Name _____ Class _____ Date _____

2 Earth's Ocean Waters

BIGIDEAS

- Nearly three-quarters of Earth is covered by water, the majority of which is saltwater found in the ocean.
- Water has many unique properties that shape our planet and life on Earth.
- All living things depend on water for survival.

Engage

Activate Prior Knowledge

In this lesson you will learn about the unique properties of water and how these properties influence Earth and life on our planet. Before reading and trying the activities in your textbook, use the chart below to record what you already know about these topics. 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
What are some properties of water?	*Answers will vary. Sample responses are shown. Water is a liquid we can drink.*	*Water exists in three phases on Earth. Water is a polar covalent molecule and acts as a universal solvent.*
Where does water exist as a solid and why is this important?	*Ice is solid water. Ice exists around Earth's poles.*	*Water exists as a solid around the poles, in glaciers and on mountaintops.*
Why is ocean water salty?	*There is a lot of salt dissolved in water, making it salty.*	*Salt in the ocean comes from land, the atmosphere and inside Earth.*
Why is water important to both marine organisms and humans?	*Living things must drink water to survive.*	*Living things need water to carry out life processes.*

Name _____ Class _____ Date _____

Explore

Vocabulary Review

Using pages 22–31 of your textbook, complete the activities below to review key vocabulary. For questions 1–5, match each lab material to its correct definition.

1.	___d___ Tap water	a. Solid carbon dioxide commonly used to keep foods cold during shipping
2.	___a___ Dry ice	b. Water in the solid state
3.	___e___ Saltwater	c. Pure water with all substances removed
4.	___b___ Ice	d. Freshwater from a faucet, which has been treated to kill bacteria and harmful substances
5.	___c___ Distilled water	e. Water that contains dissolved salts

For questions 6–11, draw a line to match each term to its correct description.

6.	Sublimation	The temperature at which a liquid begins to change into a solid
7.	Freezing point	The temperature at which a liquid begins to change into a gas
8.	Melting point	The temperature at which a solid begins to change into a liquid
9.	Boiling point	The process of changing from a solid to a gas
10.	Density	The attraction between molecules at a liquid's surface
11.	Surface tension	The amount of mass in a given volume of a substance

Complete the paragraph below with the missing terms from the word bank.

solvent **solution** **saturated** **solute** **solubility**

Saltwater is an example of a ___*solution*___. It is a homogenous mixture of two or more substances in which one substance is evenly mixed throughout the other. In a mixture of salt water, water is the ___*solvent*___. Salt is the ___*solute*___. The ability of one material to dissolve in another is referred to as ___*solubility*___. When no more of a substance can dissolve in a solvent, a solution is ___*saturated*___.

Name _____ Class _____ Date _____

Practice Process Skills: RECORD DATA

During scientific investigations, we make observations and collect data. Data is factual information. Your name and height are data about you. Carefully recording data is a key part of scientific research. Detailed notes help us review our work and help us to analyze and draw conclusions about our results.

Scientists often use data tables to record information in a quick and organized way. In a data table, information is arranged in labeled rows and columns. Data tables can help you find information at a glance. They can also be helpful in interpreting information that either you, or others, have gathered. It is always useful to know what kind of data you will collect and need to record before starting an investigation. This way you'll be sure to keep careful notes.

Throughout the investigations on pages 22–31 of your textbook you will record data in tables. Before trying the activities, skim through the procedures. Then answer the following questions.

1. What data will you record in the *Phase Changes of Water I: Freezing Point* experiment?

We will record the temperature of tap and saltwater every 30 seconds as they cool in a bucket of dry ice.

