

ROVE THE COVE

LESSON OVERVIEW

OBJECTIVE

Students will practice making and reading graphs.

RECOMMENDED GRADE LEVELS

2-4

DURATION

20 minutes

MATERIALS

- Student worksheet (provided)
- Whiteboard or large easel paper
- Scissors

TOPIC BACKGROUND

During your field trip to Brooklyn Bridge Park, students explored the shoreline. The **intertidal zone** is home to many living and nonliving things. As students discovered, some organisms and objects such as algae and rocks are very abundant. Other mobile organisms such as crabs and snails are more difficult to find.

Students also conducted water quality experiments with water from the East River estuary. An **estuary** is a special name given to a body of brackish water. **Brackish water** is a mix of saltwater and freshwater. The brackish water creates a very unique environment for a lot of different living organisms.

The amount of salt in a body of a water is called the **salinity**. Salinity is usually measured in parts per million (ppm). Water with a salinity of 0 ppm is considered freshwater. Water with a

salinity of 35 ppm or greater is considered ocean water. The salinity of the East River estuary changes daily depending on the time of year, tides, and weather. In hotter months, the salinity will be higher as water molecules warm up and evaporate. During the spring when there is frequent rainfall and snow melt, more freshwater enters the estuary, diluting the salt concentration.

Scientists often record data. One method for recording amounts of certain objects is to use **tally** marks. Scientists also graph their data. **Bar graphs** are used to compare amounts. **Line graphs** are used to observe changes over time. In this lesson, students will practice math and graphing using real life science scenarios.

GETTING READY

Activity 1:

1. Print a color copy of the estuary organism sheets. Cut each picture out and apply a small piece of tape to each in order to hang in the front of the classroom.
2. Gather post-it notes (at least 1 per student)

Activity 2:

1. Print a copy of the 3-page graphing packet for each student.

STANDARDS

COMMON CORE MATH STANDARDS

- Measurement and Data

COMMON CORE ENGLISH LANGUAGE ARTS STANDARDS

- Reading Informational Text
- Speaking and Listening
- Literacy in Technical Subjects
- Literacy in Science
- College & Career Readiness
- Writing Standards

NYC K-8 SCIENCE & SOCIAL STUDIES SCOPE & SEQUENCE

- Our Community Geography
- New York City Over Time
- Animals, Plants in their Environments
- The Nature of Science
- Exploring Ecosystems
- Diversity of Life
- Interdependence
- Humans in Their Environments

NEXT GENERATION SCIENCE STANDARDS

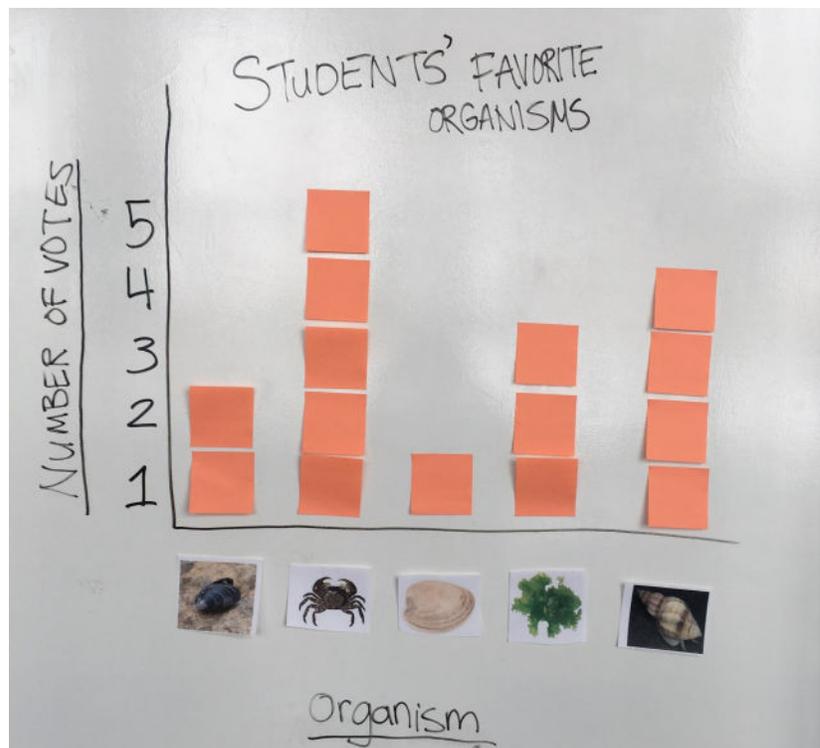
K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment

1. Structure, Function, & Information Processing
2. Interdependent Relationships in Ecosystems
3. Interdependent Relationships in Ecosystems
4. Structure, Function, & Information Processing

