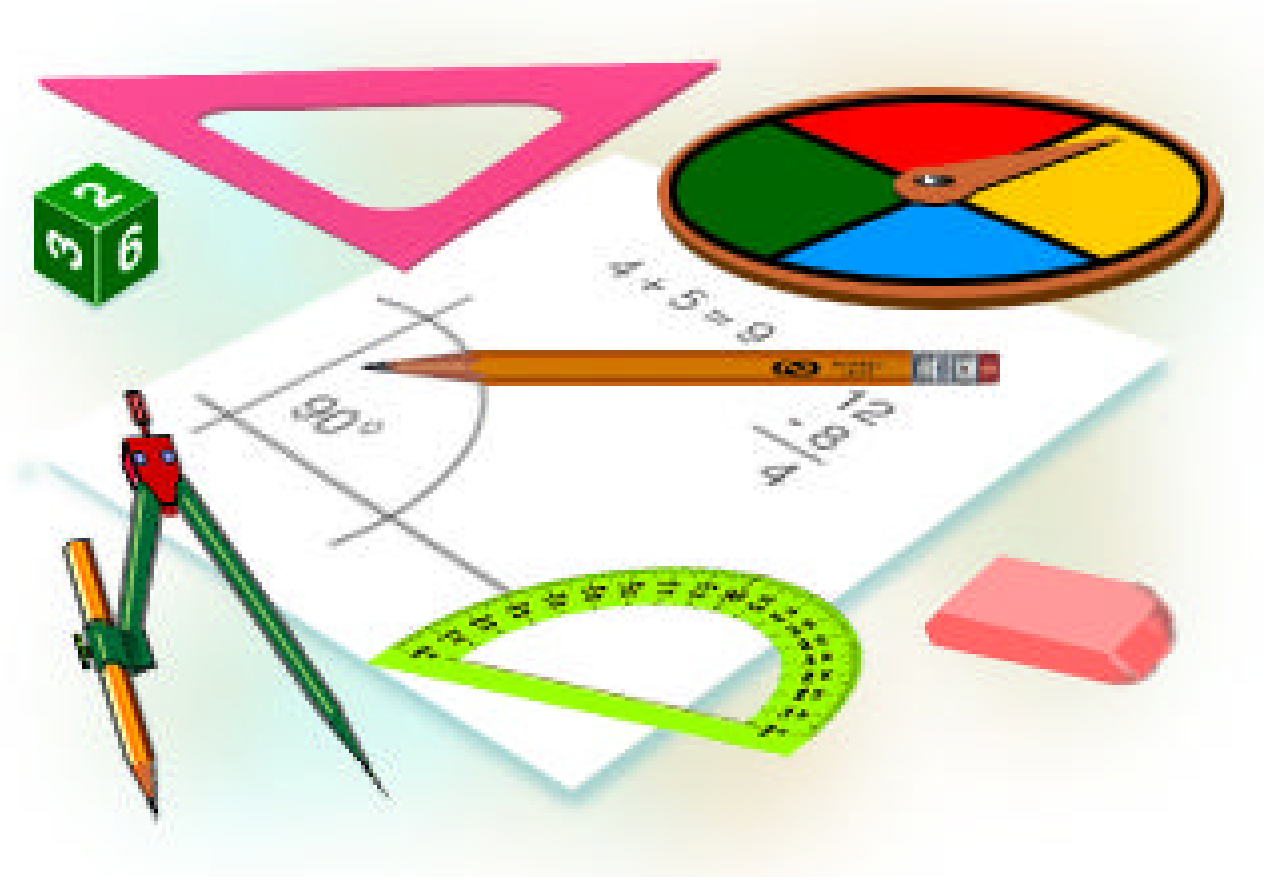


The Next Step

Mathematics Applications for Adults



Book 14017 - Graphs

OUTLINE

Mathematics - Book 14017

Graphs
<u>Introduction To Graphs</u>
answer questions about information contained in graphs.
construct a variety of graphs, given the necessary information.
<u>Problem Solving Using Graphs</u>
solve multi-step problems requiring the performance of any combination of mathematical operations involving graphs, with or without a calculator.

