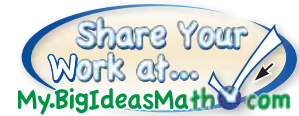## 8.3   Circle Graphs

Essential Question How can you use a circle graph to show the results of a survey?
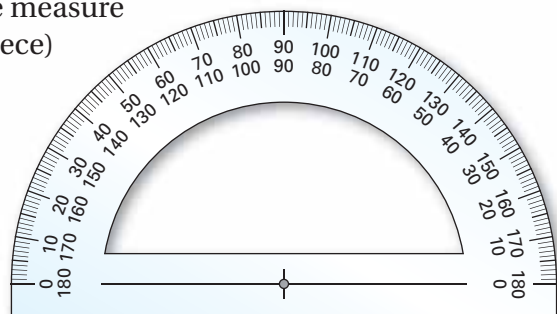
1 ACTIVITY: Reading a Circle Graph

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. Use a protractor to find the angle measure (in degrees) of the section (pie piece) for football.

b. How many degrees are in a full circle?

c. Write and solve a proportion to determine the number of students who said that football is their favorite sport.

**d.** Repeat the process for the other sections of the circle graph.

ACTIVITY: Making a Circle Graph

Work with a partner.

a. Conduct a survey in your class. Each student should check his or her favorite sport on a piece of paper similar to the one shown below.

What is your favorite sport?			
Baseball	❑	Skating	❑
Basketball	❑	Soccer	❑
Football	❑	Swimming	❑
Gymnastics	❑	Track	❑
Hockey	❑	Wrestling	❑
		Other	❑

b. Organize the results on the board.

c. Display the results in a circle graph.

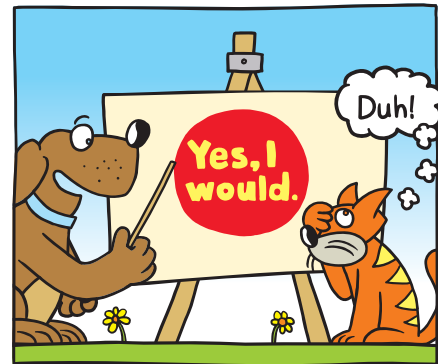d. Compare and contrast your class survey with the survey in Activity 1.
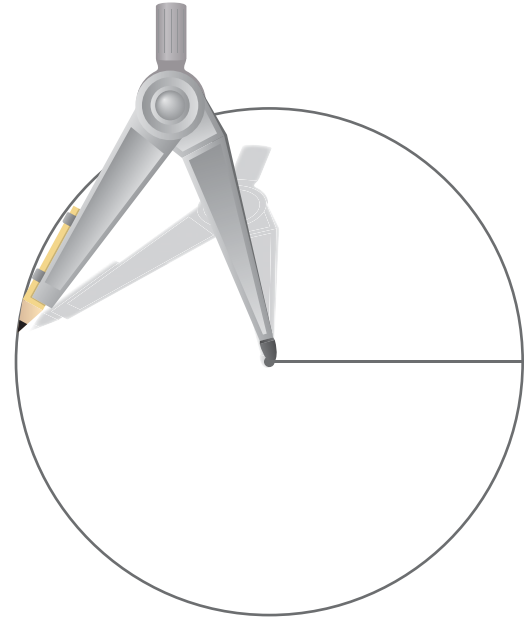
What Is Your Answer?

3. **IN YOUR OWN WORDS** How can you use a circle graph to show the results of a survey?

4. Find a circle graph in a newspaper, in a magazine, or on the Internet. Copy it and describe the results that it shows.

"I conducted a survey and asked 30 people if they would like a million dollars."

"I organized the results in a circle graph."

Yes, I would.

Duh!

