



**Tools for Active Teaching and Active Learning**



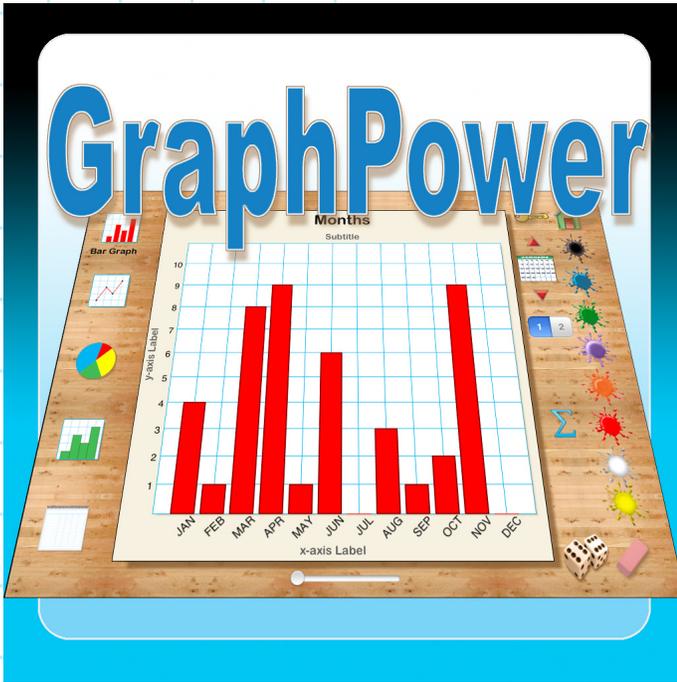
## **Instructor's Guide**

**Ventura Educational Systems**

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## Overview

We live in an Information Age. We are constantly bombarded with facts and figures about our complex world. The ability to understand and interpret graphs is an increasingly important skill which helps us to make sense of confusing information in an effort to be better able to make decisions.

Nationally, math educators have recognized that it is necessary to stress developing skill in graph interpretation as an essential part of the elementary and secondary curriculum in order to prepare students for full participation in adult society. The Curriculum and Evaluation Standards for School Mathematics, published by the National Council of Teachers of Mathematics and the Common Core Standards Initiative, call for increased emphasis on the use of graphing as a way to better interpret statistical data.

Technology offers powerful tools for creating and presenting graphs. Teachers who use this tool seek to help students become better problem solvers and to improve data analysis skills. Getting students actively involved in collecting, organizing, graphing and interpreting data is one of the best ways to develop their skill. Students at all levels should be encouraged to think critically. Learning to analyze data and to use data in making decisions will enable students to effectively process the enormous amounts of data they encounter through various forms of media.

GraphPower is designed to help you bring graphing into the elementary classroom as an integral part of project-based math explorations. Graphing is an excellent math activity for both primary and upper grade level students. For young students teachers may find it beneficial to link graphing projects to manipulative approaches. Older students will benefit from the graphing experiences which help them to develop critical thinking skills. The active teaching/active learning approach implemented in this curriculum tool involves the use of real-world data. Graphing helps students to understand a complex world and to relate the study of mathematics to their individual personal experiences. Four different types of graphs are implemented in GraphPower. Each type of graph is a specialized tool for organizing and simplifying data. For many students these activities will be their first experience with statistics and teachers will want to enthusiastically describe the work of real-life statisticians -- gathering data and creating graphs to assist in data analysis. Newspapers and news magazines as well as televised news programs and on-line services can be used to help students realize that statistics and the presentation of data through graphs is an integral part of daily life and that these tools help people to arrive mathematically at conclusions about the world.

A number of important skills are developed through graphing activities. In order to create a graph students will often need to classify items according to similarities and differences and through this process will strengthen their ability to determine critical attributes. Graphing may also involve

## **Introducing GraphPower**

sorting objects according to a particular attribute of interest. Learning how to make a graph is only the first step toward the goal of developing the ability to interpret graphs. To correctly make a graph students may need to count accurately or use their research skills to find data. Addition and subtraction skills may be employed to arrive at exact comparisons based on observations made from visual comparisons. In completing graphing projects, problem-solving skills will be used to help students determine why a particular set of results were obtained. Teachers will want to help students make appropriate generalizations about their data.

### **Developmental Stages**

Learning theory suggests that students are more likely to be successful in understanding a new concept if the presentation of the new concept proceeds through three distinct stages. These stages do not necessarily correspond to the age of the students, but more importantly relate to the stage of development in relation to the concept. In terms of building data analysis skills we can think of these three stages:

#### **Graphs Using Concrete Materials**

An effective way to introduce the concept of the graph is to use models. Models help students more readily see the relationship between the real world and the graph. For example, students may be asked to assemble a set of blocks in rows or columns according to some attribute. Our iPad app titled Hands-On Math Graph Cubes simulates using concrete materials to build graphs and is a good precursor to GraphPower. Hands-On Math Graph Cubes is suitable for student at an early stage of learning about graphs.

#### **Graphs Using Representation Materials**

At the representation level pictographs and pictograms are used to develop data analysis skills in our new app Hands-On Math Pictographs which present concepts using icons to make pictographs, data tables and charts.

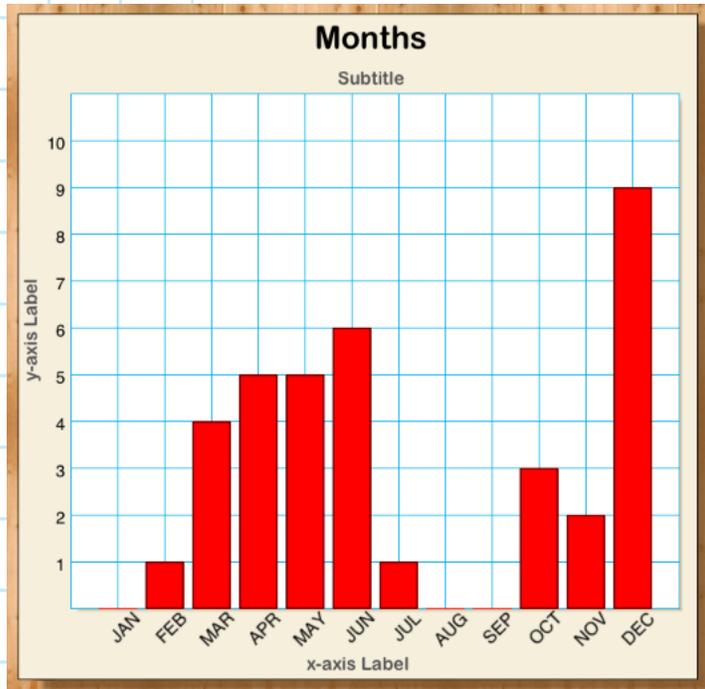
#### **Graphs Using Abstract Materials**

Bar graphs, line graphs, circle graphs and histograms are more abstract ways to represent data. GraphPower is a useful tool for teachers because it can be used to create experiences to help students understand the different applications for each type of graph. GraphPower is appropriate for almost all students because students are able to freely explore the concept of graphing and data analysis at both the representational and abstract levels of learning.

One of the most exciting ways to use graphs in the classroom is to create graphs that describe real data collected about the students in the class. The 'answers' to this type of activity will vary and therefore students will need to analyze and judge their work to determine if it appropriately describes the data that was collected. By participating in this type of classroom experience

students will learn that it is important to develop the ability to evaluate their products in terms of how accurately and effectively the meaning of the data is communicated. Students should be encouraged to think mathematically about the information presented in the graphs that they produce.

The activities suggested in this manual serve to guide students in the use of GraphPower. These activities are designed to assist classroom teachers in helping students develop graphing skills. GraphPower is a flexible tool that can be applied to a variety of problem solving situations in the classroom. The graphs produced with GraphPower can be incorporated in reports written using other software products. Because two of the key areas to be emphasized when developing data analysis skills are dialogue and discussion, teachers will want to demonstrate how to incorporate graphs in reports and presentations since doing so will facilitate learning these important skills.

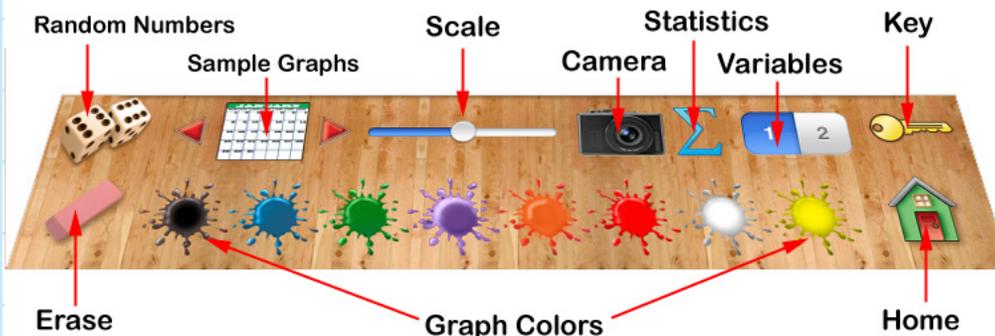


Math educators have realized the importance of developing skill in how to

communicate mathematical ideas to others. Teachers will find that GraphPower can facilitate the development of each student's ability to communicate the meaning of tables of numbers. Because GraphPower is designed as a tool students must select an appropriate graph for the type of data being analyzed. During the process of communicating to others the meaning of a graph, students may realize that a particular type of graph is not well suited for a given sample of data. With GraphPower it is easy to change the graph. This type of experience is a valuable lesson for the student to learn.

In using GraphPower to do the work of mathematicians students will participate in an exciting process. They will formulate questions and select a process to use to investigate their questions. They will gather data and organize their data into meaningful tables. They will evaluate their data to determine what is relevant and

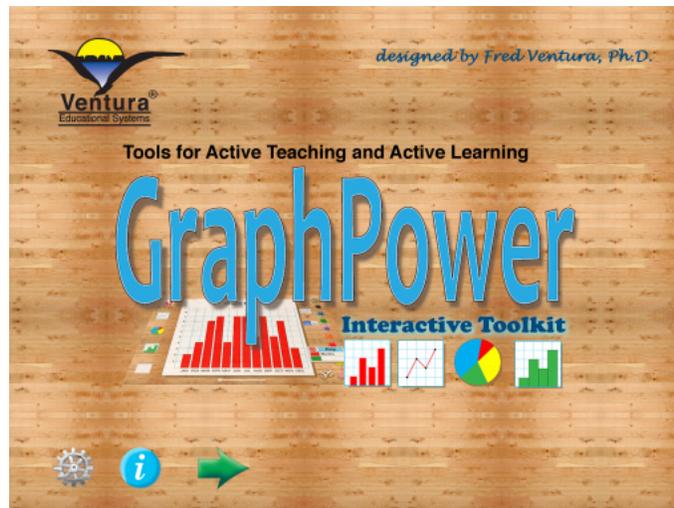
what is not. Once a meaningful set of data has been collected students will need to analyze and interpret it. Bar graphs, line graphs and circle graphs and histograms are four common tools which assist in data analysis. In addition, GraphPower provides basic statistical information about the data set.



## Getting Started

GraphPower helps students develop an understanding of several important mathematical concepts, such as, using tables and graphs to represent data, make comparisons and to analyze the results of surveys and other research questions related to social and physical sciences. The program is designed in such a way that the physical operation of the app does not interfere with the learning activity. Icons are used to provide the user with complete control over the interaction with the software features.

Tap the GraphPower icon to launch the app.



The opening view presents the title page with three options:



Settings - Tap this icon to control the sound, speech and view options of the app.



Info - Tap this icon to access the User's Guide where an overview of the app is presented.

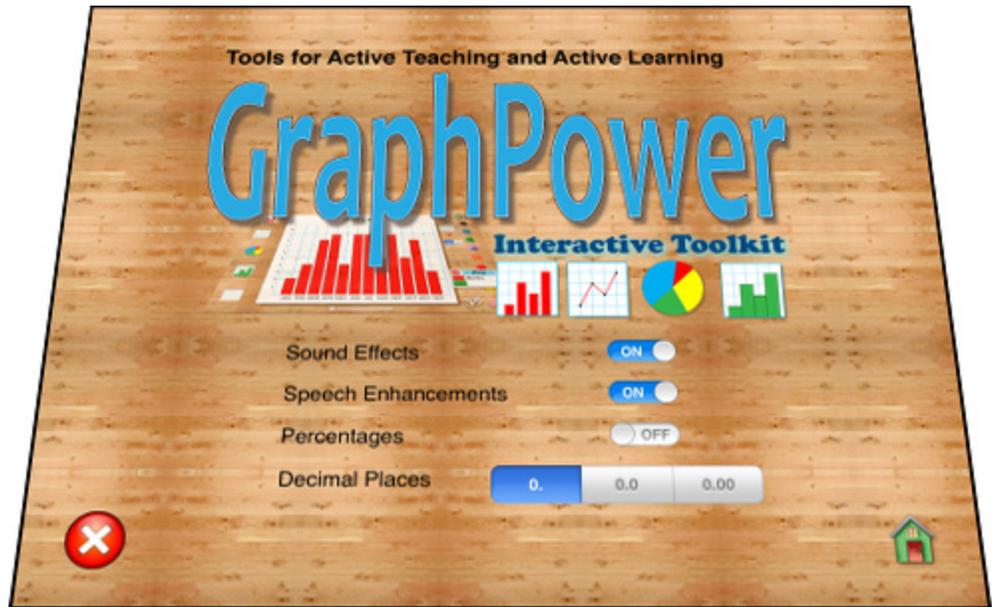


Begin - Tap the green arrow to start using the GraphPower.

## Settings

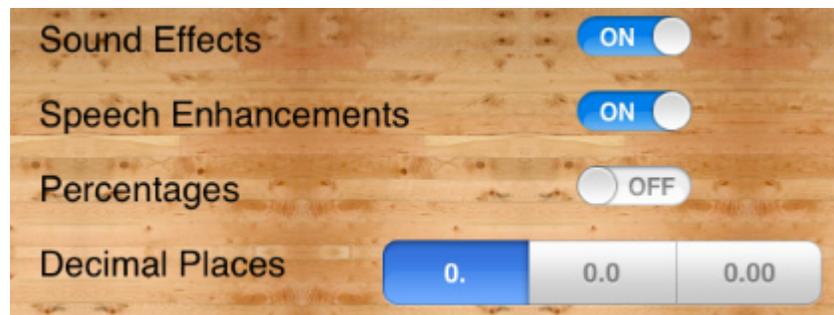


The Settings option provides control of some of the basic features of the app. Options include control for sound effects and speech.



Mild sound effects are used through out the app and add a level of interest for students. When using the app with very young students teachers may wish to have the Speech option on. When Speech is 'on' the names of the graphs and the colors are pronounce when tapped.

*Use Speech effects with very young children to reinforce the names of the graphs and colors.*



Use the on/off switches to activate or deactivate the sound effects, speech enhancements and the display of percentages.

The Decimal Places segmented control provides three display options for decimals. With the first option "0." selected, numbers are displayed as whole numbers. The second and third options display one or two decimal places respectively.

GraphPower only uses positive numbers and zero for graphs.

## In App User's Guide



Tapping the Info icon brings up the GraphPower User's Guide. The guide provides a quick overview to the features of the app. It serves as a quick reference to the use of the product. More extensive information is available in the Instructor's Guide.



Users can navigate by tapping either the right or left arrows. Swiping right or left can also be used to move to the next page or previous page.

Exit the user's guide by tapping the home icon.