THE NEXT STEP

Book 14017

Graphs

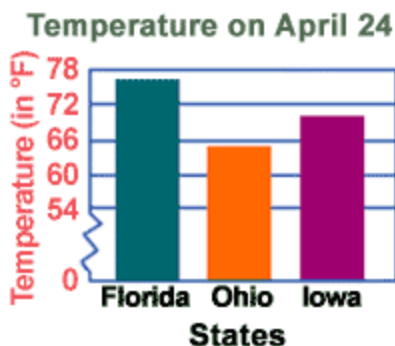
Introduction to Graphs

A *graph* is a kind of drawing or diagram that shows *data*, or information, usually in numbers. In order to make a graph, you must first have data.

Bar Graph

A graph that uses separate bars (rectangles) of different heights (lengths) to show and compare data. They are generally more complicated to read than other types of graphs.

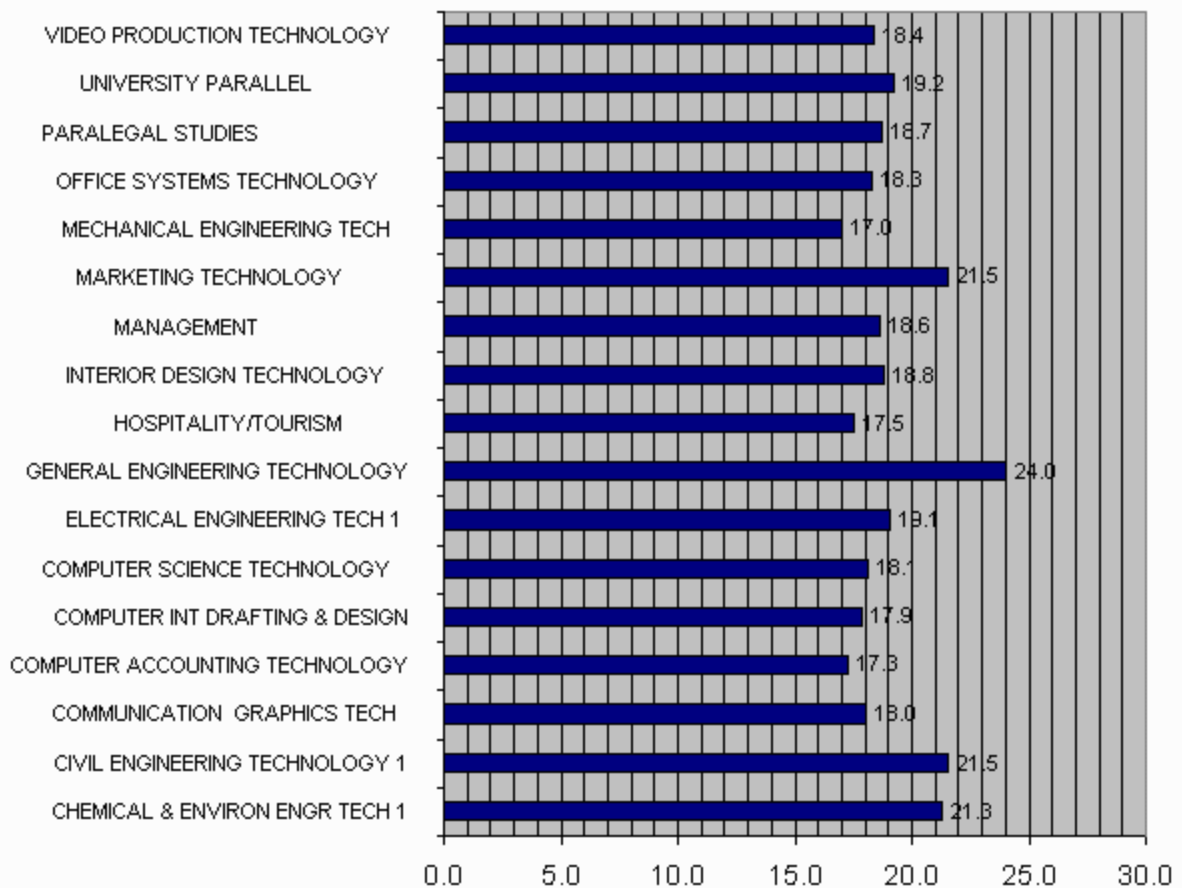
Example:



Bar graphs are usually drawn in one of two different directions:

- 1) With the bars *running up and down* like the graph above. The bars are placed at equal distances along the *horizontal axis* that runs across the bottom of the graph.
- 2) With the bars *running from left to right* like the graph on the next page. The bars are placed at equal distances along the *vertical axis* on the left side of the graph.