2. What data will you record in the *Phase Changes of Water II: Melting and Boiling Points* experiment? ***We will record the temperature of frozen tap water and frozen saltwater every minute as they are heated on a hot plate. We will also record any changes we see.***

3. What question are you trying to answer in *Investigation 2: Surface Tension*? ***How many pennies can we add to cups of tap water, tap water and detergent and tap water and spice before the cups overflow?***

Name _____ Class _____ Date _____

4. What data will you need to record to answer this question? *We will record the number of pennies we added to each cup before it overflowed.*

5. Look at the data table you will complete in *Investigation 3: Floating and Sinking*.

   What information will you record in column 1? *The name of the item we are testing*

   What information will you record in column 5? *The mass of the item we are testing*

6. How will recording your predictions, observations and calculations in a data table help you interpret and compare your results? *Students' answers should reflect that they will be able to see at a glance all of their experimental data and will be able to compare data for each item easily.*

7. In *Investigation 4: Solutions*, why do you think you need to record the volume of the water? *We need to know the volume of the water used because this affects how much salt will dissolve. The volume of water used needs to stay the same throughout the experiment.*

8. Why do you think you need to record the starting mass of the salt? *We need to know the starting mass so we can calculate how much salt we added to the beaker.*

Name _____ Class _____ Date _____

Math Mini-Lesson

For the *Floating and Sinking* activity on pages 28–29 of your textbook, you will calculate the density of various items. Density is defined as a material's mass per unit volume. You can think of density as how compact something is. When a lot of mass is packed in a small space, density is high. When little mass is packed in a large space, density is low.

Before trying the activity in your textbook, use the formula below to practice calculating density.

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

To calculate density we divide an object's mass by its volume. Here's an example. Suppose a piece of wood has a mass of 5.85 g and a volume of 7.57 cm^3. Its density would be:

$$\frac{5.85\ g}{7.57\ cm^3} = 0.773\ g/cm^3$$

1. Cooking oil has a mass of 22.75 g and a volume of 25 mL. What is its density? Show your work.
   22.75 g/25 mL = 0.91 g/mL

2. A piece of lead has a mass of 170 g and a volume of 15 cm^3. What is its density? Show your work.
   170 g /15 cm^3 = 11.3 g/cm^3

3. A helium balloon has a mass of 0.036 g and a volume of 200 cm^3. What is its density? Show your work.
   0.036 g /200 cm^3 = 0.00018 g/cm^3

Name _____ Class _____ Date _____

Explain

Complete the chart below as you read pages 32–37 of your textbook. Write the definition of each vocabulary term in your own words. Then write a note or draw a picture to help you remember the meaning of each term. Use the chart to review key concepts after you have finished the lesson.

Term	Definition	Example/Model/Drawing
Atom	*The most basic particle of an element; made up of neutrons, protons and electrons*	*Answers will vary. Some sample responses are shown.*
Valence electron	*An electron that is located in the outer shell of an atom*	
Noble gas	*Atoms with complete outer electron shells that do not react with other atoms to make molecules or compounds*	
Diatomic molecule	*A molecule made up of two atoms of an element chemically bonded together*	*The prefix di- means two. These are molecules with two atoms.*
Cohesion	*The property of water making it attracted to other molecules of water*	*A related term is the word cohesive which means holding or sticking together.*
Covalent bond	*A pair of electrons that is shared equally between two atoms in a molecule*	*To bond means to link or join together.*

Name _____ Class _____ Date _____

Term	Definition	Example/Model/Drawing
Polar covalent bond	*A pair of electrons that is not shared equally between two atoms in a molecule*	
Polar covalent molecule	*A molecule in which electrons are not evenly distributed or shared by its atoms; the molecules will attract each other and "stick" together*	*Poles are opposites, so a polar molecule has sides that are oppositely charged.*
Hydrogen bonding	*The attraction between hydrogen in a polar covalent molecule and atoms within other molecules*	
Ionic compound	*A compound that consists of ions that have an electrical charge*	
Ionic bond	*A bond formed by the attraction between oppositely charged ions*	
Conductivity	*The ability of a material to carry an electrical charge*	*I see the word conduct in conductivity. To conduct means to let electricity flow; a conductor is a material that lets electricity flow through it easily.*
Salinity	*The measure of dissolved salts in water*	

Name _____ Class _____ Date _____

Review What You Learned

After reading pages 32–37 of your textbook, answer the questions below to review what you learned.

1. What kind of charge does each atomic particle have?

Neutron *Neutral/no charge*

Proton *Positive charge*

Electron *Negative charge*

2. How many atoms make up a water molecule? What are they?

Water is made up of three atoms – two hydrogen atoms and one oxygen atom.

3. What kind of molecule is water? Explain what this means in your own words.

Water is a polar covalent molecule. In polar covalent molecules, electrons are not evenly distributed. This causes one side of the molecule to be slightly positive, and the other side of the molecule to be slightly negative.

