The Minnesota Literacy Council created this curriculum with funding from the MN Department of Education. We invite you to adapt it for your own classrooms.

MASTER
Charts and Graphs: Week 1 of 2

Unit Overview
This 2-week unit is designed to teach students how to use, interpret and make their own different types of graphs and charts.

Unit Objectives:
- Students will learn the purpose of different types of graphs and charts
- Students will learn how to interpret different types of graphs and charts
- Students will practice making their own different types of graphs and charts
- Students will read about different types of graphs and learn vocabulary related to graphs and charts.

Week 1
Monday: Bar Graphs
Tuesday: Circle Graphs
Wednesday: Line Graphs
Thursday: Picture Graphs

Week 2
Monday: Regular Charts
Tuesday: Venn Diagrams
Wednesday: Timelines
Thursday: Flow Charts

MATERIALS
- Teacher Created Resources: Document-Based Questions: Grade 2. 978-1-4206-8372-1 **(TCR2)**
- Teacher Created Resources: Document-Based Questions: Grade 5. 978-1-4206-8375-2 **(TCR5)**
- Teacher Created Resources: Document-Based Questions: Grade 6. 978-1-4206-8376-9 **(TCR 6)**
- Stech-Vaugh: Maps-Globles-Graphs. Book 1. 0-8114-2087-6 (out of print) **(MGG)**
- Terdy, Dennis: Content Area ESL: Social Studies. Linmore Publishing, Inc. 0-916591-06-9 **(ESL SS)**

Charts and Graphs: Monday, Week 1 of 2
Bar Graphs

Lesson Objectives:	**Materials:**
Students will... ● Be able to interpret data and understand information from a bar graph ● Be able to make their own bar graph	Resources (find following today's curriculum): ● **TCR5 Pgs: 40-42** ● **ESL SS Pg: 150**

Activity Ideas:

<u>Warm-up: Making a Bar Graph</u>

- Tell ss the the class is going to make their own bar graph.
- On a large piece of chart paper draw and x-y axis. (you must decide ahead of time what you will graph. Ideas: ss' favorite fruit or vegetable? Pick 3-5 things. List those things at the bottom (x-axis) of the graph).
- Now have ss take a post-it note and put it above their choice, making a bar going up the chart.
- Count how many post-its are on each bar and write that number on the Y-axis. Have a student give the chart a name. Hang the chart in the room.

<u>Reading & Interpreting Bar Graphs</u>

Pre-reading:

- Introduce the name Isaac Newton, and do a "brainstorm around a word" to activate ss' prior knowledge.
- Pre-teach any key/difficult vocab words.

Reading:

- Have ss read TCR page 40. Discuss any vocabulary, as needed. Re-read a second time, in a different way (partner reading/popcorn reading/silent reading).
- Have ss study the bar graph on page 41. Ask ss what they think this graph is showing. Answer any questions ss have to help them get the basic idea of what the graph shows.

Post-reading:

- Now, work with ss to answer the questions about the graph on page 42.

More practice with bar graphs:

- Next, tell ss that you are going to look at a new bar graph. Hand out ESL SS page 150. Again, have ss study the graph, looking at the title, the x-y axis, etc.... Have ss try and answer the questions about the graph on their own. Then have ss compare answers.

Related content, use as a lesson supplement:

- Go to this news article and related activities about Neil Armstrong, at Breaking News English.com.
- Complete a variety of the pre-reading, reading (or listening!) and post-reading(listening) activities so ss get to practice a variety of language skills.

http://www.breakingnewsenglish.com/1208/120826-neil_armstrong.html

Discovery of Gravity

Isaac Newton was born in 1642. He lived in England. He wanted to know how the world worked. One day Newton saw an apple fall from a tree branch. It hit the ground near his feet. He thought about the apple. Why did things always fall to the ground? Why didn't anything ever fall up? Newton realized that an unseen force had pulled the apple down. He called the force gravity. Gravity pulls an object toward a larger one. On Earth it pulls things to the ground.

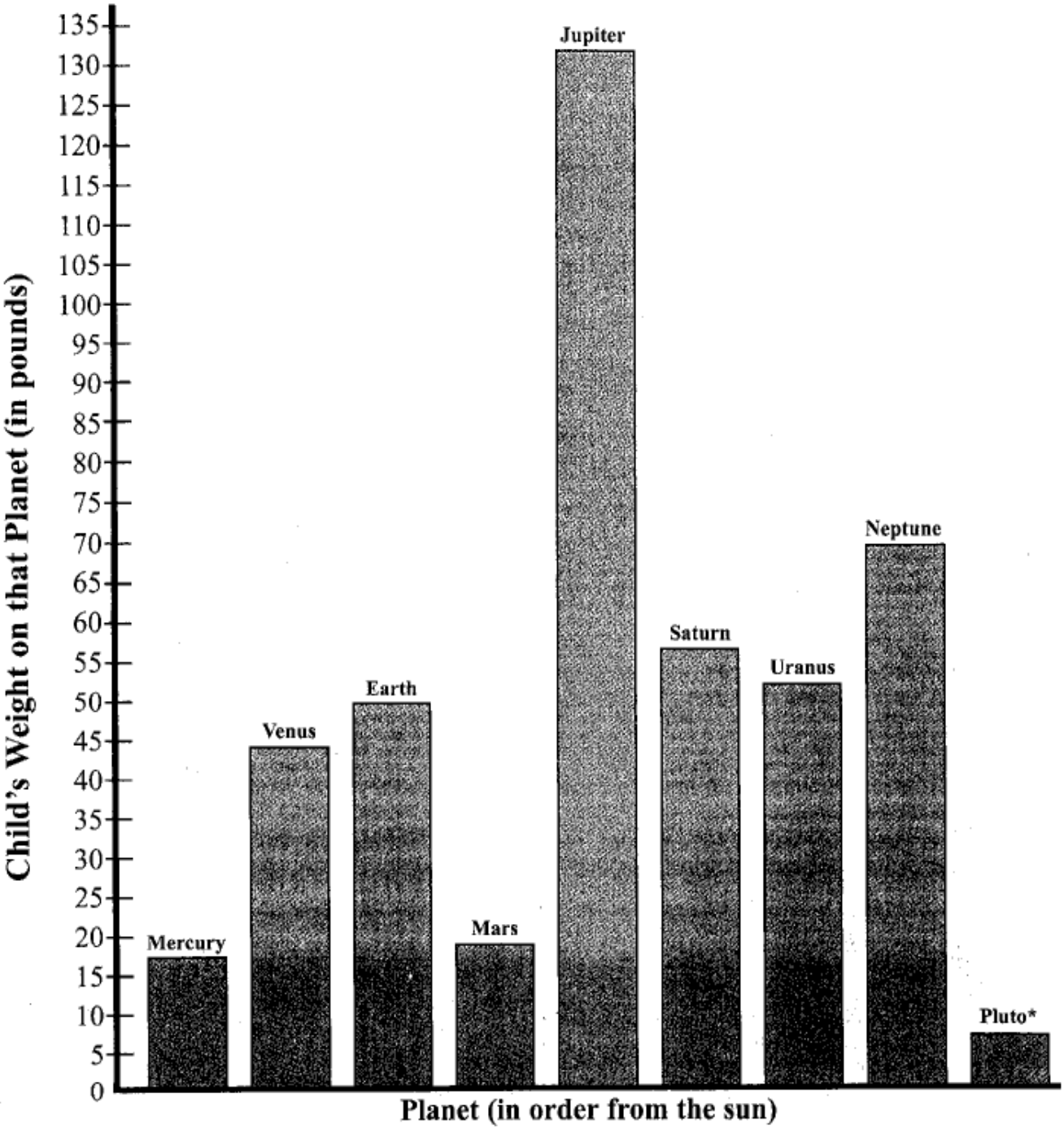
Newton loved math. He was smart. He used math to show how mass (size) affects gravity. Things with a lot of mass pull with strong gravity. A big rock has more mass than a pebble. That's why the big rock falls faster. He figured out how distance effects gravity, too. If an object is far away, it has less pulling power.

