeling Real Life



Students chose one of four topics for their science projects. Six students chose *Atoms*. (a) How many students are in the class? (b) What is the probability that a randomly chosen student from the class did not choose *Atoms*?



a. The percents in the circle graph must total 100%. Write and solve an equation to find the percent of students surveyed that chose *Atoms*.

$25\% + 25\% + 31.25\% + x = 100\%$ Write an equation.

$x = 18.75\%$ Solve for x.

The 6 students who chose *Atoms* represent 18.75% of the class. Write and solve a proportion to find the number of students in the class.

$\frac{6}{w} = \frac{18.75}{100}$ Write a proportion.

$600 = 18.75w$ Cross Products Property

$32 = w$ Divide each side by 18.75.

▶ So, there are 32 students in the class.

b. $P(\text{not } Atoms) = \frac{\text{number of students that did not choose } Atoms}{\text{number of students in the class}} = \frac{32 - 6}{32} = \frac{26}{32} = \frac{13}{16}$

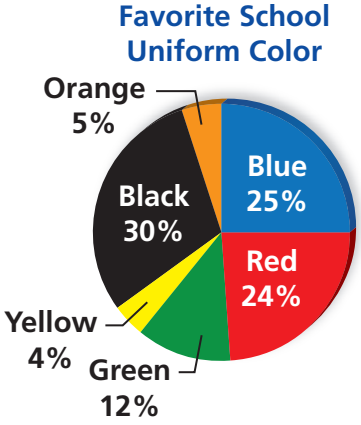
▶ So, the probability that a randomly chosen student from the class did not choose *Atoms* is $\frac{13}{16}$, 0.8125, or 81.25%.

4 MTR COMPARE METHODS

Explain how you can use percents in the circle graph to answer part (b). How does this compare to using actual numbers of students as shown in part (b)?

In-Class Practice

1 I don't understand yet. 2 I can do it with help. 3 I can do it on my own. 4 I can teach someone else.



5. A survey asked students to name their favorite school uniform color. The results are shown in the circle graph. Twelve students chose black. How many students were surveyed?

6. OPEN-ENDED Use a circle graph to display information about languages spoken in Florida. Then write a probability question that can be answered using the circle graph.

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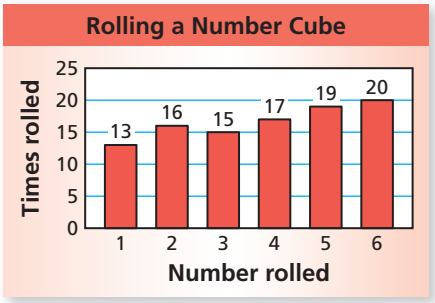
6.3 Practice with CalcChat® and CalcView®

Review & Refresh

Use the bar graph to find the experimental probability of the event.



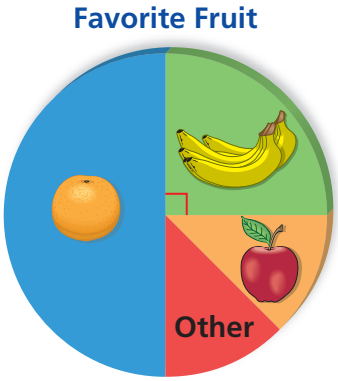
1. rolling a 5
2. rolling a 2 or 6
3. rolling at least a 3
4. rolling a number less than or equal to 4

Solve the proportion. Explain your choice of method.

5. $\frac{1}{3} = \frac{9}{w}$
6. $\frac{42}{x} = \frac{7}{5}$
7. $\frac{y}{3.6} = \frac{1.8}{7.2}$

Concepts, Skills, & Problem Solving

READING CIRCLE GRAPHS **The circle graph shows the results of a survey.** (See Exploration 1.)



8. Which fruit is the most popular?
9. Compare the number of students who chose oranges with the number of students who chose apples.
10. The survey included 80 students. How many students chose bananas?

FINDING MEASURES **Find the angle measure that corresponds to the percent of a circle.**

11. 20%
12. 15%
13. 70%
14. 3%

MAKING A CIRCLE GRAPH **Display the data in a circle graph.** (See Example 1.)

▶ 15.

Yearly Rainfall	
Season	**Percent**
Spring	25%
Summer	50%
Fall	17%
Winter	8%

16.

Expense	Cost (dollars)
Play rights	400
Costume rental	650
Programs/tickets	300
Advertising	250
Other	400

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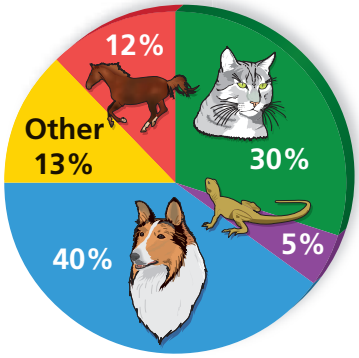
17. **B.E.S.T. Test Prep** A circle graph shows the results of a survey. One section of the circle graph has an angle measure of 60°. How many responses does the section represent when 42 people were surveyed?

Ⓐ 6 Ⓑ 7 Ⓒ 8 Ⓓ 9

USING A CIRCLE GRAPH The circle graph shows the types of pets treated at a pet hospital. (See Example 2.)

Types of Pets Treated



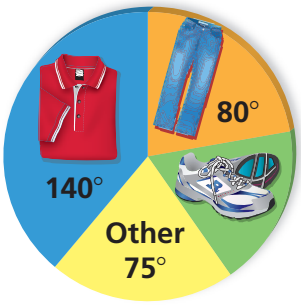
18. How many of the next 20 pets treated do you expect to be cats?

19. How many of the next 25 pets treated do you expect to be dogs?

20. How many of the next 40 pets treated do you expect to be cats or lizards?

21. **REASONING** A survey asks a group of students what they like to do during summer vacation. The results show that 68% like to go to the beach, 45% like to go camping, 72% like to go to amusement parks, and 29% like to go to the mall. Can a circle graph be used to display these data? Explain your reasoning.

Department Store Sales



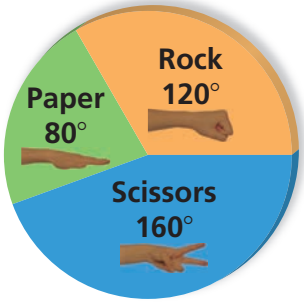
7 MTR

22. **MODELING REAL LIFE** A department store had $7200 in sales.
   a. Find the amount collected for each category.
   b. Long sleeve shirts were $\frac{1}{4}$ of the shirt sales. Find the angle measure of the section that would represent long sleeve shirts on the circle graph.
   c. How much of the next $900 in sales do you expect to be from pants?

7 MTR

23. **MODELING REAL LIFE** You ask all the participants in a Rock Paper Scissors tournament what their first choice was in the first round of the tournament. Eight participants chose scissors. (See Example 3.)
   a. How many people participated in the tournament?
   b. What is the probability that a randomly chosen person from the tournament did not choose paper?
   c. You are one of the participants who chooses rock. What is the probability that you win in the first round of the tournament?

Rock Paper Scissors



Track Events

24. **Dig Deeper** The circle graph shows the results of a survey that asked 72 students to name their favorite types of track events.
   a. What is the probability that a randomly chosen person chose jumps or sprints?
   b. Two students switch their answers from sprints to long distance. How does this affect your answer in part (a)? Explain.

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