

Analyzing Categorical Data

Q How can you use proportional reasoning to solve problems involving graphs of data?

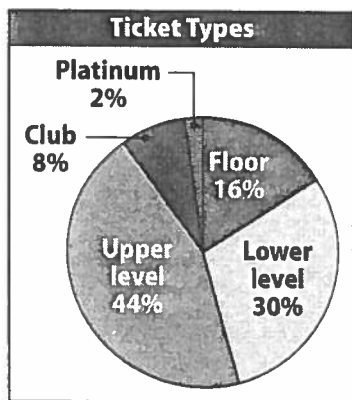
A. _____, _____ and proportional reasoning can be used to compare the data in groups.

Vocab

1. Dot Plot _____
2. Bar Graph _____
3. Circle Graph _____
or pie _____
4. Proportion _____

There are 5,000 tickets available for a concert. The percent of available tickets belonging to each ticket type is shown in the circle graph. Calculate the number of tickets available for each type of ticket.

Circle graphs are sometimes called pie charts.



STEP 1 Write a ratio to represent each type of ticket.

Floor: $16\% = \frac{16}{100}$ Lower level: $30\% = \frac{30}{100}$
 Platinum: $2\% = \frac{2}{100}$ Upper level: $44\% = \frac{44}{100}$
 Club: $8\% = \frac{8}{100}$

STEP 2 Set up and solve a proportion to find the number of each type of ticket.

Floor: $\frac{16}{100} \stackrel{\times 50}{=} \frac{x}{5,000}; x = 800$ Lower level: $\frac{30}{100} \stackrel{\times 50}{=} \frac{x}{5,000}; x = 1,500$
 Platinum: $\frac{2}{100} \stackrel{\times 50}{=} \frac{x}{5,000}; x = 100$ Upper level: $\frac{44}{100} \stackrel{\times 50}{=} \frac{x}{5,000}; x = 2,200$
 Club: $\frac{8}{100} \stackrel{\times 50}{=} \frac{x}{5,000}; x = 400$

The floor has 800 tickets, the lower level has 1,500, the upper level

LESSON
11-1

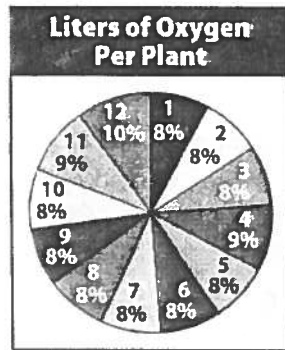
Analyzing Categorical Data

Reading Strategies: Use Vocabulary

Circle graphs allow data elements to be compared to a *whole* collection of data or to *other data elements*. There are special terms for these two types of comparisons. Subsets of a collection of data can be *equivalent*, too.

Part-to-whole comparison

Look at the circle graph of the oxygen produced by a dozen green plants after exposure to carbon dioxide from farm animals and sunlight.



What do the percentages mean? How were the percentages found?

- > Individual plant #1 produces 8% of the total oxygen.
- > Plant #1 oxygen ÷ Total oxygen produced by all 12 plants.

Part-to-part comparison

The oxygen produced by one plant can be compared to the oxygen produced by another plant.

Example Compare the oxygen produced by plants #1 and #12.

Plant #1: 8% of the total Plant #12: 10% of the total

$$\text{Divide the plant percentages: } 8\% \div 10\% = \frac{4}{5} = 0.8 = 80\%$$

Plant #1 produces 80 percent as much oxygen as Plant #12.

Answer the questions.

1. Plant #1 produces 34 liters of oxygen. Which other plants produced an equivalent amount of oxygen?

2. Estimate the amount of oxygen produced by all of the plants without doing calculations for each plant. What feature of the data allows you to make this estimate?

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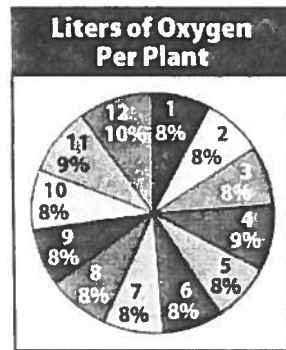
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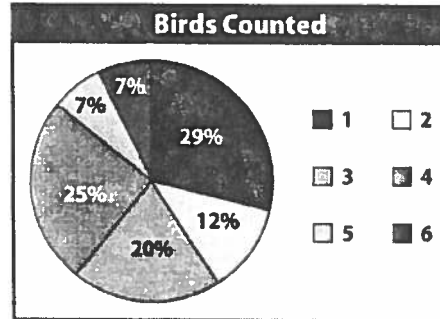
- Estimate the amount of oxygen produced by all of the plants without doing calculations for each plant. What feature of the data allows you to make this estimate?