Our sun is big and heavy. It has a large mass. And its gravity keeps the planets from floating away. Its gravity keeps Earth in its orbit. Earth is much smaller than the sun. So its gravity is not as strong. But Earth's gravity keeps us on the ground. And it keeps our moon from floating away. It holds our moon in its orbit.

Our moon is much smaller than Earth. Can you guess what that means? Its gravity is weaker. Suppose you weigh 50 pounds on Earth. On the moon you would weigh just 8 pounds! (About the weight of a newborn baby.) You would feel lighter. You could jump higher.

Discovery of Gravity

The smaller something is, the less gravity it has. So on planets that are smaller than Earth, you weigh less. On planets bigger than Earth, you weigh more.



*Pluto has been reclassified as a dwarf planet

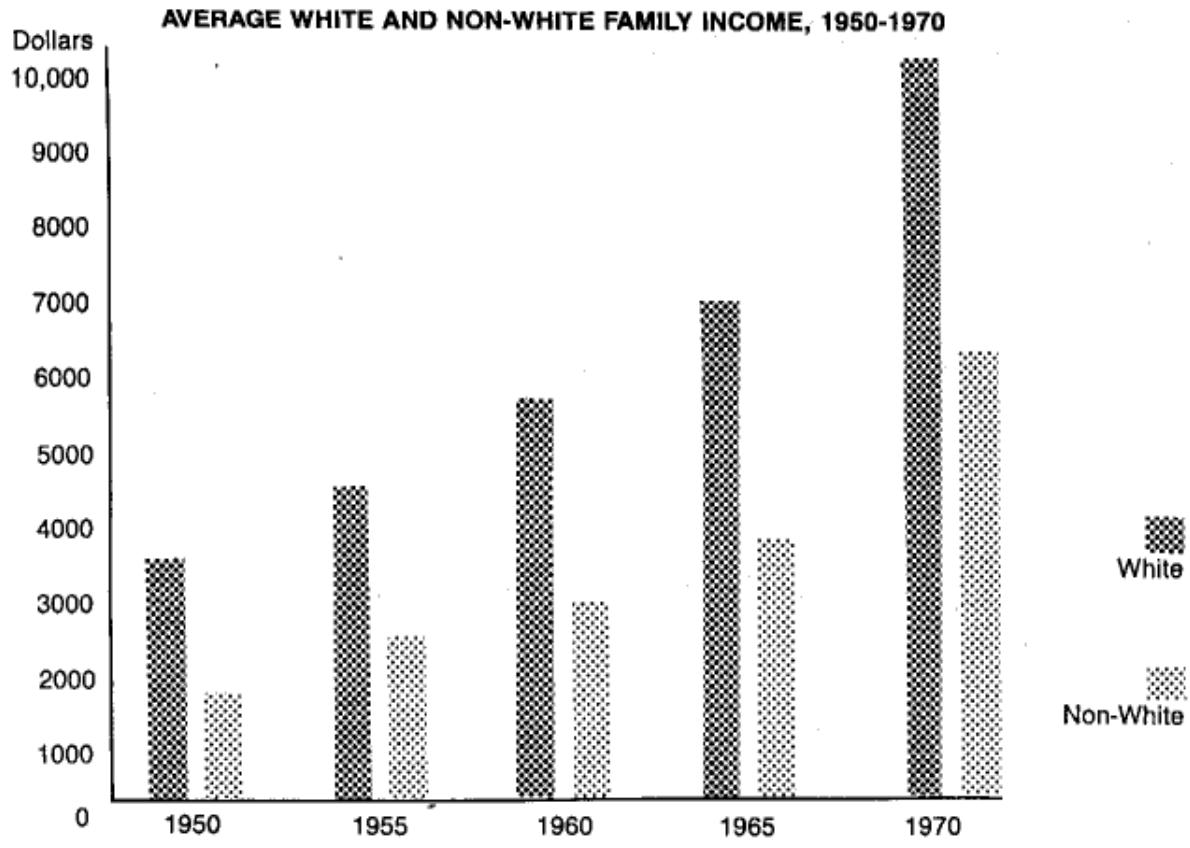
Discovery of Gravity

1. What force holds Earth's moon in its orbit?
   a. gravity b. mass c. speed
2. Which statement is correct?
   a. A pencil will fall faster than a hardcover book.
   b. A hardcover book will fall faster than a pencil.
   c. A pencil and a hardcover book will fall at the same speed.
3. Why does every object on Earth fall toward the ground?
   a. The moon's gravity pulls everything on Earth toward the ground.
   b. Earth is the largest planet in our solar system.
   c. Every object on Earth has less mass than Earth itself.
4. The gravity on Earth is less than the gravity on the sun. True or False? Tell why.

