

# OCEANS

**Grade Level:**

6<sup>th</sup> Grade

**Written by:**

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**Length of Unit:**

12 lessons (approximately one hour in length for each lesson)

## I. ABSTRACT

This unit will focus on the *Core Knowledge Sequence* 6<sup>th</sup> grade topic of *Oceans*. Students will learn about ocean layers, tides, waves, currents and marine life. There will be hands-on experiments, note taking, graph interpretation and an independent research project for students to complete.

## II. OVERVIEW

### A. Concept Objectives

1. Students will understand the structure of the Earth's systems. (Colorado State Standard (CSS) 4)
2. Students will understand the dynamics of the Earth's processes. (CSS 4)
3. Students will understand the characteristics of living things and how living things interact with each other and their environment. (CSS 3)

### B. Content from the *Core Knowledge Sequence*

1. Ocean layers (pp. 152-153)
2. Ocean currents, tides, waves (pp. 152-153)
3. Marine life and water chemistry (pp. 152-153)

### C. Skill Objectives

1. Students will identify the names and locations of the world oceans.
2. Students will distinguish between the layers of the ocean and recognize characteristics of these layers.
3. Students will create diagrams to reflect their understanding of ocean layers, ocean motion and marine life.
4. Students will know the qualitative properties of waves (frequency, wavelength, crests and troughs. (CSS 7.2)
5. Students will describe the characteristics of waves, tides and currents.
6. Students will explain how the nonliving characteristics of the local environment have affected the types of plants and animals that live there. (CSS 3.1.d)
7. Students will develop their note-taking skills and abilities.
8. Students will conduct hands-on experiments to reinforce new concepts.
9. Students will conduct experiments creating a written plan for investigations. (CSS 1.d.)
10. Students will use appropriate tools, technologies and measurement units to gather and organize data. (CSS 1.e.)
11. Students will interpret and evaluate data in order to form conclusions. (CSS 1.f.)

## III. BACKGROUND KNOWLEDGE

### A. For Teachers

1. Simons, B. & Wellnitz, T.R. *Science Explorer: Earth's Waters*. New Jersey: Prentice Hall, 2000. ISBN: 0-13-434484-7
2. VanCleave, J. *OCEANS for Every Kid: Easy Activities that Make Learning Science Fun*. USA: John Wiley & Sons, 1995 ISBN: 0-471-12454-0
3. Fredricks, A.D. *Exploring the Oceans: Science Activities for Kids*. Colorado: Fulcrum Publishing, 1998. ISBN: 1-55591-379-2

- B. For Students
  - 1. *Core Knowledge Sequence* – Grade 1, Oceans and Undersea Life, page 37

#### IV. RESOURCES

- A. Simons, B. & Wellnitz, T.R. *Science Explorer: Earth's Waters*
- B. Fredricks, A.D. *Exploring the Oceans: Science Activities for Kids*
- C. VanCleave, J. *OCEANS for Every Kid: Easy Activities that Make Learning Science Fun*
- D. VanCleave, J. *Earth Science: Easy Activities that Make Learning Science Fun*
- E. Simon, S. *How to Be an Ocean Scientist in Your Own Home*

#### V. LESSONS

##### **Lesson One: Introduction to Oceans** (one 60-minute period)

- A. *Daily Objectives*
  - 1. Concept Objective(s)
    - a. Students will understand the structure of the Earth's systems.
  - 2. Lesson Content
    - a. Ocean layers
  - 3. Skill Objective(s)
    - a. Students will identify the names and locations of the world oceans.
- B. *Materials*
  - 1. Appendix A: World Map (blank) (one per student)
  - 2. Appendix B: Rubric for World Map
  - 3. Chart paper (one sheet)
  - 4. Markers (any color)
  - 5. Colored pencils for students (one pack each person)
  - 6. Atlas or maps for students (one per pair of students)
- C. *Key Vocabulary*
  - 1. Southern Ocean – the ocean bordering Antarctica and extending 60 degrees latitude; the International Hydrographic Organization recognized this fifth ocean in the spring of 2000
- D. *Procedures/Activities*
  - 1. Review what students know about oceans and the Earth's water with a question and answer session. Example questions:
    - a. How much of Earth is covered by water? (71%)
    - b. How many oceans are there? (5)
    - c. Who can name all 5? (Arctic, Southern, Pacific, Atlantic, Indian)
  - 2. Complete a KWL chart to fill in throughout the entire unit. Use chart paper and markers to make three columns. They will be labeled What Students *Know*, What Students *Want* to Learn and What Students *Learned*. Fill in the first two columns during the brainstorming session and leave the last column until later.
  - 3. Pass out blank copy of world map (Appendix A). Students need to utilize atlases or wall map to label the oceans.
  - 4. Students are expected to label, color and include a legend and compass rose on their maps to be handed in for grading. Use Appendix B to mark maps.
- E. *Assessment/Evaluation*
  - 1. Use Rubric in Appendix B to assess the accuracy and neatness of map.

##### **Lesson Two: Ocean Bottom** (two 60-minute periods)

- A. *Daily Objectives*
  - 1. Concept Objective(s)
    - a. Students will understand the structure of the Earth's systems.

