Charts display data visually. A chart tells a story quickly and effectively. It's easier ti interpret charts when you are familiar with the three main kinds of charts and their parts.

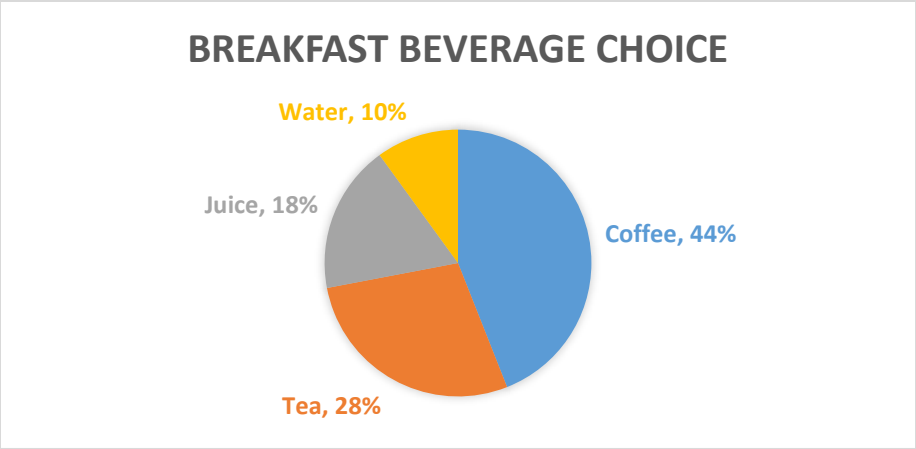
Circle ("Pie") Charts

A circle graph shows an entire set of data broken down into its parts. Its parts, therefore, add up to the whole. If a circle graph shows percentages, for example, the total of those percents should total 100%.

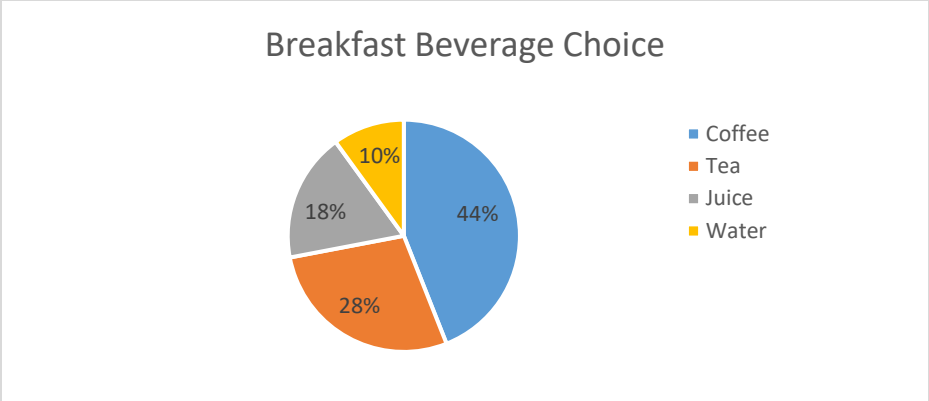
Circle graphs are often called "pie" charts. They are round, like pies, and we can think of each piece as a slice of pie. Are all the slices the same size, or are some bigger than others? Who (or what category) is getting the big slice of the pie?

The chart title is the first thing you should read. Look at the example below. The title is "Breakfast Beverage Choice." That title tells us that the "pie" pieces are going to show what some people choose to drink with their breakfast.

In this example, there are four beverage choices (coffee, tea, juice, and water). The segment, or piece of the pie, for coffee is almost half of the entire circle. That quickly tells us that coffee is the most common choice of beverage with breakfast. In this example the choices and percentages are outside the circle, but positioned close to the corresponding segments.



The same graph could be formatted slightly differently (see below), so that the choices are listed in a separate area, called the "legend." This option usually works better with different colors, but even in black and white shading, we can usually tell which segment goes with each label.