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Analyzing Categorical Data
Practice and Problem Solving: D

Use the description and the circle graph below to complete Exercises 1–4. The first one is done for you.

The circle graph shows the percentages of 6 different bird species that were spotted at the feeder. The numbers match the species: 1, blue birds; 2, cardinals; 3, chickadees; 4, finches; 5, nuthatches; 6, sparrows. Answer the questions.



1. If 41 birds were counted and 20 percent of the birds were chickadees, how many chickadees were counted?

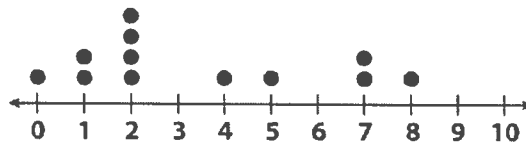
Twenty percent of 41 is 0.2 times 41 or 8.2, so 8 chickadees were counted.

2. What percentage of the birds counted were finches? _____

3. How many of the birds spotted were finches?
- _____

4. Which two species were spotted the *fewest* times at the feeder? Explain.
- _____

Answer the questions about the dot plot of goals scored by a soccer player. The first one is done for you.



5. In which game(s) did she score the most goals? How many? Game 2, 4 goals

6. In which game(s) did she score no goals? _____

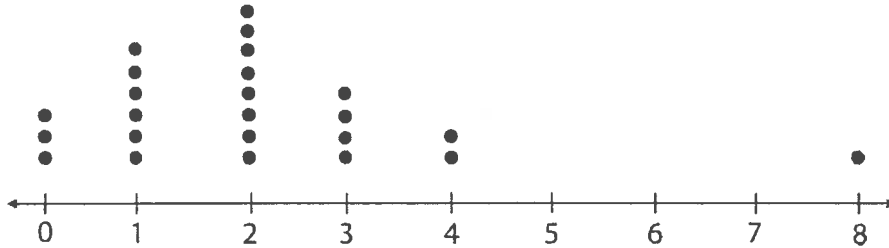
7. In which game(s) did she score two *or more* goals? _____

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Analyzing Categorical Data

Practice and Problem Solving: A/B

The number of pets owned by each seventh-grade student's family is shown in the dot plot. Answer the questions. Explain your answers. Show your work.



1. What number of pets occurs most often? _____
2. What fraction of the class has the number of pets that occurs most often? Express your answer as a percent, too.

3. Why is the student's family that has 8 pets not representative of the class as a whole?

4. Which type of display(s) could be used to display the data in the table to show a trend—a dot plot, a bar graph, or a circle graph? Explain.

5. Which type of display(s) would *not* show the trend in the table effectively? Explain.

Percent of Americans Who Have Completed High School

Year	Percent
1910	13.5
1920	16.4
1930	19.1
1940	24.5
1950	34.3
1960	41.1
1970	55.2
1980	68.6
1990	77.6
1999	83.4

Analyzing Categorical Data

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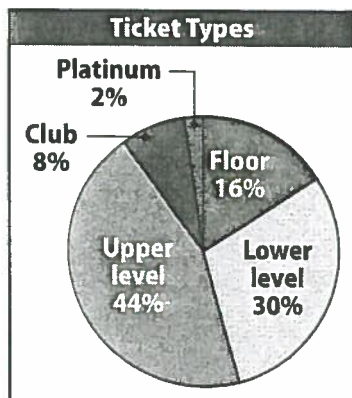
A. Fractions, percents and proportional reasoning can be used to compare the data in groups.

Vocab

1. Dot Plot graphical display of data using dots; 1 dot for each data point
2. Bar Graph graphical display of data using different height bars. Can be colored
3. Circle Graph or pie graphical display of data using a circle divided into parts. The entire circle is 100%. Used to compare
4. Proportion An equation that states that 2 ratios are equivalent

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Circle graphs are sometimes called pie charts.



STEP 1 Write a ratio to represent each type of ticket.

$$\begin{aligned} \text{Floor: } 16\% &= \frac{16}{100} & \text{Lower level: } 30\% &= \frac{30}{100} \\ \text{Platinum: } 2\% &= \frac{2}{100} & \text{Upper level: } 44\% &= \frac{44}{100} \\ \text{Club: } 8\% &= \frac{8}{100} \end{aligned}$$

STEP 2 Set up and solve a proportion to find the number of each type of ticket.

$$\begin{aligned} \text{Floor: } \frac{16}{100} &\stackrel{\times 50}{\underset{\div 50}{=}} \frac{x}{5,000}; x = 800 & \text{Lower level: } \frac{30}{100} &\stackrel{\times 50}{\underset{\div 50}{=}} \frac{x}{5,000}; x = 1,500 \\ \text{Platinum: } \frac{2}{100} &\stackrel{\times 50}{\underset{\div 50}{=}} \frac{x}{5,000}; x = 100 & \text{Upper level: } \frac{44}{100} &\stackrel{\times 50}{\underset{\div 50}{=}} \frac{x}{5,000}; x = 2,200 \\ \text{Club: } \frac{8}{100} &\stackrel{\times 50}{\underset{\div 50}{=}} \frac{x}{5,000}; x = 400 \end{aligned}$$