PROCEDURE

Activity 1: Introduction to Graphing

1. Begin by challenging students to think about the objects and organisms they learned about during their trip. Hold up the estuary creature images one at a time, allowing students to guess the correct name.
2. Hand each student a post-it note and tell them we are going to take a class vote on their favorite Brooklyn Bridge Park organism.
3. Tape the organism images to the board or wall (leaving adequate space between each for post-it note votes).
4. Allow each student to cast their vote by sticking their post-it near the image representing their favorite.
5. Once everyone has voted, count the number for each organism, by creating a tally chart on the board.
6. Next, explain and show students that we can better interpret data by creating a chart. Relocate the post-its and images to create a bar graph. (See photo example below) Use a whiteboard marker to add a scale and axis titles.
7. Explain to students that each square counts as 1 unit, or in this case 1 vote. Continue to explain to students the different ways we can show data (pictograph, line graph, bar graph).



PROCEDURE CON'T

Activity 2: East River Graphing Packet

1. For this activity, be sure to first introduce students to students reading a number table, making and counting tallies, and plotting line and bar graph.
2. Hand out the 3-page graphing packet to each student. Each page contains a science scenario and a series of questions. The first worksheet involves counting tallies and making a bar graph. The second page involves interpreting a table and line graph. The final page includes making a line graph.
3. Alternatively, teachers may want to only print & hand out worksheet pages that involve content students have already covered in class.

RECOMMENDED BOOKS

- *Seashells by the Seashore* by Marianne Berkes (Gr. K-3)
- *A Journey Into an Estuary (Biomes of N. America)* by Rebecca L. Johnson (Gr. 3 +)
- *Hudson River: An Adventure from the Mountains to the Sea* by Peter Lourie (Gr. 2 +)

RECOMMENDED WEBSITES

About the Intertidal Zone

www.enchantedlearning.com/biomes/intertidal/intertidal.shtml

Estuary Education

www.coast.noaa.gov/estuaries

BrainPOP Jr. Bar Graphs

jr.brainpop.com/math/data/tallychartsandbargraphs

BrainPop Jr. Line Graphs

jr.brainpop.com/math/data/linegraphs

TEACHER NOTES:



Shore Crab



Mussel



Sea Snail



Clam



Rockweed (Algae)



Sea Lettuce (Algae)