4. Make a diagram of a water molecule. Label the atoms and show the electric charge associated with each.

5. Water's molecular structure gives it certain properties. What are some of these special properties?

The polar nature of water molecules causes the molecules to attract one another. This property is described as cohesion; it explains water's ability to form beads or droplets.

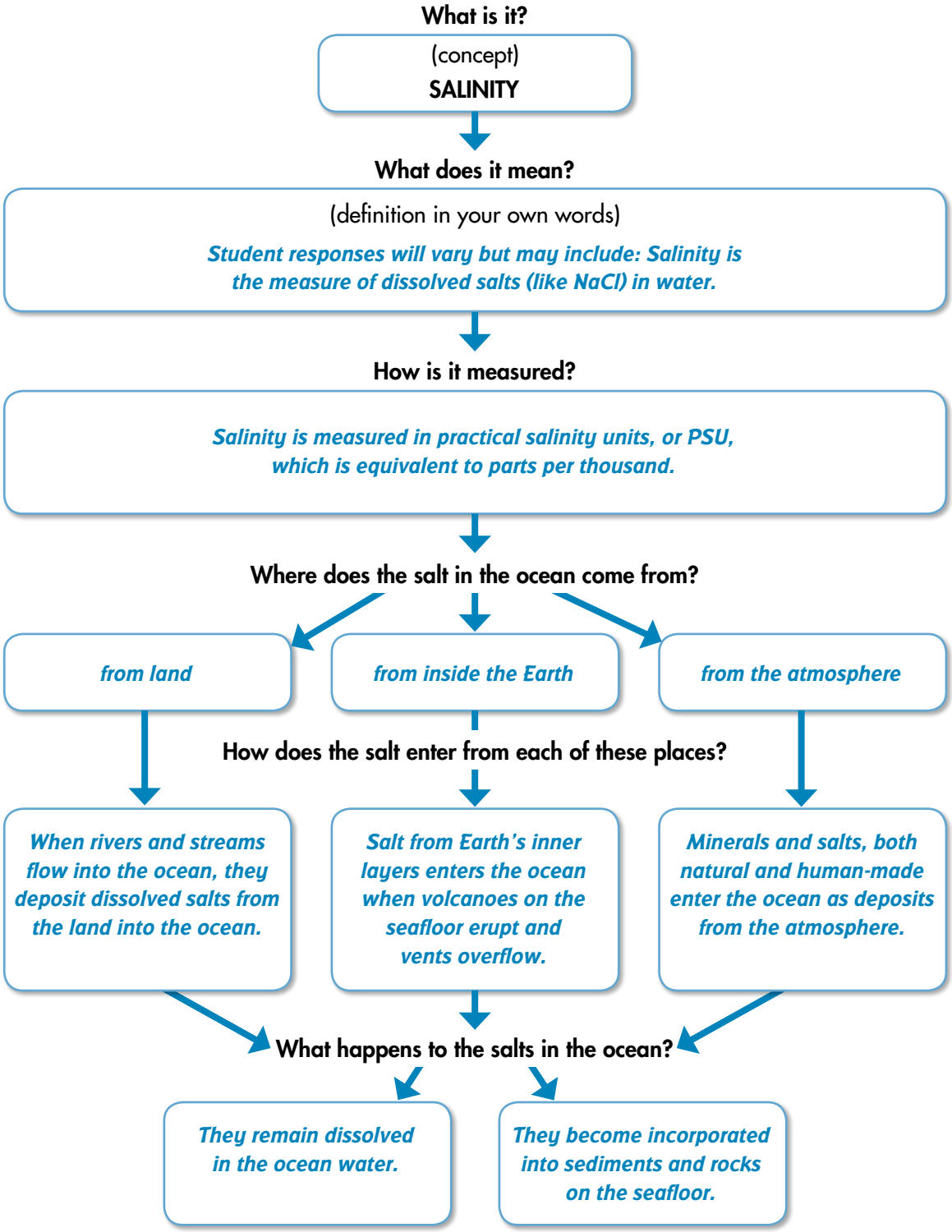
Water's size and polarity enable it to dissolve salts and other polar compounds.