*Swipe right or left to change pages or use the buttons.*



Next Page - Tap this icon to move to the next page.



Previous Page - Tap this icon to move to the next page.



Instructor's Guide - Tap to automatically begin downloading the PDF of the Instructor's Guide from [www.venturaes.com](http://www.venturaes.com). We recommend you install the Instructor's Guide in iBooks for convenient reference.

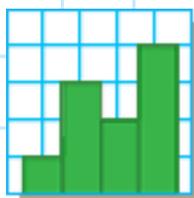
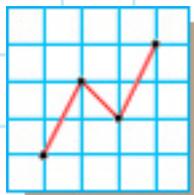


Tap the World Wide Web icon to launch your iPad browser and view the Ventura Educational Systems website.

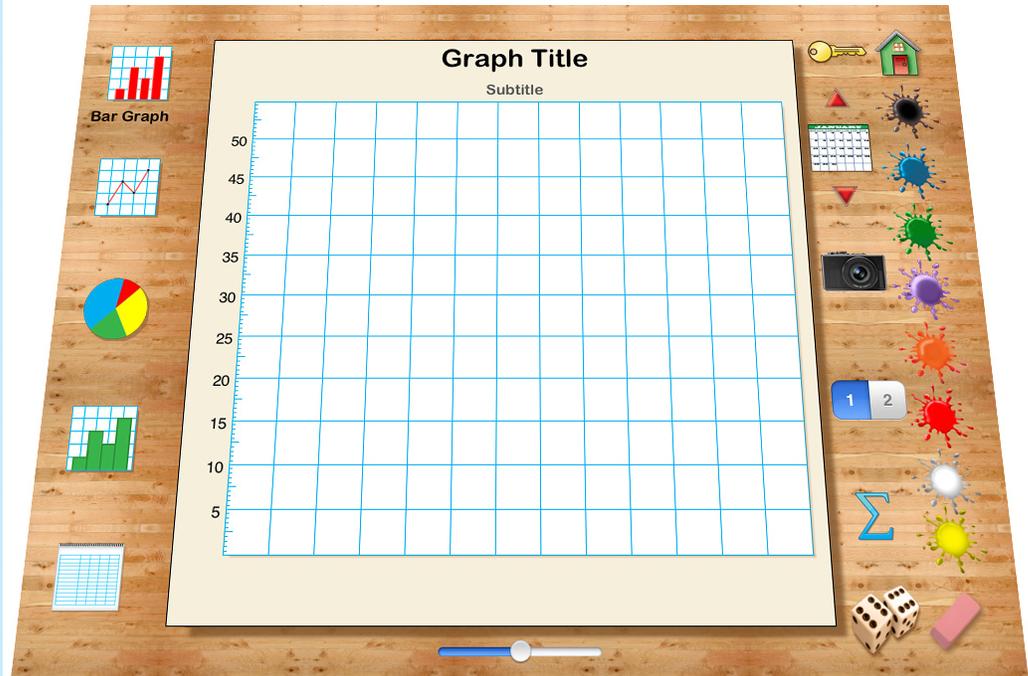


Home - Tap this icon to exit from the User's Guide.

# GraphPower Start



Launch GraphPower and let the fun begin. Tap the green arrow to get started. You will notice that in addition to the grid at the center of the screen there is a set of graph icons and a table icon. The type of graph is selected by tapping one of these icons. Grouped with the graph icons there is a data table icon. Tap this icon to enter or edit the data for the graph.



One important skill to learn for working with data and graphs is how to set up an appropriate scale. For GraphPower a slider is used to set the scale. The default setting is for the scale to be set with numbers from 1 to 10. The scale is changed by dragging the slider control. Options for the scale are:

- 1 to 10 counting by 1's
- 2 to 20 counting by 2's
- 5 to 50 counting by 5's
- 10 to 100 counting by 10's
- 100 to 1000 counting by 100's

Any of eight different colors can be selected to color the bars, lines or sections of a graph.

The color options are:

- Black
- Blue
- Green
- Purple
- Orange
- Red
- White
- Yellow



## Sample Graphs

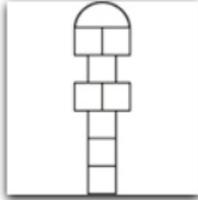
When using GraphPower a variety of built-in sample graphs are available. The graphs are selected by tapping an icon. The red arrows are used to scroll through the icons. Tapping the dice icon randomly generates a set of numbers for the sample graph.



This feature is designed for teachers to be able to quickly generate a graph for classroom discussions.

<b>Calendar</b>	<b>Labels</b>
	JAN APR JUL OCT FEB MAY AUG NOV MAR JUN SEP DEC
<b>Transportation</b>	<b>Labels</b>
	Car Balloon Walk Bus Bicycle Skate Motor Bike Sled Skateboard
<b>Colors</b>	<b>Labels</b>
	Black Purple Blue Red Green White Orange Yellow
<b>Days</b>	<b>Labels</b>
	Monday Friday Tuesday Saturday Wednesday Sunday Thursday

## Sample Graphs

Activities	Labels
	<p>Hopscotch Jump Rope Tehterball Bars</p> <p>Swings Slide Dodgeball</p>

Books	Labels
	<p>Fiction Nonfiction Adventure Fantasy</p> <p>Biography Poetry Sci-Fi</p>

Sports	Labels
	<p>Football Basketball Baseball Soccer</p> <p>Gymnastics Track Hockey</p>

Weather	Labels
	<p>Sunny Cloudy Rainy Snow</p> <p>Stormy Foggy Hot</p>

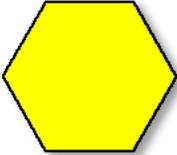
Planets	Labels
	<p>Mercury Venus Earth Mars</p> <p>Jupiter Saturn Uranus Neptune</p>

## Sample Graphs

Toys	Labels
	airplane sailboat doll
	car train set video game

Pets	Labels
	dog cat bird fish
	hamster snake pony guinea pig

Fruit	Labels
	apple banana cherry grapes
	lemon orange peach pear

Shapes	Labels
	circle triangle square rectangle
	pentagon hexagon octagon

Ice Cream	Labels
	vanilla chocolate cherry
	strawberry coffee rocky road

## Sample Graphs

North America	Labels
	United States      Honduras Mexico              El Salvador Canada              Nicaragua Guatemala          Costa Rica Dominican Republic Panama

South America	Labels
	Brazil                Chile Colombia          Ecuador Argentina        Bolivia Peru                 Paraguay Venezuela        Uruguay

Europe	Labels
	Russia              Ukraine Germany            Spain France              Poland United Kingdom    Romania Italy                 Netherlands

Asia	Labels
	China                Russia India                 Japan Indonesia          Philippines Pakistan            Viet Nam Bangladesh        Turkey

Australia	Labels
	Australia            Tonga Papua New Guinea    Micronesia New Zealand        Kiribati Fiji                  Marshall Is. Solomon Islands     Palau

## Special Options



### Statistics Window

The summation icon is used to open the Statistics window. Here a statistical analysis of the data is presented. The calculations reported are:

Sum	Maximum
Mean	Range
Minimum	Median
Maximum	Mode

### Number of Variables

The segmented control labelled with a 1 and 2 is a special control. When a two-variable graph is selected the control determines how many variables are used in the graph. The bar graph and line graph can display one or two variables.



The circle graph and histogram only display one variable at a time. When the Number of Variables segmented control is set on 1 the first column of data from the data table is used in creating the graph. When it is set on 2 the second column of data is used.

### The Key or Legend

Tap the Key icon to display a key or legend for the graph. When a bar graph, line graph or histogram is selected the key is labelled with the headings from the top of columns in the Data Table. For a circle graph the key is labelled using the words at the beginning of each row in the Data Table.



### Dice

Tap the dice to randomly generate a set of numbers for the current graph. The range of the numbers generated is determined by the scale setting. This option is useful to teachers who want to quickly set up a graph while teaching a lesson in order to point out a concept or relationship by asking questions using the sample graph.



### Erase

Tap the eraser to instantly erase the data for the graph.



### Color Splash

Tap any of the eight color splashes to assign a color to the bars, lines or sections of a graph.



## The Data Table



Tap the Data Table icon to show the table associated with the current graph. As changes are made in the Data Table the graph is instantly updated. Labels in the table can be changed by using standard editing functions.

Students should enter their data, column headings and a title for their graph.

Books Read	Girls	Boys
JAN	49	20
FEB	9	24
MAR	10	6
APR	11	9
MAY	45	42
JUN	41	38
JUL	45	27
AUG	1	24
SEP	20	1
OCT	26	39
NOV	10	31
DEC	5	25

The data shown above was quickly generated by following these steps:

1. Select the Calendar sample graph by tapping the icon.
2. Set the scale to 1 to 50.
3. Tap the Number of Variables segmented control to 2.
4. Generate numbers for the graph by tapping the dice.
5. Give the graph meaning by entering a title and column headings.

## Instructional Goals

minimum

range

mean

difference

survey

greatest

mode

least

average

maximum

mode

In general the purpose for using GraphPower is provide students with activities that involve collecting, describing, visualizing, and analyzing data based on real-life situations. We want to encourage students to think about data in mathematical terms. Key terms and concepts are important for students to learn and GraphPower is a tool to help teachers illustrate words associated with data analysis..

Several of the activities involve collecting data in response to survey questions and using the answers to build graphs. Other projects involve research to find out information about topics in social sciences and sciences. Teachers will want to lead students in discussions that involve summarizing the information contained in their graphs. Students should be encouraged to explore the relationships revealed by a graph.

Discuss with students the implications of adding new data to a given chart or graph. Help students see that tables are a common way to organize a data set. Students will begin to realize that information organized in a table in many cases can be converted to a graph which is a pictorial representation that is helpful in providing insights into the data.

As students use this app they should begin to expand their mathematical vocabulary. Encourage students to give verbal descriptions of the graphs that they create while using the app. Some of the activities require the students to work in small groups and this is an opportunity to use mathematical language in sharing and refining ideas. In large group instructional situation with your iPad connected to a projection device teachers can demonstrate a variety of mathematical concepts related to data analysis using the app.

Teachers will want to guide the learning experience with questions that help students focus on data analysis skills. “Which pet was the most popular?” “Which color was chosen the least? “How many more students chose football compared to baseball as their favorite sport?

GraphPower is designed to be used at a variety of grade levels. It is appropriate for individual, small group or classroom learning situations

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# Level K: Lunchtime Fruit

Let's begin exploring GraphPower by building a graph to show the results of a survey.



Settings

Tap the Settings icon and change the options.



Sound Effects



Speech Enhancements

Tap the home icon and return to the top level. Tap the green arrow to begin. If necessary tap the eraser to erase the graph.



Home



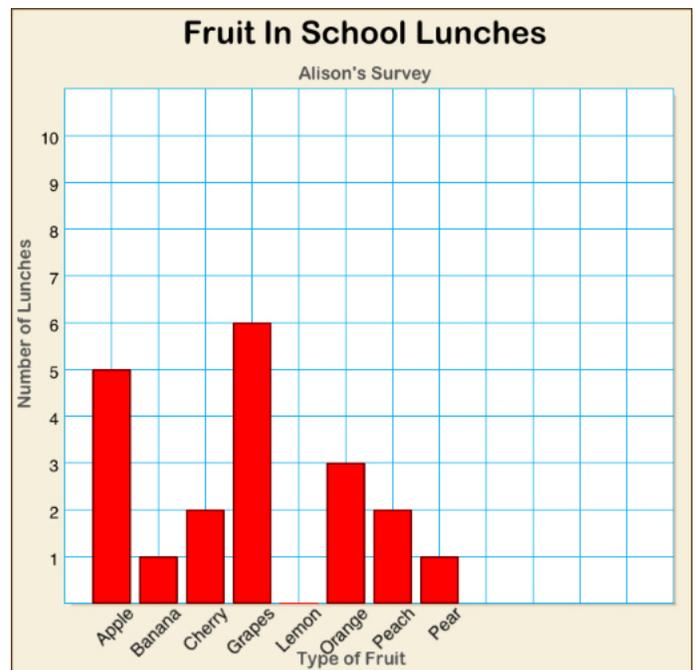
Eraser

Alison asked 33 people at her school to answer the question, "Which type of fruit is in your lunch?" She used a chart to collect the answers.

Use GraphPower to build a graph to show the results of Alison's survey. Compare your graph to the graph shown below.



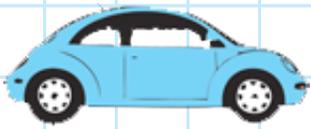
Fruit	Lunches
Apple	5
Banana	1
Cherry	2
Grapes	6
Lemon	0
Orange	3
Peach	2
Pear	1



1. How many students had grapes in their lunch?  
\_\_\_\_\_
2. How many students had a banana in their lunch?  
\_\_\_\_\_
3. Five students had this type of fruit. \_\_\_\_\_
4. Which fruit did more students have, oranges or peaches? \_\_\_\_\_

## Level K: How Did You Get To School?

Let's make a graph. Ask 20 students at your school how they got to school today. Use a tally to keep track of the answers.



Enter the data from your survey into GraphPower. Make a bar graph to show the results of your survey.

Car	
Walk	
Bicycle	
Motor Bike	
Skateboard	
Balloon	
Bus	
Skate	
Sled	

Here's a sample of the data Jonathan collected.