5. Look at the graph. Which planet is the biggest (you weigh the most)? Which planet near us is similar in size to Earth?

6. A helicopter and a jet airplane must work against gravity in order to fly. Which one would you prefer to fly in? Tell why.

GRAPHICAL LITERACY.
Look at the chart. Answer the questions.



1. Which years does the chart cover? _____
2. What is shown on the side of the chart? _____
3. What does the black bar indicate? _____
4. What does the light bar indicate? _____
5. What was the average white family income in 1970? _____
6. What was the average non-white family income in 1970? _____
7. What was the average white family income in 1950? _____
8. What was the average non-white family income in 1950? _____
9. What was the average white family income in 1960? _____
10. What was the average non-white family income in 1960? _____
11. What was the approximate increase in white income between 1950 and 1960? _____

_____

12. What was the approximate increase in non-white income between 1950 and 1960?

_____

Graphs and Charts: Tuesday, Week 1 of 2
Circle Graphs

Lesson Objectives:	**Materials:**
Students will... ● Be able to interpret data and understand information from a circle graph ● Be able to make their own circle graph	Resources: ● **TCR5 Pg: 37-39** ● **ESL SS Pg: 94** ● Make your own graph website

Activity Ideas:

Reading & Analyzing Circle Graphs

Pre-reading:

- Brainstorm around the word "trash", to activate ss' prior knowledge and to start a discussion about trash/recycling in different countries.
- Pre-teach any key/difficult vocabulary from the reading.

Reading:

- Work with ss to read the story on TCR5, pg. 37. Use different reading strategies and needed. (ie; reading aloud, taking turns, silent reading, teacher reading etc). Have student underline any new vocab and discuss as needed. Allow ss to read at least 2 times.
- Have ss study the circle graph on page 38. Ask what they think this graph is about and answer any questions they have.

Post-reading:

- Work with ss to answer the questions about the reading and graph on p. 39.
- Practice more with circle graphs on ESL SS p. 94. Study the graphs and answer the questions.

Making a Circle Graph

- Next, tell the ss they are going to make their own circle graphs.
- Have the ss collect data about where the ss are from in each class. (Arrange with the coordinator to have your ss poll the other classes at the learning center.) Have ss write down where each student is from.
- Use the website: **http://tinyurl.com/makeyourowngraph** make your own graph. (The coordinator may need to do most of the work).

Steps for website graph:

1. Click on Pie Chart
2. Click on Data Tab. Give your graph a title.
3. Have your ss count how many countries are represented and use that number where it says "number of pie slices".
4. Under item level, list each country. Under value, put the number of student from each country.
5. Click on Labels tab. Choice type you would like: probably % of total. Choose a font.
6. Click on preview to see your chart.
7. Go to print and save. Print your graph and hang it in the room. Students might also want a copy.

Trash: It's Got to Go Somewhere

As long as there have been people, there's been trash. In the United States, beginning in colonial days, people in rural areas just threw their trash in one spot on their property. The plant and animal materials rotted. The rest just piled up. Getting rid of trash has always been a bigger problem in cities. There just wasn't space available for junk to pile up. So towns had bands of roaming wild dogs and pigs. They ate a lot of the refuse. But the things that they couldn't eat were still left behind.

Starting in the 1800s, most U.S. cities had garbage carts. Horses drew these carts. The driver announced his arrival with a trumpet. When the people heard the trumpet, they brought out their trash and loaded it onto the cart themselves. (This practice lasted until about 1935.)

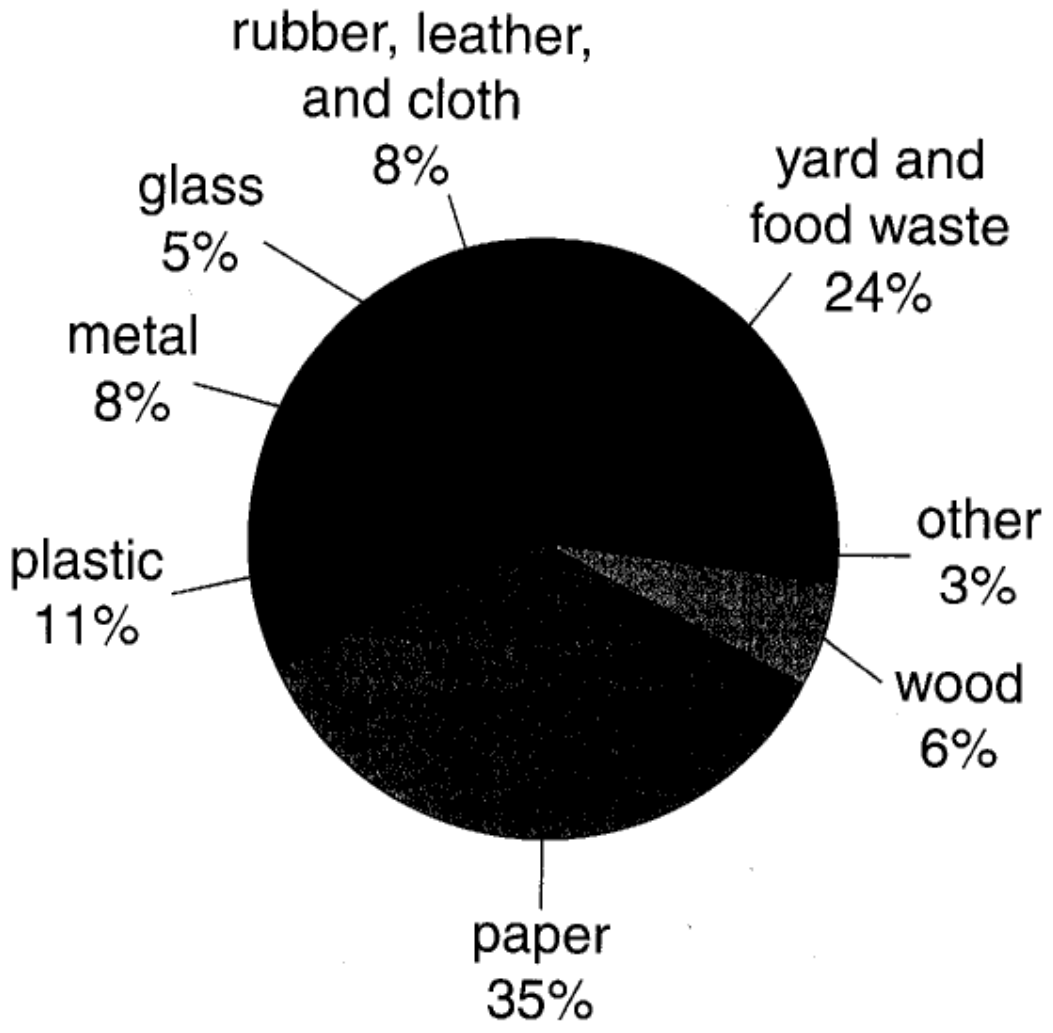
The trash was taken to the city's incinerator. However, not everything could go into this furnace. So women sorted through the garbage on the carts. They pulled out metal, glass, and any other things that wouldn't readily burn. The metal and glass were bundled and put up for sale. If no one bought this scrap, the items would be buried.

