

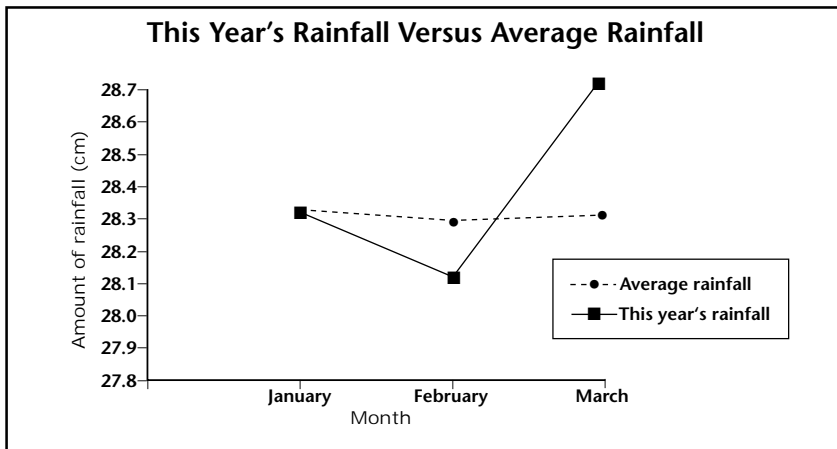
COMMUNICATING SKILLS

Recognizing Bias in Graphs

Graphs can be used to display your data at a glance. However, graphs can distort your results if you are not careful. The picture that results may not be **objective**, or without bias or distortion. Look at the first graph.

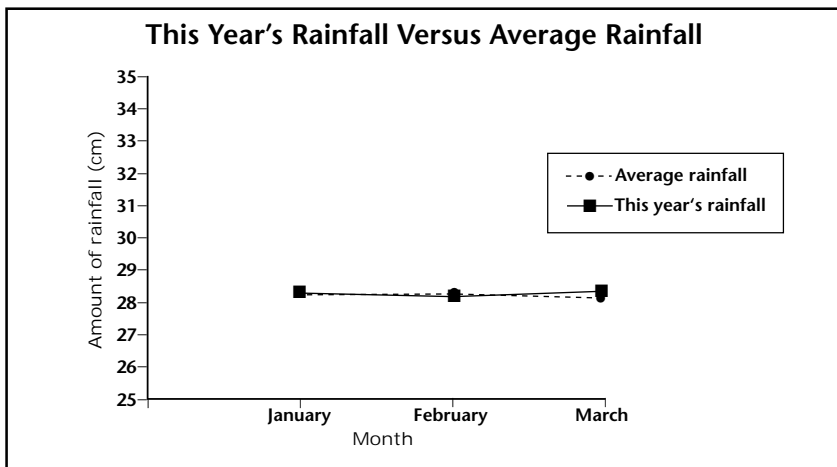
How Much Rain Really Fell?

In the graph below, it appears as though March had drastically more rainfall compared with an average month. But did that really happen?



Wait! March's rainfall was only 0.4 cm above average. On the graph, that looks like a large increase. On the ground, a 0.4 cm increase is not that much. This graph is *biased* because it exaggerates the difference between the two lines. Because the interval between 27.8 cm to 28.7 cm on the y -axis is so small, the difference in rainfall seems very large and noticeable.

If you increase the interval between numbers on the y -axis, the scale becomes larger. That makes the difference between the two lines smaller, as shown below.



Recognizing Bias in Graphs, continued

Refer to the graphs on the previous page to answer the following questions:

1. What is the range of values on the y -axis in the second graph?

2. How does the difference between the two lines in the second graph compare with the difference between the two lines in the first graph? Which graph is a more accurate picture of the data? Explain.

A Matter of Scale

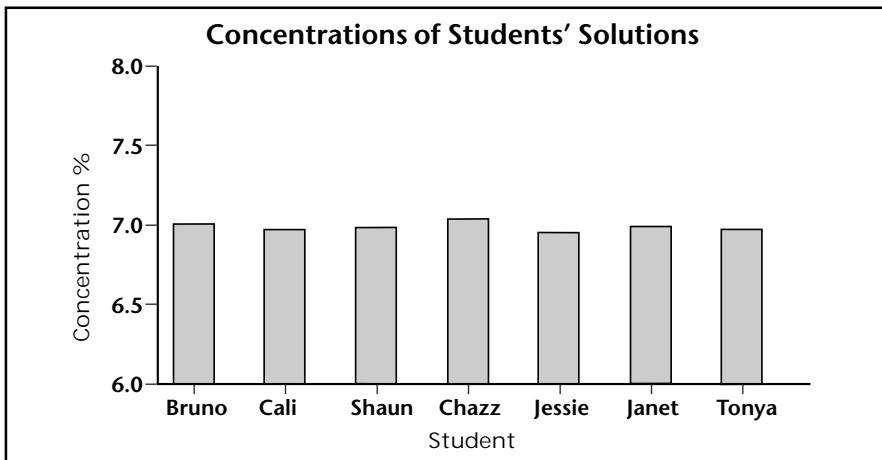
Here is another example of how the choice of the scale can alter a graph.