Name _____ Class _____ Date _____

Reading Strategy: TAKING NOTES

Taking notes when you read is an important tool that can help you remember key concepts. One way to take notes and keep new information organized is by using a concept map. A concept map is a graphic organizer used to show key ideas and facts about a concept.

As you read about salinity on pages 36–38 of your textbook, use the concept map below to record key ideas. Then use this note-taking skill as you complete other sections of the lesson.

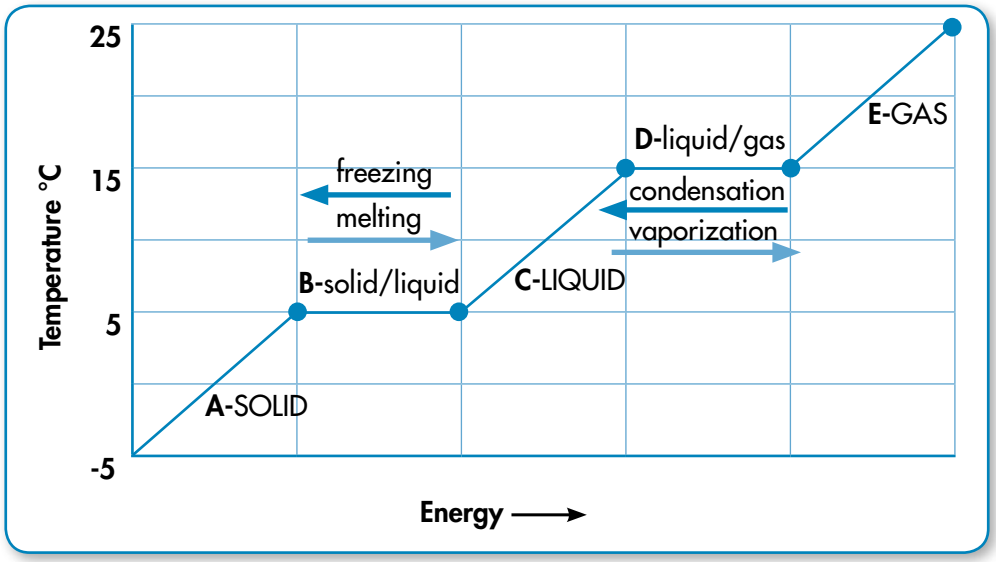


Name _____ Class _____ Date _____

Visual Literacy: Reading Graphs

Pages 39–40 of your textbook discuss phase changes and show a graph called a phase change diagram. Graphs, maps and charts are often used in science to show information in a visual way. They are as important as the text you read. Knowing how to read and understand information from graphs and other images is an important skill.

Below is a phase change diagram. As heat is added to a material, the material gains energy and its temperature rises. If enough energy is gained, its state changes. Use pages 22–23 in your text to help you answer the questions below and review how to read and interpret graphs.



1. What is the freezing temperature of this substance? *5° C*

2. What letter represents the melting point of the substance? *B*

3. What is the boiling temperature of the substance? *15°C*

4. What happens as the solid changes to a liquid? *Its temperature remains the same.*

5. What is vaporization? How is it shown on the diagram? *Vaporization is the process of changing from a liquid to a gas. It is shown by letter d on the diagram.*

