Name _____ Class _____ Date _____

3 The Ocean Over Time

BIG IDEAS

- Humans have relied upon and utilized the ocean for thousands of years for food, resources, trade, transportation and recreation.
- Scientific inquiry is a cyclical process that scientists employ to learn about our world.

Engage

Activate Prior Knowledge

In this lesson, you will learn about ways in which humans have relied upon and utilized the ocean for thousands of years. Before reading and trying the activities in your textbook, use the chart below to record what you already know about this topic. After you complete the lesson, use the chart to record new information you learned.

Read each question below and think about what you already know about the topic. Write a few ideas, thoughts or sentences in the What I Know column of the chart.

Question	What I Know	What I Learned
In what ways have people used the ocean over time?	*Answers will vary. Some sample responses are shown.*	*For thousands of years humans have used the ocean for travel, trade, food and fun.*
How much do we know about the ocean and its organisms?	*We have explored and mapped Earth's oceans. Scientists study and track marine organisms*	*Ninety-five percent of the ocean is still unexplored.*
How do we explore and learn about the ocean?	*Scientists use ships and submarines to explore Earth's oceans.*	*Scientists use satellites and go out on research vessels to learn about marine animals.*
What is algae?	*Algae is seaweed that grows in the ocean.*	*Algae is used in many household products and foods.*

Name _____ Class _____ Date _____

Explore

Build Background

The activity on pages 51–54 of your textbook asks you to create a timeline. A timeline is a visual guide that helps you quickly see a sequence of historical events. Timelines can help you understand how things happened or changed over time. They can help you make connections between events and see, for example, how one event triggered another. As practice for the *Ocean in History* activity in your textbook, try first to make a timeline of your life to review this concept.

Timelines have these key elements:

- They are formed from a straight horizontal or vertical line.
- They show events in chronological order (as points on the line).
- They are drawn to scale.

To get started, fill in the first two columns of the chart below with important events from your life. Begin with the year you were born and end with the current year. Use a new row for each event. You may enter more than one event in the same year if you feel they are both important.

Date or Year	Event	Category
April 17, 1995	*I was born on April 17 at 6:05 PM.*	*Growth Milestone*
March 1996	*I said my first word, Cocoa. Cocoa is my dog's name.*	*Growth Milestone*
June 12, 1998	*My little brother, John, was born.*	*Family*
September 2000	*I started school.*	*Academic*
January 2001	*I lost my first tooth.*	*Growth Milestone*
May 2003	*I was the star in our school play.*	*Academic*
July 2005	*My mother got a new job, and we moved to Florida.*	*Family*
October 2007	*I went to my first school dance.*	*Recreation*
September 2009	*I joined the soccer team.*	*Recreation*