Today each American creates about four pounds of trash daily. Trucks come to people's homes to gather the trash. Where does it all go? About 20 percent is burned to make steam or electricity. About 45 percent is buried in a landfill or dumped far out in the ocean. After garbage trucks dump waste at a landfill, bulldozers compress the material. It's covered with soil daily. This prevents the trash from blowing around and odors from escaping. But it means that little oxygen or water reaches the waste, making it decay slowly. As the materials rot, they send methane gas fumes through pipes. These vents are placed in the landfill for this purpose. Rainwater also seeps into the landfill. Sanitary landfills have heavy plastic or clay liners to contain the water. A drainage system sends the trapped water to a sewage treatment plant.

Only about 35 percent of all solid waste is recycled. That percentage should be higher. Much of the paper, plastic, glass, and metal that can be recycled is not. That's because people throw it in the trash can instead of the recycle bin. A recent study showed that people are most apt to recycle if they have curbside pickup instead of having to take the materials to a center. People are also most likely to recycle if landfill space is in short supply.

Trash: It's Got to Go Somewhere

Total Trash Generated in 2003 in U.S. (before recycling)



U.S. Environmental Protection Agency. Municipal Solid Waste Generation, Recycling, and Disposal in the United States, 2003.

Trash: It's Got to Go Somewhere

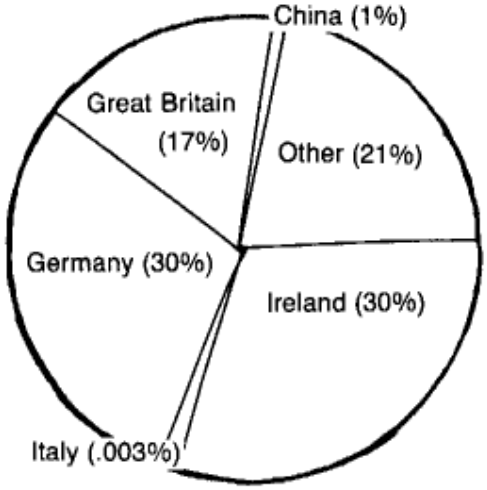
1. Landfills have liners in order to keep
   a. polluted water from getting into the groundwater.
   b. solid waste from rotting.
   c. the trash from blowing around.
   d. odors from escaping.
2. Most of the United States' solid waste is
   a. recycled.
   b. buried in a landfill or dumped in the ocean.
   c. burned to make steam or electricity.
   d. sent into outer space.
3. An incinerator is a type of
   a. landfill.
   b. recycling center.
   c. trash pick up.
   d. furnace.
4. People are most likely to recycle when they must take materials to a recycling center. True or False? Explain.

5. Name three items included in the "other" category of the pie graph. (Hint: Think about the things in your home.)

6. Should recycling be required and a big fine charged to anyone who fails to recycle? Defend your stance.

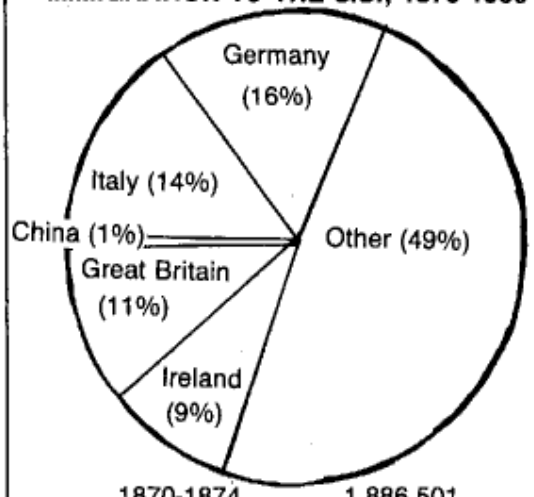
GRAPHICAL LITERACY.
Look at the charts. Answer the questions.