2. Lesson Content
    - a. Ocean layers
  3. Skill Objective(s)
    - a. Students will conduct hands-on experiments to reinforce new concepts.
- B. *Materials*
1. Fredricks, A.D. *Exploring the Oceans: Science Activities for Kids* (one per student)
  2. VanCleave, J. *OCEANS for Every Kid: Easy Activities that Make Learning Science Fun*
  3. Empty boxes (students supply from home)
  4. Tin foil to line box with (students supply from home)
  5. Materials to make ocean bottom (i.e. papier mache, clay, plasticene, sand/water mixture etc...) (students will choose what they will use and bring all the supplies from home)
  6. Overhead projector and transparency
  7. Flour (2 cups per group)
  8. Toothpicks (one box per group)
  9. Appendix C: Ocean Bottom Model (one per student)
  10. Scissors
- C. *Key Vocabulary*
1. Abyssal plain – a smooth, nearly flat region of the deep ocean floor
  2. Guyot – a seamount (underwater mountain) with a flat top
  3. Hydrothermal vent – an area where the ocean water sinks through cracks in the ocean floor, is heated by the underlying magma, and rises again through the cracks
  4. Mid-Atlantic ridge – part of the gigantic, underwater mountain chain in the Atlantic Ocean
  5. Mid-ocean ridge – the continuous range of mountains on the ocean floor that winds around Earth
  6. Mountain range – a string of connected mountains (aka – ridge)
  7. Oceanic ridge – mountain ranges from each ocean connecting to form a gigantic mountain system
  8. Seamount – underwater mountain
  9. Trench – a deep canyon in the ocean floor
- D. *Procedures/Activities*
1. Using *Exploring the Oceans* by A.D. Fredricks, if available, draw a diagram of the ocean bottom onto transparency to display on the overhead projector.
  2. Students need to copy this diagram into their books and write down the definition of each figure.
  3. Students will create a model of the ocean floor working in groups of 2-4.
  4. Let them know ahead of time the materials each group is required to bring! (See Materials list.)
  5. Each group needs to cut down their box until it is only 2 inches (5 cm.) tall and line the bottom completely with tinfoil. This will not allow any water to soak into the box.
  6. Students need to decide whether they want to use clay, plasticene, a mixture of glue and water with newspaper, sand and water or any other materials they can come up with to build their ocean bottom.
  7. Now they can start building! Remember, the only structures rising above the box top are mountains or islands. Also remember, the abyssal plain needs to be as flat as possible.

8. Next, students need to put labels on the features using toothpicks and paper.
- E. *Assessment/Evaluation*
  1. Evaluate the ocean bottom models using the rubric in Appendix C.

**Lesson Three: Bulletin Board Display** (one 60-minute class)

- A. *Daily Objectives*
  1. Concept Objective(s)
    - a. Students will understand the structure of the Earth's systems.
  2. Lesson Content
    - a. Ocean layers
  3. Skill Objective(s)
    - a. Students will utilize and recall current knowledge on oceans to design a mural/bulletin board.
- B. *Materials*
  1. Cardboard (enough to cover wall space available)
  2. Construction paper (enough to cover wall space available)
  3. Scissors, glue
  4. Popped popcorn (lots!) from an air-popped popcorn maker
- C. *Key Vocabulary*

None
- D. *Procedures/Activities*
  1. Choose a spot in the school hallway or a classroom bulletin board to display information gathered on oceans.
  2. Cut out blue construction paper to cover wall space.
  3. With a pencil draw in 'wave shapes' at ocean surface. To make it look foamy glue popcorn onto waves.
  4. Using cardboard or paper have students label the ocean zones onto wall: intertidal zone, neritic zone, open-ocean zone, surface layer, subsurface layer and deep layer.
  5. On five square pieces of paper (any color, about 8" x 5" in.), write one of the five oceans at the top. Below the title write the characteristics of the ocean and any other distinguishing factors.
  6. As the unit progresses, have students add any new information to the display (especially marine life that will be studied). Students can include pictures of animals and plants found in specific zones.
- E. *Assessment/Evaluation*
  1. Observe students individually to ensure equal participation.

**Lesson Four: Ocean Water Chemistry** (two 60-minute period)

- A. *Daily Objectives*
  1. Concept Objective(s)
    - a. Students will understand the structure of the Earth's systems.
  2. Lesson Content
    - a. Ocean layers
  3. Skill Objective(s)
    - a. Students will conduct experiments creating a written plan for investigations.
    - b. Students will use appropriate tools, technologies and measurement units to gather and organize data.
- B. *Materials*
  1. VanCleave, J. *Earth Science: Easy Activities that Make Learning Science Fun*

2. Paper cup: any size (two per pair of students)
  3. Plasticene or modeling clay (one ball the size of your palm per group)
  4. Dirt and water mixture (mix 1 tbsp. dirt with 1 tbsp. of salt per pair)
  5. Black construction paper (one piece per pair)
  6. Paper coffee filters (one per pair)
  7. Water (4 cups per group)
  8. Plastic spoons (one box)
  9. Appendix M: Lab Write-Up Rubric (one per student)
- C. *Key Vocabulary*
1. Salinity – the total amount of dissolved salts in a water sample
- D. *Procedures/Activities*
1. For a class demonstration of how to remove salt from salt water boil a salt-water mixture in a beaker on a hotplate. It may take a while to evaporate all the water from the beaker so start early in the period and watch carefully.
  2. To introduce the new concept of water chemistry, use the Prentice-Hall text and read together pp. 127-129.
  3. Next, students will determine how the ocean get its salt. (Refer to J. VanCleave’s *Earth Science* pp. 208-209.)
  4. In each group, get students to punch holes in the bottom of the paper cup with the point of a pencil. Place coffee filter inside.
  5. Place four small balls onto the sheet of black construction paper, place the cup onto the four balls (so the cup stands on clay legs).
  6. Pour about three spoons of water into the cup and allow the water to drain through the cup and onto the black paper.
  7. Allow the paper to dry (it’s faster if cups are placed in sunlight).
  8. The results of the experiment will be that salt will be left on the black paper since the water dissolves the salt as it passes through the cup and then is left behind on the paper once the water evaporates. In nature, the rainwater dissolves salt from the soil. If this water finds its way to rivers that flow into the ocean, the salt is added to the ocean water.
  9. Have students record observations in the scientific inquiry format the next day and complete the report to be handed in (Question, hypothesis, materials, method, observations, results, conclusion).
- E. *Assessment/Evaluation*
1. Evaluate their lab write-ups using Appendix M.