Name _____ Class _____ Date _____

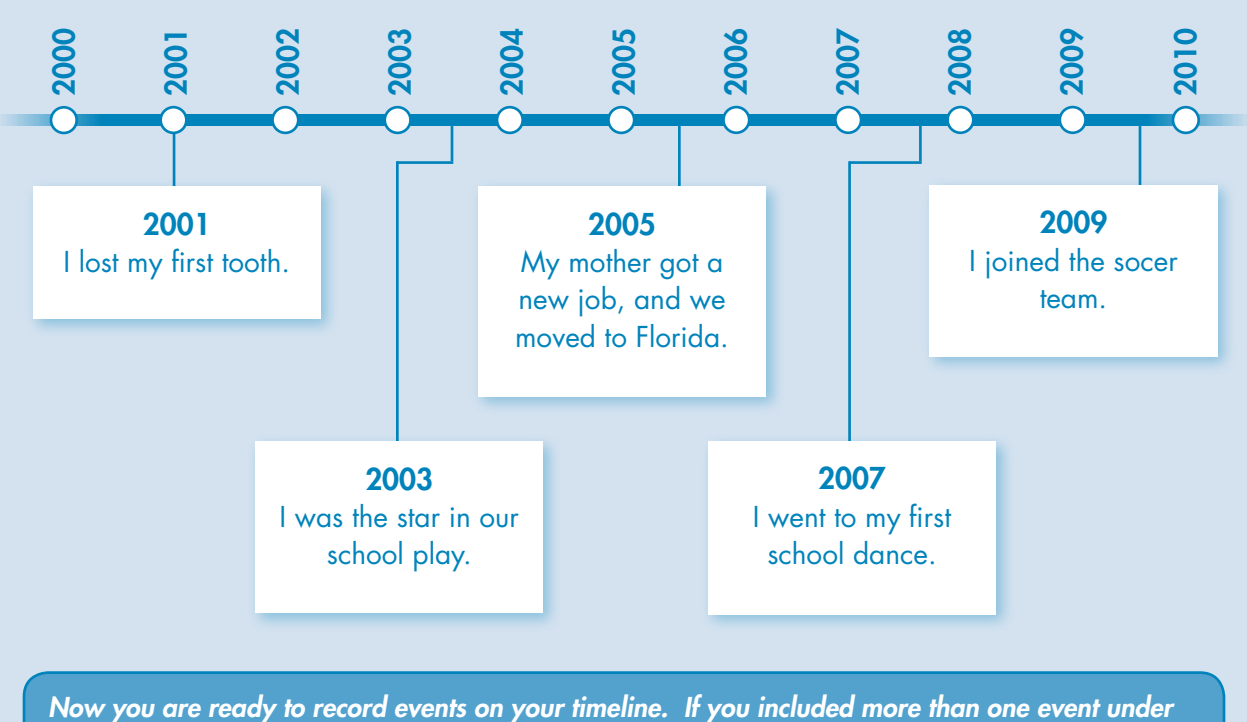
Events on a timeline are often categorized into groups. Some events you recorded in the chart on the previous page might be growth milestones, such as saying your first words. Other events may be related to family life, such as the birth of a sister or brother. Categorizing the events on a timeline helps to organize and show activities that are related.

Look at the events you recorded in the chart and think about how they can be categorized, or grouped. Fill in the category names in the last column of the chart. After recording the titles of your categories, select a different color for each category. Record your color scheme below.

Timeline Key

Now you are ready to construct your timeline. Timelines are formed from a straight horizontal or vertical line. The line is divided into even intervals, or sections, of time. This is the timeline's scale. The scale should remain the same throughout the timeline. That means the amount of space between years should not change. This helps people see at a glance whether a little or a lot of time has passed between events.

Draw a straight line on a sheet of paper. Then determine your scale. Using a ruler as a guide, mark each year on your timeline. See the example below for a model.



Now you are ready to record events on your timeline. If you included more than one event under a certain year, record the events in the order that they happened. If you did not include an event for a year, leave the year blank, but make sure the year is visible on your timeline. Complete your timeline by lightly coloring each event according to the category color and including a key.

Name _____ Class _____ Date _____

Explain

Review What You Learned

As you learned in the Explore and Explain activities of your textbook, humans have made incredible progress in exploring and learning about Earth's ocean. Nonetheless, much research is yet to be conducted and innumerable questions are yet to be answered about the ocean. Scientists today refer to our ocean as the final frontier.

Read the following selection that summarizes our explorations of the ocean and potential for future research. Then answer the questions below to review what you learned.

"How did the ocean form? Where does it get its power? Why is it blue, brown, or green? What is living in it? ... Certainly these are some of the questions asked thousands of years ago before explorers had access to what we consider, at best, extremely primitive instrumentation and ocean-going vessels.

Today, we have sophisticated technological capabilities that have made the ocean more "visible" and more accessible than it has ever been before. As a result of "new technological eyes," hundreds of new species and new ecosystems have been discovered—some of which may hold the keys to the origin of life on Earth, cures to life-threatening diseases, and knowledge about presently-unknown metabolic pathways for obtaining and using energy to support life here on Earth.