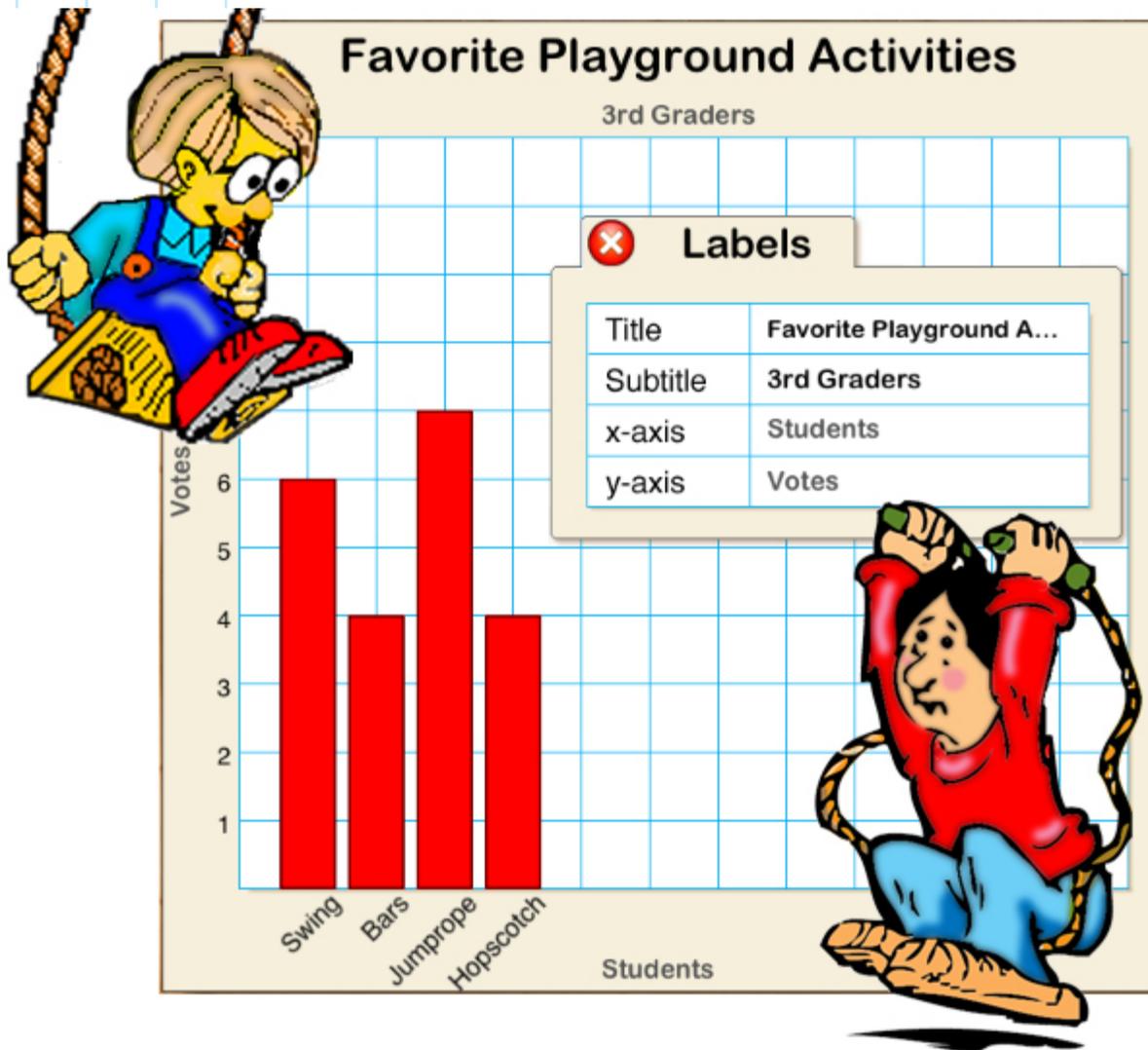
1. Which way of getting to school had the most students? \_\_\_\_\_
2. Did more students travel by bus or bicycle? \_\_\_\_\_
3. How many students walked to school? \_\_\_\_\_
4. How many more students need to walk to school to be the same as the number who take the bus? \_\_\_\_\_
5. How many more students walked than students who rode a bike? \_\_\_\_\_
6. What is one way that no students got to school? \_\_\_\_\_

Transportation	Students
Car	8
Walk	5
Bicycle	2
Motor Bike	1
Skateboard	0
Balloon	0
Bus	4
Skate	0
Sled	0

Sort

- 1 -

## Level K: Playground Activities



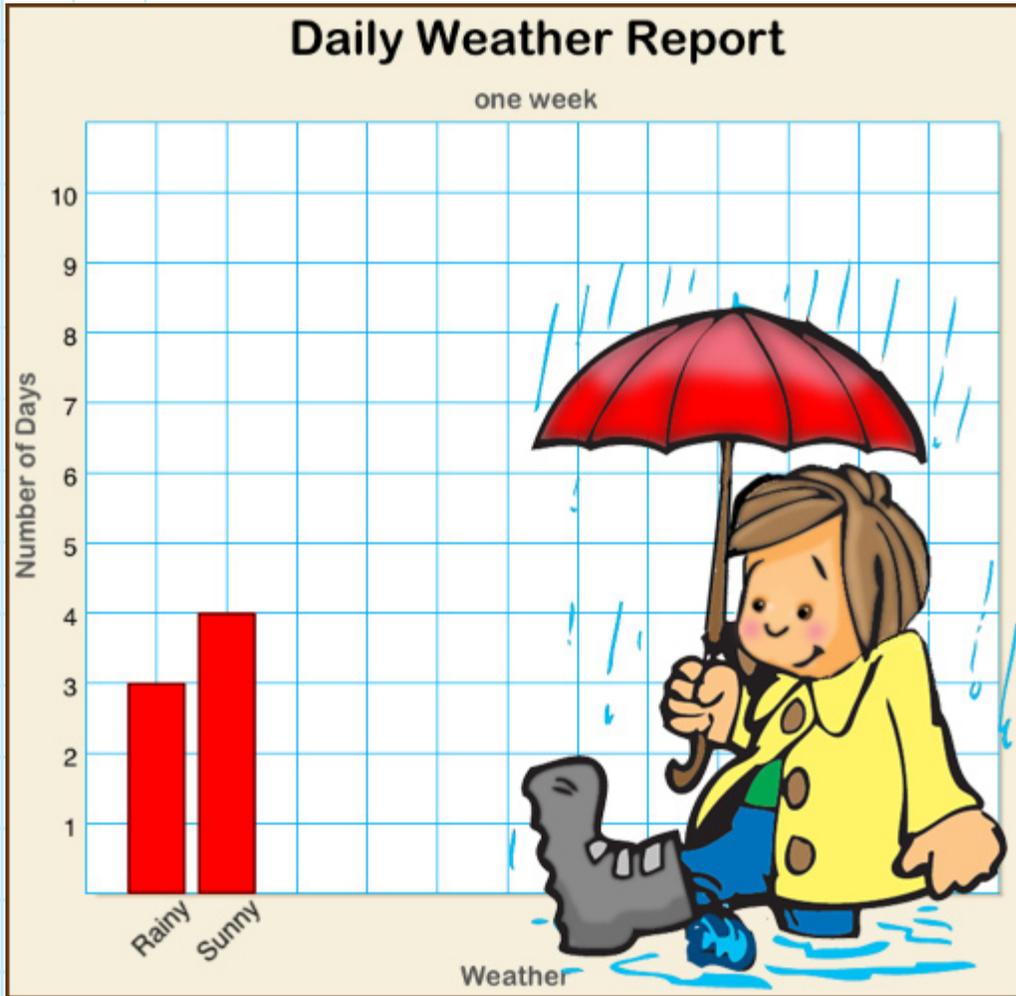
Take a survey to find out which activity is the favorite.

Activity	Tally	Number
Swing		
Bars		
Jumprope		
Hopscotch		

Make a bar graph. Which activity is the favorite?

\_\_\_\_\_

# Level K: Sunny Days, Rainy Days



Study the graph. Answer these questions.

1. How many rainy days?

2. How many sunny days?

3. How many days in all?

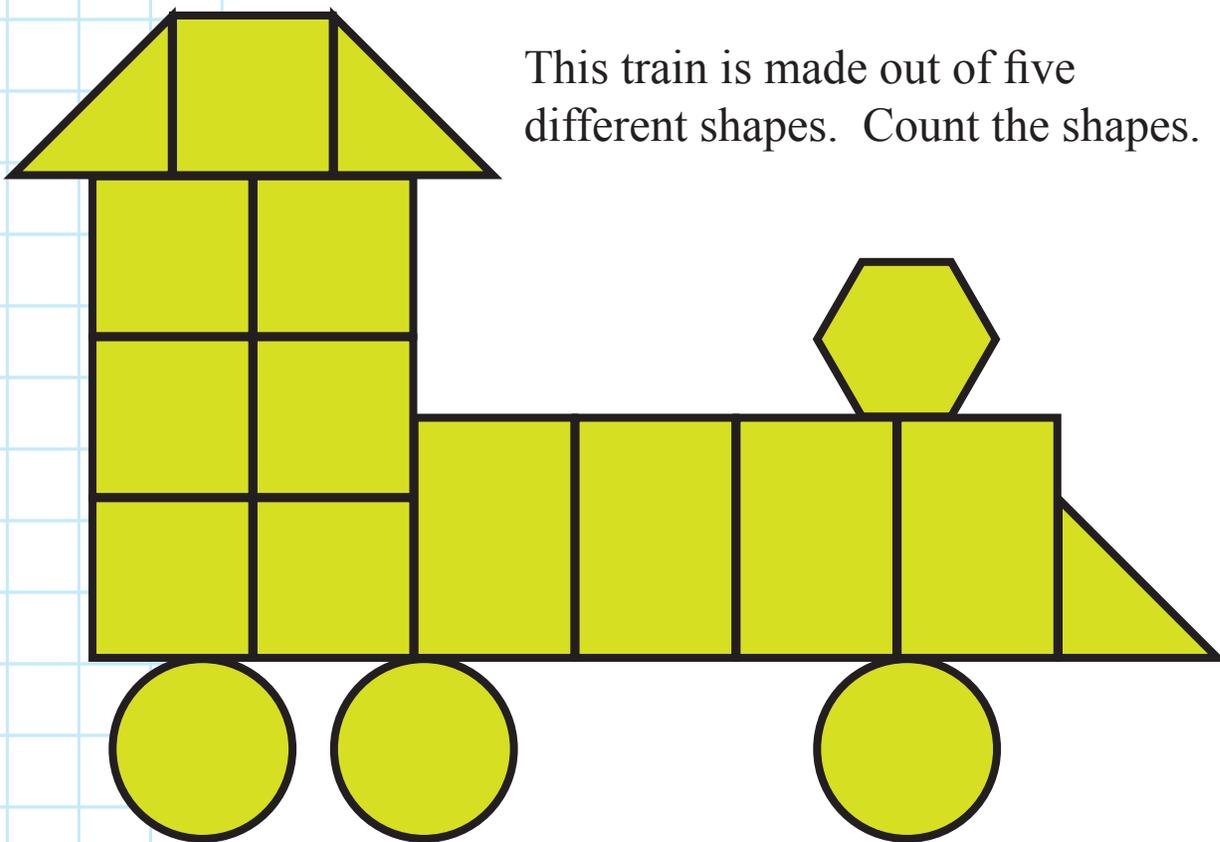
4. Which is the greatest?

Rainy

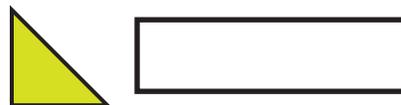
Sunny

## Level K: Shape Train

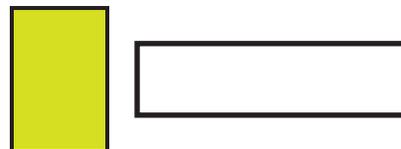
This train is made out of five different shapes. Count the shapes.



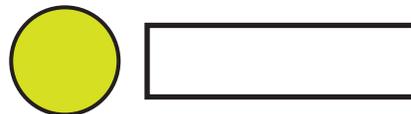
1. Write the number of triangles.



2. Write the number of rectangles.



3. Write the number of circles.



4. Write the number of squares.

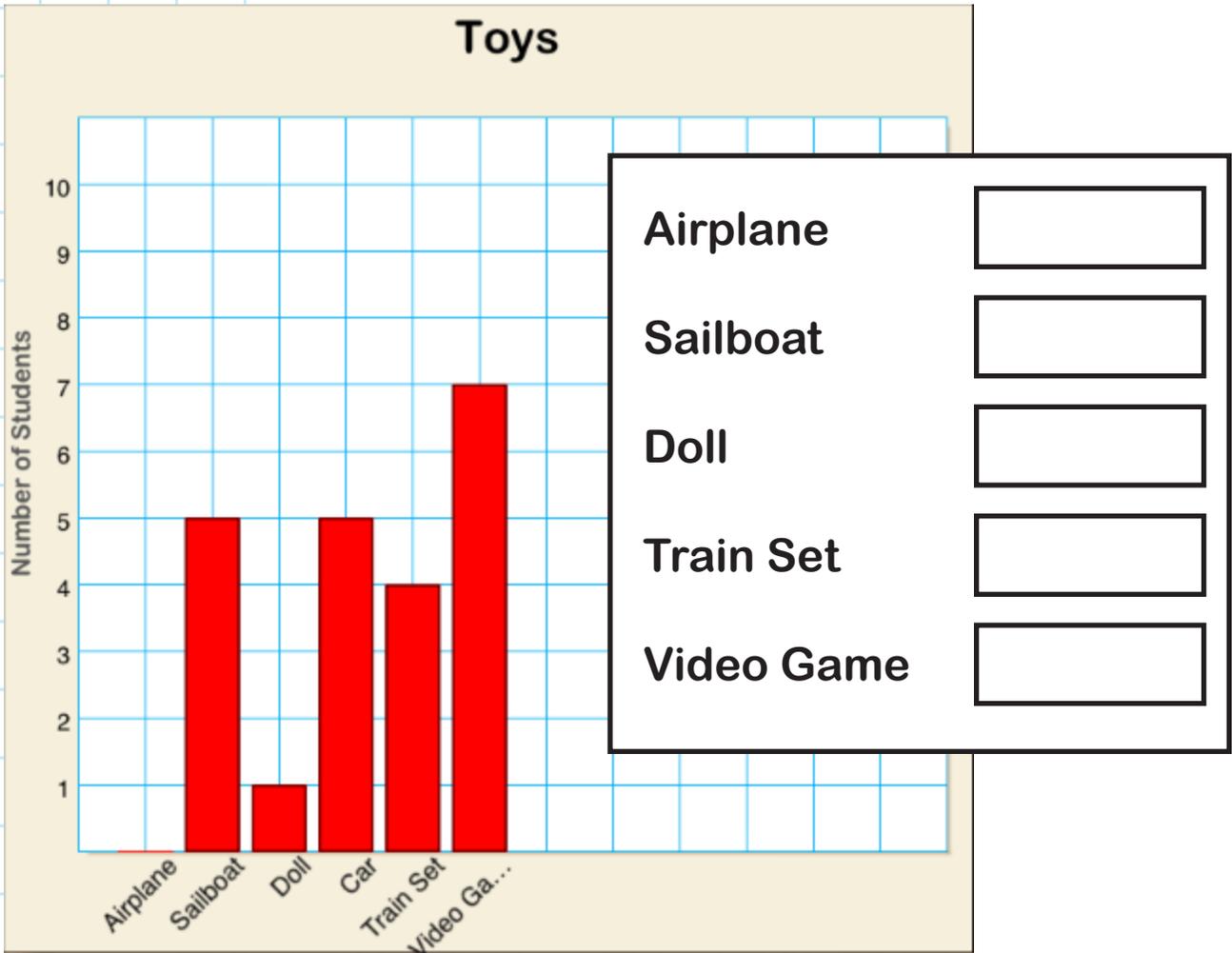
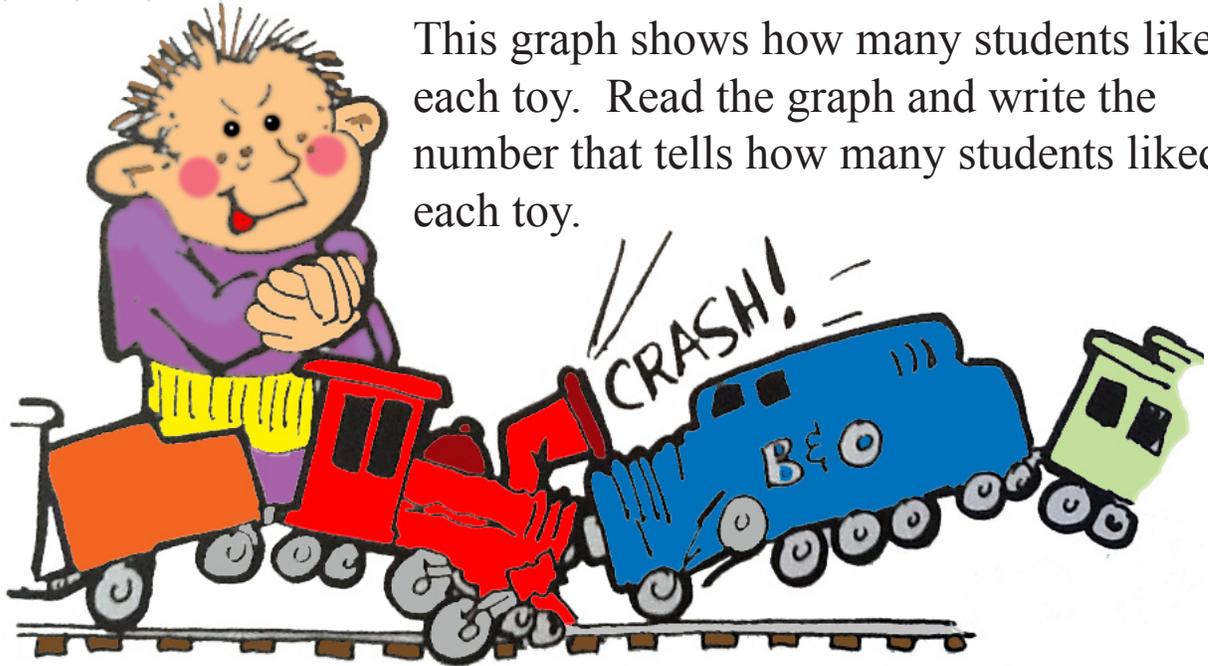