IMMIGRATION TO THE U.S., 1840-1869



1840-1844	400,031
1845-1849	1,027,306
1850-1854	1,917,527
1855-1859	897,027
1860-1864	707,243
1865-1869	1,374,018

IMMIGRATION TO THE U.S., 1870-1909



1870-1874	1,886,501
1875-1879	855,636
1880-1884	3,037,594
1885-1889	2,210,974
1890-1894	2,320,645
1895-1899	1,373,649
1900-1904	3,255,149
1905-1909	4,947,239

1. How many people came to the U.S. from 1840 to 1844? _____
2. How many people came to the U.S. from 1860 to 1864? _____
3. How many immigrants came from 1855 to 1859? _____
4. How many immigrants came from 1840 to 1869? _____
5. What percent of all immigrants from 1840 to 1869 came from Germany? _____
6. What percent of all immigrants from 1840 to 1869 came from Ireland and Great Britain? _____
7. How many immigrants came from 1890 to 1894? _____
8. How many immigrants came from 1900 to 1904? _____
9. How many immigrants came from 1900 to 1909? _____
10. What is the total number of immigrants who came from 1870 to 1909? _____
11. From 1840 to 1869, where did the largest percent of immigrants come from? _____
12. What percent of immigrants came from Ireland from 1840 to 1869? _____
13. What percent of immigrants came from Ireland from 1870 to 1909? _____

Graphs and Charts, Wednesday, Week 1 of 2
Line Graphs

Lesson Objectives:	**Materials:**
Students will... ● Be able to interpret data and understand information from a line graph ● Be able to make their own line graph	● **TCR5 Pg: 19-21** ● **ESL SS Pg: 110** ● **Ask coordinator for report on class hours.** **(Note for Coodinators: Run the report in MABE under Student reports, Student Hours by Class and Month. Print off this report for teacher)**

Activity Ideas:

<u>Reading & Analyzing Line Graphs</u>

Pre-reading

- Choose a pre-reading activity to activate ss' prior knowledge of public health.

Reading

- Work with ss to read page 19 of TCR5. Use various reading activities (taking, turns, reading alone, teacher reads, etc.) Have ss underline unknown vocab as they go. Go through vocab as needed.
- Have ss study the chart on page 20. Answer any questions as needed. Do they understand what this graph is showing?

Post-reading

- Answer questions on page 21 referring to the graph.
- Work with ss to complete ESL SS page 110.

<u>Making a Line Graph</u>

- Now explain that the class is going to make it's on line graph.
- On a large piece of chart paper, work with ss to make chart with an X axis that has the months listed and on the Y axis counting by 20 or 30.
- Now place dots on the correct coordinates and have the students connect them with a ruler or straight edge. Give graph a title and hang in the classroom.
- Talk about the trends in ss' hours. Is it less during the winter or summer? Why?

Related content: Choose a news article related to a public health issue. Incorporate pre-reading, reading and post-reading activities so ss can practice a variety of language skills.

Dr. Abel Wolman, Public Health Engineer

Dr. Abel Wolman has saved so many lives that no one can keep count. How? He worked with Linn Enslow to perfect a formula to use chlorine to clean water. Many people feel that this was the most important contribution to public health in the twentieth century.

Dirty drinking water used to spread disease and death. Cholera, yellow fever, and typhoid fever were common. These diseases could be passed from person to person. But they spread the fastest through dirty water. In fact, before 1935, as many Americans died of typhoid fever each year as the number who die in car crashes today.

In 1919 Wolman and Enslow found a way to safely chlorinate water using the least possible amount. But they had to convince the water utilities to act. Most did not want to put a poison into the water. Wolman persisted. He wrote articles. He made speeches. He wouldn't let the matter drop. And once his methods were applied to water supplies nationwide, the death rate from water-borne diseases fell. At the same time the life span of Americans increased.

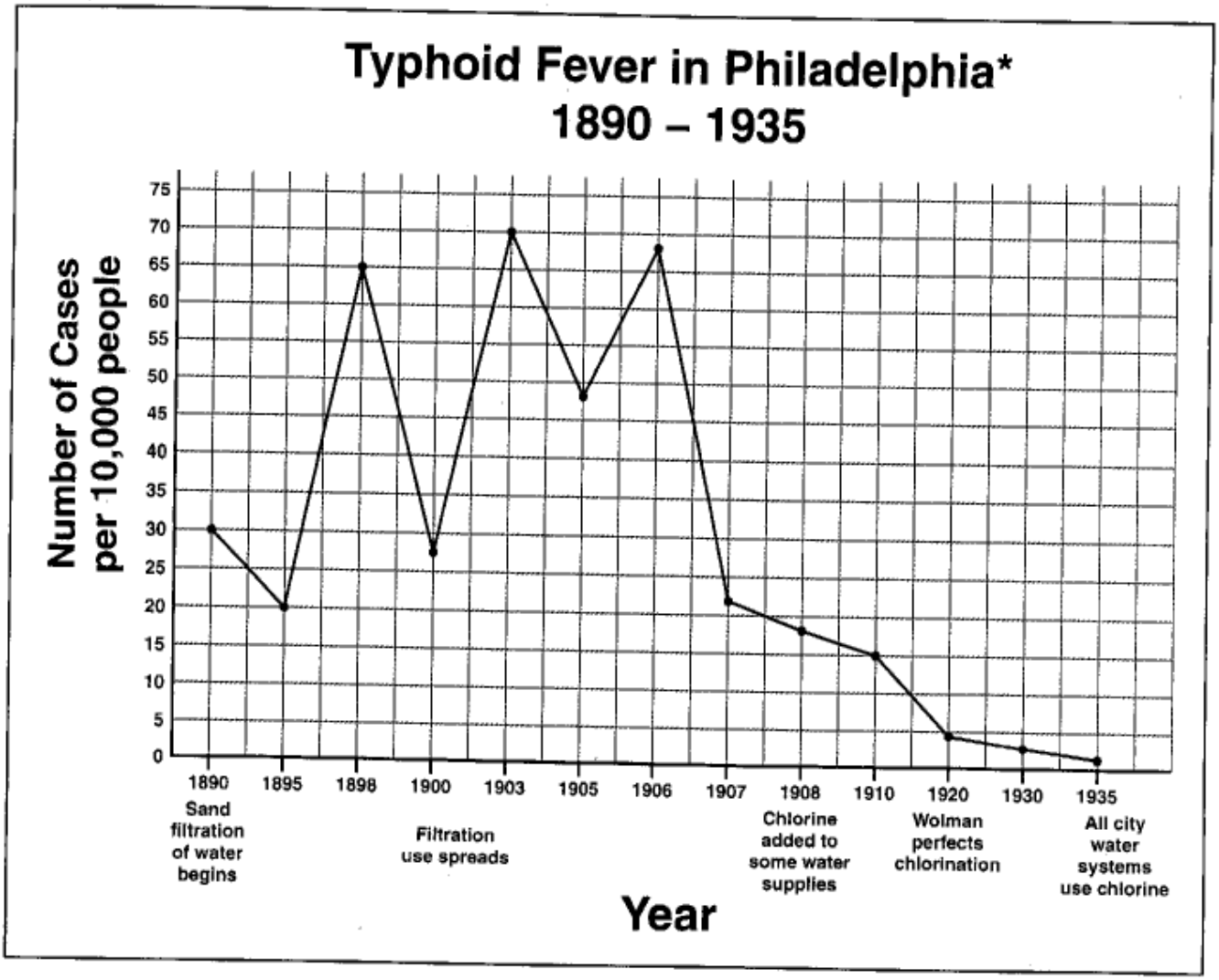
When Wolman saw the positive impact that clean water had on Americans' health, he wanted people worldwide to have clean water. So he served as an advisor to more than 50 nations and the World Health Organization (WHO). He worked to help them improve water quality.