**Lesson Five: Filtering Out Freshwater from Saltwater** (two 60-minute periods)

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the structure of the Earth’s systems.
  2. Lesson Content
    - a. Ocean layers
  3. Skill Objective(s)
    - a. Students will create a written plan for investigations.
- B. *Materials*
1. Aluminum pan (one per group)
  2. Heavy piece of cardboard (a bit bigger than the pan) (one per group)
  3. Black paint and paintbrush (one each per group)
  4. Aluminum foil (two boxes)
  5. Two wire coat hangers per group
  6. Plastic wrap (i.e. Saran wrap) (two boxes)

7. Plastic drinking glass: any size (one per group)
  8. Salt water mixture (mix a cup of water with ¼ cup salt per group)
  9. Simon, S. *How to Be an Ocean Scientist in Your Own Home*
  10. Appendix M: Lab Write-Up Rubric (one per student)
  11. Appendix N: Solar Distillation Plant (one per student)
- C. *Key Vocabulary*  
None
- D. *Procedures/Activities*
1. Paint the inside of the aluminum pan black and let dry completely.
  2. Cover the cardboard with foil and shape the edges of the foil to form a trough at one of the corners to make an outlet at one side of the pan.
  3. Place the black pan on the aluminum covered cardboard inside the trough.
  4. Bend the wire hangers into a tent-like shape about the same size as the cardboard. Cover the sides of the tent with the plastic wrap. (For a diagram refer to *How to be an Ocean Scientist in your Own Home* pp. 15-19.)
  5. Pour a cup of salt water into the aluminum pan. Place the wire and plastic tent over the cardboard.
  6. Put the model in sunlight or below a strong bulb to help speed up the process. Put the glass below the outlet to catch the fresh water you will be making.
  7. When there is enough water in the glass (any amount), have a student taste it. It should be fresh water since the saltwater evaporated and when it condensed it left behind the salt and the fresh water vaporized on the plastic and runs into the cup.
  8. When the experiment is conducted, complete a lab write-up together to ensure the correct procedure is being followed.
  9. For a diagram of this lesson see Appendix N.
- E. *Assessment/Evaluation*
1. Collect lab write-ups to ensure completion of work and grade reports with Appendix M.

**Lesson Six: Vocabulary Review and Test** (one 60-minute period)

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the structure of the Earth’s systems.
  2. Lesson Content
    - a. Ocean layers
  3. Skill Objective(s)
    - a. Students will identify the names and locations of the world oceans.
    - b. Students will distinguish between the layers of the ocean and recognize characteristics of these layers.
- B. *Materials*
1. Appendix D: Ocean Test (one per student)
  2. Appendix E: Ocean Test Answers
  3. Appendix F: Ocean Crossword (one per student)
- C. *Key Vocabulary*  
None
- D. *Procedures/Activities*
1. Pass out copies of Appendix D to quiz students on knowledge comprehension learned up to this point.
  2. Pass out copies of Appendix F: Ocean Crossword to students who finish the test early.

- E. *Assessment/Evaluation*
1. Use Appendix E to grade the tests

**Lesson Seven: Ocean Waves** (one 60-minute class)

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the dynamics of the Earth's processes.
2. Lesson Content
  - a. Ocean currents, tides, waves
3. Skill Objective(s)
  - a. Students will conduct hands-on experiments to reinforce new concepts.
  - b. Students will create diagrams to reflect their understanding of ocean layers, ocean motion and marine life.
  - c. Students will know the qualitative properties of waves (frequency, wavelength, crests and troughs).

B. *Materials*

1. Aquarium or clear dish per group
2. Water (enough to fill each dish)
3. Metal washers (any size) (12 per group)
4. String (two balls of string to be cut)
5. Four corks per group (any size or shape)
6. Simons, B. & Wellnitz, T.R. *Science Explorer: Earth's Waters* (one per student)

C. *Key Vocabulary*

None

D. *Procedures/Activities*

1. Fill an aquarium about  $\frac{3}{4}$  full of water.
2. Tie enough metal washers to a cork so that the cork floats about 3 cm from the bottom of the tank.
3. Repeat Step 2 with more corks so that they float 9 cm from the bottom, 15 cm from the bottom and so on until the last cork floats on the surface.
4. Make small, steady waves in the tank by moving your hand up and down in the water. Note what happens to each cork.
5. Repeat Step 4 increasing the height of the waves by moving your hand faster.
6. Ask the class to draw the tank in their books and to write the method they used to build and conduct the experiment. They need to write this question in their books and answer it: *How does increasing the wave height affect the motion of each cork?*

E. *Assessment/Evaluation*

1. Observe the groups to ensure the experiment is conducted properly. Have students hand in their question and answer the following day to verify completion.

**Lesson Eight: Water Molecules** (one 60-minute period)

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the dynamics of the Earth's processes.
2. Lesson Content
  - a. Ocean currents, tides, waves
3. Skill Objective(s)
  - a. Students will develop their note-taking skills and abilities.
  - b. Students will conduct hands-on experiments to reinforce new concepts.

