

# Great Science Adventures



## Table of Contents

Introduction.....	i
How to Use This Program.....	ii
3D Graphic Organizers .....	ix
Teacher's Section	
1. What do we know about Earth? .....	2
2. What do we know about water?.....	4
3. What do we know about the ocean?.....	8
4. What is oceanography? .....	10
5. What is saltwater? .....	12
6. What do we know about the ocean floor?.....	16
7. What are the ocean layers?.....	18
8. What lives in the ocean layers?.....	22
9. What are waves? .....	24
10. What are tides?.....	28
11. What are ocean currents?.....	30
12. How does the ocean affect weather?.....	32
13. What is the intertidal zone and what lives there?.....	34
14. What do we know about life on the seashore?.....	36
15. What are estuaries? .....	38
16. What do we know about crustaceans, mollusks, and sponges? .....	40
17. What are the three types of fish?.....	42
18. What do we know about anemones, marine worms,echinoderms, and marine fishes? ...	44
19. What are coral reefs?.....	46
20. What do we know about sharks and rays? .....	48
21. What do we know about marine reptiles?.....	50
22. What do we know about marine mammals? .....	52
23. What do we know about pinnipeds? .....	54
24. What are ocean resources? .....	56
<i>Lots of Science Library Books</i> .....	59
Graphics Pages.....	121



# Great Science Adventures

## Lesson 1

### *What do we know about Earth?*

#### **Ocean Concepts:**

- Earth is one of the nine planets in our solar system and the third planet from the Sun.
- The Sun produces light and heat.
- One of Earth's unique qualities is the presence of water.
- About 75% of Earth's surface is covered with water.
- Continents separate the oceans: Pacific, Atlantic, Indian, Arctic, and Southern.
- Earth's crust is divided into continental plates which move apart or collide, or slide against each other.
- Molten rock can rise, cool, and form new rock on land or the ocean floor.

**Vocabulary:** Earth Sun solar system continents \*continental plates \*Pangaea

**Construct and Read:** *Lots of Science Library Book #1.* (See page 65)

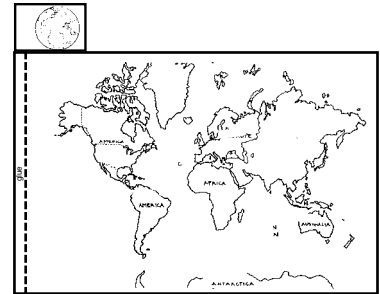
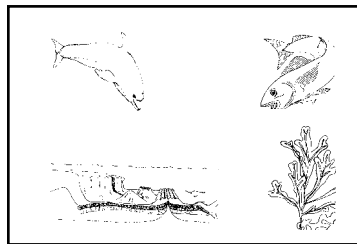
#### **Activities:**




#### **Earth Graphic Organizer**


**Focus Skills:** mapping, labeling

**Paper Handouts:** a copy of Graphics 1A & B




**Graphic Organizer:** This is the beginning of a 22-Tab Graphic Organizer entitled *Discovering the Ocean* that will be used in this and future lessons. Title Graphic 1A and color the pictures for the cover page. Glue the cover on Graphic 1B at the glue line. On Graphic 1B:



-  Copy or dictate the names of the seven continents.
-  List the seven continents. Using an atlas, list at least two cities or countries for each continent.
-  List the seven continents. Using an atlas, list at least five cities or countries for each continent.

 Copy or dictate the five oceans.

**Pacific, Atlantic, Indian, Arctic, Antarctic or Southern**

   Write the five ocean names leaving room to add data from Lesson 3

Throughout this study use the space on the back of the previous page as needed in the Discovering the Ocean Graphic Organizer.

## Moving Continental Plates - Investigative Loop Lab 1-1

**Focus Skill:** observing a concept

**Lab Materials:** two popsicle sticks pencil dishwashing liquid large, shallow pan water

**Paper Handouts:** 8.5" x 11" sheet of paper a copy of *Lab Graphic 1-1*

Lab Record Cards (3" x 5" index cards or pieces of 3" x 5" paper)

**Graphic Organizer:** Make a Pocket Book. See page 2 for directions.

This is the student's Lab Book. Glue Lab Graphic 1-1 on the left pocket.

**Concept:** Continents drift apart.

**Research:** Read *Lots of Science Library Book #1*.

**Procedure:** Pour water into the pan until it is about half full. Gently place the popsicle sticks on the middle of the water's surface, leaving a small gap between the two popsicle sticks. Dip the pencil point in dishwashing liquid and insert the pencil tip between the two popsicle sticks.