Today Wolman's methods are still used. If you live in a city, here's how you get your water. First the water is collected in a reservoir. This can be manmade or a lake. When the water is needed, it flows into a building. Chlorine is added there to kill bacteria. Then alum is put into the water. This makes dirt particles clump.

Next the water is stirred with huge mixing paddles. When the paddles stop, the water is still. This lets all of the solids fall to the bottom. The clear water at the top of the tank runs through a gravity sand filter. Then lime is added to reduce the acidity. (Acid would ruin metal pipes.) Often fluoride is put in, too. This chemical strengthens teeth.

The water is left in a reservoir. As it is pulled from the tank, it gets an extra shot of chlorine to sterilize it again. The water moves through pipes by gravity or is pumped into elevated storage tanks. From there, it flows to your faucet.

Dr. Abel Wolman, Public Health Engineer



*During these years Philadelphia was the third-largest city in the United States. It was one of the first places to use sand filtration and chlorination to treat its drinking water.

Statistics from Davis, Mackenzie L. and David A Cornwell.
Introduction to Environmental Engineering. Boston: PWS Publisher, 1985.

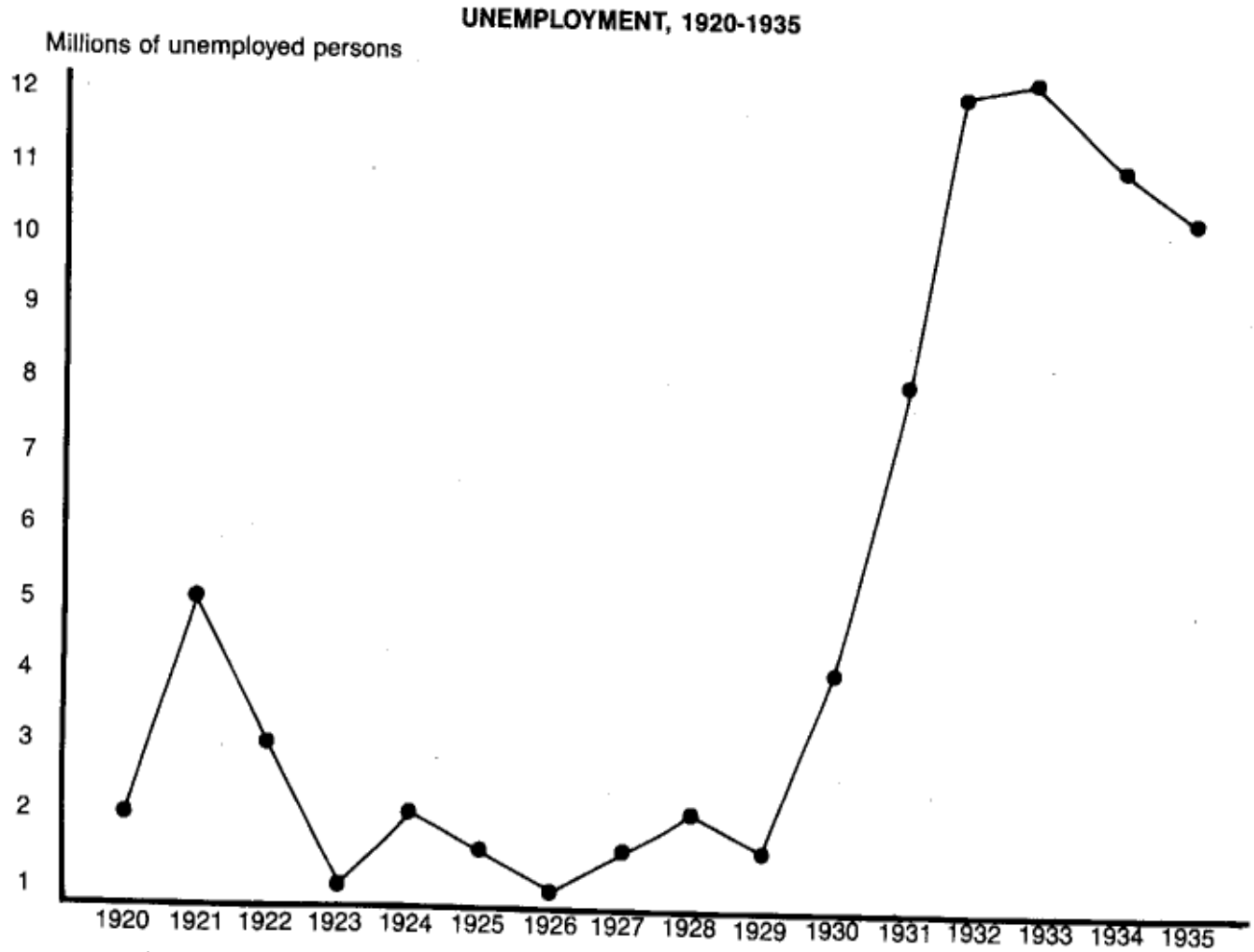
Dr. Abel Wolman, Public Health Engineer

1. Alum is added to drinking water to
   a. reduce the acid level.
   b. sterilize the water.
   c. make dirt pieces in water clump together.
   d. strengthen people's teeth.
2. About how long did it take for all Philadelphia water utilities to use Wolman's chlorination method?
   a. 2 years
   b. 4 years
   c. 11 years
   d. 16 years
3. Why does Abel Wolman get more credit for creating pure drinking water than Linn Enslow?
   a. because Enslow had nothing to do with inventing sand filtration
   b. because Wolman kept after the water utilities to use chlorination and later worked with WHO to improve water quality worldwide
   c. because Enslow died while the men were perfecting the chlorination formula
   d. because Wolman denied that Enslow had ever helped him with the chlorination formula
4. Sand filtration of drinking water was first used in Philadelphia in 1880 and is still used today. True or False? Explain.

5. Look at the line graph. In what year was chlorine first added to the Philadelphia water supply, and was it soon obvious that it helped to curb typhoid fever?