Scud



Sand Worm



Red Algae

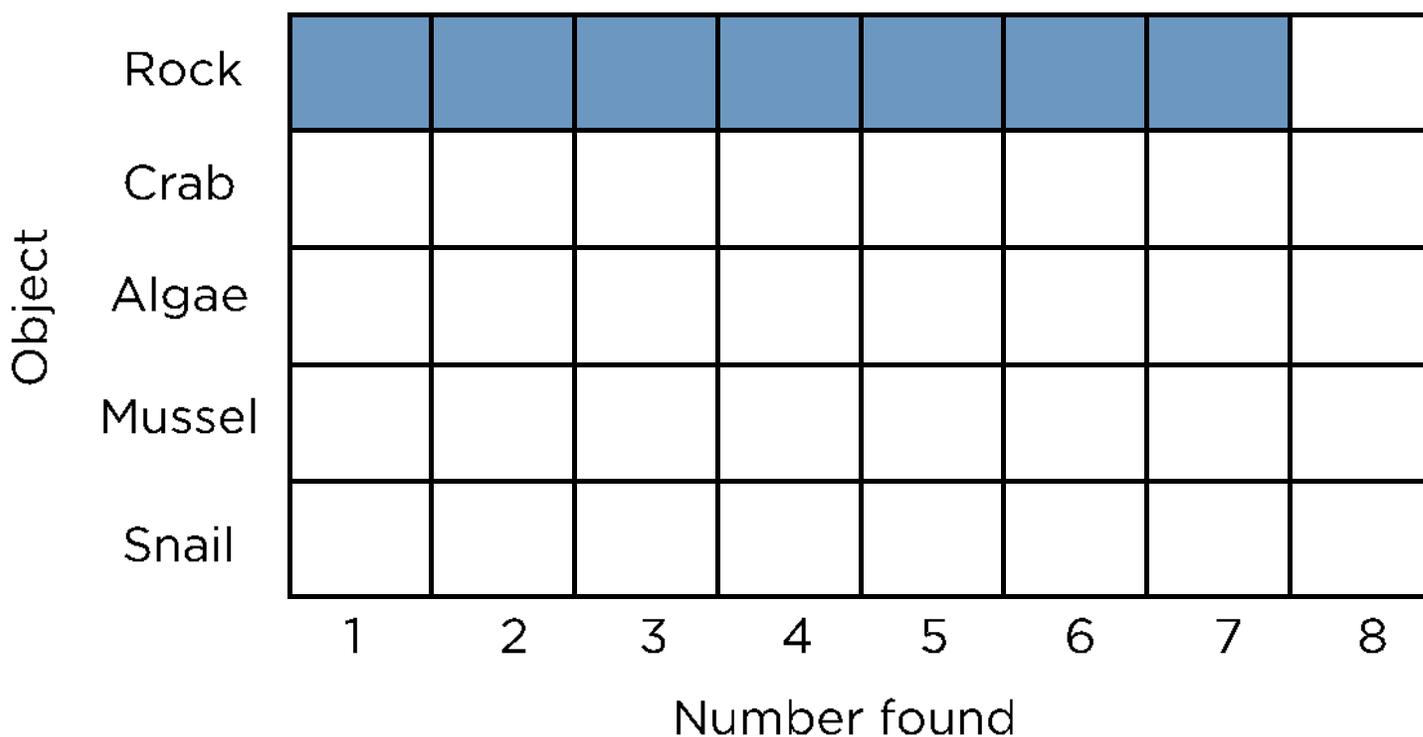
Name: _____

While visiting Brooklyn Bridge Park, a group of students explored the shoreline and tallied the number of objects they found.

OBJECT	TALLY	NUMBER
ROCK	 	
SHORE CRAB		
ALGAE	 	
MUSSEL SHELL		
SNAIL SHELL		

1. Count the number of tallies in each row and record the number in the last column.
2. Which item was found the most?
3. Which item was found the least?

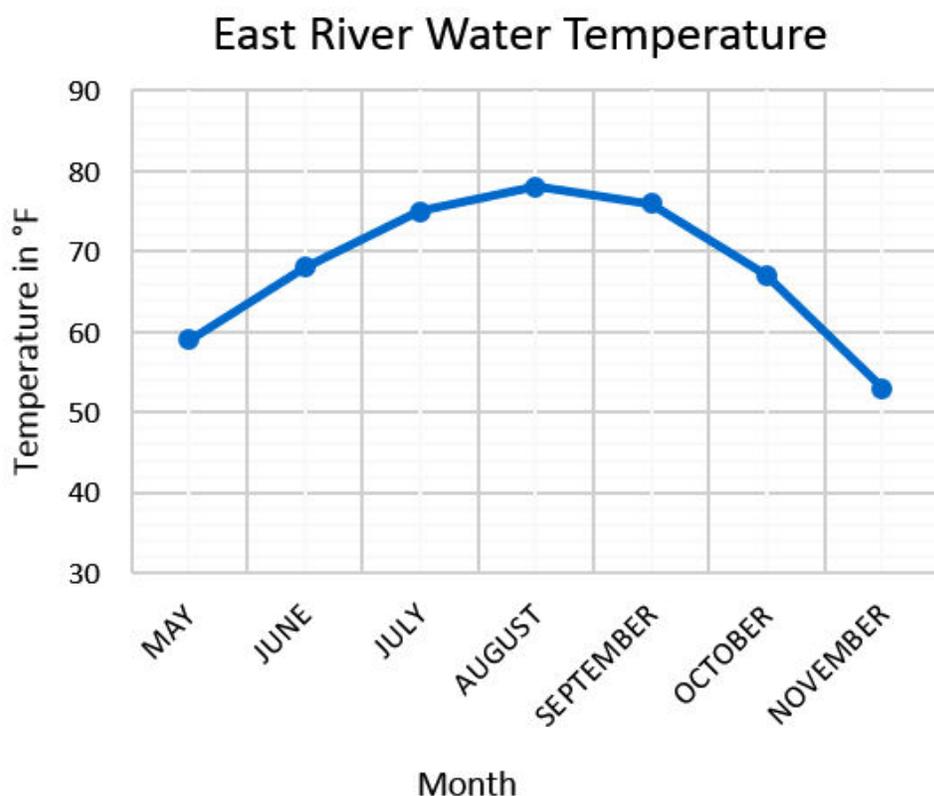
4. Create a bar graph below. Color enough boxes in each object row to equal the number tallied above. For example, 7 rocks were collected so 7 boxes in the rock row have been shaded.



Name: _____

A scientist went out on a boat once a month to collect water samples from the East River. She recorded the water temperature in the table below and later created the line graph on the right. Line graphs are used to track changes over time. Study the line graph, then answer the questions below.