5. Write the number of hexagons.



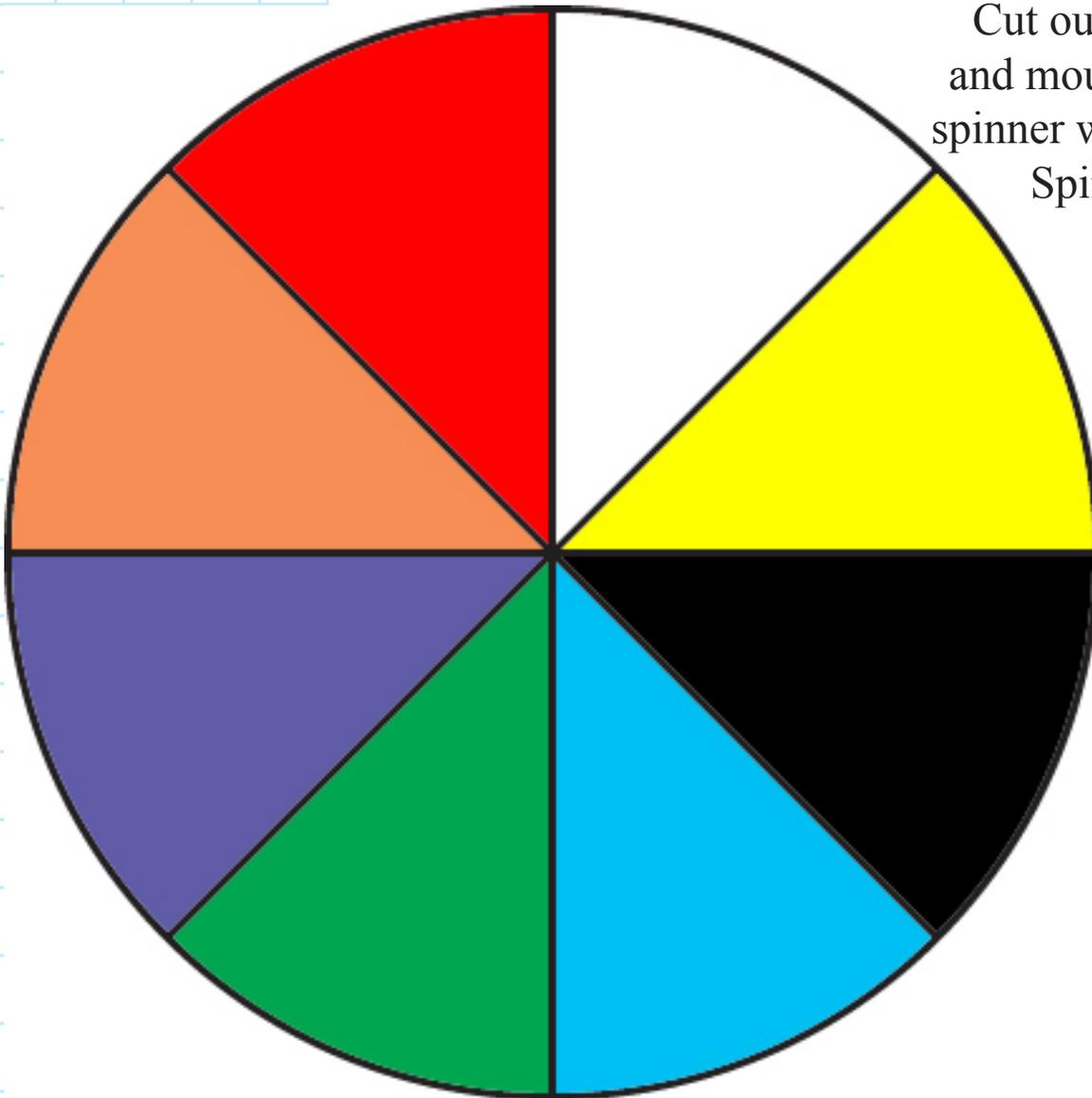
Make a bar graph to show how many of each shape was used to make the train.

## Level 1: Favorite Toys



## Level 1: Color Spinner

Cut out the arrow  
and mount it to the  
spinner with a brad.  
Spin 20 times.



Use a tally table to record  
the results.

Make a bar graph to  
show the results of this  
experiment.

Color	Tally	Number
Black		
Blue		
Green		
Purple		
Orange		
Red		
White		
Yellow		

## Level 1: Favorite Colors

What is your favorite color?

Ask your classmates to pick one of these colors.

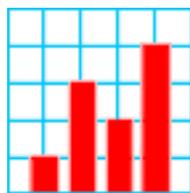
Black	
Blue	
Green	
Purple	
Orange	
Red	
White	
Yellow	



Make a bar graph to show the results of your survey.

Colors	Votes
Black	
Blue	
Green	
Orange	
Purple	
Red	
White	
Yellow	

Enter numbers in the data table to show how many students voted for each color.



Tap the bar graph icon to make a graph.

1. How many chose red? \_\_\_\_\_
2. How many chose blue? \_\_\_\_\_
3. Which color was the most popular? \_\_\_\_\_
4. Which color was the least popular? \_\_\_\_\_

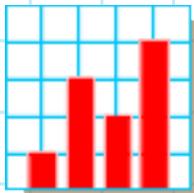
## Level 1: Collecting Cans



Tap the days of the week icon to start the table.

On their summer camping trip, the Thomas family collected cans for a one week period. This table shows how many cans they collected.

**MTWTFSS**



Tap the bar graph icon to make a graph.

Days	Cans
MON	9
TUE	8
WED	12
THU	13
FRI	15
SAT	10
SUN	6

1. How many cans were collected on Thursday? \_\_\_\_\_
2. On which day were the most cans collected? \_\_\_\_\_
3. Make a bar graph to show how many cans were collected each day.

## Level 2: Family Pets

Let's take a survey to find out about our pets. Take a survey of the students in your class. Find out how many have each type of pet at home.



Tap the bar graph icon to make a graph.

Complete this table:

Pets		
Dog		
Cat		
Bird		
Fish		
Hamster		
Snake		
Pony		
Guinea Pig		

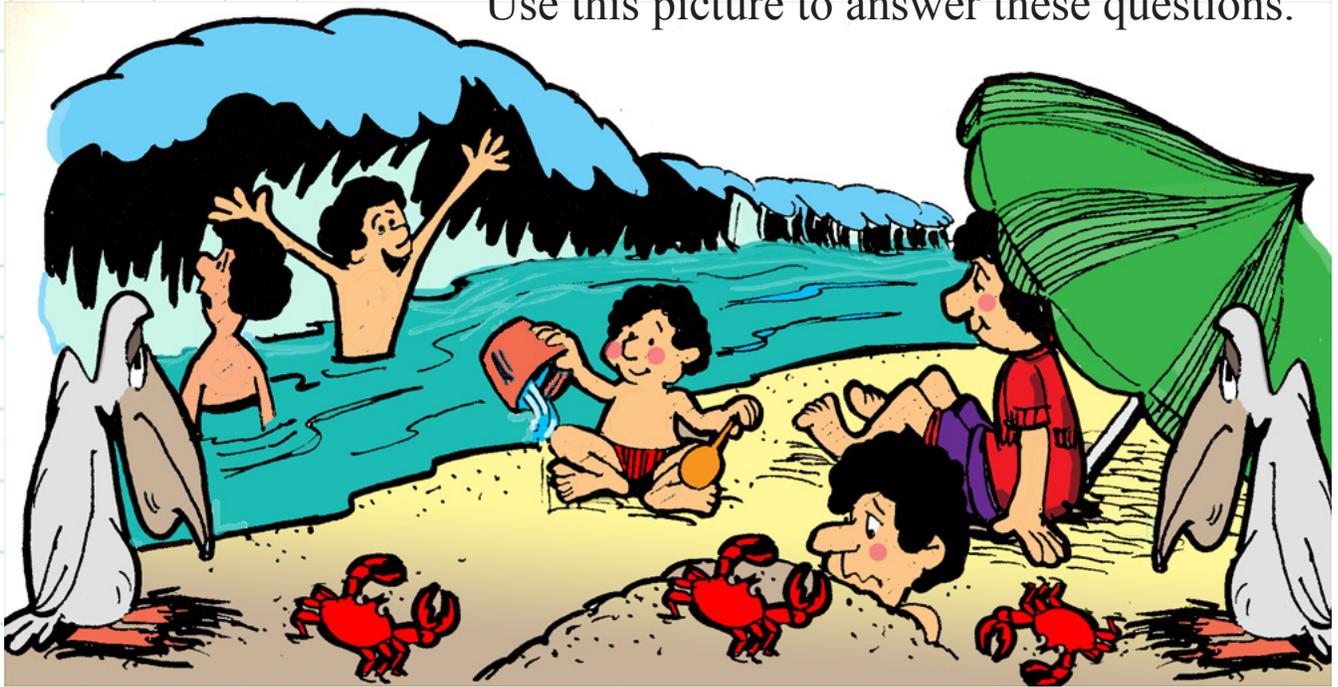
Sort

- 1 -

1. More families have a \_\_\_\_\_ than any other pet.
2. Which pet do the least number of families have?  
\_\_\_\_\_
3. Which pet was more popular, dogs or cats?  
\_\_\_\_\_
4. Were any pets zero? Which ones? \_\_\_\_\_  
\_\_\_\_\_

## Level 2: Beach Trip

Use this picture to answer these questions.



Enter the number of people, pelicans, crabs, buckets and umbrellas in to the GraphPower data table.



Tap the bar graph icon to make a graph.

1. How many people are in the picture? \_\_\_\_\_
2. How many pelicans? \_\_\_\_\_
3. How many crabs? \_\_\_\_\_
4. How many buckets? \_\_\_\_\_
5. How many umbrellas? \_\_\_\_\_
6. Add number of buckets, umbrellas, crabs and people? \_\_\_\_\_

Enter a title and labels for your graph.

## Level 2: Delicious Favorites



Use a chart to make a tally table to find out each student's favorite ice cream flavor. Use the GraphPower data table to enter the results.

Flavor	Tally	Count
vanilla		
chocolate		
cherry		
strawberry		
coffee		
rocky road		

Make a bar graph to show the results of your survey.



Tap the bar graph icon to make a graph.

Survey your classmates to find out each student's favorite fruit. Make a tally table.

Favorite Fruit	Tally	Count
apple		
banana		
strawberry		
orange		
plum		
cherry		

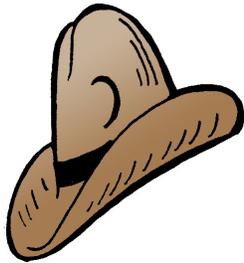
Use GraphPower to make a bar graph to show the results of your survey.

## Level 2: Collecting Data at Home



Tap the bar graph icon to make a graph.

Use tally sheets to count some of the items in your home. Enter your data in GraphPower. Make a bar graph from the data you collected.

Item	Tally
	Shoes
	Hats
	Shirts
	Sweaters

## Level 3: Backyard Field Trip



Tap the bar graph icon to make a graph.

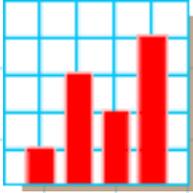
Which types of graph are appropriate for these data?

- Bar Graph
- Line Graph
- Circle Graph
- Histogram

Take a field trip to your back yard or a park near your house. Spend 15 minutes observing nature. Enter your data in a GraphPower table and make a bar graph to show your results.

Animal	Tally
	Birds
	Squirrels
	Frogs
	Insects

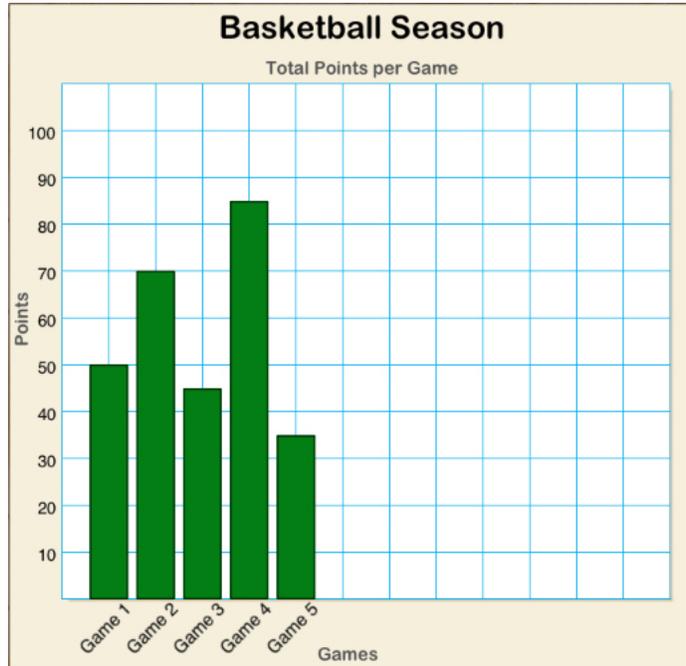
## Level 3: Basketball Scores



The coach wants to help the team compare the number of points scored in the last five basketball games.

Game	Score
Game 1	50
Game 2	70
Game 3	45
Game 4	85
Game 5	35

*Enter the scores to make a bar graph.*

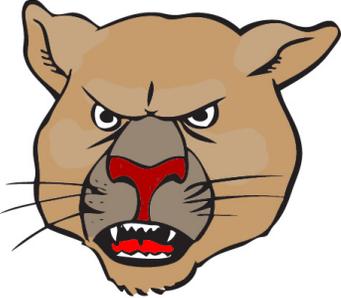


Read the bar graph and then solve.