After reading the title, look at the names of each segment. Think about what the picture shows. In this case, we noticed that coffee is the most common choice; it is almost half of the entire circle. Then consider other aspects of the chart. How many segments are there? Are they mostly the same size, or are they very different in size?

In a test situation, you might be asked, "What is the most common breakfast beverage choice?" It's clear that coffee is the most common choice, because it is the biggest segment of the circle. Another question might be, "What is the least common breakfast beverage choice?" The smallest segment is water, representing only 10%.

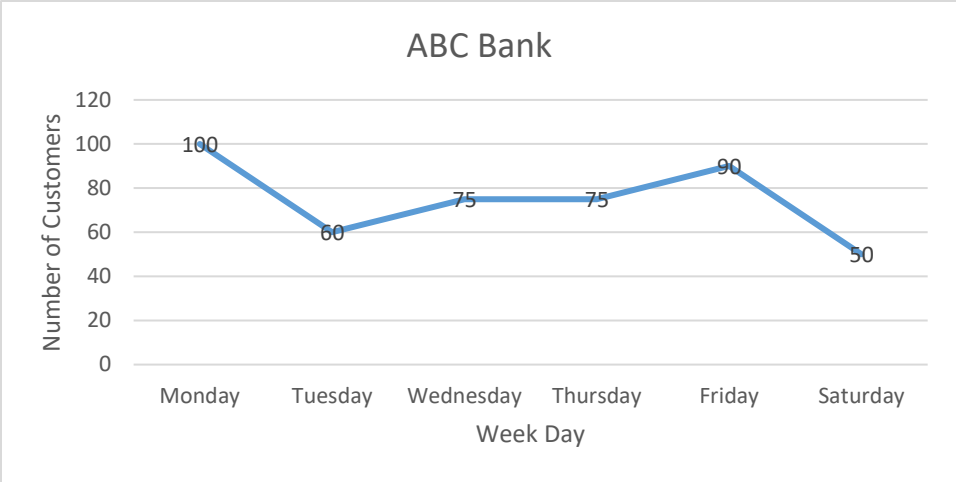
With a little more information, we can also calculate how many people chose each beverage. For example, "If 250 people were surveyed to gather this data, how many chose water as their breakfast beverage?" Remember, in a circle chart the segments add up to the total. If the number of people surveyed is 250, then 10% of 250 chose water. 10% of 250 is 25, so 25 people in the survey chose water.

Line Charts

A line chart is often used to show a trend, often over time. There is an "x-axis," the horizontal line. There is also a "y-axis," which is the vertical line. Generally, the values on each axis increase from left to right, and from bottom to top. Each axis is also likely to have an "axis title" that tells us what two measurements are included in the chart.

Consider the chart below, titled "ABC Bank." The horizontal x-axis is labeled "Week Day," and we can see that the values start with Monday and go to Saturday. The vertical y-axis is labeled "Number of Customers." Grid lines next to the y-axis mark even intervals from 0 to 120. From this information, we know we will be learning about the trend of how many customers visit the bank during the week.

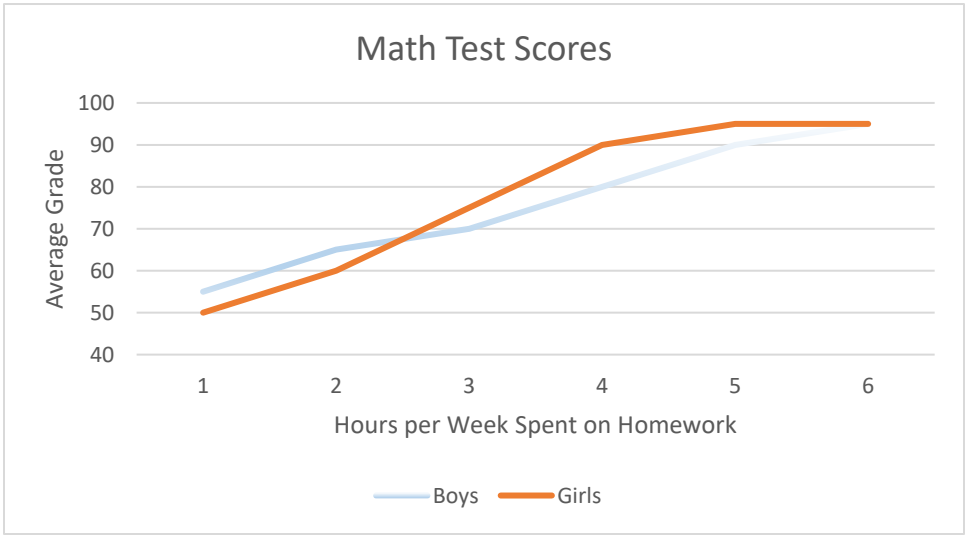
The line in this line chart connects the values for each day. In this chart, those values are given (exactly 100 customers on Mondays). Sometimes, the exact value is not given, so we use the y-axis grid lines to estimate the values.