Even though we live on an Ocean Planet, approximately two-thirds of which is covered by water, approximately 95% of the ocean remains unexplored. Recent progress in technology permits us to completely rethink how we conduct exploration and oceanographic studies. Developments in biotechnology, sensors, telemetry, power sources, microcomputers, and materials science now permit the U.S. to ... study the undersea frontier. We need not be limited by weather and blind sampling from ships, but like true explorers, can immerse ourselves in new places and events. The great challenge is getting to the frontier. Once there, we can use many of the same tools and technologies used by scientists studying terrestrial habitats."

Credit: NOAA, http://oceanexplorer.noaa.gov

1. Here's a fact: We know more about the Moon than our own ocean. Is this surprising to you? Why or why not? How has the information you learned in the Explore and Explain activities in your textbook shaped your response?

Answers will vary. A sample response follows: I am surprised that we know more about the Moon than our ocean. The Moon is thousands of miles away in space, and our ocean is right here. Even though we have been exploring the ocean for centuries we still know so little about it.

Name _____ Class _____ Date _____

2. What are some obstacles that have prevented us from exploring Earth's ocean?

Answers will vary. A sample response follows: The ocean is vast and deep. We haven't been able to access parts far below the ocean's surface until the last century. A lack of technology and tools were our biggest obstacles.

3. How are technologies helping us to overcome some of the obstacles related to ocean research?

Answers will vary. A sample response follows: New technologies, such as submersibles, allow us to observe the deep sea where it was previously difficult to explore. Satellites have enabled us to measure and analyze conditions of the ocean more easily.

4. How have our attitudes about the ocean shifted over time? How are these mental shifts helping us make progress in exploring and learning about the ocean?

Answers will vary. A sample response follows: We used to view the ocean as a source of endless resources. Today we recognize that resources are not unlimited. We appreciate the value of the ocean and the need to protect it because it is necessary for life on Earth.

5. What new discoveries do you think humans will make about the ocean over the next 50 to 100 years? Predict events you might be able to add to the Ocean History Timeline in the future.

Answers will vary. A sample response follows: I think we'll learn more about the deep sea and organisms living on the seafloor.