- c. Students will conduct experiments creating a written plan for investigations.
  - d. Students will use appropriate tools, technologies and measurement units to gather and organize data.
- B. *Materials*
  - 1. VanCleave, J. *OCEANS for Every Kid: Easy Activities that Make Learning Science Fun*
  - 2. Clear, rectangular baking dish for each group
  - 3. Tap water
  - 4. Scissors (one per group)
  - 5. Drinking straw (one box)
  - 6. Timer (one per group)(students can use their watches)
  - 7. Unsharpened pens (two boxes)
  - 8. Appendix M: Lab Write-Up Rubric (one per student)
- C. *Key Vocabulary*  
None
- D. *Procedures/Activities*
  - 1. This activity is adapted from J. VanCleave's *Oceans* p. 83.
  - 2. Fill the baking dish  $\frac{3}{4}$  full with water.
  - 3. Cut about 1 inch from one end of the straw. Place the small piece of straw in the center of the water in the dish.
  - 4. Wait about 30 seconds to allow the water to become calm.
  - 5. With the unsharpened end of the pencil, tap the surface of the water at one end of the dish.
  - 6. Observe the straw and the surface of the water.
  - 7. **Note to teachers** : Waves start where the water is touched by the pencil, move to the opposite end of the dish and return again. While the waves are moving back and forth across the surface, the straw is moving up and down. The energy in the wave moves the water up and down with very little horizontal movement. In one complete wavelength, a molecule of water moves through a complete circular path and ends up at about the same place that it started.
  - 8. Discuss with the class the principals of motion with respect to water molecules.
  - 9. Have students complete a lab write-up.
- E. *Assessment/Evaluation*
  - 1. Evaluate lab write-ups using Appendix M.

**Lesson Nine: Review and Test** (one 60-minute period)

- A. *Daily Objectives*
  - 1. Concept Objective(s)
    - a. Students understand the dynamics of the Earth's processes.
  - 2. Lesson Content
    - a. Ocean currents, tides, waves
  - 3. Skill Objective(s)
    - a. Students will describe the characteristics of waves, tides and currents.
- B. *Materials*
  - 1. Simons, B. & Wellnitz, T.R. *Science Explorer: Earth's Waters*
  - 2. Appendix G: Ocean Motion Test (one per student)
  - 3. Appendix H: Ocean Motion Test Answers
- C. *Key Vocabulary*  
None

- D. *Procedures/Activities*
  1. Review any questions students have at beginning of class.
  2. Pass out Appendix: G: Ocean Motion Test.
- E. *Assessment/Evaluation*
  1. Use Appendix H to mark tests.

**Lesson Ten: Marine Life** (three to four 60-minute classes)

- A. *Daily Objectives*
  1. Concept Objective(s)
    - a. Students will understand the characteristics of living things and how living things interact with each other and their environment.
  2. Lesson Content
    - a. Marine life and water chemistry
  3. Skill Objective(s)
    - a. Students will create diagrams to reflect their understanding of ocean layers, ocean motion and marine life.
    - b. Students will explain how the nonliving characteristics of the local environment have affected the types of plants and animals that live there.
- B. *Materials*
  1. Fredricks, A.D. *Exploring the Oceans: Science Activities for Kids*
  2. Bristol board (one per student)
  3. Markers and/or colored pencils (a few per student)
  4. Appendix I: Bulletin Board Presentation
- C. *Key Vocabulary*
  1. High-tide zone – zone within inter-tidal zone that is closest to shore
    - a. characterized by organisms that must endure the harshest extremes of life; plants and animals must be able to endure bright sunlight, dehydration and rapid changes in temperature; at high tide they are covered by cold water; at low tide they are high and dry and exposed to sun and wind
    - b. high tide organisms: barnacles, mole crabs, periwinkles, hermit crabs, sea lettuce, green algae, black turban snail
  2. Mid-tide zone – zone within inter-tidal zone that is second closest to shore
    - a. characterized by varied and colorful organisms; diverse collection of plants all struggling for places on the rocks; in competition with animals clinging to rocks; typically covered by the tide for  $\frac{3}{4}$  of day and exposed to air for about 6 hours each day
    - b. mid-tide organisms: starfish, chitons, hermit crabs, anemones, sponges, mussels, rockweed, shore crabs, snail fur, springtails
  3. Low-tide zone – zone within inter-tidal zone that is furthest from shore
    - a. normally always underwater except for at extremely low tide; organisms that live here are less competitive and more cooperative; richest and most diverse assortment of organisms ever; animals that look like plants and plants that look like animals
    - b. low-tide organisms – kelp, sea anemones, abalones, barnacles, lobsters, red algae, sand dollars, sea hare, spider crab, algae, urchins
- D. *Procedures/Activities*
  1. Using *Exploring the Oceans*, refer to pp. 14-20 for more information.
  2. After characterizing each region on board and having students copy into their notebooks, assign the students the following project: a poster board presentation that illustrates the life and times of one creature from the zone of their choice.

3. Tell the class they will be presenting their posters to the class, no duplicate organisms will be allowed and you are expecting a lot of information and color on their displays.
- E. *Assessment/Evaluation*
1. Use Appendix I to evaluate projects.

**Lesson Eleven: Marine Life** (one 60-minute period)

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the characteristics of living things and how living things interact with each other and their environment.
  2. Lesson Content
    - a. Marine life and water chemistry
  3. Skill Objective(s)
    - a. Students will explain how the nonliving characteristics of the local environment have affected the types of plants and animals that live there.
- B. *Materials*
1. VanCleave, J. *OCEANS for Every Kid: Easy Activities that Make Learning Science Fun*
  2. Overhead projector and markers (optional)
  3. Appendix J: Marine Life Worksheet (one per student)
- C. *Key Vocabulary*
1. Sunlight zone – top layer of the ocean with the most light; smallest zone but it contains more than 90% of marine life
  2. Twilight Zone – starts from bottom of sunlight zone and extends down to about 3000 feet below surface; darker further down (mostly blue and violet light); less animal life; animals here feed off of falling remains of dead organisms from the sunlight zone; some animals in this zone glow in the dark (bioluminescence)
  3. Midnight zone – extends from the bottom of the twilight zone to the ocean floor; only light in this zone is produced by bioluminescence; fewer life-forms; low temperatures; high water pressure and scarce food supplies; animals living here generally grow very slowly and live for a longer period of time
- D. *Procedures/Activities*
1. Using Janice VanCleave’s Oceans book, refer to pp. 166 for more information.
  2. Place the information from vocabulary section onto board or overhead projector and have students write the characteristics of each zone into their workbooks.
  3. Cut out the words in boxes from Appendix K and place into an envelope. Hand out one envelope to each pair of students and have them put words into appropriate columns: Sunlight zone, twilight zone, midnight zone.
  4. When students are finished, have a class discussion to ensure each student placed the appropriate word into the proper category.
- E. *Assessment/Evaluation*
1. Observe students while they are working and make sure they are on task. Placing words on board at end of class will ensure each group did the task correctly.