The next thing to consider when looking at a line chart are the high and the low points. In this case, on which day does the bank have the largest number of customers? (Monday.) Which day has the smallest number of customers? (Saturday.)

Test questions might be as simple as finding the high and the low points. Other test questions might require us to make a connection with some other fact that we know about banks. For example, "On what day would you expect the longest lines at the ABC Bank?" Well, since Monday has the most customers, we can conclude that the lines are longest on Mondays.

Line charts can also contain more than one line, showing a comparison of two (or more) subjects. Consider the following chart:



First, read the chart title: "Math Test Scores." Second, read the axis titles: along the x-axis are "Hours per Week Spent on Homework," and along the y-axis "Average Grade." So, the chart will show us whether or not there is a relationship (pattern) between hours spent on homework and math test scores.

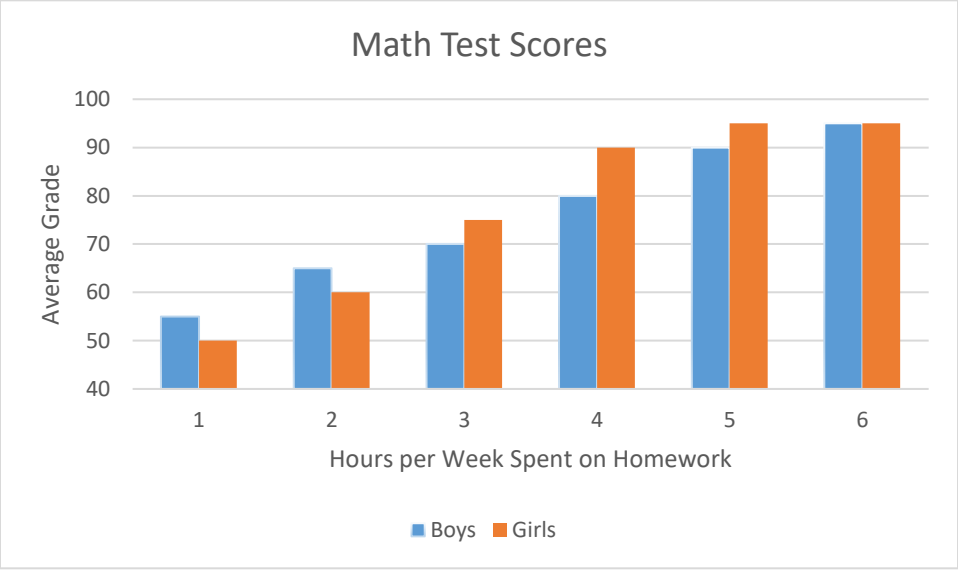
There are two lines on the chart; one is darker and one is lighter. The legend at the bottom explains that the lighter line is for boys, and the darker line is for girls.

Now that we know what is on the chart, think about what the chart is telling us. Is there a relationship? Yes, for both boys and girls, math grades go up as more hours per week are spent on homework.