6. If you were a marine scientist, what aspect of the ocean would you want to study? Why?

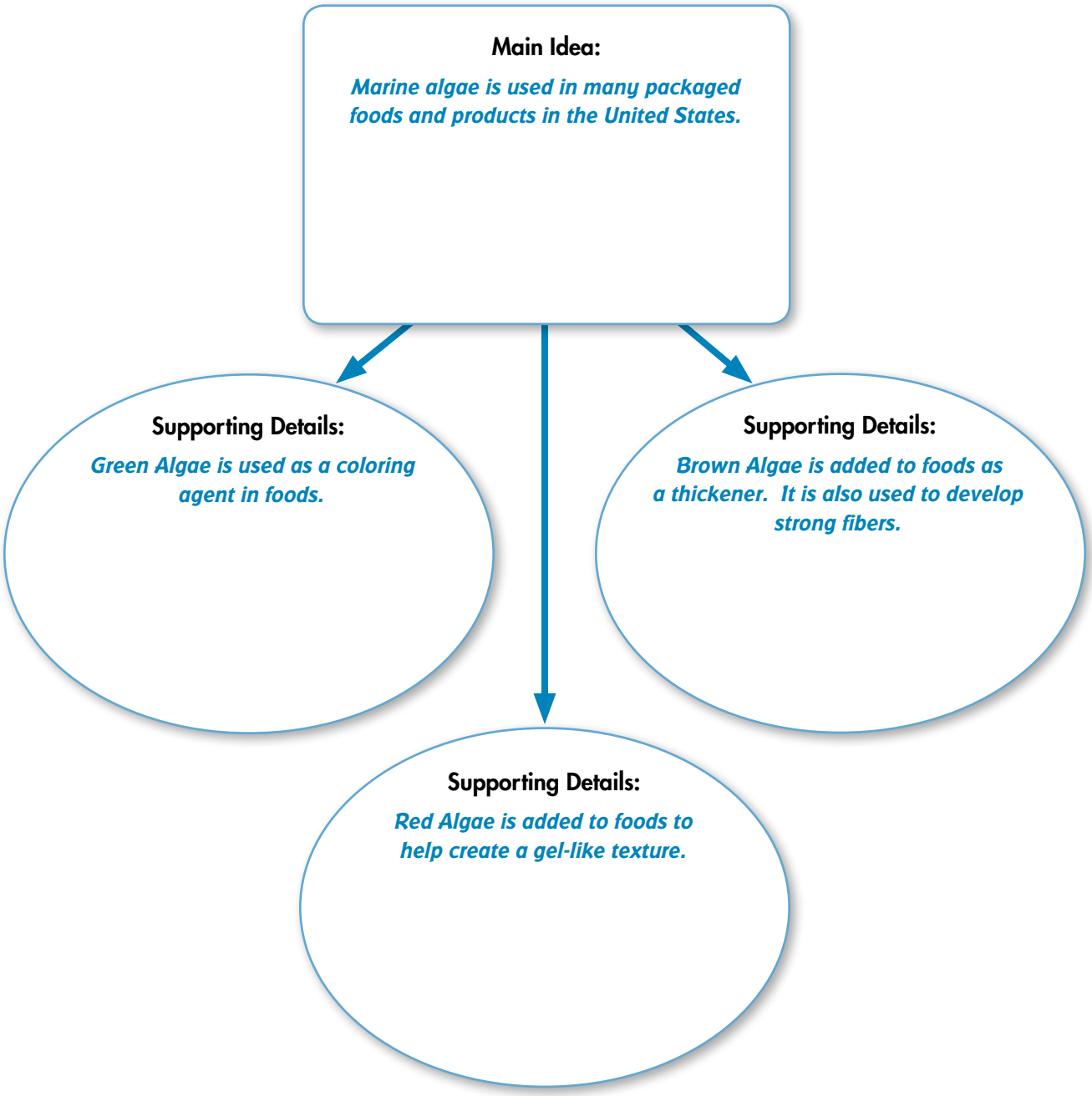
Answers will vary.

Name _____ Class _____ Date _____

Reading Strategy: MAIN IDEA and DETAILS

When you read, it is important to identify the main idea of the selection you are reading. The main idea tells what the selection is 'mainly,' or mostly about. It is the key concept of the text, or the most important idea being expressed. Often, but not always, the main idea is found at the beginning of a selection or paragraph. Details help to support the main idea often by answering the questions who, what, where, when, why, how, or how many.

As you read the text about algae on page 56 of your textbook, fill in the Main Idea and Details graphic organizer below. This will help you keep track of and remember what you read.



Name _____ Class _____ Date _____

Elaborate

Vocabulary Review

Complete the chart below as you read pages 58–62 of your textbook. Write the definition of each vocabulary term in your own words. Then write a note to yourself on how you can remember the meaning of each term. Use the chart to review key concepts after you have finished the lesson.

Term	Definition	How I Will Remember
Scientific inquiry	*The process scientists use to investigate and learn about something by asking questions and making observations*	*Answers will vary. Some sample responses are shown.*
Observation	*Information you collect through the five senses*	
Data	*Observations, or facts, that are collected and recorded*	*Data is information.*
Quantitative data	*Observations that include measurements*	*I see the word quantity in quantitative. A quantity is an amount or measurement.*
Qualitative data	*Data that is descriptive*	*I see the word quality in qualitative. A quality is a feature that can be described.*
Inference	*A logical explanation to a question or situation based on past knowledge and experience*	
Hypothesis	*A testable idea about a question*	

Name _____ Class _____ Date _____

Term	Definition	How I Will Remember
Experiment	*A scientific investigation to test a hypothesis*	*To experiment means to test or try something.*
Conclusion	*An analysis of data that will support, fail to support or contradict a hypothesis*	
Engineering	*The process of applying scientific concepts to a new problem to design solutions and systems*	*To engineer means to put together or solve.*
Indigenous	*Related to groups of people that are native to a certain place for thousands of years*	

Practice Process Skills: OBSERVE

Scientific Inquiry is a process scientists use to answer questions and learn about the world. Scientific Inquiry often begins with observations. When we observe, we use our senses to take in information about our world. You might notice the sound of a siren as you walk down the street. This is an observation. You might notice the smell of food cooking in a kitchen. This is an observation, too. Making observations is a foundation of scientific exploration.