**VI. CULMINATING ACTIVITY**

**Lesson: Independent Research Project** (five 60-minute periods)

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the structure of the Earth’s systems.
    - b. Students will understand the dynamics of the Earth’s processes.

- c. Students will understand the characteristics of living things and how living things interact with each other and their environment.
  - 2. Lesson Content
    - a. Ocean layers
    - b. Ocean currents, tides, waves
    - c. Marine life and water chemistry
  - 3. Skill Objective(s)
    - a. Students will describe the characteristics of waves, tides and currents.
    - b. Students will explain how the nonliving characteristics of the local environment have affected the types of plants and animals that live there.
- B. *Materials*
  - 1. Materials will vary from student to student depending on the type of project they choose
  - 2. Appendix K: Independent Research Project Rubric
- C. *Key Vocabulary*  
None
- D. *Procedures/Activities*
  - 1. Have students pick a topic on oceans: ocean layers, motion or marine life.
  - 2. Hand out Appendix L to give students an idea what format they would like to display their information in (book, essay, presentation, poster etc.)
- E. *Assessment/Evaluation*
  - 1. Use Appendix K to evaluate projects.

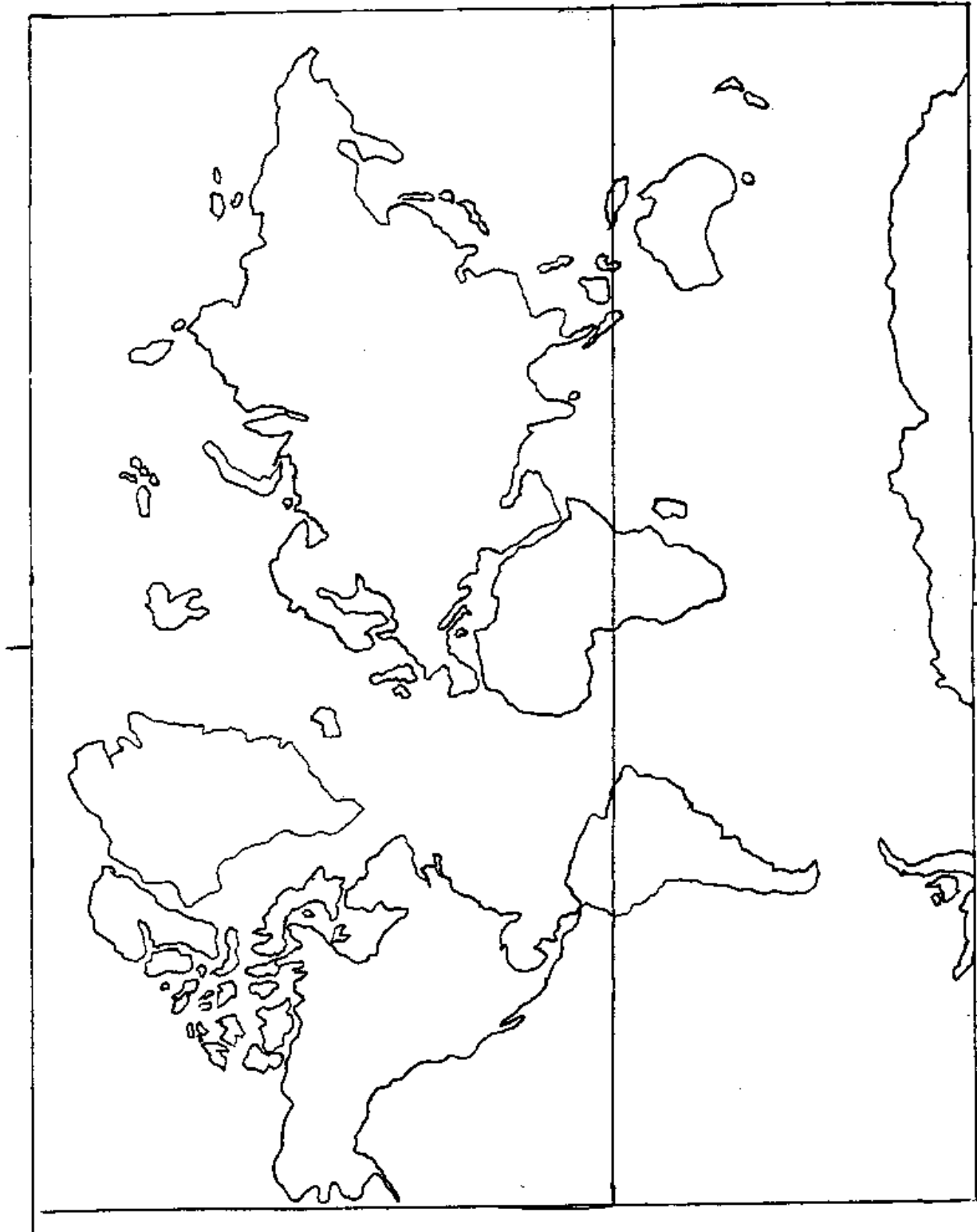
## VII. HANDOUTS/WORKSHEETS

- A. Appendix A: World Map
- B. Appendix B: Map Rubric
- C. Appendix C: Ocean Bottom Model
- D. Appendix D: Ocean Test
- E. Appendix E: Ocean Test Answers
- F. Appendix F: Ocean Crossword
- G. Appendix G: Ocean Motion Test
- H. Appendix H: Ocean Motion Test Answers
- I. Appendix I: Bulletin Board Presentation
- J. Appendix J: Marine Life Worksheet
- K. Appendix K: Independent Research Project Rubric
- L. Appendix L: Solar Distillation Plant
- M. Appendix M: Science Lab Write-Up Rubric