What about subtler questions that we can answer from this chart? "Which gender gains the biggest increase in test score when homework hours increase from one to two?" When we look at the scores for students who spend one hour on homework vs. those who spend two hours on homework, boys actually have the biggest increase (represented by a steeper section of the trend line). "What is the fewest number of hours girls can spend on math homework to achieve their highest average score?" Notice that the trend line for girls is flat from five to six hours; it means that there is no real increase in grade gained by that extra hour of homework for girls.

Bar Charts

Bar charts are similar to line charts. They also have an x-axis and a y-axis, but instead of showing only the trend line, each data point is represented with a bar. The chart below shows the same data as our previous example, but in a bar chart format.

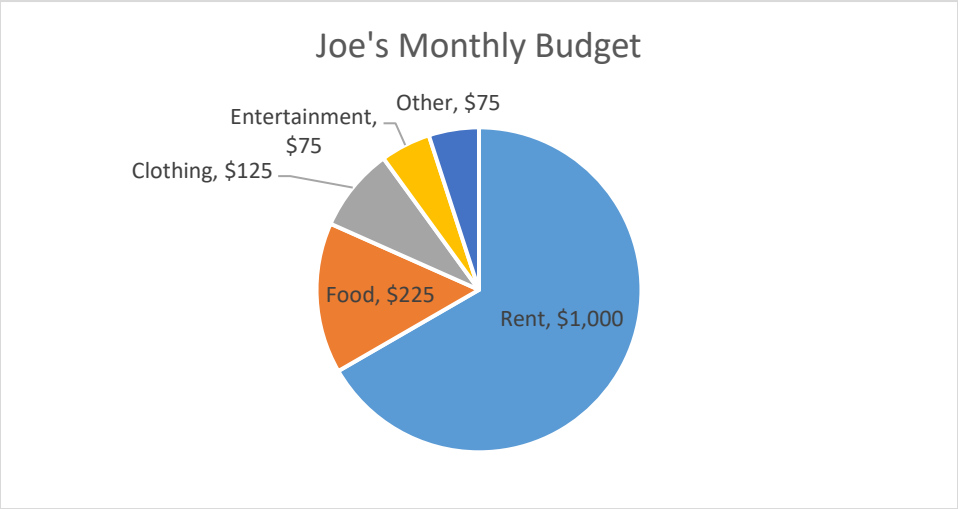


Which format is easier to interpret, or represents the data better? Often format is a matter of personal preference. The choice of format might also depend on the data being represented. When there are many lines in a line chart, each one crossing over the other frequently, the data may look simpler when represented by a bar chart.

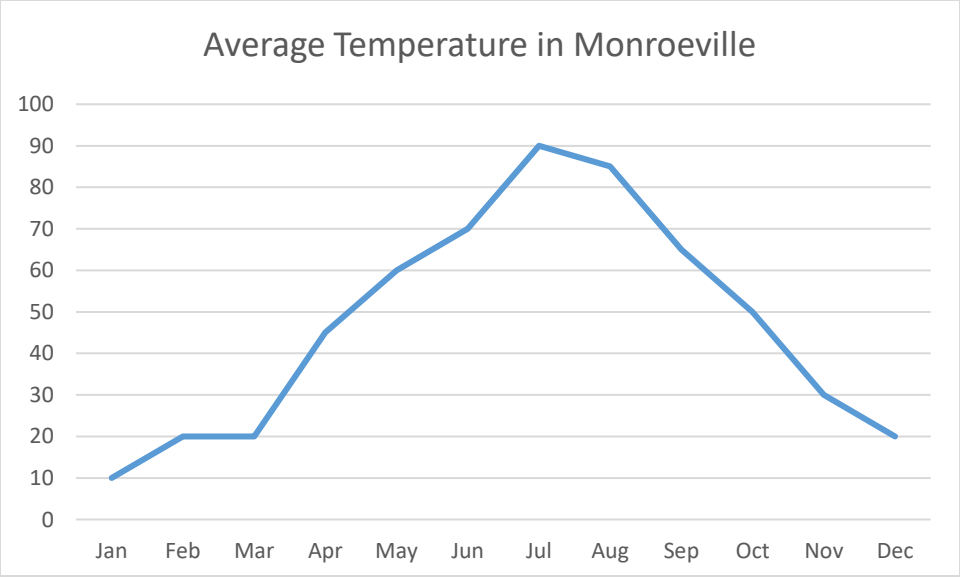
Whichever format is used, the process of interpreting the chart remains the same: read the chart title, read the axis-titles, consider what the segments are, and, finally, look for the trends.