Look or walk around your classroom. What are six things you observe? Remember, observations can be made with any of your senses.

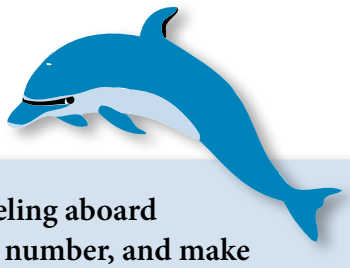
Anything you notice by touch, taste, smell, sight, or hearing is an observation.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Name _____ Class _____ Date _____

Data from observations are often classified as quantitative or qualitative. Qualitative data offer a descriptive picture of something. The statements are true facts, but do not involve any type of measurement. Quantitative data, on the other hand, are data collected from measurements. Quantitative data always involve numbers or amounts of some kind.

Read the passage below about dolphins. Circle or highlight the data included in the passage as you read. Then use the chart below to classify the data as qualitative or quantitative.



Scientists in Florida conduct an annual Dolphin Watch. Traveling aboard a research vessel, they tag 100 dolphins, assign each dolphin a number, and make observations about the dolphins' behavior over the course of a year. The dolphins are not hurt in any way, and they usually form a bond with the scientists.
Some dolphins are sighted more than others. Dolphin number 79, for example, was a social creature who stayed close to her home near the NASA Causeway. Number 79 was a friendly female dolphin who was always playful. Scientists were often worried that Number 79 was not timid enough around humans. In the same year that Number 79 was tagged, she was sighted by scientists 25 times, and she was sighted by the general public 93 times. There were 105 photos taken of Number 79 the year she was tagged. Number 79 even got her photo on the front page of a local newspaper.

Qualitative Observations	Quantitative Observations
Number 79 was social and friendly.	*One hundred dolphins were tagged.*
Number 79 stayed close to her home.	*Number 79 was sighted by scientists 25 times.*
Number 79 was a female dolphin.	*Number 79 was sighted by the public 93 times.*
Number 79 was not timid around humans.	*One hundred five photos were taken of Number 79.*

Name _____ Class _____ Date _____

Evaluate

Lesson Summary

- For thousands of years humans have relied upon the ocean for food, resources, transportation and recreation. Humans continue to rely upon the ocean today.
- Although only 95% of the ocean has been explored, scientists have been researching the ocean and everything in it for centuries.
- Technologies have helped people explore and learn about the ocean. As technologies improve and become more sophisticated, we become more able to research the ocean and its inhabitants.
- People's attitudes about the ocean have shifted over time as we learned more about its value and need of protection. Laws and agencies have been created to help protect the ocean and its resources.
- Scientific Inquiry is a cyclical process scientists use to learn about the world. Scientific Inquiry involves making observations, asking questions, forming hypotheses, conducting research and experiments, drawing conclusions and asking more questions.

Lesson Review

Complete the graphic organizer below to record the main ideas of the lesson in your own words. Then turn back to page 23 of this workbook and record information you gained from this lesson in the What I Learned column of the chart.

How have the ways that humans use the ocean changed over time?	How do humans learn about the ocean?
People long ago used boats as their main method of long distance travel. Today people tend to travel on airplanes.	*Scientists conduct research about plants and animals in the ocean.*
People used to fish for their own food more than they do today.	*Scientists use tools and technologies to explore organisms and the condition of the ocean.*
People used to think the ocean's resources were endless. Today laws protect the ocean and its organisms.	*Scientists make observations and record data.*
Ports used to be the busy and central part of a city, while now city centers are often located farther away from ports.	*Humans are inquisitive about their world.*