MONTH	WATER TEMPERATURE
MAY	59
JUNE	68
JULY	75
AUGUST	78
SEPTEMBER	76
OCTOBER	67
NOVEMBER	53

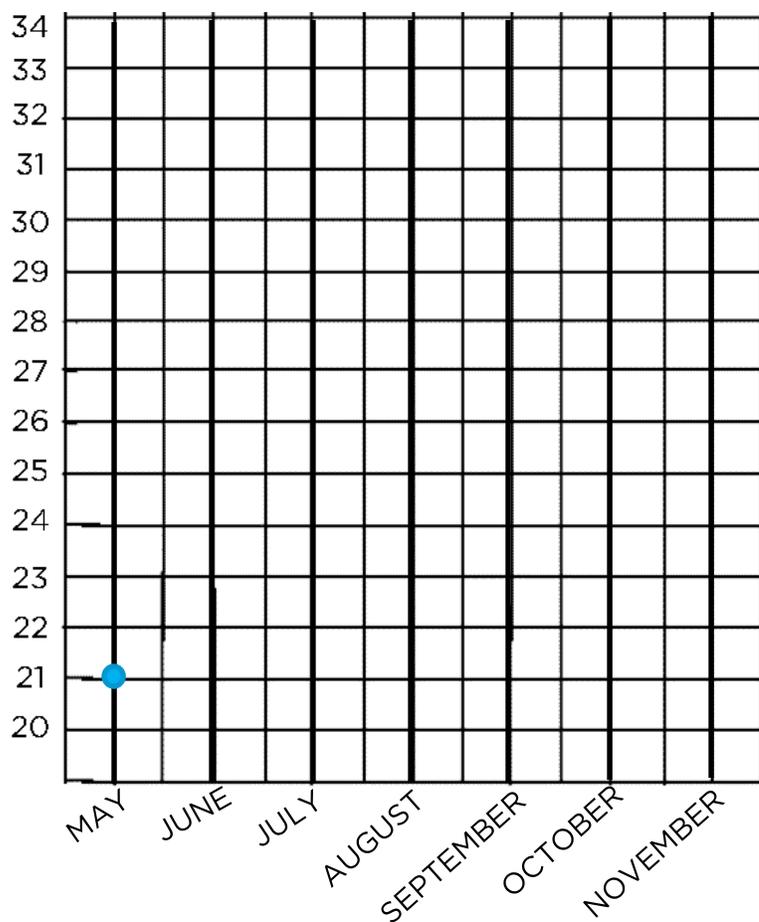


1. In which month was the temperature the highest?
2. In which month was the temperature the lowest?
3. What was the lowest temperature recorded?
4. This graph shows that the temperature of the river increased , then later decreased over time. Why do you think there was a change in the river's temperature?

Name: _____

The scientist also measured the salinity of the East River each month. The word salinity means how much salt is in the water. Water with a salinity of 0 contains no salt (also known as freshwater). The ocean has a salinity of about 35. Water that has a salinity between 15-30 is called an estuary.

MONTH	SALINITY
MAY	21
JUNE	22
JULY	32
AUGUST	33
SEPTEMBER	24
OCTOBER	23
NOVEMBER	20



1. Create a line graph using the numbers above. Plot a point at the salinity level for each month, then connect the dots. The first month is done for you.

2. When was the salinity the highest?

3. Why do you think the salinity is greater during summer months?

4. Based on these measurements, is the East River freshwater, saltwater, or an estuary?

Vocabulary



Algae: a plantlike organism that grows and lives in water. Algae comes in shades of green, brown, and red. It has many shapes and textures. Sometimes people call it seaweed.

Abiotic factors: those nonliving physical and chemical factors which affect the ability of organisms to survive and reproduce.

Bar graph: A graph that shows rectangles with lengths proportional to numbers as a visual way of comparing the numbers.

Biotic factors: The living portion of an environment.

Bivalve: an aquatic mollusk that has a soft body enclosed within a hinged shell, such as oysters, clams, mussels, and scallops. In other words, an animal with two shells.

Brackish: Slightly salty water, due to the mixture of freshwater from rivers and streams and seawater.

Driftwood: pieces of wood or tree debris that are floating on the water or have been washed ashore.

Ecosystem: community together with its environment, functioning as a unit.

Estuary: A semi-enclosed body of water containing both fresh and salt water.

Habitat: The area or environment where an organism or ecological community normally lives or occurs.

Intertidal zone: the area that is above water at low tide and under water at high tide. Also known as the seashore or shoreline and sometimes referred to as the littoral zone.

Living thing: organisms composed of cells that display the key characteristics of life. These characteristics include the ability to grow, reproduce, take in and use energy, excrete waste, respond to the environment, and possess an organized structure.

Man-made: made or caused by human beings (as opposed to naturally occurring); artificial.

Nonliving: Not having the characteristics of life.

Natural: existing and produced by nature; not artificial

Plot: To mark, note, or locate on a map or chart.

Tally: A method of keeping count where you draw one line (or tally) for each item you count.

Tidal Strait: A channel that connects two saltwater bodies. The East River is technically a tidal strait because it connects the New York Bay to the Long Island Sound.

Univalve: a mollusk with a shell consisting of a single valve or piece, such as a snail. Also known as gastropods.

Line graph: A graph in which line segments join points representing different values