1. In which game did the team score the most points? \_\_\_\_\_
2. In which game did the team score the least points? \_\_\_\_\_
3. What is the difference between the points scored in Game 1 and Game 2?  
\_\_\_\_\_
4. In Game 6 the team scored 55 points, add this score to the graph.
5. In Game 2 Mike scored 20 points. How many points did the rest of the team score? \_\_\_\_\_

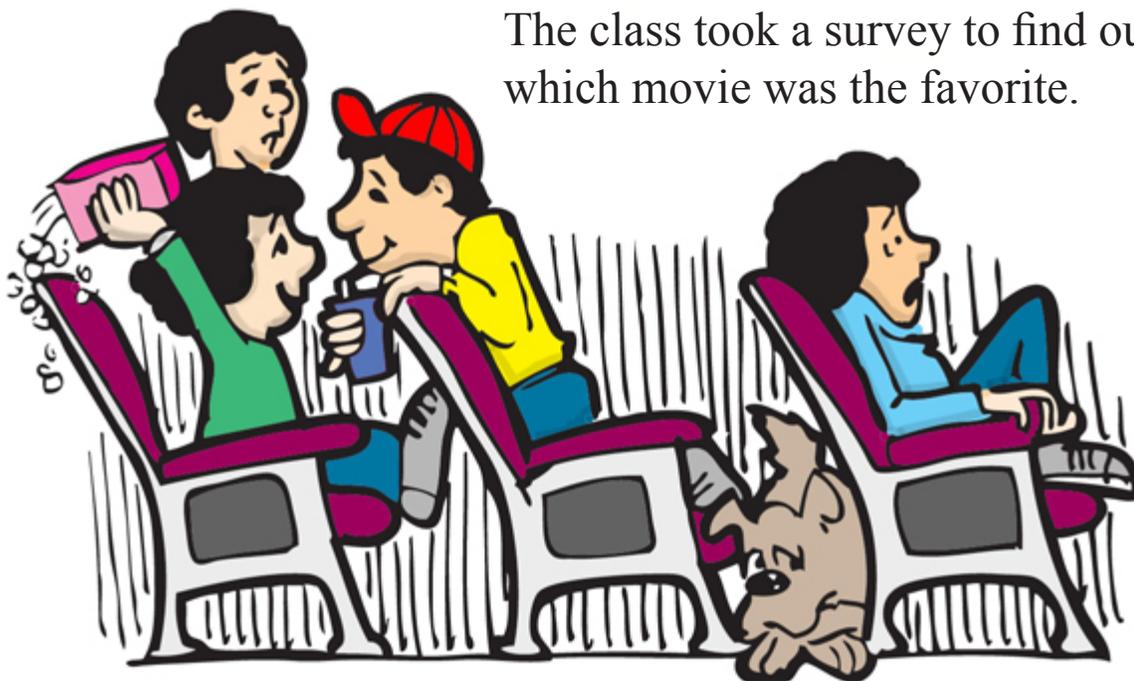
### Level 3: Sports Teams

Make a bar graph to compare the final scores in these games.

		1	2	3	4	Total
Bears		12	6	7	14	
		7	6	7	0	
		1	2	3	4	Total
Bulldogs		0	6	0	7	
		14	7	6	21	

### Level 3: Favorite Movies

The class took a survey to find out which movie was the favorite.



Tap the circle graph icon to make a graph.

Use GraphPower to make a circle graph to show the results.

Movie Title	Votes
Dinosaur Park Expedition	10
Invaders from Space	8
The Long Journey Home	6
Mystery Island	1
Rocky Mountain Adventure	5

Write the names of five movies. Take a survey of your classmates. Make a circle graph.

Movie Title	Votes

## Level 4: Rock Hound



Let's test the hardness of different rocks. Geologists use a scratch test in the field to help identify rocks. Bring to school a small interesting rock for our classroom collection.

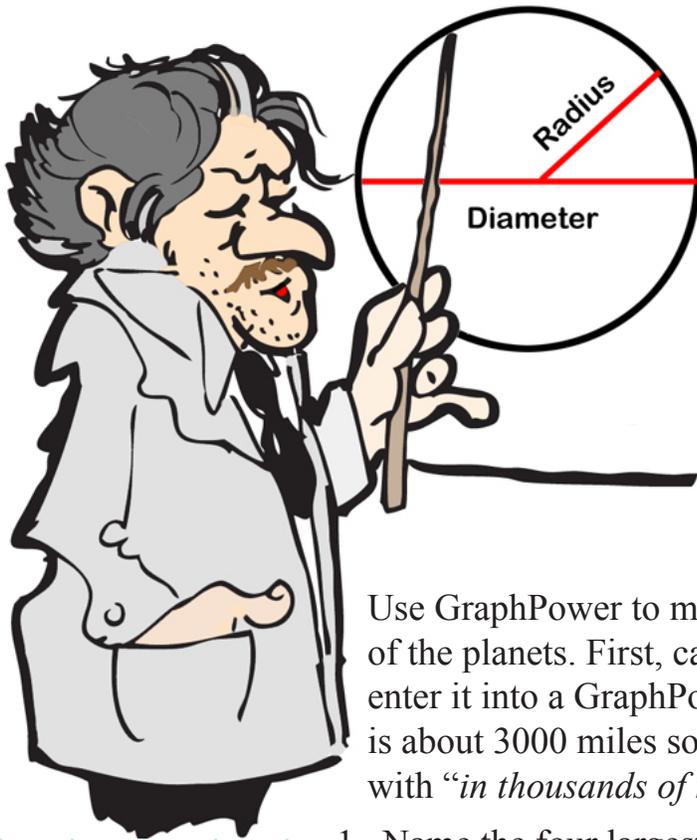
Type of Rock	Count
Hard Rocks	
Soft Rocks	

1. Use a scratch test to put the rocks into two groups according to hardness. Record how many rocks are in each group. Make a circle graph to show the results of your experiment.
2. Geologists classify rocks according to how the rock was formed. There are three main types of rocks:

Type of Rock	Description
igneous rocks	These rocks are created when hot liquid material called magma cools and solidifies. Magma comes from deep in the earth and is a mixture of almost all of the 92 naturally occurring elements.
sedimentary rocks	This type of rock is formed from the worn fragments of other rocks. Sedimentary rocks are called clastic rocks. Conglomerates, sandstone, mudstones and shales are examples of clastic rocks.
metamorphic rocks	Great amounts of heat and pressure are needed to form metamorphic rocks. Examples of metamorphic rocks are marble, hard slate, and quartzite.

One student's rock collection contained 15 igneous rocks, 10 sedimentary rocks and 12 metamorphic rocks. Use GraphPower to make a circle graph for these data.

## Level 4: Diameter of the Planets



The professor used a table in his lecture to explain the differences in the sizes of each planet.

### Radius of Each Planet

Planet	miles	kilometers
Mercury	1,516	2,440
Venus	3,760	6,052
Earth	3,963	6,378
Mars	2,111	3,397
Jupiter	44,423	71,492
Saturn	37,449	60,268
Uranus	15,882	25,559
Neptune	15,388	24,764

Use GraphPower to make a bar graph to compare the diameters of the planets. First, calculate the diameter for each planet and enter it into a GraphPower Data Table. The diameter of Mercury is about 3000 miles so enter 3.0 and then label the scale (y-axis) with “*in thousands of miles*”.

1. Name the four largest planets:

\_\_\_\_\_

\_\_\_\_\_

2. Which planet is closest in size to the Earth?

\_\_\_\_\_

3. Which planet has the smallest diameter? \_\_\_\_\_

4. Which two planets are closest in size? \_\_\_\_\_

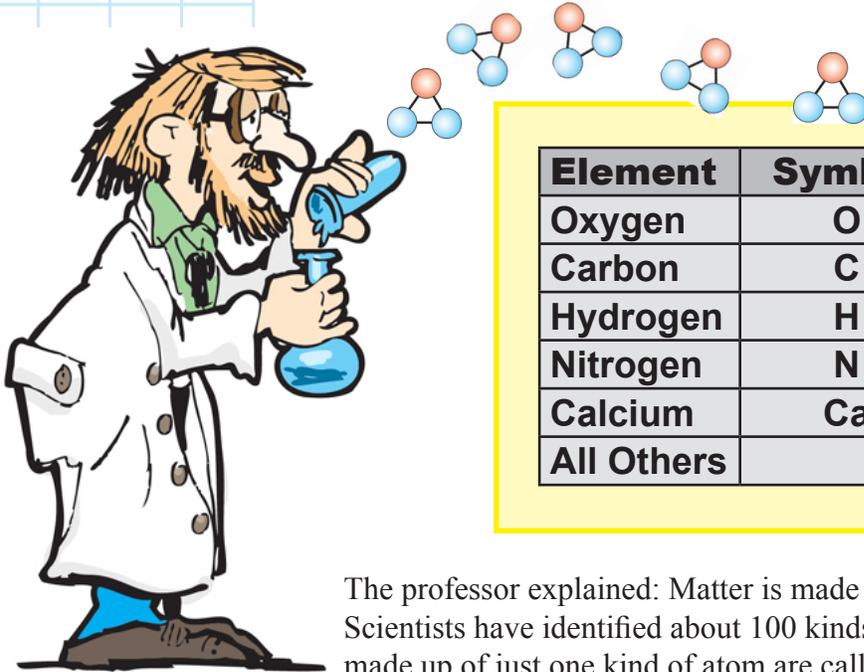
5. Since the planets are listed in order of distance from the sun, a line graph is also appropriate. Make a line graph using these data.

6. List the planets in order by size: \_\_\_\_\_  
\_\_\_\_\_



**Use the slider to set an appropriate scale.**

# Level 4: Elements in Our Bodies



Element	Symbol	Percentage
Oxygen	O	65.0%
Carbon	C	18.6%
Hydrogen	H	9.7%
Nitrogen	N	3.2%
Calcium	Ca	1.8%
All Others		1.7%

The professor explained: Matter is made up of different kinds of atoms. Scientists have identified about 100 kinds of atoms. Substances that are made up of just one kind of atom are called elements. Some elements you might be familiar with are oxygen, gold, silver, iron and aluminum.

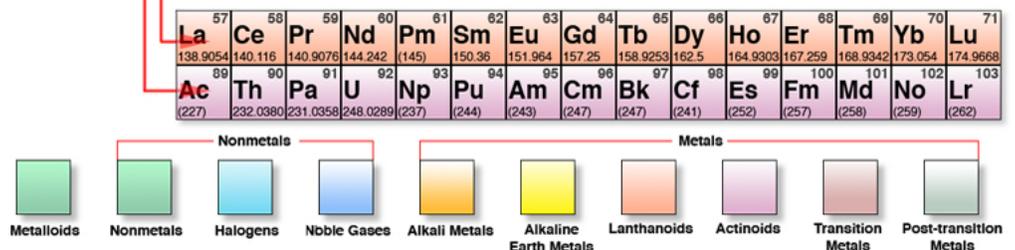
The professor's computer reported how much of our bodies are made up of each element. Use GraphPower a bar graph to compare the amounts of each element.

Chemists use the Periodic Table to organize the elements into a pattern. Locate oxygen, carbon, hydrogen, nitrogen and calcium in the table.

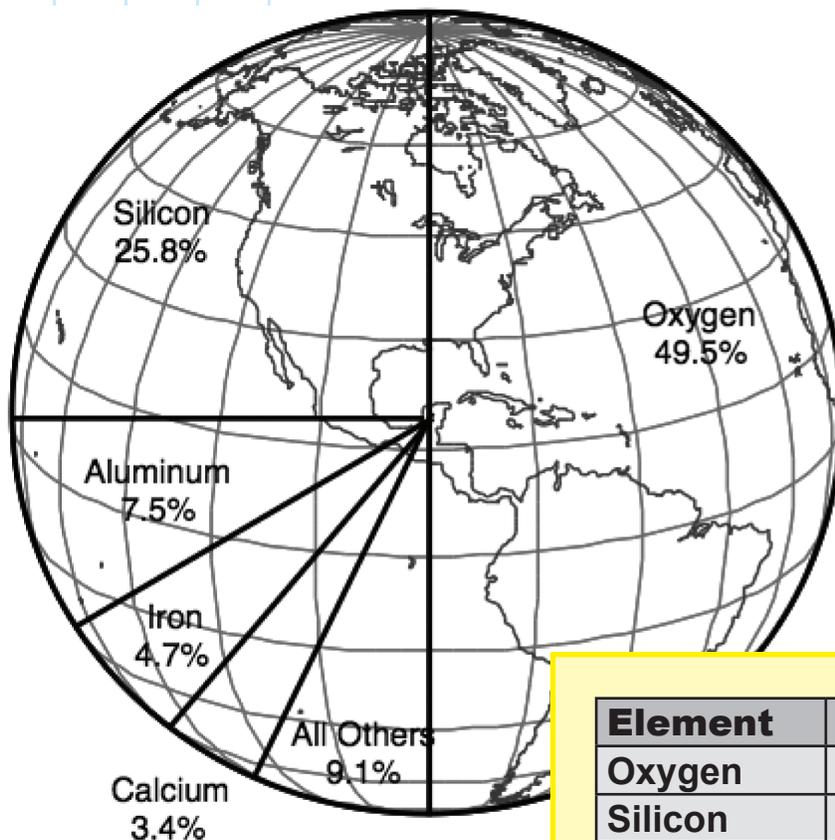
Which types of graph are appropriate for these data?

- Bar Graph
- Line Graph
- Circle Graph
- Histogram

## Periodic Table of Elements

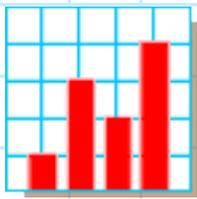


## Level 4: Elements from Our Earth



The outer layer of the earth is called the crust. The earth's crust is made up of three types of rocks: igneous, sedimentary and metamorphic. Scientists who study the composition of rocks have found that all rocks are made up of mostly two elements - oxygen and silicon. These two elements account for over 75% of the earth's crust. The other common elements are aluminum, iron and calcium. All of the other elements combined account for 9.1%.

Element	Symbol	Percentage
Oxygen	O	49.5%
Silicon	Si	25.8%
Aluminum	Al	7.5%
Iron	Fe	4.7%
Calcium	Ca	3.4%
All Others		9.1%



Tap the bar graph icon to make a graph.



Tap the circle graph icon to make a graph.

- Which fraction best represents the amount of oxygen.

$$\frac{1}{2} \quad \frac{1}{3} \quad \frac{1}{4} \quad \frac{2}{3} \quad \frac{1}{5}$$

- Which fraction best represents the amount of silicon.

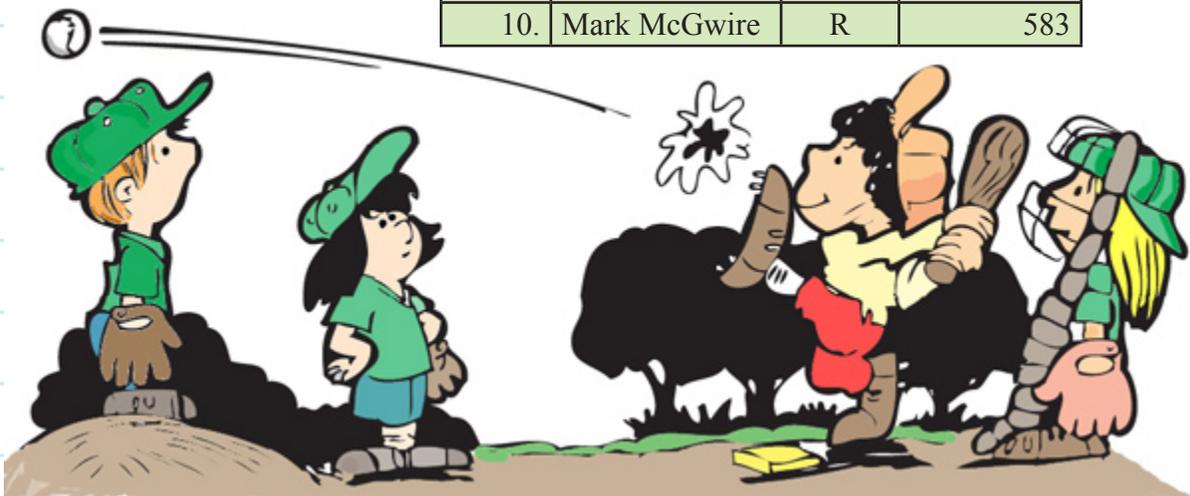
$$\frac{1}{2} \quad \frac{1}{3} \quad \frac{1}{4} \quad \frac{2}{3} \quad \frac{1}{5}$$

Use GraphPower to enter the names of the six most common elements in the earth's crust. Make a bar graph. Use the same data to make a circle graph.