Practice   Use what you learned about circle graphs to complete Exercises 5–7 on page 366.
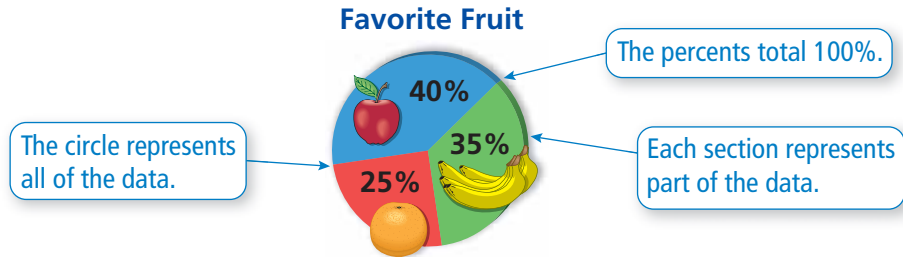
Key Vocabulary 🔊
circle graph, *p. 364*

🔑 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°.

Favorite Fruit

The percents total 100%.

40%

35%

25%

The circle represents all of the data.

Each section represents part of the data.

When the data are given in percents, multiply the decimal form of each percent by 360° to find the angle measure for each section.

EXAMPLE 1 Making a Circle Graph

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

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

Step 1: Find the total number of people.

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

Step 2: Find the angle measure for each section of the graph. Multiply the fraction of people that chose each park by 360°.

Check

$$\frac{25}{60} + \frac{15}{60} + \frac{12}{60} + \frac{8}{60} = 1$$

$$150° + 90° + 72° + 48° = 360° \checkmark$$

Disney World
$$\frac{25}{60} \cdot 360° = 150°$$

Busch Gardens
$$\frac{15}{60} \cdot 360° = 90°$$

Universal Studios
$$\frac{12}{60} \cdot 360° = 72°$$

Marineland
$$\frac{8}{60} \cdot 360° = 48°$$

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

150° 90° 72° 48°

Favorite Amusement Park

Disney World 25

Busch Gardens 15

Universal Studios 12

Marineland 8

🔊 **Multi-Language Glossary at BigIdeasMath.com.**
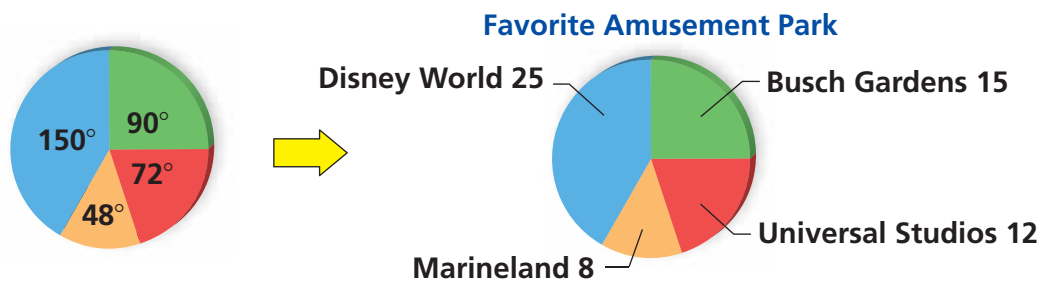
**1.** The table shows the dog and cat ownership among teachers in a school. Display the data in a circle graph.

Kind of pet	Dogs only	Cats only	Both	Neither
Percent	30%	30%	15%	25%

EXAMPLE **2** **Using a Circle Graph**

Students chose one of four topics for their science projects. (a) What fraction of the students chose *Biotechnology*? (b) How many students are in the class? (c) How many students chose *Plate Tectonics*?

Science Projects

Solar Energy
Plate Tectonics
Deforestation 10
Biotechnology 8
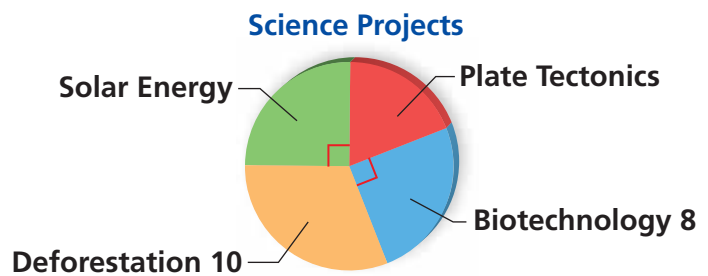
a. Because the *Biotechnology* section has a right angle, this section represents $\dfrac{90°}{360°} = \dfrac{1}{4}$ of the data.