**Observations:** Describe the motion of the popsicle sticks (which represent continental plates) after you inserted the pencil tip. *The popsicle sticks move like rafts on water.*

**Record the Data:** Label a Lab Record Card "Lab 1-1." Record your observations.

**Conclusions:** What can you conclude about the movement of continental plates?

**Communicate the Conclusions:** Write your conclusions. Label a second Lab Record Card "Lab 1-1" if needed.

**Spark Questions:** Discuss questions sparked by this lab.

**New Loop:** Choose one question to investigate further.

**Design Your Own Experiment:** Select a topic based upon the experiences in the *Investigative Loop*. See page viii for more details.

### Experiences, Investigations, and Research

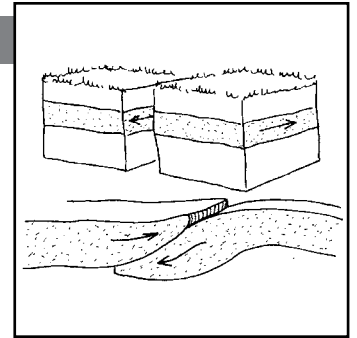
Select one or more of the following activities for individual or group enrichment projects. Allow your students to determine the format in which they would like to report, share, or graphically present what they have discovered. This should be a creative investigation that utilizes your students' strengths.



1. Examine a globe, concentrating on the vastness of the ocean.



2. Use two stacks of bath towels to represent the layers of the Earth. Push the stacks together and observe what happens to the "layers." Pull the stacks apart and relate this to Earth's plate movement.





# Great Science Adventures

## Lesson 2

### *What do we know about water?*

#### **Ocean Concepts:**

- The hydrosphere consists of all of the water on or near the Earth's surface.
- Water occurs in three states: solid, liquid, and gas.
- Water molecules stick together due to surface tension.
- Earth's water is constantly moving through the water cycle: evaporation, condensation, and precipitation.
- More than 97% of Earth's water is found in oceans.

**Vocabulary:** water solid liquid gas density water cycle \*hydrosphere  
\*hydrogen \*oxygen \*surface tension \*evaporation \*condensation  
\*precipitation

**Construct and Read:** Lots of Science Library Book #2.

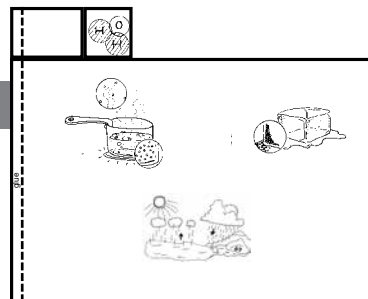
#### **Activities:**

##### Water - Graphic Organizer

**Focus Skill:** charting

**Paper Handouts:** a copy of Graphic 2A

**Graphic Organizer:** Glue Graphic 2A under the previous page of Discovering the Ocean at the glue line. On the top of that page:



Under the picture of ice:


- Draw a picture of ice.
- Write one or two facts about water in its solid state. Possible answers: *molecules locked together in hexagonal crystals; molecules vibrate quickly.*
- Complete Explain why ice floats in water.


Under the pictures of water and water vapor:

- Draw a picture of water and water vapor and label accordingly.
- Write one or two facts about water in its liquid and gas states. Possible answers: *liquid - molecules move quickly so do not remain locked together; molecules move slowly enough to be attached to each other; water is less dense than in its solid state; gas molecules so far apart and move so quickly that they rarely collide and do not become attached.*
- Explain the structure of water in its liquid and gas states.

Label the water cycle graphic: *Evaporation, Condensation, and Precipitation.*


 Color the picture.


 Write one or two facts about the water cycle: *heat from Sun turns water into water vapor; condensation - when water vapor meets cooler air, clouds form; precipitation - when clouds cannot hold any more water vapor, rain falls.*



 Explain the three stages of the water cycle.

## H<sub>2</sub>O Activity

**Paper Handout:** Any size of paper

 Draw a picture of a water molecule from *Lots of Science Library Book #2*, page 2.

 Draw a pie chart indicating the percentages of Earth's water found in the oceans, glaciers, groundwater, rivers, lakes, and streams, and the atmosphere: *ocean - 97%; Antarctica and glaciers - 2%; groundwater - .5%; rivers, lakes, streams - .02%; atmosphere - .0001%.*

 Complete  Explain water's cohesive property and surface tension.

