

In Context Toolbox – How to Read and Interpret Graphs

The **In Context Toolbox** tip sheets are designed to help middle school and high school researchers prepare a written report. Graphs can be a great way to show data. This document will explain how to **read and interpret graphs**; you can use the tips provided in this guide in to create your own report.

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Graphs are used in newspapers, magazines, history books, and science texts. Graphs are a great way to show a lot of information. But reading and interpreting graphs can be confusing. Answering questions about graphs can be harder still. Generally, when people make mistakes reading and interpreting graphs it is for the two following reasons.

Common Mistake # 1

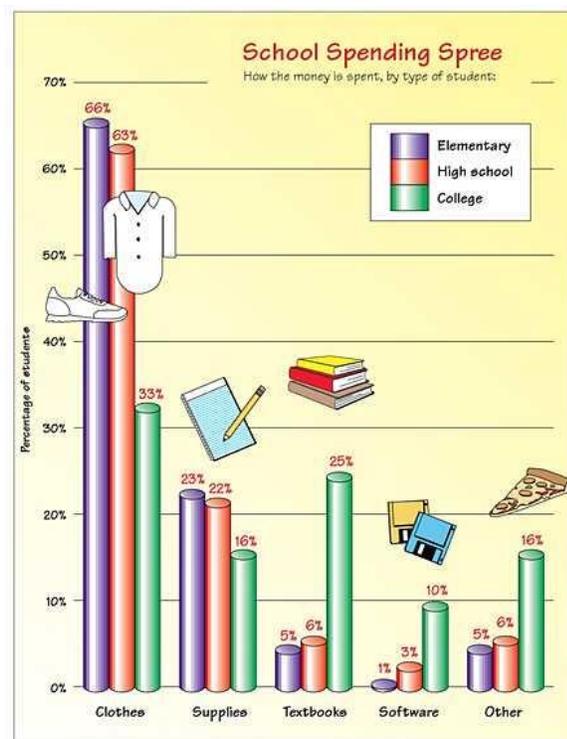
The most common mistake made seems to be trying to interpret the graph before really understanding the graph. Graphs can be read just like you read the words in a story. Look at the title, the words describing the X and Y axis (the bottom and side of the graph), and the information that is presented. As you read the graph, think about whether the information makes sense. If it is a graph about the number of sunny days per month in each state, think about how much sun you usually get in your state in each month. Does the information seem to make sense with what you know? If it does, it is likely that you are reading the graph correctly. If it doesn't make sense, try to figure out why it is not making sense before you try to answer the questions!

Common Mistake #2

The second mistake people make when reading and interpreting graphs is not understanding the questions. Break down each question to make sure you understand it. For example, if you are asked to compare the marriage and divorce rate between 1950 and 1998, you know that you will have to look at the difference between the numbers of marriages and divorces in those two years. If you are asked to describe a trend based on information in a graph, you will have to notice how the amounts increase or decrease over the time shown.

We'll use the bar graph to the right as an example.

This is a bar graph with a lot of information. Our first priority is to look at the title and the categories. The title *School Spending Spree*, tells us that this graph has information about money spent on school. Hopefully this makes you think about the shopping you did before school started. A look at the categories listed in the bottom of the chart (the X axis) will help us to see what kinds of things money was spent on. The categories of clothes, supplies, textbooks, and software sound like typical ways to spend money for school. There is nothing unexpected like bubble gum or costumes.



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Now that we know what the graph will tell us about, we need to look at the key and the writing on the left side of the graph. This left side of the graph is the Y axis. The key shows three colors: purple, red, and green. Purple represents elementary students, red is for high school students, and green stands for college students. The Y axis tells us that the information is being presented in percentages. In other words, if you added up all the purple percentages, it would equal 100%. The same is true for the red and the green.

Take a minute to think about what you would expect those different types of students to spend. Students who are growing the most would probably spend the most on clothing, while college students would probably spend the most on textbooks and software. A quick glance at the graph confirms these predictions. Before you try to answer any questions about the graph, read it carefully. See if there is any surprising information in it. This will help you to see if the information makes sense.

Answering questions about this graph could be tricky since it shows spending in five categories by three different age groups of students. Make sure as you answer the questions, you think about that.

Let's try some questions about this graph.

1. What do college students typically spend the most on for school?

Look at all of the green bars. Which one shows the largest percentage by it? You will notice that the clothes category is 33%. That is more than the percentages spent on supplies, or textbooks, or software or the other category.