**ACT Mean Composite Scores
for First-time Freshmen - Fall, 1999**



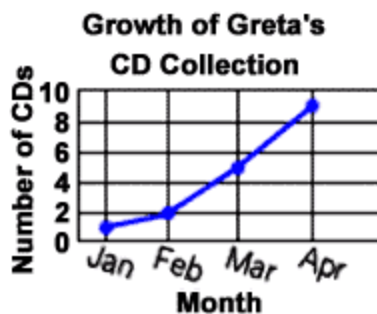
Bar graphs may also use a key to show additional information.

Sometimes, a graph may have a break in the vertical axis and an open space running across the graph. This means that some values have been left off to save space on the graph.

Line Graph

A graph in which line segments are used to show changes over time. Like the bar graph, a line graph is drawn using values along a horizontal and a vertical axis.

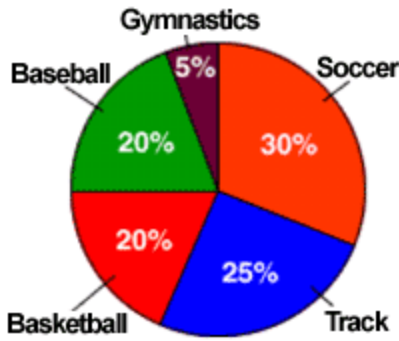
Example:



Circle Graph

A graph using a circle that is divided into pie-shaped sections showing percents or parts of the whole. A part of a circle graph is called a **segment** or a **section** and has its own name and value. The segments of a circle add up to a whole or 100% of the topic.

Example:



Circle graphs are often used to illustrate budgets and expenses.

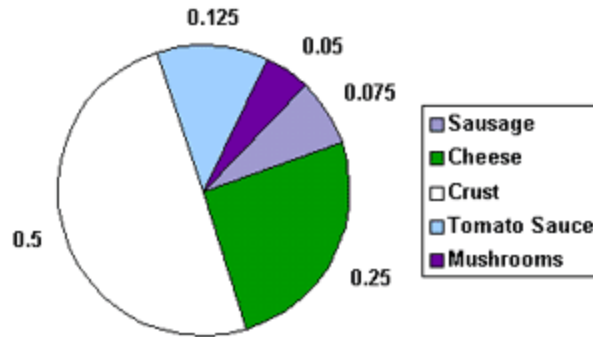
Pie Charts

A pie chart is a circle graph divided into pieces, each displaying the size of some related piece of information. Pie charts are used to display the sizes of parts that make up some whole.



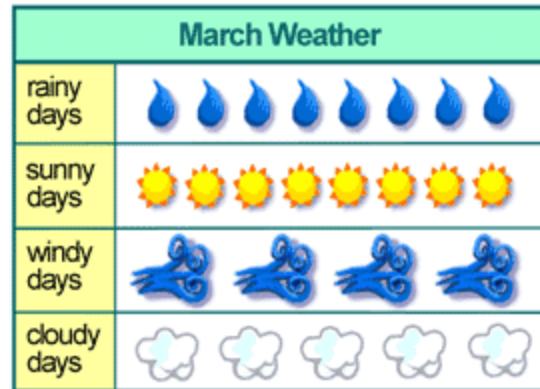
The pie chart below shows the ingredients used to make a sausage and mushroom pizza. The fraction of each ingredient by weight is shown in the pie chart below. We

see that half of the pizza's weight comes from the crust. The mushrooms make up the smallest amount of the pizza by weight, since the slice corresponding to the mushrooms is smallest. Note that the sum of the decimal sizes of each slice is equal to 1 (the "whole" pizza").



Pictographs (picture graphs) are graphs that use pictures called *icons* to display data. Pictographs are used to show data in a small space. Pictographs, like bar graphs, compare data. Because pictographs use icons, however, they also include keys, or definitions of the icons. Parts of symbols are often used to represent a fractional amount of a quantity shown in the key.