## Sticky Skin Water - Investigative Loop - Lab 2-1

**Focus Skill:** observing

**Lab Materials:** small hand mirror water bowl

**Paper Handouts:** Lab Book Lab Record Card  
a copy of Lab Graphic 2-1

**Graphic Organizer:** Glue Lab Graphic 2-1 on the right pocket of the Lab Book.

**Concept:** Water has surface tension.

**Research:** Read *Lots of Science Library Book #2*.

**Procedure:** Place the mirror on a flat surface. Dip your finger in a bowl of water and gently flick a drop of water onto the mirror. Place another drop of water on top of the existing drop of water. Try changing the shape of the drop of water.

**Observations:** Describe the drop of water. **The drop of water is circular and dome-shaped.**

Describe what happened after you added another drop of water. **The two drops of water stay together to form one drop.** Explain what happened when you changed the shape of the drop of water. **The water drops stayed together.**

**Record the Data:** Label the Lab Record Card, Lab 2-1. On a Lab Record Card, sketch the lab. Show the different shapes you made with the drops of water.

**Conclusions:** Explain why the water molecules stick together. **Water molecules stick together by cohesion, which creates a "skin" on a drop of water. This effect is called surface tension.**

**Communicate the Conclusions:** On a Lab Record Card, record your conclusions. Put the Lab Record Card in the Lab 2-1 Pocket.

**Spark Questions:** Discuss questions sparked by this activity.

**New Loop:** Choose one question and investigate it further.

**Design Your Own Experiment:** Select a topic based upon the experiences in the *Investigative Loop*. See page vi-vii for more details.



## Experiences, Investigations, and Research

Select one or more of the following activities for individual or group enrichment projects. Allow your students to determine the format in which they would like to report, share, or graphically present what they have discovered. This should be a creative investigation that utilizes your students' strengths.



1. How many drops of water will fit on a penny? Use an eyedropper to put drops on a penny. Estimate the number of drops and then determine the actual amount that will fit on the penny. Try the same procedure with a dime, nickel, and quarter.



2. Fill a glass with water. The water should be level with the top of the glass. Guess how many pennies you can slowly drop into the water before the water spills out of the glass. Use what you have learned in this lesson to explain your observations.





# Great Science Adventures

## Lesson 3

### *What do we know about the ocean?*

#### **Ocean Concepts:**

- Oceans contain more than 97% of Earth's water.
- The Pacific, the largest and deepest ocean, holds about 50% of all Earth's water.
- Energy from the Sun keeps Earth's water in constant motion.
- Ocean water evaporates and eventually returns to Earth as rain or snow.
- Rainwater flows into rivers, picking up salts, and eventually dumping them into the ocean.

**Vocabulary:** oceans Pacific Ocean Atlantic Ocean Indian Ocean  
Arctic Ocean Southern Ocean seas rain salty \*deltas

**Construct and Read:** *Lots of Science Library Book #3.*

#### **Activities:**

#### **Oceans - Graphic Organizer**

**Focus Skill:** describing, listing

**Paper Handouts:** *Discovering the Ocean* Graphic Organizer

**Graphic Organizer:** Beside each ocean name of 1B, write or dictate the area, and list the average and maximum depth:

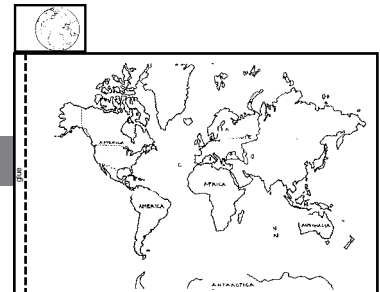
Pacific - 69,000,000 sq mi; average depth 14,000 ft; maximum depth 36,000 ft

Atlantic - 40,000,000 sq mi; average depth 11,000 ft; maximum depth 30,000 ft

Indian - 28,000,000 sq mi; average depth 13,000 ft; maximum depth 25,000 ft

Arctic - 5,440,000 sq mi; average depth 4,265 ft; maximum depth 17,880 ft

Southern or Antarctica - 8,000,000 sq mi; average depth 15,000 ft; maximum depth 23,700 ft



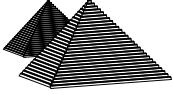


## Experiences, Investigations, and Research

Select one or more of the following activities for individual or group enrichment projects. Allow your students to determine the format in which they would like to report, share, or graphically present what they have discovered. This should be a creative investigation that utilizes your students' strengths.



1. Make a Bar Graph indicating the average or maximum depth of each ocean area.



2. Make an ocean discovery time line that documents important events and accomplishments in oceanography.



3. Research how scientists map the ocean floor.