## Level 4: Home Run Leaders

This table shows the names of the players who hit the most home runs in their major league baseball career. Use the data to make a bar graph. Enter the player's name in the first column and the number of home runs in the second column.

Rank	Player	Bats	Home Runs
1	Barry Bonds	L	762
2	Hank Aaron	R	755
3	Babe Ruth	L	714
4	Willie Mays	R	660
5	Alex Rodriguez	R	647
6	Ken Griffey	L	630
7	Jim Thome	L	612
8	Sammy Sosa	R	609
9	Frank Robinson	R	586
10	Mark McGwire	R	583



Tap the summation icon to show the statistics.

Make a bar graph to compare the all time top ten home run leaders. Study the statistics for these data.

1. What was the least number of home runs hit by a home run leader?  
\_\_\_\_\_
2. What was the greatest number of home runs hit by a home run leader?  
\_\_\_\_\_
3. What was the average number of home runs hit by a home run leader?  
\_\_\_\_\_

## Level 5: U.S. Regions - New England States



Tap the summation icon to show the statistics.



Tap the circle graph icon to make a graph.

*Note: To complete this activity, set the scale to 0-10. Label the scale with "in millions".*

State	Population
Connecticut	3,574,097
Maine	1,328,361
Massachusetts	6,547,629
New Hampshire	1,316,470
Rhode Island	1,052,567
Vermont	625,741

Locate the states in this region of the United States on the map. Use GraphPower to make a bar graph. Use the statistical functions to help answer questions 1 and 2.

1. What is the total population for the this region. \_\_\_\_\_
2. Which state in the region has the smallest population. \_\_\_\_\_
3. Make a circle graph to compare the population of the states in this region.
4. Make a bar graph to compare the populations and land area of the states in this region.

## Level 5: U.S. Regions - Mid-Atlantic States



Tap the summation icon to show the statistics.

*Note: To complete this activity, set the scale to 0-10. Label the scale with "in millions".*

State	Population
Delaware	897,934
Maryland	5,773,552
New Jersey	8,791,894
New York	19,378,102
Pennsylvania	12,702,379



Tap the circle graph icon to make a graph.

Locate the states in this region of the United States on the map. Use GraphPower to make a bar graph. Use the statistical functions to help answer questions 1 and 2.

1. What is the total population for the this region. \_\_\_\_\_
2. Which state in the region has the smallest population. \_\_\_\_\_
3. Make a circle graph to compare the population of the states in this region.
4. Make a bar graph to compare the populations and land area of the states in this region.

## Level 5: U.S. Regions - Appalachian Highlands



Tap the summation icon to show the statistics.



Tap the circle graph icon to make a graph.

*Note: To complete this activity, set the scale to 0-10. Label the scale with "in millions".*

State	Population
Kentucky	4,339,367
North Carolina	9,535,483
Tennessee	6,346,105
Virginia	8,001,024
West Virginia	1,855,364

Locate the states in this region of the United States on the map. Use GraphPower to make a bar graph. Use the statistical functions to help answer questions 1 and 2.

1. What is the total population for the this region. \_\_\_\_\_
2. Which state in the region has the smallest population. \_\_\_\_\_
3. Make a circle graph to compare the population of the states in this region.
4. Make a bar graph to compare the populations and land area of the states in this region.

## Level 5: U.S. Regions - Southeastern States



Tap the summation icon to show the statistics.



Tap the circle graph icon to make a graph.

*Note: To complete this activity, set the scale to 0-10. Label the scale with "in millions".*

State	Population
Alabama	4,779,736
Arkansas	2,915,918
Florida	18,801,310
Georgia	9,687,653
Louisiana	4,533,372
Mississippi	2,967,297
South Carolina	4,625,364

Locate the states in this region of the United States on the map. Use GraphPower to make a bar graph. Use the statistical functions to help answer questions 1 and 2.

1. What is the total population for the this region. \_\_\_\_\_
2. Which state in the region has the smallest population. \_\_\_\_\_
3. Make a circle graph to compare the population of the states in this region.
4. Make a bar graph to compare the populations and land area of the states in this region.

## Level 5: U.S. Regions - Great Lakes States



Tap the summation icon to show the statistics.

*Note: To complete this activity, set the scale to 0-10. Label the scale with "in millions".*

State	Population
Illinois	12,830,632
Indiana	6,483,802
Michigan	9,883,640
Ohio	11,536,504
Wisconsin	5,686,986



Tap the circle graph icon to make a graph.

Locate the states in this region of the United States on the map. Use GraphPower to make a bar graph. Use the statistical functions to help answer questions 1 and 2.

1. What is the total population for the this region. \_\_\_\_\_
2. Which state in the region has the smallest population. \_\_\_\_\_
3. Make a circle graph to compare the population of the states in this region.
4. Make a bar graph to compare the populations and land area of the states in this region.

## Level 5: U.S. Regions - Heartland States



Tap the summation icon to show the statistics.



Tap the circle graph icon to make a graph.

*Note: To complete this activity, set the scale to 0-10. Label the scale with "in millions".*

State	Population
Iowa	3,046,355
Kansas	2,853,118
Minnesota	5,303,925
Missouri	5,988,927
Nebraska	1,826,341
North Dakota	672,591
South Dakota	814,180

Locate the states in this region of the United States on the map. Use GraphPower to make a bar graph. Use the statistical functions to help answer questions 1 and 2.

1. What is the total population for the this region. \_\_\_\_\_
2. Which state in the region has the smallest population. \_\_\_\_\_
3. Make a circle graph to compare the population of the states in this region.
4. Make a bar graph to compare the populations and land area of the states in this region.

## Level 5: U.S. Regions - Southwestern States



Tap the summation icon to show the statistics.



Tap the circle graph icon to make a graph.

*Note: To complete this activity, set the scale to 0-10. Label the scale with "in millions".*

State	Population
Arizona	6,392,017
New Mexico	2,059,179
Oklahoma	3,751,351
Texas	25,145,561

Locate the states in this region of the United States on the map. Use GraphPower to make a bar graph. Use the statistical functions to help answer questions 1 and 2.

1. What is the total population for the this region. \_\_\_\_\_
2. Which state in the region has the smallest population. \_\_\_\_\_
3. Make a circle graph to compare the population of the states in this region.
4. Make a bar graph to compare the populations and land area of the states in this region.

## Level 5: U.S. Regions - Mountain States



There is one place in the United States where you can stand and be in four states at the same time. Can you find it?



Tap the summation icon to show the statistics.

*Note: To complete this activity, set the scale to 0-10. Label the scale with "in millions".*

State	Population
Colorado	5,029,196
Idaho	1,567,582
Montana	989,415
Nevada	2,700,551
Utah	2,763,885
Wyoming	563,626

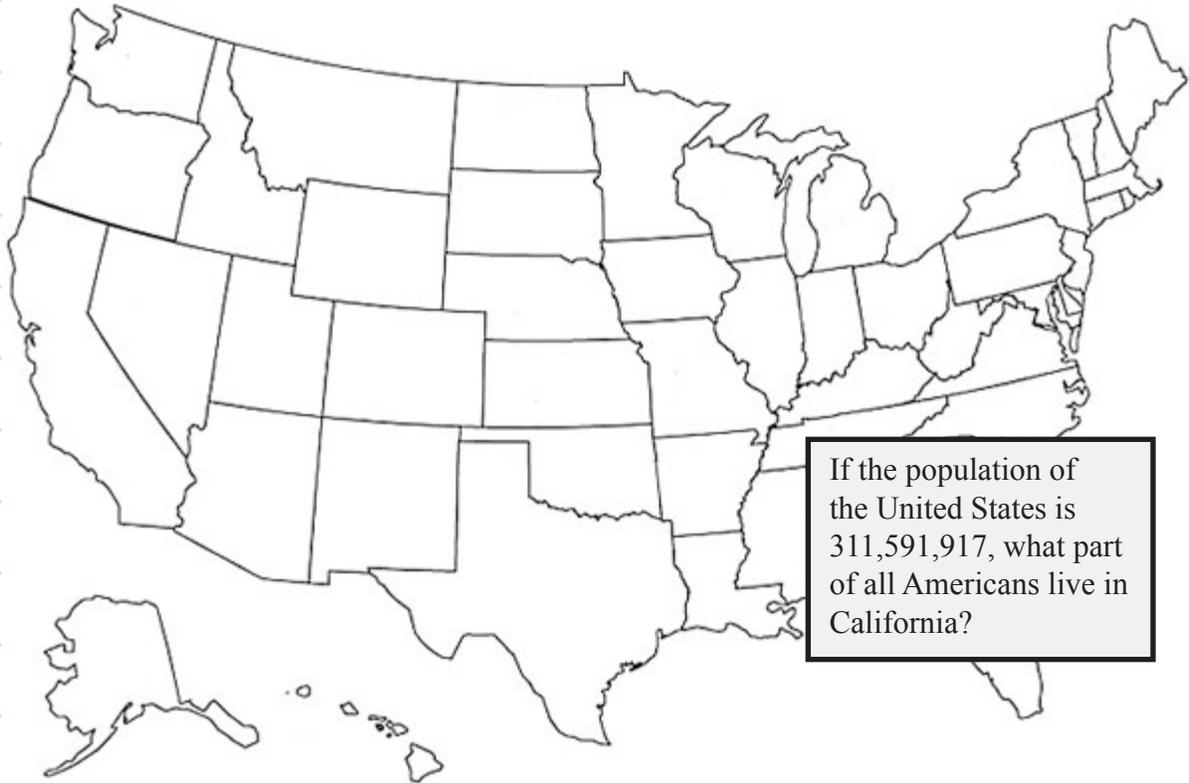


Tap the circle graph icon to make a graph.

Locate the states in this region of the United States on the map. Use GraphPower to make a bar graph. Use the statistical functions to help answer questions 1 and 2.

1. What is the total population for the this region. \_\_\_\_\_
2. Which state in the region has the smallest population. \_\_\_\_\_
3. Make a circle graph to compare the population of the states in this region.
4. Make a bar graph to compare the populations and land area of the states in this region.

## Level 5: U.S. Regions - Pacific Coast States



If the population of the United States is 311,591,917, what part of all Americans live in California?



Tap the summation icon to show the statistics.

*Note: To complete this activity, set the scale to 0-10. Label the scale with "in millions".*

State	Population
Alaska	710,231
California	37,253,956
Hawaii	1,360,301
Oregon	3,831,074
Washington	6,724,540



Tap the circle graph icon to make a graph.

Locate the states in this region of the United States on the map. Use GraphPower to make a bar graph. Use the statistical functions to help answer questions 1 and 2.

1. What is the total population for the this region. \_\_\_\_\_
2. Which state in the region has the smallest population. \_\_\_\_\_
3. Make a circle graph to compare the population of the states in this region.
4. Make a bar graph to compare the populations and land area of the states in this region.

## Level 5: Australian States and Territories



*Note: To complete this activity, set the scale to 0-10. Label the scale with "in millions".*



Tap the summation icon to show the statistics.



Tap the circle graph icon to make a graph.

Locate the states and territories of Australia on the map. Use the GraphPower statistics function to answer the questions.

State/Territory	Population
Australian Antarctic Territory	1,000
Australian Capital Territory	370,700
Jervis Bay Territory	495
New South Wales	7,247,700
Northern Territory	232,400
Queensland	4,513,000
South Australia	1,645,000
Tasmania	511,700
Victoria	5,574,500
Western Australia	2,387,200

1. Tap the sort button on the Data Table to organize the information from highest to lowest.

Which state has the largest population? \_\_\_\_\_

2. What is the range in population for the states and territories of Australia?

\_\_\_\_\_

## Level 5: Countries of the United Kingdom



*Note: To complete this activity, set the scale to 0-10. Label the scale with "in millions".*



Tap the summation icon to show the statistics.

Locate the countries that a part of the United Kingdom. Use the GraphPower statistics function to answer the questions.

Country	Population
England	50,762,900
Northern Ireland	1,741,600
Scotland	5,116,900
Wales	2,965,900



Tap the circle graph icon to make a graph.

1. Tap the sort button on the Data Table to organize the information from highest to lowest.

Which country has the largest population? \_\_\_\_\_

2. What is the range in population for countries of the United Kingdom?

\_\_\_\_\_

## Level 5: Provinces of Canada



Tap the summation icon to show the statistics.



*Note: To complete this activity, set the scale to 0-10. Label the scale with “in millions”.*

Locate the provinces of Canada on the map. Use the GraphPower statistics function to answer the questions.

Province	Population
Alberta	3,645,257
British Columbia	4,400,057
Manitoba	1,208,268
New Brunswick	751,171
Newfoundland and Labrador	514,536
Northwest Territories	41,462
Nova Scotia	921,727
Nunavut	31,906
Ontario	12,851,821
Prince Edward Island	140,204
Quebec	7,903,001
Saskatchewan	1,033,381
Yukon	33,897



Tap the circle graph icon to make a graph.

1. Tap the sort button on the Data Table to organize the information from highest to lowest.

Which province has the largest population? \_\_\_\_\_

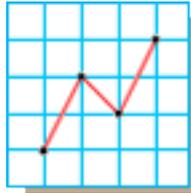
2. What is the range in population for the provinces of Canada?

\_\_\_\_\_

# Level 5: Seed Growth Experiment

Day	Length (cm)
1	1
2	2
3	3
4	5
5	6
6	8
7	9
8	11
9	12
10	13

Line graphs are often used to show a change over time. In this activity you will make a graph to show how the length of a seed changed over time.



A student planted a seed and measured the length of growth over a 10 day period. Make a line graph to show the growth of the seed.

1. What is a good title for this graph?

\_\_\_\_\_

2. Would a circle graph be appropriate for this experiment? Explain.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Level 5: Barbecue Survey

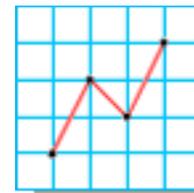


The class took a survey to find out which barbecue foods the class likes best. The table shows the results of the survey.

Enter these data in a GraphPower table and make a bar graph.

Food	Boys	Girls
Hamburgers	15	12
Chicken	12	18
Hot Dogs	8	5
Chips	7	9
Salad	7	8
Beans	5	7
Corn	8	3

1. Mark with checks the types of graphs that are appropriate for comparing the types of food shown in the results of this survey.

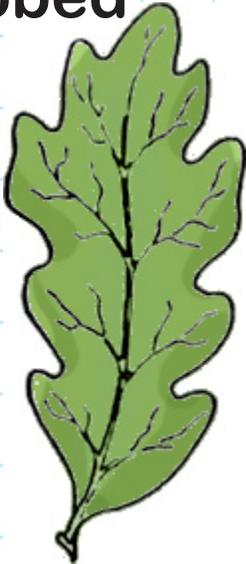


**Do Your Own Survey!**

2. The table shows data for boys and girls. A key is used to show which color in the graph represents the boys votes and which color represents the girls votes. Set up the graph so that green is used for the boys and red is used for the girls.
3. Ask the boys and girls in the class to vote for their favorite barbecue foods. Collect the data for the survey in a table. Make a bar graph to show the results of the survey.