6. Were the people in charge of the water utilities throughout America wrong not to adopt Wolman's chlorination method immediately? Defend your stance.

GRAPHICAL LITERACY.
Look at the chart. Answer the questions.



1. What is shown on the side of the chart? _____
2. What is shown on the bottom? _____
3. What is the first year on the chart? _____
4. What is the last year on the chart? _____
5. How many millions of people were unemployed in 1920? _____
6. How many millions of people were unemployed in 1922? _____
7. How many millions of people were unemployed in 1924? _____
8. How many millions of people were unemployed in 1930? _____
9. Were more people unemployed in 1920 or in 1930? _____
10. Were more people unemployed in 1932 or in 1934? _____
11. How many more people were unemployed in 1930 than in 1928? _____
12. Which year had the highest unemployment? _____

Graphs and Charts, Thursday
Picture Charts

Lesson Objectives:	**Materials:**
Students will... ● Be able to interpret data and understand information from a picture chart ● Be able to make their own picture chart	Resources: ● **TCR2 Pg: 49-51** ● **ESL SS Pg: 74**

Activity Ideas:
Reading & Analyzing a Picture Chart *Pre-reading* ● Choose a pre-reading activity to activate ss' prior knowledge of volcanoes. *Reading* ● Work with ss to read page 49 of TCR2. Use various reading activities (taking, turns, reading alone, teacher reads, etc.) Have ss under line unknown vocab as they go. Go through vocab as needed. ● Have ss study the chart on page 50 Answer any questions as needed. Do they understand what this graph is showing? *Post-reading* ● Answer questions on page 51 referring to the graph. ● Work with ss to complete ESL SS page 74.

Birth of an Island

Did you know that there are volcanoes under the sea? They can form new land. The island of Surtsey started out this way. On November 8, 1963, a volcano spilled hot lava onto the sea floor. This lava cooled. It formed rock. More lava flowed. In just one week enough had built up to reach the sea's surface. And this happened where the sea is 427 feet deep! Once it broke through the sea's surface, it formed an island. All of the Hawaiian Islands formed this same way.

Surtsey appeared near Iceland. Sailors at sea saw the huge cloud of smoke and steam. They thought that a ship was on fire. They rushed there. They were shocked at what they found.

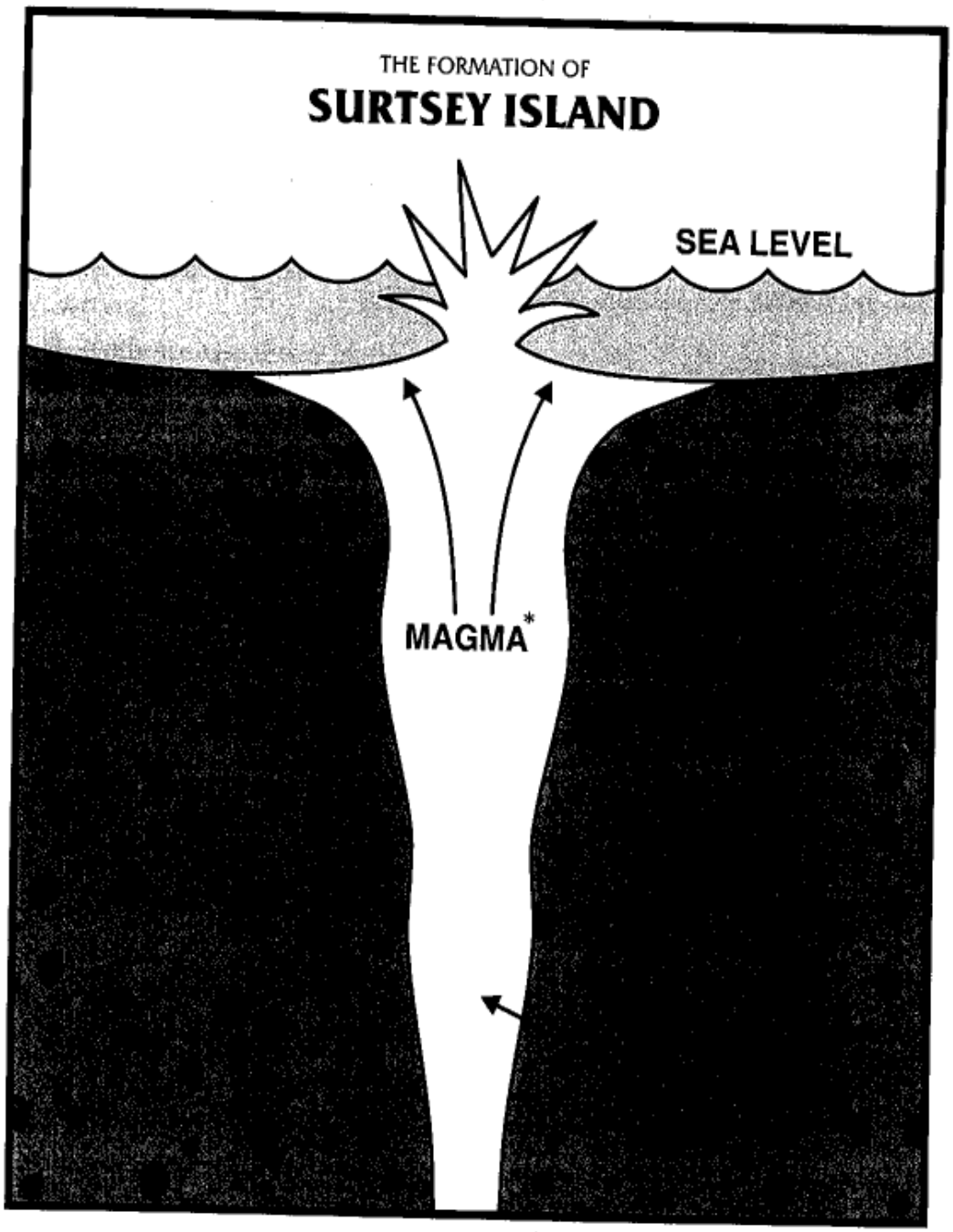
Lava flowed until June 1967. By then Surtsey was one mile wide and one mile long. Now wind and waves have worn away the land. It is smaller.

