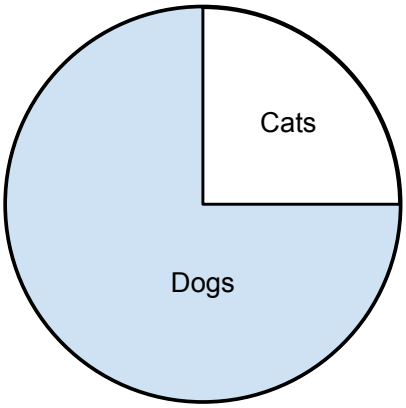
Problem of the Week
Problem A and Solution
More Dogs

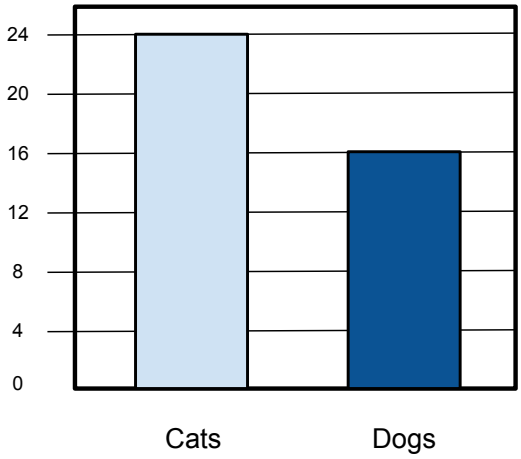
Problem

The graphs below represent the number of cats and dogs in two local animal shelters. Shelter A and Shelter B have the same number of animals.

Shelter A



Shelter B



There are more dogs in Shelter A than in Shelter B. How many more? Justify your answer.

Solution

Looking at Shelter B, we see that there are 24 cats and 16 dogs. This means there is a total of $24 + 16 = 40$ animals in each of the two shelters.

It appears that in Shelter A, $\frac{3}{4}$ of the shelter is filled with dogs, and $\frac{1}{4}$ are cats. If the total number of animals at this shelter is 40, then we need to calculate $\frac{1}{4}$ of 40.

Since $10 + 10 + 10 + 10 = 40$, then $\frac{1}{4}$ of $40 = 10$. So there are 10 cats in Shelter A. This means that there are $40 - 10 = 30$ dogs in Shelter A.

Since there are 30 dogs at Shelter A and 16 dogs at Shelter B, then there are $30 - 16 = 14$ more dogs at Shelter A than Shelter B.

Teacher's Notes

Data can be visualized in many ways. A tool like a spreadsheet can automatically convert numeric data into a chart. The same data can be used to generate different styles of charts. Consider the bar chart showing the data for Shelter B. The spreadsheet automatically calculated the maximum value on the y-axis and chose the distance between the horizontal lines in the chart. Most spreadsheeets would give the user the option of changing the maximum value and changing the distance between each of the horizontal lines. Once those decisions are made, the spreadsheet will automatically recalculate the size of the chart and its elements.

If students want to create their own charts, they would need to do all of those calculations themselves. The work to determine the values of regular intervals from the minimum to the maximum as the locations of the horizontal lines is not trivial. Suppose you use graph paper to draw the chart. You need to determine a scale, such as 1 square represents 2 dogs. This is setting up a *ratio*, which is a fixed relationship between the number of squares on the paper and the number of dogs that distance represents.

The calculations involved in producing a pie chart can also be tricky. It is easy to divide a pie in half or in quarters, but other fractions can be more difficult. The size of a pie slice that represents some data can be determined by equivalent fractions. A whole circle contains 360 degrees. A slice of a circle is called a *sector*. The size of the sector can be described by the angle from one edge of the slice to the other. So a sector that is one quarter of the circle has an angle of 90 degrees, since 90 is one quarter of 360. To determine the size of a sector for any data value, you need to find a fraction with a denominator of 360 that is equivalent to the fraction of the data value divided by the total number in your set. For example, suppose we had a total of 40 animals at the shelter, and 4 of them are birds. If we wanted to show a pie slice representing the birds in this example, we need to find the value of x when $\frac{x}{360} = \frac{4}{40}$. In this case $x = 36$. So the sector will have an angle of 36 degrees.