Pictographs are often not as exact as other types of graphs, but they are the easiest to read. All you need to do is count the symbols on a line and compute their value.



How to Create Eye-catching, Information-packed Graphs

A woman stands up in a crowded city council meeting and reads the research. "We recently asked a random sampling of 250 citizens how often they use the new toll road. Five percent say they use it four or more times a week, eight percent say they use it one to three times a week, 12 percent say..." and continues on.

The point she would eventually get to, could have been stated in a simple declarative sentence, in half the time, with twice the effect: "We completed some eye-opening research this week--over one third of the people in the city don't use the new toll road because they can't afford it!"

The same is true on paper. Instead of getting mired in statistical detail, you can make your point with a simple, informative graph.

STEP-BY-STEP GRAPHS

Creating graphs is easy if you divide it into a few manageable steps.

STEP 1: *Gather and present accurate information*

You will need to seek out facts and figures from reputable sources. It is imperative, too, that your proportions be reasonably accurate. If, for example, you intentionally exaggerate a bar that represents 50% to look like 60%, you risk the reader dismissing your whole argument because of it. Be sure to add a caption line that credits your source.

Where possible, gather and present your information in a ***table of values***. This table will allow you to organize your data in rows and columns.

STEP 2: *Focus on a single point*

Don't make the mistake the speaker did. Sort through the details and decide on a single point to be made and organize everything around it. Simplify as much as you can: Consolidate several nonessential categories into one. Choose units of measure that are most easily understood. And round off values.

STEP 3: *Find the most relevant image*

Be obvious--you have just a moment to make the connection with your reader.

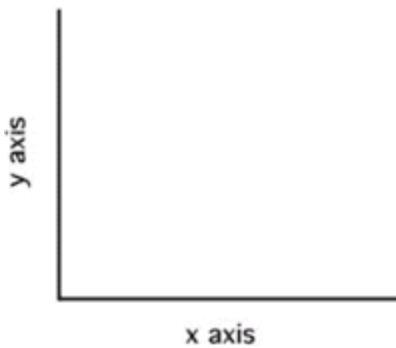
STEP 4: *Use words sparingly*

Your reader should get your point with as few words as possible. Use a title of five words or less to telegraph the

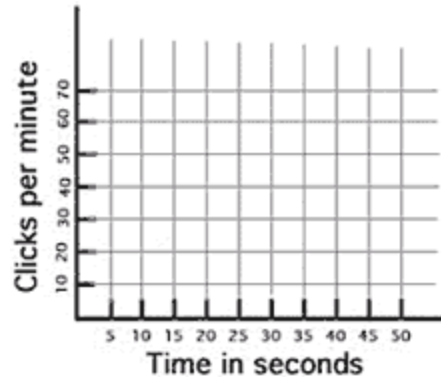
theme, and a short subhead to fill in the details. Use labels economically and let the shapes, colors, and proportions do the work.

How to Construct a Line Graph.

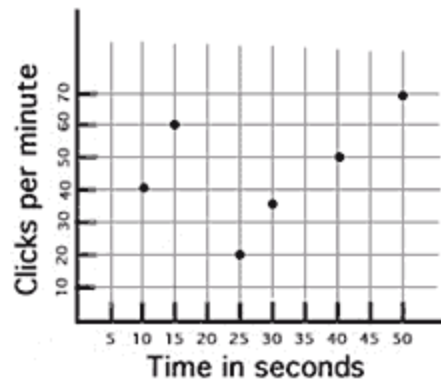
1. Draw a pair of axes (x-axis and y-axis).



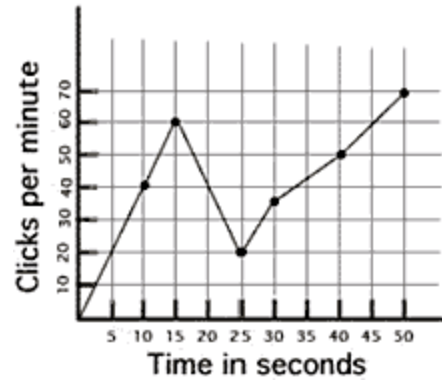
2. Label each axis with a scale.