Practice Problems

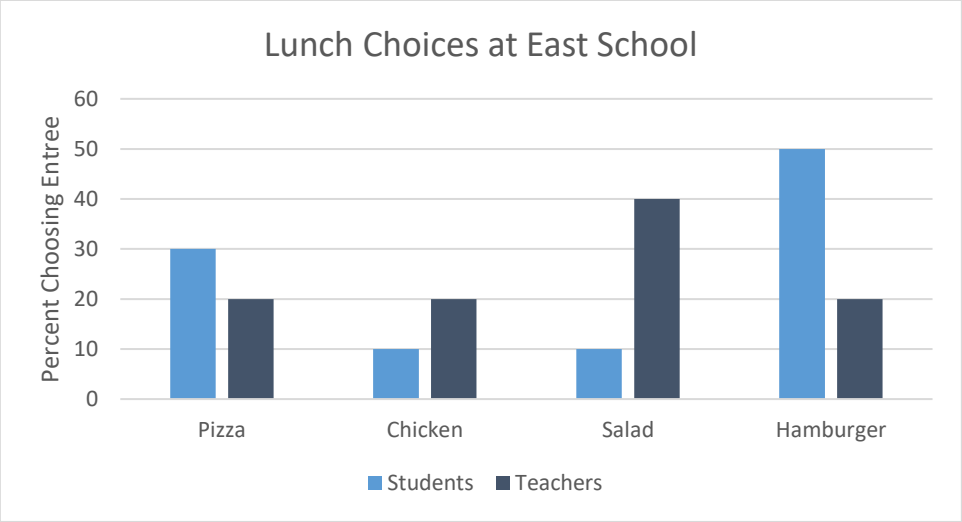
1. According to the chart below, what is the amount spent by Joe on food and clothing each month?



2. Between which two months is the greatest increase in average temperature in Monroeville?



3. Which entrée is most often chosen by students at East School? Which entrée is most often chosen by teachers at East School?



Answer Key for Practice Problems

1. $350 2. March and April 3. Students: Hamburger; Teachers: Salad

Practice Problems Solved with Explanation

1. The chart title is "Joe's Monthly Budget," so the segments will directly tell us how much is spent on each category. Add the two segments Clothing ($125) and Food ($225) together and the answer is $350. What if the question had been, "What is the amount spent by Joe on food and clothing each year?" If we are not paying attention, we will not notice that now the question is about a YEAR and the chart is about a MONTH. Of course, to answer the new version of the question, multiply by 12 to adjust for the different time period. $350 x 12 = $4200. It's important to read the chart title!

2. The chart title is "Average Temperature in Monroeville." There aren't any axis titles. However, the y-axis must be temperatures because of the chart title, and the x-axis is obviously months. To find the largest increase between two months, we only need to look at the intervals from January to July. After July the temperatures are decreasing, so those intervals won't answer the question. Visually, the steepest increases might be between March and April, or possibly June and July. Using the grid lines, March appears to be 20 and April is about 45; that's an increase of 25. June is 70 and July is 90; that's an increase of 20. Therefore, the interval between March and April is the largest.

3. The chart title is "Lunch Choices at East School." The y-axis title is "Percent Choosing Entrée," but there is no x-axis title. However, along the x-axis are four choices of entrees. According to the legend, students are represented by the lighter bars and teachers by the darker bars. 50% of students choose hamburgers, far more than the other choices. 40% of teachers choose salad.