## Level 5: Investigating Leaves

**lobed**



**pointed**



**serrated**

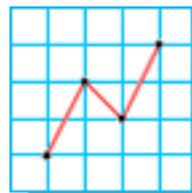
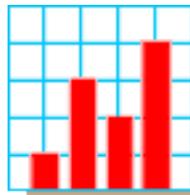


**Do Your Own Survey!**

The class took a field trip to the park to study the different types of leaves. The leaves that the students found could be classified into three groups: lobed, pointed or serrated.

Type of Leaf	Tally	Count				
lobed	<table style="display: inline-table; border: none;"> <tr> <td>###</td> <td>###</td> </tr> <tr> <td>###</td> <td>###</td> </tr> </table>	###	###	###	###	
###	###					
###	###					
pointed	<table style="display: inline-table; border: none;"> <tr> <td>###</td> <td>###</td> </tr> <tr> <td>///</td> <td></td> </tr> </table>	###	###	///		
###	###					
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serrated	<table style="display: inline-table; border: none;"> <tr> <td>###</td> <td>###</td> </tr> <tr> <td> </td> <td></td> </tr> </table>	###	###			
###	###					

1. Use the tallies to determine the numbers for the count column.
2. Use GraphPower to make a table to show the results. Mark with checks the types of graphs that are appropriate for comparing the types of leaves.



3. In your backyard or at a park look for 30 leaves. Make a chart to show how many are lobed, pointed or serrated.
4. Use GraphPower to make an appropriate graph to show the results of your field research.

## Level 6: U.S. Population Growth

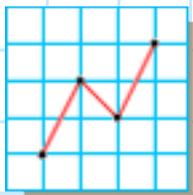
A line graph is a good way to show changes over a period of time. This graph shows how the population of the United States has changed during the last century.

Year	Population
1910	92,407,000
1920	106,461,000
1930	123,076,741
1940	132,122,446
1950	152,271,417
1960	180,671,158
1970	205,052,174
1980	227,224,681
1990	249,464,396
2000	281,421,906
2010	308,745,538



### Population Growth

1. Enter the years 1910-2010 into the first column of the GraphPower Data Table.
2. Round the population figures to the nearest million. Enter only how many millions in the second column of the Data Table.
3. Make a line graph and save your project.
4. Use the graph to predict the population of the United States in the year 2020.

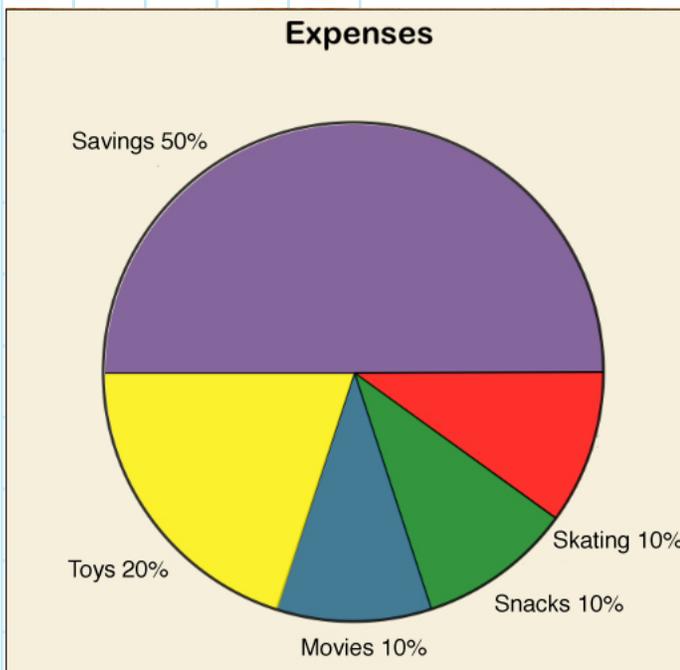
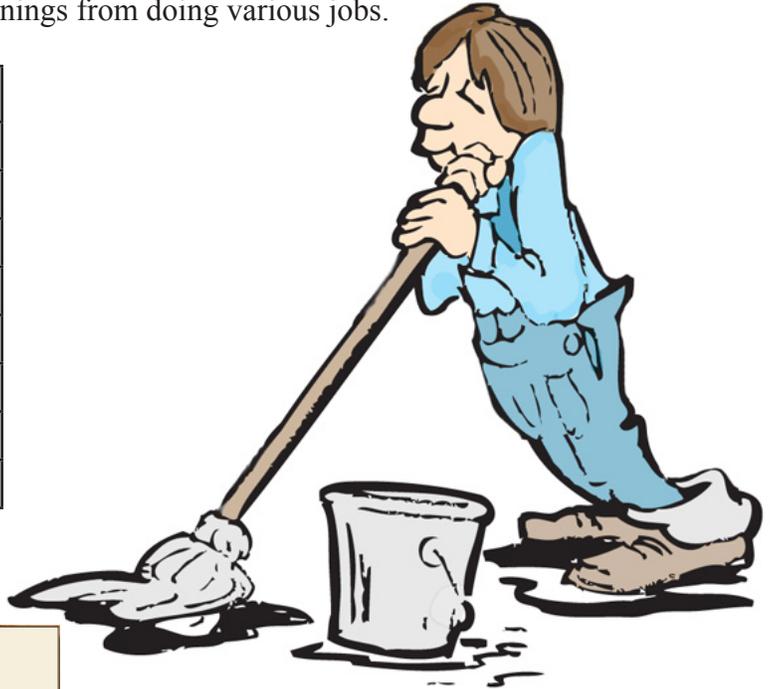


Tap the line graph icon to make a graph.

## Level 5: Income and Expenses

A student found several ways to earn money. The chart shows earnings from doing various jobs.

Job	Amount
Mowing Lawns	\$8.00
Washing Cars	\$12.00
Baby Sitting	\$6.00
Washing Windows	\$4.00
Weeding	\$7.00
House Cleaning	\$10.00
Pet Sitting	\$3.00
Total	



Expenses	Amount
Savings	
Toys	
Movies	
Snacks	
Skating	
Total	

### Income

1. Find the total amount of money that was earned.
2. Make a circle graph using the data to compare how much money was earned doing various jobs.
3. What part of the total was earned by cleaning houses?

### Expenses

4. The student used the money that was earned in various ways. This circle graph shows how the money was spent.

How was most of the money used? \_\_\_\_\_

5. Use the circle graph to find how much money was spent in each category.

## Level 6: How Sweet It Is!



Product	Total Sugar
Honeynut Snackers	56.0
Cocoa Bites	43.0
Chewy Chunks	42.2
Tasty Triangles	35.9
Daybreak	16.0
Pixies	4.8
Wheat Shreads	0.6

Shopping for what to eat is an important decision. This chart shows the amount of total sugar for some cereals.

1. Ask each student in your group to bring in an empty box of cereal. From the packaging on the cereal boxes make a chart showing the total sugar for five brands.
2. Make a bar graph to compare the sugar content of these cereals.
3. Bring to class the nutritional information from a box of cereal. Here is a sample.

100% Whole Grain Wheat Berries	
Protein	3g
Carbohydrate	23g
Fat	1g
Chloolesterol	0g
Sodium	230mg
Potassium	115mg

**Remember:**  
1g = 1000mg

4. Make a circle graph based on the nutritional information for your brand of cereal. Compare your graph with others in your group. (Remember to convert all the values to mg for the graph.)

## Level 6: Bar Graphs and Histograms

### Olympics - Women's 100-Meter Run

A bar graph is a useful way to compare data. A histogram is a type of bar graph that shows the number of times data occurs within a certain range. This chart shows the elapsed time for a 100 meter race.



Tap the histogram icon to make a graph.

Year	Athlete	Country	Time
1952	Marjorie Jackson	Australia	11.67
1956	Betty Cuthbert	Australia	11.82
1960	Wilma Rudolph	United States	11.18
1964	Wyomia Tyus	United States	11.49
1968	Wyomia Tyus	United States	11.08
1972	Renate Stecher	Germany	11.07
1976	Annegret Richter	Germany	11.08
1980	Lyudmila Kondratyeva	Russia	11.06
1984	Evelyn Ashford	United States	10.97
1988	Florence Griffith Joyner	United States	10.54
1992	Gail Devers	United States	10.82
1996	Gail Devers	United States	10.94
2000	(vacant)		
2004	Yuliya Nesterenko	Belarus	10.93
2008	Shelly-Ann Fraser	Jamaica	10.78
2012	Shelly-Ann Fraser-Pryce	Jamaica	10.75



1. Enter the year and the time to make a bar graph for the data. Change the bar graph to a line graph.

A histogram tells how many individuals are in each category.

The data from the Olympics can be arranged in a table in order to produce a histogram.

Time	Athletes
10.50-10.99	7
11.00-11.49	6
11.50-11.99	2

2. Enter the time ranges and number of athletes. Click on the bar graph icon to make a histogram.

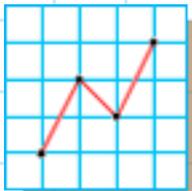
## Level 6: Areas and Populations

Let's study the areas and populations of the continents.



Continent	Area	
	sq. mi.	km <sup>2</sup>
North America	9,365,000	24,256,000
South America	6,880,000	17,819,000
Europe	3,837,000	9,938,00
Asia	17,212,000	44,579,000
Africa	11,608,000	30,065,000
Australia & Oceania	2,968,000	7,687,000
Antartica	5,100,000	3,209,000

1. Enter the names of the continents in the first column of the Data Table. Enter the either the area in square miles or the area in square kilometers in the second column. Make a bar graph and a circle graph using this data.
2. Which graph is most helpful in comparing the sizes of the continents? Explain.



Tap the line graph icon to make a graph.

Continent	Population	Density
North America	528,720,588	22.9
South America	385,742,554	21.4
Europe	738,523,843	70
Asia	4,140,336,501	86.7
Africa	994,527,534	32.7
Australia & Oceania	36,102,071	4.25
Antartica	4,490	0.0003

3. Enter the names of the continents in the first column of the Data Table. Enter the population in the second column. Make a bar graph and a line graph using this data.
4. Why is a line graph inappropriate for the population data? Explain.
5. Which geographic region has the greatest population?
6. Which geographic region has the largest land area?

## Level 7: What is in the Air?



Gas	Percentage
Nitrogen	78.11%
Oxygen	20.95%
Other Gases (argon, carbon dioxide, water vapor, xenon, helium, hydrogen, methane and nitrous oxide)	0.94%

The philosopher Aristotle taught the ancient Greeks that all things were made of four elements: earth, air, fire and water. This theory was accepted for over 2,000 years. Joseph Priestley, an English scientist, discovered oxygen in 1774. Later, in 1777 Antoine Lavoisier proved that air was a mixture of gases and that about one-fifth of air is oxygen.

Today, we know that air is a mixture of gases. The chart gives the percentages for nitrogen, oxygen and the other gases that make up air.



Tap the  
circle graph icon  
to make a graph.

1. Make a circle graph to compare the types of gases found in air. Carbon dioxide (CO<sub>2</sub>) is a naturally occurring gas in the air but carbon monoxide (CO) is one of the main types of air pollution produced by industrial societies.

This chart shows the main sources of carbon monoxide in the atmosphere.

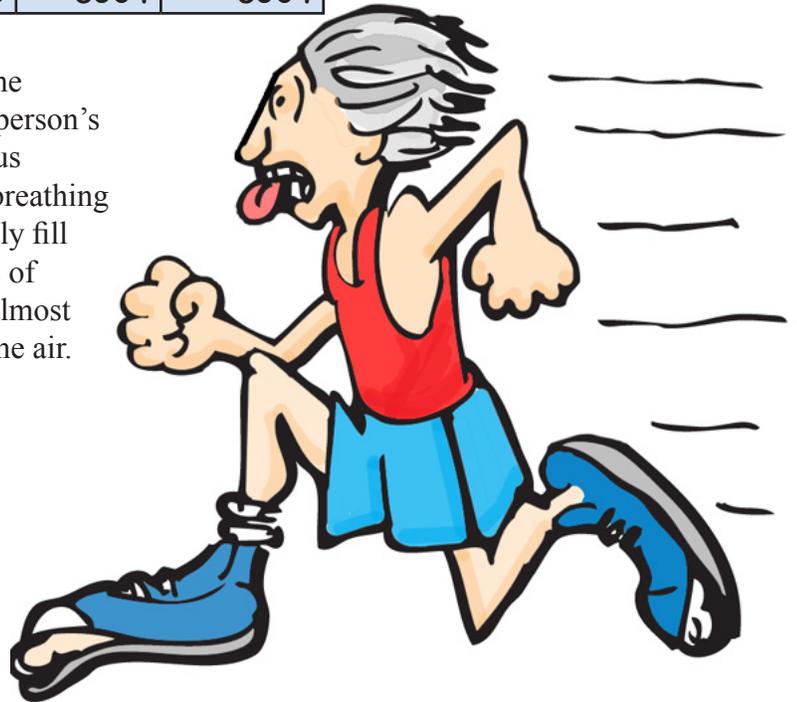
Source of Carbon Monoxide Pollution	Percentage
Industrial Processes	6.8%
Fuel Combustion	10.3%
Transportation	70.65%
Miscellaneous	12.3%

2. Make a circle graph to compare the sources of air pollution.

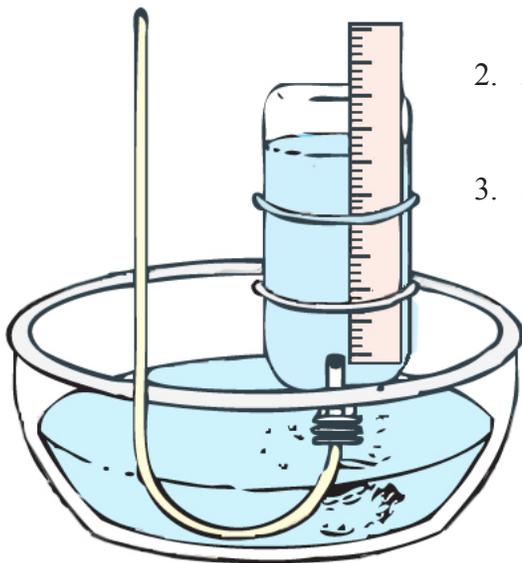
## Level 7: Human Respiration

Activity	cubic inches		cubic centimeters	
	Inhale	Exhale	Inhale	Exhale
Normal Breath	183	150	3001	2460
Moderate Exercise	205	130	3362	2132
Strenuous Exercise	220	120	3608	1968
Deep Breath	360	90	5904	5904

This chart shows the amount of air in a person's lungs during various activities. During breathing we never completely fill or empty our lungs of air. Human lungs almost always contain some air.



1. Enter the data given in this table into the Data Table. Make a double bar graph to show the volume of air in the lungs during the various activities.
2. About how many cubic inches of air are always in the lungs? \_\_\_\_\_
3. According to the graph, during moderate exercise about how much air is exhaled? \_\_\_\_\_

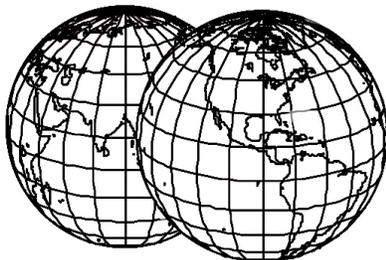


Use a rubber tube, a large plastic bottle and a plastic bowl to build the apparatus needed for this experiment.