**3. Plot the data points for each pair of data.
First go over on the x-axis and then the y-axis.**

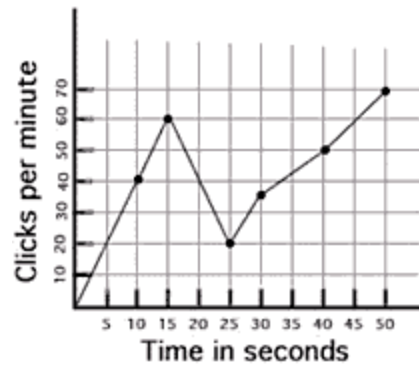


4. After all the data points are plotted, connect them.



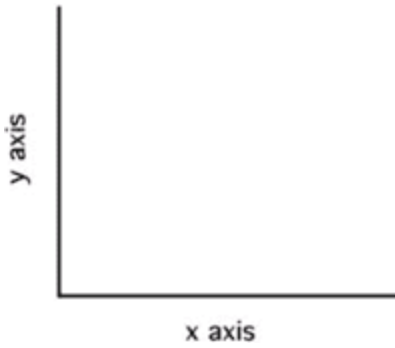
5. Give the graph a title.

Radioactivity

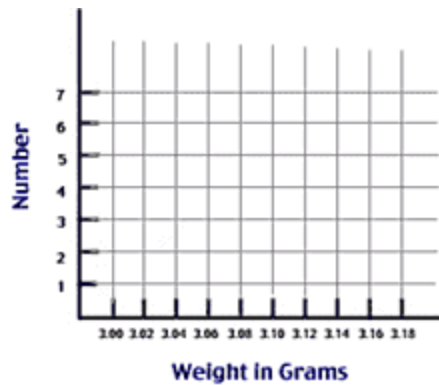


How to Construct a Bar Graph.

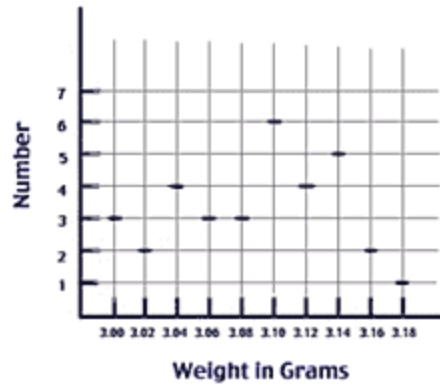
1. Draw a pair of axis (x-axis and y-axis).



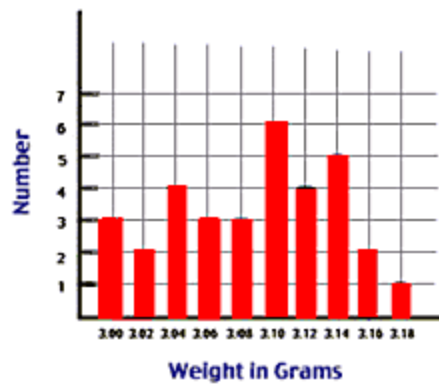
2. Label each axis with a scale.



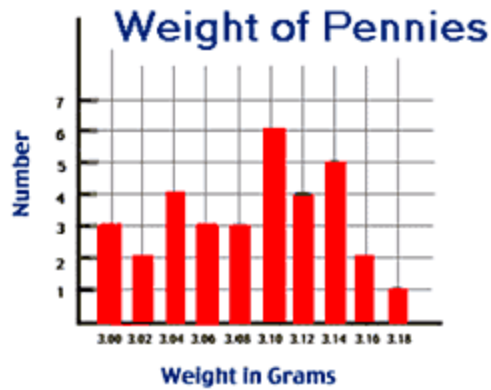
- 3. Plot the data points for each pair of data.
First go over on the x-axis then up on the y-axis.**



- 4. Draw a thick bar from the x-axis up to an imaginary point where the y-axis would intersect the bar.**