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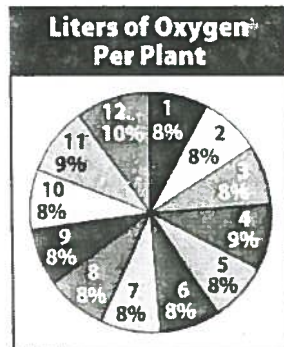
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Plant #1 produces 80 percent as much oxygen as Plant #12.

Answer the questions.

1. Plant #1 produces 34 liters of oxygen. Which other plants produced an equivalent amount of oxygen?

2, 3, 5, 6, 7, 8, 9, 10

2. Estimate the amount of oxygen produced by all of the plants without doing calculations for each plant. What feature of the data allows you to make this estimate?

9 of 12 account for 8% 3 of 12 are 9% 9% 10%

34
12

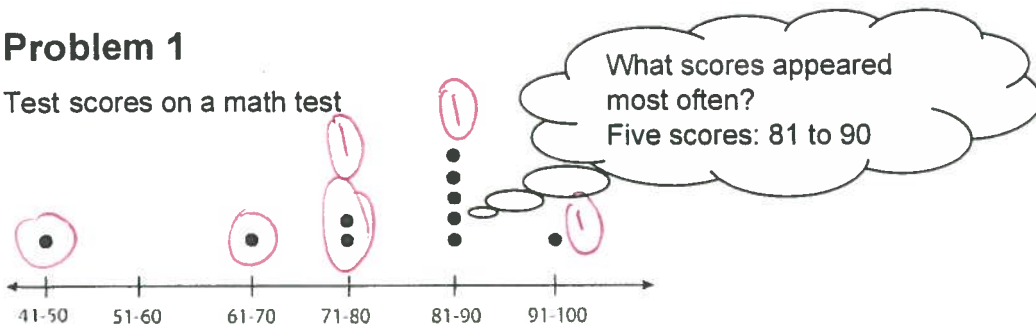
68
34

more than 408
425 goal
actual 439

LESSON
11-1 **Analyzing Categorical Data**
Success for English Learners

Problem 1

Test scores on a math test



How many scores fall at or below 80? 4

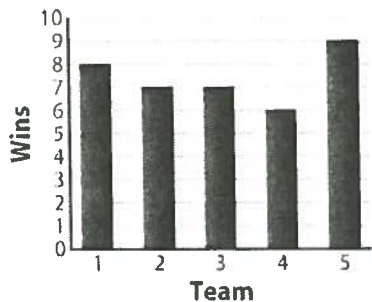
Can you tell from the dot plot? Yes. Count the dots from 41 to 80.

Check your answer. Here are the scores:

83	43	75	79	89
91	84	85	90	70

Problem 2

How many teams won 7 or fewer football games?



How many teams won 7?
How many won less than 7?

Teams 2, 3, and 4 won 7 or fewer games; 3 teams

1. In Problem 1, how many scores are *above* 70?

8

2. In Problem 2, how many teams won *more* than seven games?

2 teams 1 and 5

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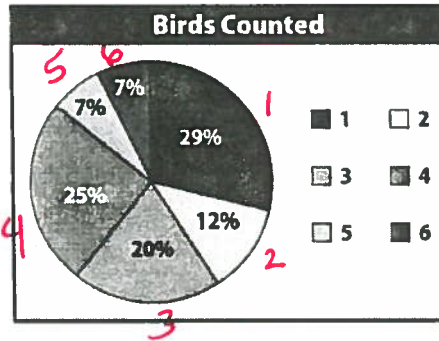
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Practice and Problem Solving: D

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1. If 41 birds were counted and 20 percent of the birds were chickadees, how many chickadees were counted?

Twenty percent of 41 is 0.2 times 41 or 8.2, so 8 chickadees were counted.



2. What percentage of the birds counted were finches? ~~25%~~ 25%

3. How many of the birds spotted were finches?

41 x .25 = 10 Finches

4. Which two species were spotted the fewest times at the feeder? Explain.

Nuthatches and sparrows both had 7% which is the smallest

Answer the questions about the dot plot of goals scored by a soccer player. The first one is done for you.



5. In which game(s) did she score the most goals? How many? Game 2, 4 goals

6. In which game(s) did she score no goals? 3, 6, 9, 10

7. In which game(s) did she score two or more goals? 1, 2, 7