⋮⋮ One-fourth of the students chose *Biotechnology*.

b. Let x be the number of students.

$\dfrac{1}{4}x = 8$ Use the circle graph and the results of part (a) to write an equation.

$x = 32$ Multiply each side by 4.

⋮⋮ There are 32 students in the class.

c. Because the *Solar Energy* and *Biotechnology* sections have the same angle measure, the same number of students chose each project. So, 8 students chose *Solar Energy*. Subtract to find the number of students who chose *Plate Tectonics*.

$32 - 8 - 8 - 10 = 6$

⋮⋮ Six students chose *Plate Tectonics*.

On Your Own

2. What percent chose *Deforestation*? What percent chose either *Biotechnology* or *Solar Energy*?

Check It Out
Help with Homework
BigIdeasMath.com

✓ Vocabulary and Concept Check

1. **VOCABULARY** How do you make a circle graph when the data are given in percents?

2. **REASONING** Can one section of a circle graph be 110%? Explain.

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

$$360° \qquad 100\% \qquad 1 \qquad \frac{1}{2}$$

4. **DIFFERENT WORDS, SAME QUESTION** Which is different? Find "both" answers.

How many people chose drama?

What is 25% of 120?

What is 90% of 120?

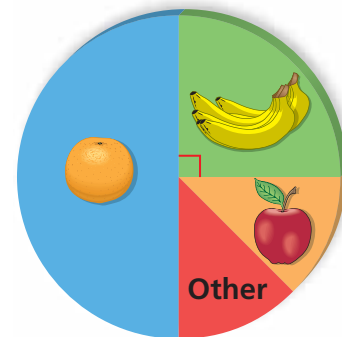What is $\frac{1}{4}$ of 120?

Favorite Movie

Total: 120

Practice and Problem Solving

The circle graph shows the results of a survey on favorite fruit.

5. Which fruit is the most popular?

6. Compare the number of students who chose oranges with the number of students who chose apples.

7. The survey included 80 students. How many students chose bananas?

Favorite Fruit

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

8. 20%   **9.** 15%   **10.** 70%   **11.** 3%

Display the data in a circle graph.

12.

Season	Rainfall (inches)
Spring	9
Summer	18
Fall	6
Winter	3

13.

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

14. **LAND AREA** The table shows the land areas, in millions of square miles, of all the countries in North America.

Country	United States	Mexico	Canada	Other
Land area	3.72	0.76	3.85	1.12
Percent				
Angle in circle graph				

   a. Copy and complete the table. Round each angle to the nearest 5 degrees.

   b. Display the data in a circle graph.

   c. Find a map of North America. Do Canada and the United States appear to have the same area? Explain why or why not.

15. **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

80°

140°

Other
75°
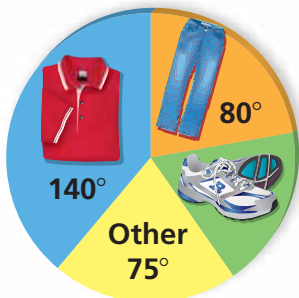
16. **RETAIL** A department store had $7200 in sales.

   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.

17. **WRITING** What math skills are needed to interpret data in a circle graph?

Favorite Subject	Students
Art	12
English	56
Math	82
Music	28
Science	22

18. **Critical Thinking** Make a circle graph and a bar graph of the data in the table. Compare and contrast the two data displays. Which of the two better represents the data? Explain your reasoning.

Fair Game Review What you learned in previous grades & lessons

Solve the proportion.

19. $\dfrac{5}{8} = \dfrac{x}{64}$

20. $\dfrac{6}{n} = \dfrac{51}{127.5}$

21. $\dfrac{138}{23} = \dfrac{9}{w}$

22. **MULTIPLE CHOICE** Which formula gives the surface area of a prism?

   (A) $S = 2\ell w + 2\ell h + 2wh$

   (B) $S = Ch + 2B$

   (C) $S = 2\pi r^2 + 2\pi rh$

   (D) $S = \frac{1}{2}C\ell + B$