## VIII. BIBLIOGRAPHY

- A. Fredricks, A.D. *Exploring the Oceans: Science Activities for Kids*. Colorado: Fulcrum Publishing, 1998. ISBN: 1-55591-379-2
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- E. VanCleave, J. *Earth Science: Easy Activities that Make Learning Science Fun*. USA: John Wiley & Sons, 1991. ISBN: 0-471-53010-7

**APPENDIX A  
WORLD MAP**



**APPENDIX B  
WORLD MAP RUBRIC**

**MAP RUBRIC**

|                     | <b>Exemplary<br/>(9-10)</b>                | <b>Competent<br/>(7-8)</b>                  | <b>Basic<br/>(5-6)</b>                      | <b>Fail<br/>(&lt;5)</b>                       |
|---------------------|--|---|---|---|
| <b>Labels</b>       | All items labeled and located correctly    | Most items labeled and located correctly    | Few items labeled and located correctly     | Items labeled and located incorrectly         |
| <b>Spelling</b>     | All spelling and capitalization correct    | Most spelling and capitalization correct    | Some spelling and grammar errors            | Many spelling, grammar and punctuation errors |
| <b>Neatness</b>     | All labels and features can be easily read | Most labels and features can be easily read | Some labels and features can be easily read | Few labels or features can be read            |
| <b>Title</b>        | Title clearly reflects purpose of map      | Title generally reflects purpose of map     | Title somewhat reflects purpose of map      | Title does not reflect purpose of map         |
| <b>Map Features</b> | Map features clearly reflect purpose       | Map features generally reflect purpose      | Map features somewhat reflect purpose       | Map features do not reflect purpose           |
| <b>Key/Legend</b>   | Has a key that uses all standard symbols   | Has a key that uses most standard symbols   | Has a key that uses some standard symbols   | Has a key that does not use standard symbols  |

**APPENDIX C  
OCEAN BOTTOM MODEL**

**Instructions to create a model of the ocean bottom:**

You will be working in groups of 2-4 to complete this project. Remember, it is imperative that **all** materials are brought to class on the day you will be building this model. You need to discuss in advance what you'd like to build your ocean floor model with. Options will be discussed in class. Discuss with your group members what materials each person is responsible for bringing. Their marks depend on their reliability!

**Steps:**

1. Using the cardboard box, cut the sides down until it is only about 2 inches (5 cm) tall. Line the sides and bottom with tinfoil.
2. Place the building material into your box and mold the ocean floor. Create as many features as possible and refer to your notes, drawings or text if you don't remember them all. Remember to make the abyssal plains as flat as possible. Also, the only features sticking up above the box are islands
3. Finally, once the features are in place label them using paper and tape on the toothpick.
4. Label your box with the group member's names. You need to hand in this sheet so I can mark your model.

**Ocean Model Rubric**

1. All members worked cooperatively and productively:

1      2      3      4      5

2. Group was prepared and supplied all the necessary materials for the group:

1      2      3      4      5

3. Many features of the ocean bottom were evident:

1      2      3      4      5

4. Features were accurate and true to form:

1      2      3      4      5

5. Labels were present and legible:

1      2      3      4      5

6. Overall impression of ocean bottom:

1      2      3      4      5

**TOTAL MARK FOR EACH GROUP MEMBER:                      /30**

**APPENDIX D  
OCEAN TEST**

**1. Ocean water is denser than freshwater at the same temperature because of:**

- a) wave height
- b) salinity
- c) high pressure
- d) tsunami

**2. In the open-ocean zone, organisms depend directly or indirectly on food that is made by:**

- a) marine mammals
- b) the land
- c) the atmosphere
- d) Earth's core

**3. The zone that receives the most sunlight is:**

- a) intertidal zone
- b) neritic zone
- c) open-ocean zone
- d) deep zone

**4. The mid-ocean ridge is:**

- a) the part of ocean floor that meets the beach
- b) the steep drop off into the ocean
- c) a chain of underwater mountains
- d) a chain of mountains forming islands

**5. As you descend from the surface to the ocean floor...**

- a) pressure increases
- b) temperature increases
- c) pressure decreases
- d) salinity decreases

**6. An ocean floor feature that looks like a volcano with a very flat top is called:**

- a) island
- b) abyssal plain
- c) geyser
- d) guyot

**7. Explain why salinity increases as you descend from the surface to the ocean floor.**

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**8. Describe what the conditions in the surface zone making reference to water temperature, marine life, pressure, and any other information you think is relevant.**

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**9. Explain why many of the world's fisheries are located in the neritic zone.**

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**10. On the back of this sheet, draw a diagram of the ocean labeling all the zones we discussed in class.**

**APPENDIX E  
OCEAN TEST ANSWERS**

1. Ocean water is denser than freshwater at the same temperature because of:

- a) wave height      b) salinity  
c) high pressure     d) tsunami

2. In the open-ocean zone, organisms depend directly or indirectly on food that is made by:

- a) marine mammals    b) the land  
c) the atmosphere     d) Earth's core

3. The zone that receives the most sunlight to support the growth of algae is:

- a) surface zone        b) neritic zone  
c) open-ocean zone    d) deep zone

4. The mid-ocean ridge is:

- e) the part of ocean floor that meets the beach  
f) the steep drop off into the ocean  
g) a chain of underwater mountains  
h) a chain of mountains forming islands

5. As you descend from the surface to the ocean floor...

- e) pressure increases  
f) temperature increases  
g) pressure decreases  
h) salinity decreases  
i)

6. An ocean floor feature that looks like a volcano with a very flat top is called:

- a) island                      b) abyssal plain  
c) geyser                      d) guyot

6. Explain why salinity increases as you descend from the surface to the ocean floor.

\*rainfall decreases salinity near the surface (or salinity increases near the surface in warm, dry areas due to evaporation)

7. Describe what the conditions in the surface zone making reference to water temperature, marine life, pressure, and any other information you think is relevant.