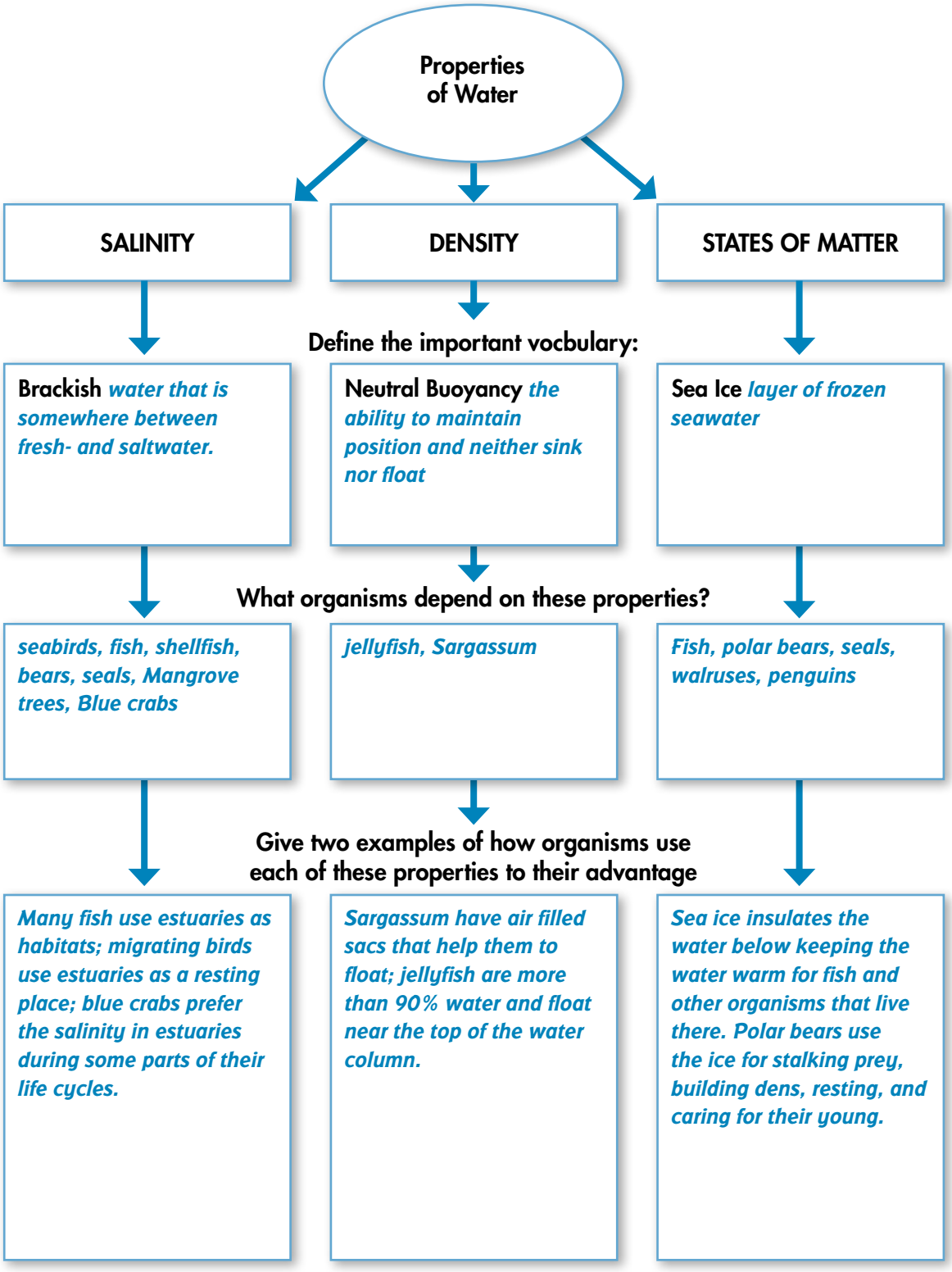
6. What is freezing? How is it shown on the diagram? *Freezing is the process of changing from a liquid to a solid. It is shown by letter B on the diagram.*

Name _____ Class _____ Date _____

Elaborate

Reading Strategy: TAKING NOTES

After reading pages 24–29 of your textbook, use the concept map below to record the key ideas of the text.



Name _____ Class _____ Date _____

Evaluate

Lesson Summary

- Most of the planet's surface is covered by water. Ninety-seven percent of this water is saltwater found in the planet's oceans. The remaining three percent of water on Earth is freshwater.
- The salt in the ocean comes from minerals in the atmosphere, rivers and streams, and volcanoes and vents under the seafloor.
- Water has many unique properties that shape life on Earth.
- Water on Earth exists in all three states of matter—solid, liquid and gas.
- Water molecules attract each other and therefore water has a high surface tension.
- Water is a universal solvent. Many things, including salts, dissolve in water.
- All living things depend on water for survival.
- Marine organisms use and depend on the ocean's properties, such as its salinity and density, in different ways to meet their needs.
- Water is considered a renewable resource. However, we must treat it with respect to ensure that the resources within the water are there for future generations

When you have completed the lesson, turn back to page 11 of this workbook and record information you gained from the lesson in the What I Learned column of the chart.