The Iceland government made Surtsey a nature reserve. Only scientists could go there. They went to study the island. They learned that the wind blew spiders to the island. When the spiders died, they rotted. Their bodies helped to form dirt for plants.

Moss and lichen grew first. Their spores* came on the wind. These plants now cover much of the island. At least 60 different plants have been found. About three new ones arrive each year. Most come in bird droppings. Birds began nesting on Surtsey three years after the eruptions ended. Now seals lay in the sun on the island's shores.

*like seeds

Birth of an Island



*Magma is the name for lava when it is still inside Earth.

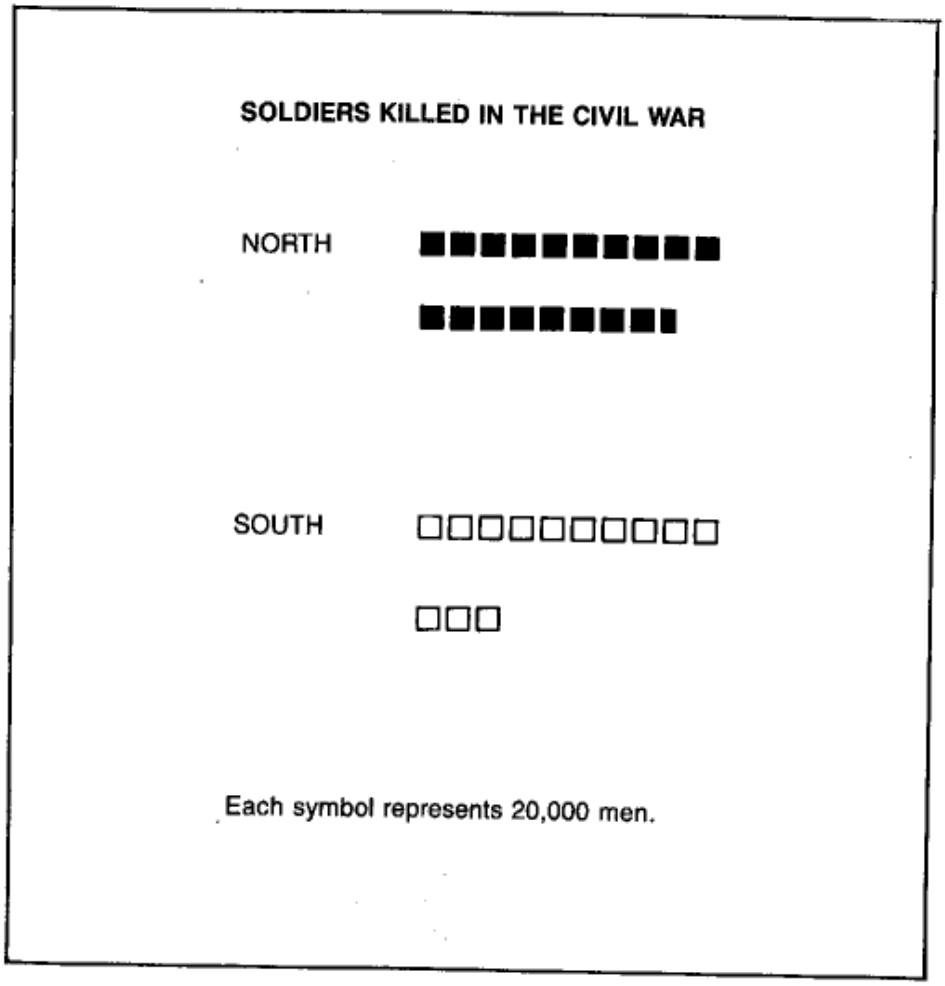
Birth of an Island

1. In November 1963 what did the sailors who rushed to Surtsey expect to find?
   a. a bomb exploding
   b. a new island rising out of the sea
   c. a ship on fire
2. Which island formed in the same way as Surtsey?
   a. the Hawaiian island of Maui
   b. Australia
   c. Greenland
3. How long did it take Surtsey to rise from the sea floor and break through the sea's surface?
   a. one day
   b. one week
   c. one month
4. Birds started nesting on Surtsey as soon as the eruption stopped. True or False? Tell why.

5. Look at the diagram that shows how Surtsey formed. What is between Earth's two land plates? What is magma?

6. Do you think that it was wise that the Iceland government only let scientists go to Surtsey? Why or why not?

GRAPHICAL LITERACY.
Look at the chart. Answer the questions.



1. How many men does each square represent? _____
2. Do the white squares represent the North or the South?

_____

3. Do the black squares represent the North or the South?

_____

4. How many Union soldiers died? _____
5. How many Confederate soldiers died? _____
6. What is the total number of soldiers who died? _____
7. Did the North or the South lose more soldiers? _____