- \*extends as far as sunlight reaches below the surface
- \*only part of ocean that receives enough sunlight to support the growth of algae
- \*plankton feed on algae
- \*crabs, mollusks and fish live here
- \*food web depends on plankton from this zone

8. Explain why many of the world's fisheries are located in the neritic zone

\*the neritic zone lies above the continental shelf. Here, the water is shallower, warmer, and contains more nutrients than the deep zone. These conditions support a large number and wide variety of fish.

10. On the back of this sheet, draw a diagram of the ocean labeling all the zones we discussed in class.

(see page 163 of Prentice-Hall text for proper diagram)

APPENDIX F  
OCEAN CROSSWORD

Oceans

E C N E C S E N I M U L O I B  
K O Z I F T S E R C I T C R A  
B N S J A I N I V N O P N W O  
A T U H K L L E T E L P E Z C  
T I B T E M P E R A T U R E G  
Z N S K V L R L N R W T I Y D  
I E U Q O T F K A I U G T T H  
I N R O I Z T E E S R C I I I  
S T F D M O M R C E S A C N I  
L A A M N A O F O G P Y M I H  
A L C E S W E C A D U U B L C  
N R E H T U O S N I N D I A N  
D X B E R U S S E R P T G S E  
S H A R K S L O P E B E Q Q R  
D F G U Y O T R O U G H D Z T

Abyssal plain  
Arctic  
Bioluminescence  
Continental  
Crest  
Current  
Deep  
Guyout  
Indian  
Intertidal

Islands  
Marine life  
Neritic  
Open-ocean  
Plankton  
Pressure  
Ridge  
Salinity  
Seamount  
Sharks

Shelf  
Slope  
Southern  
Subsurface  
Surface  
Temperature  
Trench  
Trough

**APPENDIX G**  
**OCEAN MOTION TEST**

1. Rolling waves with a large distance between crests have a long:

- a) wave height
- b) wavelength
- c) frequency
- d) trough

2. At the full moon, the combined gravitational pulls of the sun and moon produce the biggest difference between high and low tide called a:

- a) surface current
- b) neap tide
- c) spring tide
- d) rip current

3. \_\_\_\_\_ carry cold and warm ocean water around the world.

- a) tide
- b) wave
- c) current
- d) tsunami

4. The effect of Earth's rotation on the direction of winds and currents is called the...

- a) currents
- b) Gulf Stream travel
- c) Coriolis Effect
- d) El Nino

5. Describe how deep currents form and travel in the ocean.

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6. How do surface currents affect the climate?

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7. Why are there two tides a day in most places?

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8. Evaluate how destructive a tsunami is compared to a regular storm. Why?

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**APPENDIX H**  
**OCEAN MOTION TEST ANSWERS**

1. Rolling waves with a large distance between crests have a long:

- a) wave height      **b) wavelength**  
c) frequency      d) trough

2. At the full moon, the combined gravitational pulls of the sun and moon produce the biggest difference between high and low tide called a:

- a) surface current      b) neap tide  
**c) spring tide**      d) rip current

3. \_\_\_\_\_ carry cold and warm ocean water around the world.

- a) tides      b) waves  
**c) currents**      d) tsunamis

4. The effect of Earth's rotation on the direction of winds and currents is called the...

- a) currents      b) Gulf Stream travel  
**c) Coriolis Effect**      d) El Nino

5. Describe how deep currents form and travel in the ocean.

\*The density of water (depends on temperature and salinity)

\*water near the poles become denser as they move away from the poles and then flows back along the ocean floor

\*deep currents follow the hills and valleys of the ocean floor and are affected by the Coriolis Effect

6. How do surface currents affect climate on land?

\*a surface current warms or cools the air above it, influencing the climate of the land near the coast

7. Why are there two tides a day in most places?

\*as the Earth rotates once every 24 hours it passes through a tidal bulge twice during that time period

8. Evaluate how destructive a tsunami is compared to a regular storm. Why?

\*an earthquake on the ocean floor causes it and the waves get larger as they move toward land and can be just as devastating as an earthquake on land.

**APPENDIX I  
BULLETIN BOARD PRESENTATION**

**You are required to choose an organism from either the high, mid or low tide zone and re search the ‘life and times’ of this organism to your classmates. Include as much information as you can find, pictures (drawn or copied from another source) and lots of color! Make the board bright and pleasing to look at. Have fun!**

**This is the rubric that you’ll be marked with. Hand this sheet in before your presentation.**

| <b>Bulletin Board Presentation Rubric</b> |  |          |          |          |          |            |          |          |          |           |
|---|--|----------|----------|----------|----------|------------|----------|----------|----------|-----------|
| <b>1.</b>                                 | <b>Presentation is professional, well delivered and prepared.</b>  |          |          |          |          |            |          |          |          |           |
|   | <b>1</b>   | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b>   | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> |
| <b>2.</b>                                 | <b>Organism was well researched and organized.</b>                 |          |          |          |          |            |          |          |          |           |
|   | <b>1</b>   | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b>   | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> |
| <b>3.</b>                                 | <b>Bulletin board was colorful, neat and professional looking.</b> |          |          |          |          |            |          |          |          |           |
|   | <b>1</b>   | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b>   | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> |
|   | <b>TOTAL:</b>  |          |          |          |          | <b>/30</b> |          |          |          |           |

**APPENDIX J  
MARINE LIFE WORKSHEET**

- Cut words apart and tell students to place words into one of the following categories: sunlight zone, twilight zone and midnight zone.
- Photocopy this sheet the same number of times that there are groups.