5. Give the graph a title.



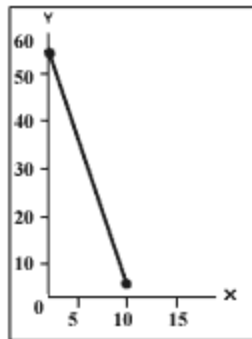
Problem Solving Involving Graphs

1. Given the data set at left, which of the graphs below most closely portrays the data?

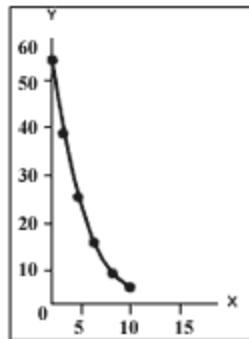
Data

X	Y
0	55
2	38
4	25
6	15
8	8
10	5

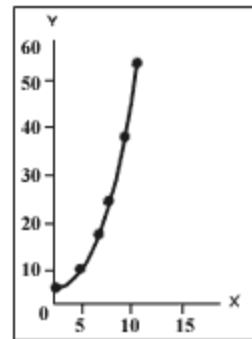
Graph A



Graph B



Graph C

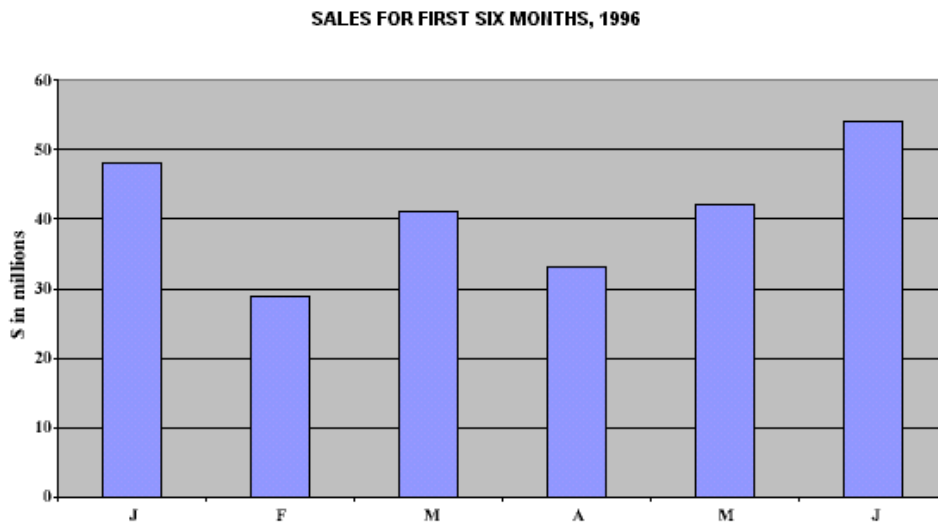


2. Given the table below, displaying the annual income of four employees, construct a bar graph that displays the same information.

Annual Income of Four Employees	
Employee	Income (in dollars)
Sue	25,000
Brian	38,000
Dan	30,000
Nancy	35,000

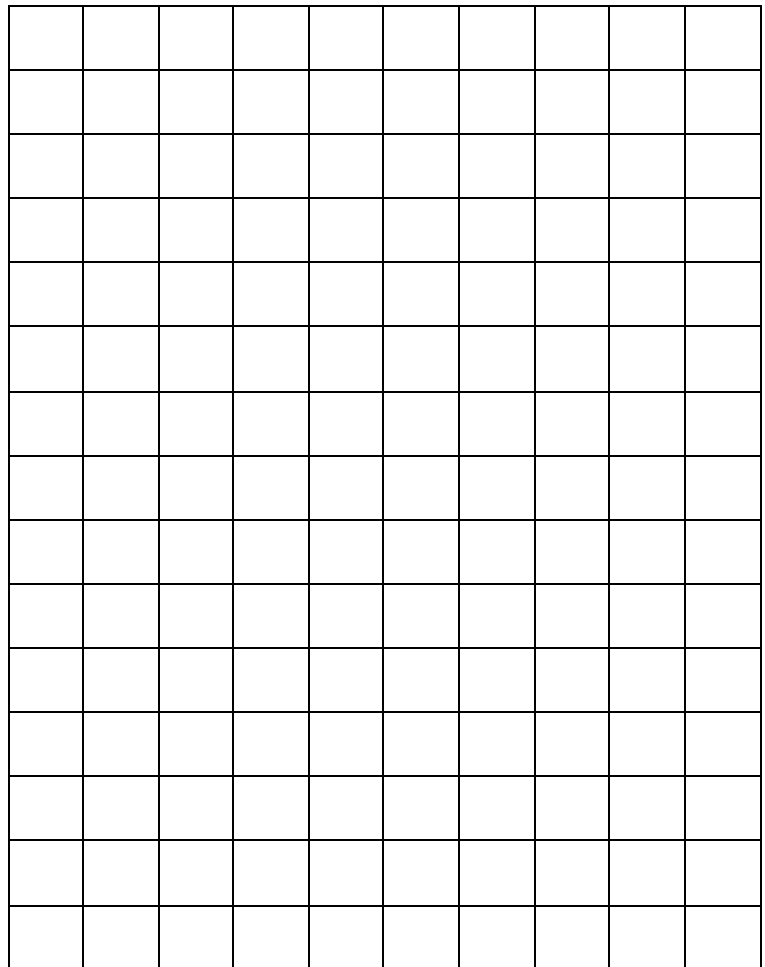
3. Refer to the bar graph below to answer the following questions.