- a. Fill bottle and dish with water.
  - b. Attach ruler as shown with rubber bands.
  - c. Insert tube into bottle.
  - d. With your hand over the mouth of the bottle place it into the water in the bowl.
4. Take a deep breath and then blow into the tube. The air from your lungs will fill the bottle and give a measure of your lung capacity.

## Level 7: Energy Production

### Energy Production and Consumption in trillions BTU



Country	Production	Consumption
United States	71,503.62	101,553.86
China	70,796.18	77,807.73
Russia	53,971.33	30,354.82
Saudi Arabia	23,806.95	7,362.72
Canada	19,421.73	13,752.63
India	13,048.46	19,093.68
Iran	12,993.74	7,916.02
Australia	11,880.51	6,123.67
Indonesia	10,930.06	4,887.11
Norway	9,941.07	1,917.95

Only a few countries are responsible for producing and consuming over half of the world's energy. The three major energy producers are the United States, China and Russia.

1. Make a horizontal bar graph to compare energy production. (Remember: Enter a title for your graph. Label the scale. Set the range from 0 to 100 and convert the numbers from trillions to quadrillions.)
2. Change the bar graph to a circle graph.

Most of the energy used in the United States comes from coal, natural gas or petroleum. This chart shows how much energy comes from each source.



### Energy Production in the U.S.

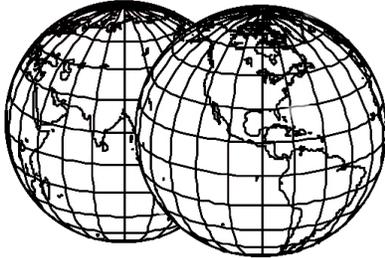
Source	(billion kWh)
Coal	1,847
Nat Gas	999
Nuclear	807
Hydro	255
Renewables	167
Petroleum	37

*Note: kWh is kilowatt hours.*

3. Make a vertical bar graph to compare how energy is produced in the United States. (Remember: Enter a title for your graph. Label the scale. Set the range from 0 to 100 and convert the numbers to hundreds of billions kWh.)

## Level 7: World-Wide Energy Use

### Energy Production and Consumption in trillions BTU



Country	Production	Consumption
United States	71,503.62	101,553.86
China	70,796.18	77,807.73
Russia	53,971.33	30,354.82
Saudi Arabia	23,806.95	7,362.72
Canada	19,421.73	13,752.63
India	13,048.46	19,093.68
Iran	12,993.74	7,916.02
Australia	11,880.51	6,123.67
Indonesia	10,930.06	4,887.11
Norway	9,941.07	1,917.95

Billions of tons of energy are used every year by all the countries of the world. The United States uses the most. Other countries, such as the countries Europe also use vast amounts of energy.

1. Make a bar graph to compare energy usage. Change the bar graph to a circle graph. (Remember: Enter a title for your graph. Label the scale. Set the range from 0 to 100 and convert the numbers to quadrillions BTU.)
2. Count the number of electrical appliances that are on in your home at different hours of the day. Make a line graph to show the results.

What can you do to help save energy?



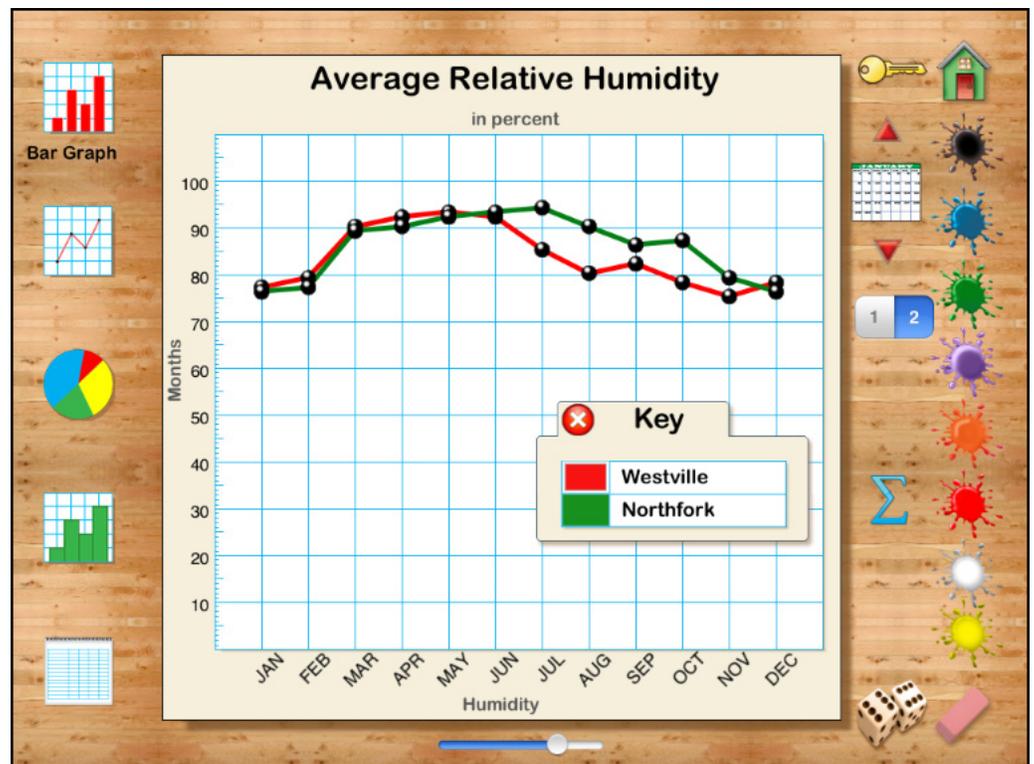
Time	Tally	Number
6:00AM		
8:00AM		
10:00AM		
12:00PM		
2:00PM		
4:00PM		
6:00PM		
8:00PM		
10:00PM		
12:00AM		
2:00AM		
4:00AM		

## Level 7: Relative Humidity

City	May	Jun
San Francisco	89	86
Los Angeles	75	74
Chicago	86	88
Miami	85	87

This chart shows the relative humidity for four U.S. cities during a four month period. Use the data to set up a table in the Data Table.

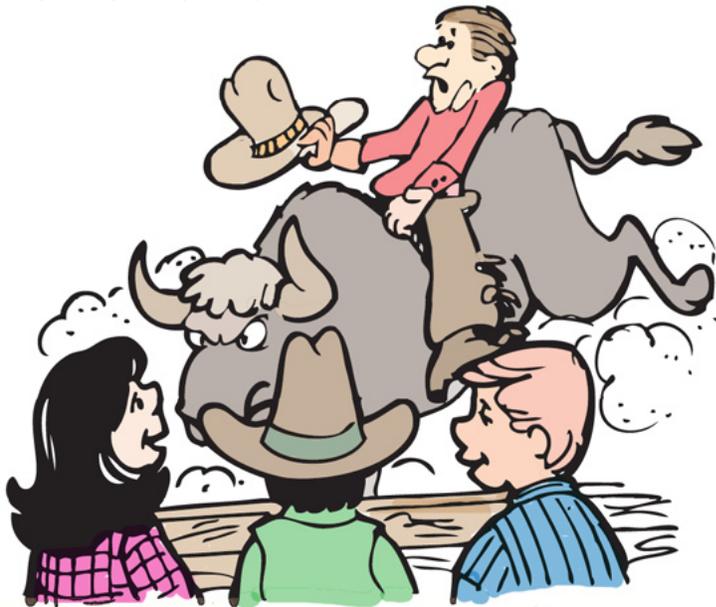
1. Make a line graph to compare the relative humidity in the four cities.
2. Did the relative humidity for Miami tend to increase or decrease from May to June?



Study this line graph.

3. Write a paragraph to compare the relative humidity in Westville to Northfork.

## Level 8: Rodeo Attendance



Year	Attendance
2003	750
2004	799
2005	820
2006	790
2007	842
2008	850
2009	900
2010	925
2011	942
2012	950

One of the most exciting events at Rocky Mountain Middle School is the annual rodeo. The chart shows the attendance for the rodeo since 2003.

1. Make a line graph to show rodeo attendance for the 10 year period.
2. Make a vertical bar graph for the same data.
3. Explain why a circle graph is not appropriate for the attendance data.

*An extrapolation is an estimate or prediction of an unknown value based on known values. A line graph shows a trend. To estimate the rodeo attendance for 2013, study the last few data points in the graph. Extend the graph along the line determined by the last few data points.*

4. Predict the attendance at the 2013 rodeo. \_\_\_\_\_

Year	Students
1985	625
1990	670
1995	720
2000	745
2005	790
2010	810

This table shows enrollment for the Jefferson Middle School.

- a. Make a line graph.
- b. Extrapolate the enrollment for 2015.  
\_\_\_\_\_
- c. How many students in 2010? \_\_\_\_\_

## Level 8: Growth Chart

When Ben graduated from high school he was six feet tall. This chart shows a record of his height and weight since age 5.

age	inches	cm	pounds	kg
5	42	106.7	70	31.7
7	46	116.8	80	36.2
9	50	127.0	92	41.7
11	60	152.4	99	44.8
13	66	167.6	119	53.9
15	70	176.4	137	62.0
17	72	182.9	158	71.8



*An interpolation is an estimated value based on two known values. Use interpolation to estimate values for these years.*

A line graph is a good way to show change over a period of time. Enter the growth rate data from the table into the GraphPower Data Table. Use either inches and pounds or centimeter and kilograms.

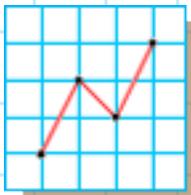
1. Make a line graph. Label the lines of the graph with the appropriate units.
2. Notice that there is no data for some of the years. You can use interpolation to estimate a number for these years from the known data.

age	inches	cm	pounds	kg
6				
8				
10				
12				
14				
16				

## Level 8: Sports Fans

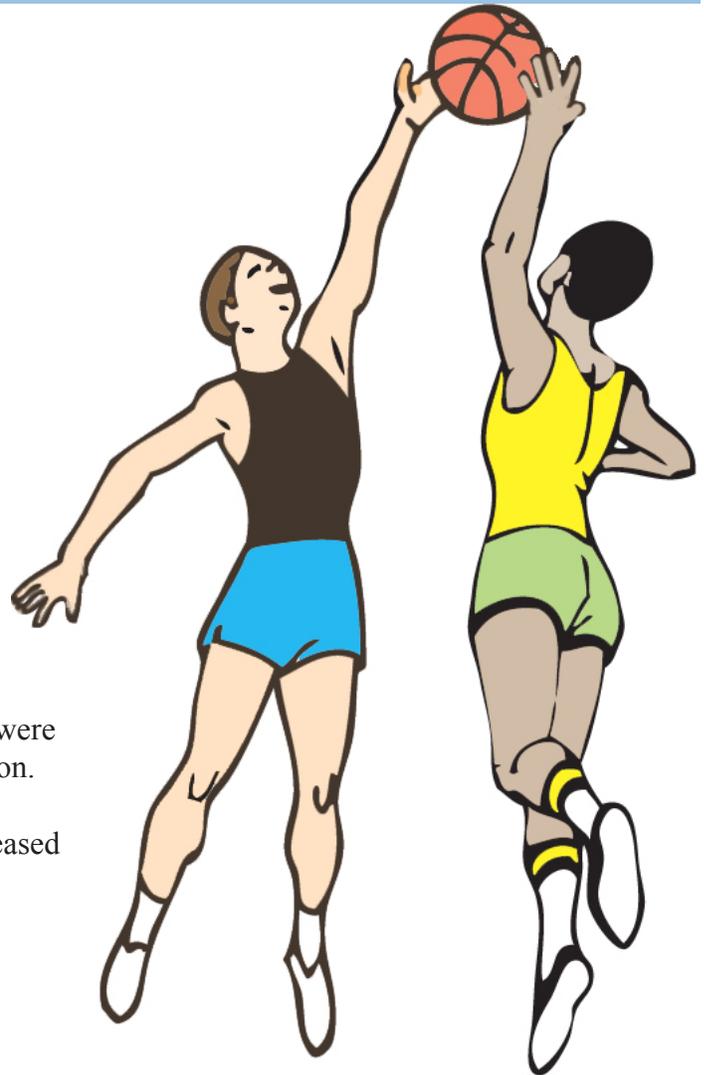
### The Lakewood Lions Basketball Season

Game	Attendance
1	486
2	512
3	545
4	620
5	644
6	712



Tap the line graph icon to make a graph.

The Lakewood Lions were having a winning season. The attendance at the basketball games increased with each victory.



Line graphs are often used to show change. Enter the attendance data from the table into the GraphPower Data Table.

1. Make a line graph to show the trend in attendance at basketball games.
2. Which technique is used to predict the attendance at the seventh game? (Choose one.)

Interpolation

Extrapolation

3. Use the GraphPower Statistics tool to find the values:

Sum		Mean	
Minimum		Maximum	
Range		Median	



Tap the summation icon to show the statistics.

## Level 8: Downhill Racers

Year	Country	Time	Seconds
1948	France	2:55	
1952	Italy	2:30	
1956	Austria	2:52	
1960	France	2:06	
1964	Austria	2:18	
1968	France	1:59	
1972	Switzerland	1:51	
1976	Austria	1:45	
1980	Austria	1:45	
1984	United States	1:45	
1988	Switzerland	1:45	
1992	Austria	1:50	
1994	United States	1:45	
1998	France	1:50	
2002	Austria	1:39	
2006	France	1:48	
2010	Switzerland	1:54	



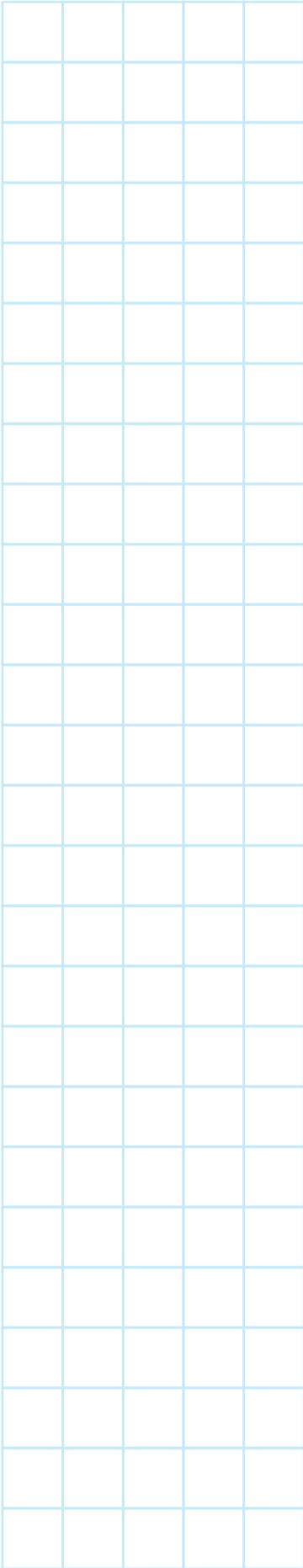
A vertical bar graph is a great way to make comparisons. To compare the times for Olympic downhill skiers change the time shown in the table to seconds.

1. Make a bar graph to compare the times of the Olympic champions since 1968.
2. Make a table to show the number of gold medals that were won by each country in downhill skiing since 1948.

Country	Gold Medals
Austria	
France	
Switzerland	
United States	

3. Make a circle graph to compare how many Olympic gold medals were won by each country in the downhill skiing competition.
4. What percent of the gold medals were won by Austria? \_\_\_\_\_
5. What percent of the gold medals were won by the United States? \_\_\_\_\_





**GraphPower**  
Ventura Educational Systems