2. What is the difference in spending on clothing between elementary students and high school students?

The key to answering this question is to understand what the question is asking. If they are asking for the difference between two categories, you will need to subtract. You will be able to easily find the percentage of spending on clothing for elementary students (the purple bar in the clothes category) and for high school (the red bar in the clothes category). From there, it is a simple matter of subtraction.

$$66\% - 63\% = 3\%$$

3. What do elementary students spend the least on for school?

This is one of the easiest questions to answer. Make sure you are looking at the purple bars. Which one is the smallest and shows the smallest percentage? Software, at 1% of the total expenditure is clearly the least.

4. What is the total expenditure on school supplies for high school and college students?

To answer this question, you must first make sure you understand what you are being asked. The word total helps you to know that you are going to be adding some numbers together. The category that you will look at is school supplies. The next step is to find the colors that correspond to high school and college. Add together the green and red columns.

5. Which category of student is likely to spend the most on miscellaneous expenditures?

You will notice that there is no category for miscellaneous items. There is only one possible category to which this can refer. The last column in this graph is labeled as other. It also shows a slice of pizza above it. The green bar is clearly the largest, so college students must spend the most on miscellaneous items.

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Types of Graphs

There are three types of graphs you will see most often. Each type of graph is used for different reasons. No matter which type of graph you are reading, it will be important to read and understand the graph before you answer any questions about the graph.

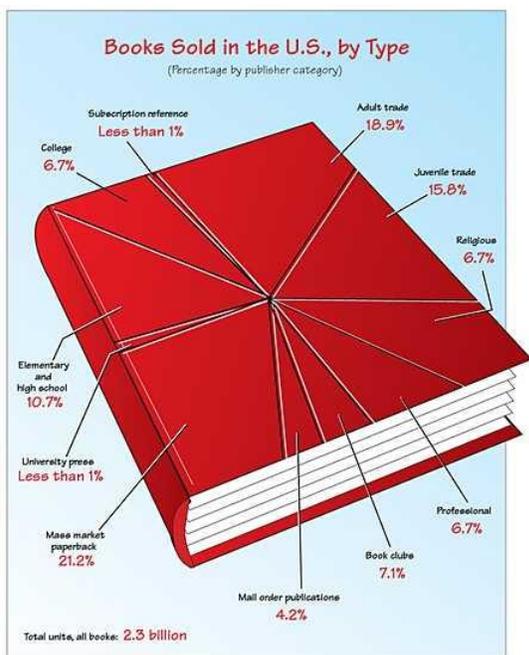
Bar Graph

Bar graphs are used to compare information or look at information over time such as years. The graph we used earlier is an example of a vertical bar graph. It compares the percentage of money that elementary, high school, and college students spend on school related items. Bar graphs can also be horizontal.

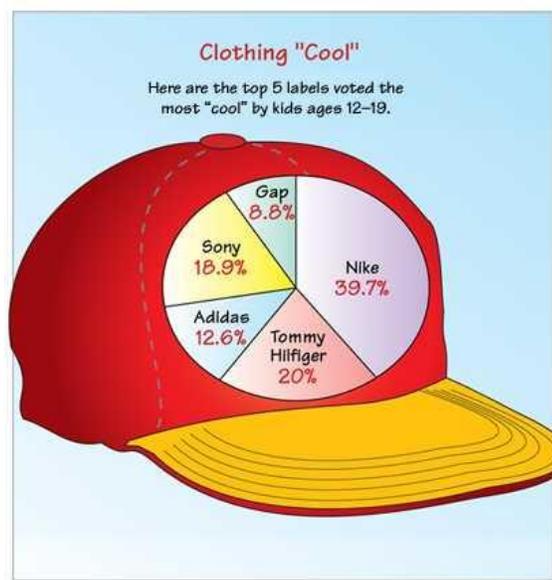


Pie Chart

Pie charts show percentages. If you add up all the percentages in a pie chart, the total would be 100%. Pie charts are very good for looking at the parts of a whole. Pie charts are often in the shape of a circle, but they do not have to be a circle. Below is an example of two pie charts. One is a circle and one is not a circle.



The pie chart on the left shows the types of books sold in the United States. If you add up all the types of books, the total is 100%. The same is true for the "Cool Clothing" pie chart on the right. When added together, the top 5 labels are equal to 100%. It makes sense to use a pie chart to show this information. It wouldn't be as easy to see the whole picture with a bar graph.



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