**Lots of light                      0-300 ft.                      small 90% of marine life**

**plants are productive                      plants require sunlight in this zone**

**tuna shark                      dolphin                      300-3000 ft.**

**water beginning to get darker                      temperature decreases**

**pressure increases                      very little light                      blue light**

**violet light green plants                      less food                      less animal life**

**eat dead organisms                      glow in dark animals**

**bioluminescence goes to ocean floor**

**remains of marine life from upper zones                      fewer life forms**

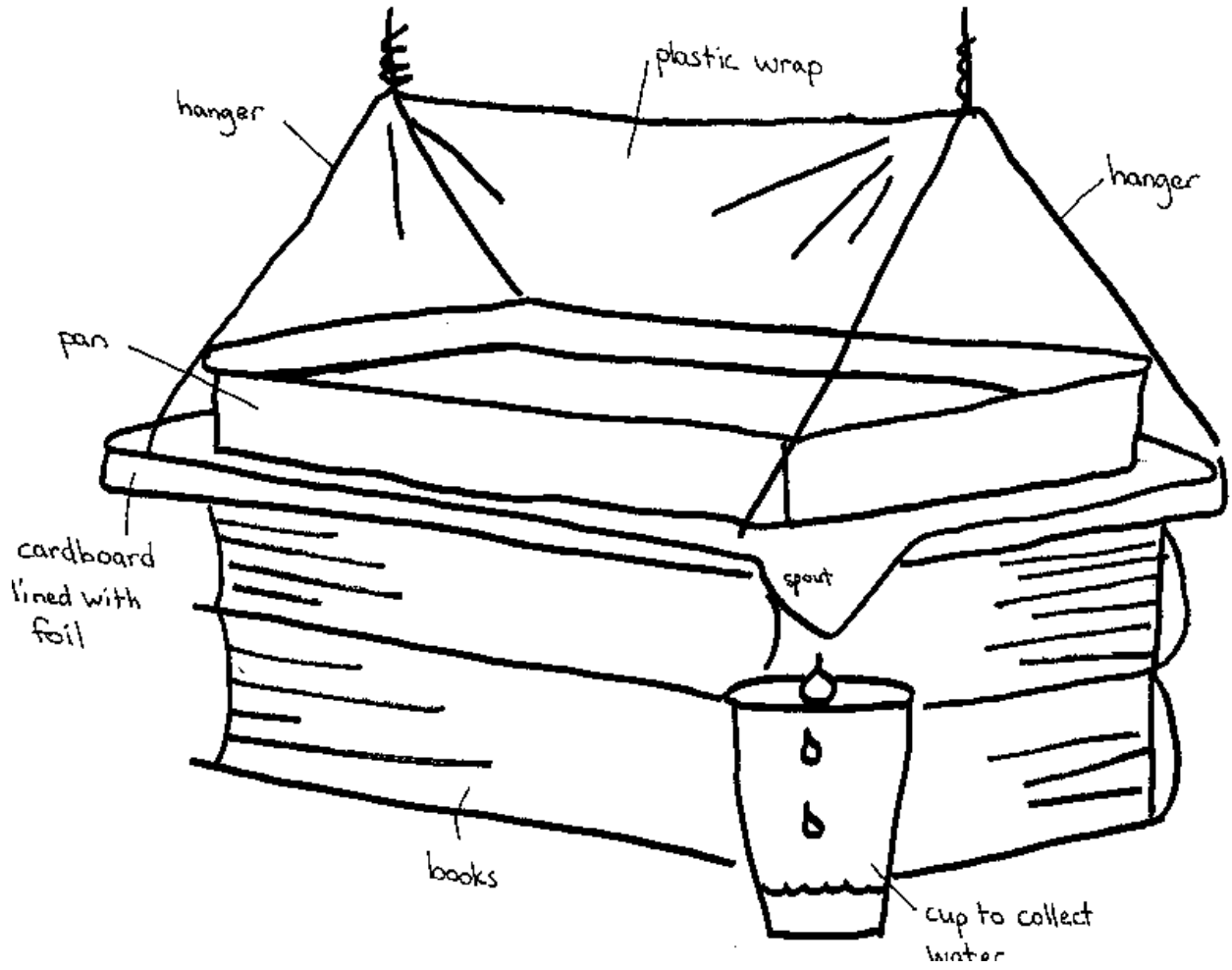
**very dark                      scarce food supplies**

**organisms grow slowly organisms live longer**

**high water pressure**



APPENDIX L  
SOLAR DISTILLATION PLANT



**APPENDIX M  
LAB WRITE-UP RUBRIC**

**SCIENCE LAB WRITE UP**

Question: - Is it detailed, relevant? /2

Materials: - Is list comprehensive, very detailed, exhaustive? /10

Method: - Are steps clear, thorough and repeatable? /10

Observations: - Are all senses used (if possible)? Sight? Smell? Feel? Hear? Taste?  
Are times recorded? Thorough? /10

Results - What happened during the experiment? Are patterns or trends present? Are there graphs or charts summarizing data? /10

Hypothesis: Is the educated guess relevant? Make sense? /5

Conclusion - Is background knowledge backing up results? Are possible source of errors or potential changes listed? /15

**TOTAL: /62**