- In which two months were sales the lowest?
- Estimate the total sales for January.
- The average monthly sales for the time period shown on the graph is \$40 million. Which month's sales were closest to the average?



4. Make a line graph for the set of data below. Label both the x (horizontal) and y (vertical) axis properly. Give the graph a title.

Height (cm)	Vertical Jump (cm)
59	12
60	17
61	16
62	24
65	21
65	35
67	27
68	36
71	31
74	11



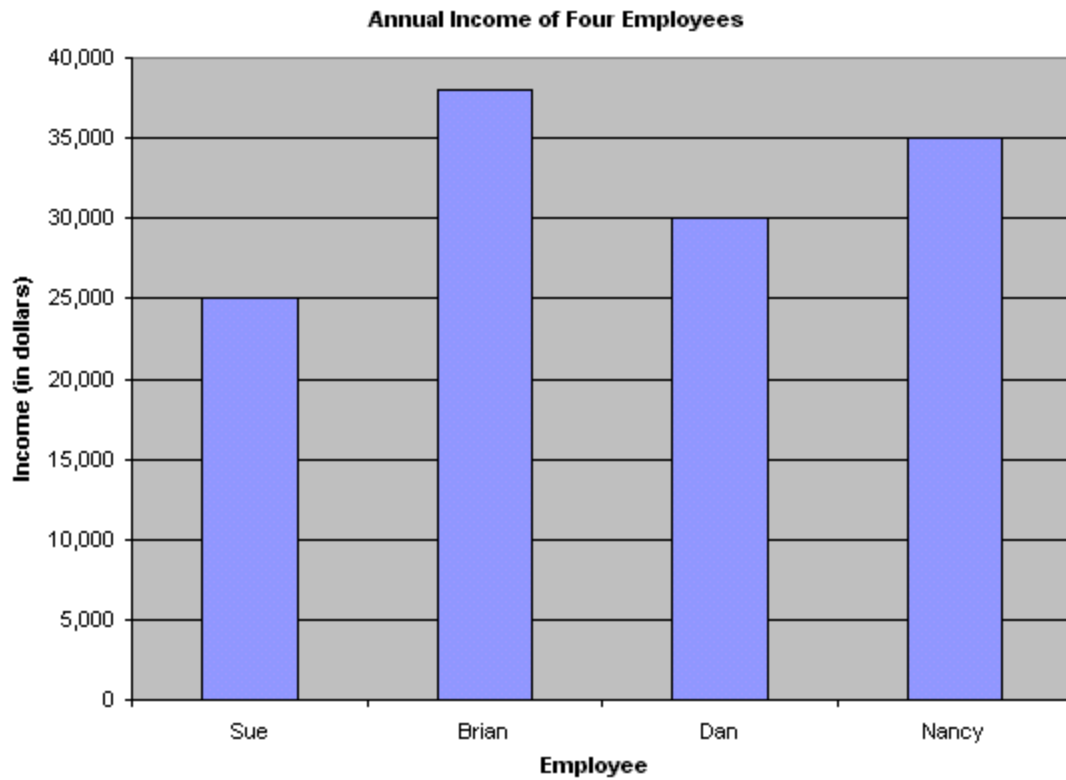
Answer Key

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Page 15

1. Graph B

2. Accept any reasonable answer.
(Example)



3. a. February and April
b. 48 million
c. March

4. Accept any reasonable answer.
(Example)