In an experiment, seven students tried to mix a solution of salt water so that its concentration would be exactly 7.00%. When the teacher tested the concentration of their solutions, he got the following results:

Concentrations of Students' Solutions

Name	Bruno	Cali	Shaun	Chazz	Jessie	Janet	Tonya
Concentration	7.02%	6.99%	7.00%	7.08%	6.97%	7.01%	6.99%

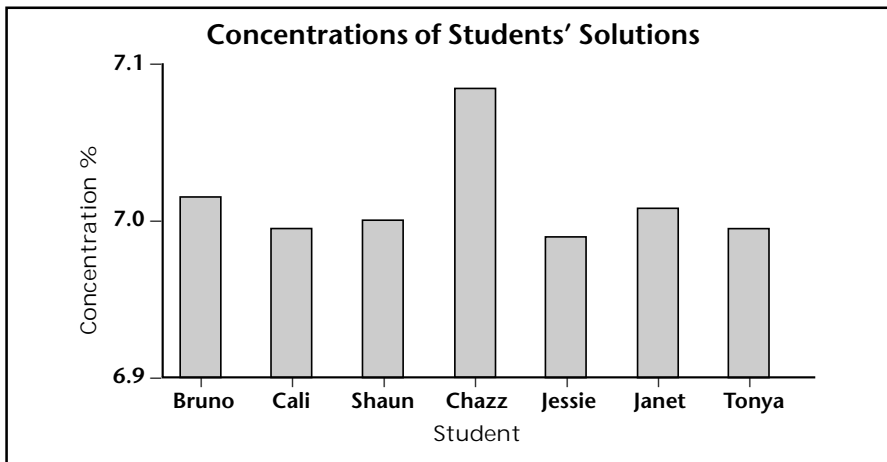
The teacher created the following graph to show the students' results:



Does this graph give you a clear picture of how the concentrations varied? Not really. The bars look so much alike that it's hard to tell the differences between them.

Recognizing Bias in Graphs, continued

Suppose the teacher decreased the scale of the *y*-axis. The graph would then look like the one below. The variation in the students' results looks much greater, even though it hasn't changed. This graph makes it easier to see the small differences.



Graphs with an Attitude

The data in the chart below were recorded by a student measuring the thickness of four rock layers.

Thickness of Rock Layers

Layer	A	B	C	D
Thickness	11.2	10.8	13.5	11.1

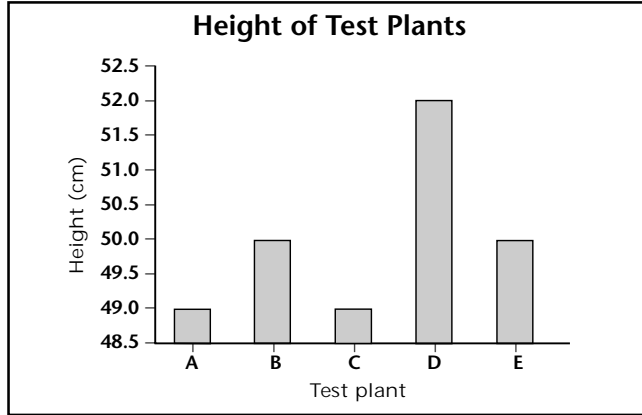
Using the above data, create two graphs in the space below. First show how similar the measurements are. (Hint: Make the scale of the *y*-axis larger. This makes the difference between the measurements seem smaller.) In your second graph, emphasize the fact that layer C was slightly thicker than the other layers.

Your Graphs:

Recognizing Bias in Graphs, continued

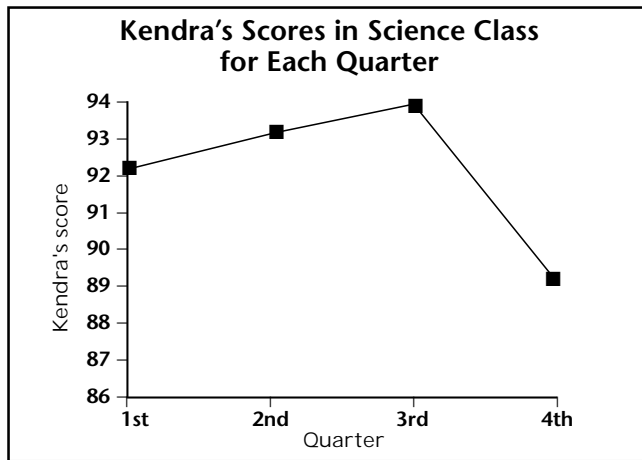
Identifying Bias on Your Own

Graph 1



1. This graph shows that test plant D grew much taller than the other plants. How is this information misleading?

Graph 2



2. This graph shows that Kendra received a much lower grade in science class during the fourth quarter. Do you think what appears to be such a large drop in her grades should worry Kendra? Explain your reasoning.
