Name _____ Date _____

CHAPTER
Concept Map

Physical and Chemical Changes

Use your textbook to help you fill in the blanks.

A physical change may involve a change in shape, size, or _____ of matter. The three states of matter are _____, _____, and _____.

Name of Process	Speed of Process	Initial Phase	Final Phase
	Slow	Liquid	Gas
Boiling		Liquid	
		Solid	Gas
		Solid	Liquid
	Slow/Fast	Gas	Liquid

LESSON Outline

Name _____ Date _____

Changes of State

Use your textbook to help you fill in the blanks.

How can matter change state?

1. Altering the form or organization of an object without changing the type of matter within it is called a(n) _____ .

2. The three states of matter are _____ , liquid, and _____ .

3. The state of matter of an object is a(n) _____ property.

4. The average vibration of molecules in an object is measured by _____ .

5. When a solid gains heat energy, its molecules begin vibrating too quickly to stay together, so the solid becomes a(n) _____ .

6. When gases lose heat, they _____ into liquids.

7. A liquid loses heat and _____ into a solid.

8. When a solid changes directly into a gas, it _____ .

9. Most liquids become _____ when they change to a solid.

Name _____ Date _____

LESSON
Outline

When does matter change states?

10. When a substance melts or boils, it absorbs _____ .

11. The temperature at which a substance changes from a solid to a liquid is its _____ .

12. The temperature at which a substance changes from a liquid to a gas is its _____ .

13. The temperature at which a substance changes from a liquid to a solid is its _____ .

14. Nonmetals are weakly attracted to one another, so they have _____ melting and boiling points.

15. The slow change from a liquid to a gas at temperatures below the boiling point is called _____ .

What are expansion and contraction?

16. An increase in an object's volume when it is heated is called _____ ; a decrease in its volume when it is cooled is called _____ .

Critical Thinking

17. How does water change when heat is added or removed?

_____

_____

_____

_____

_____

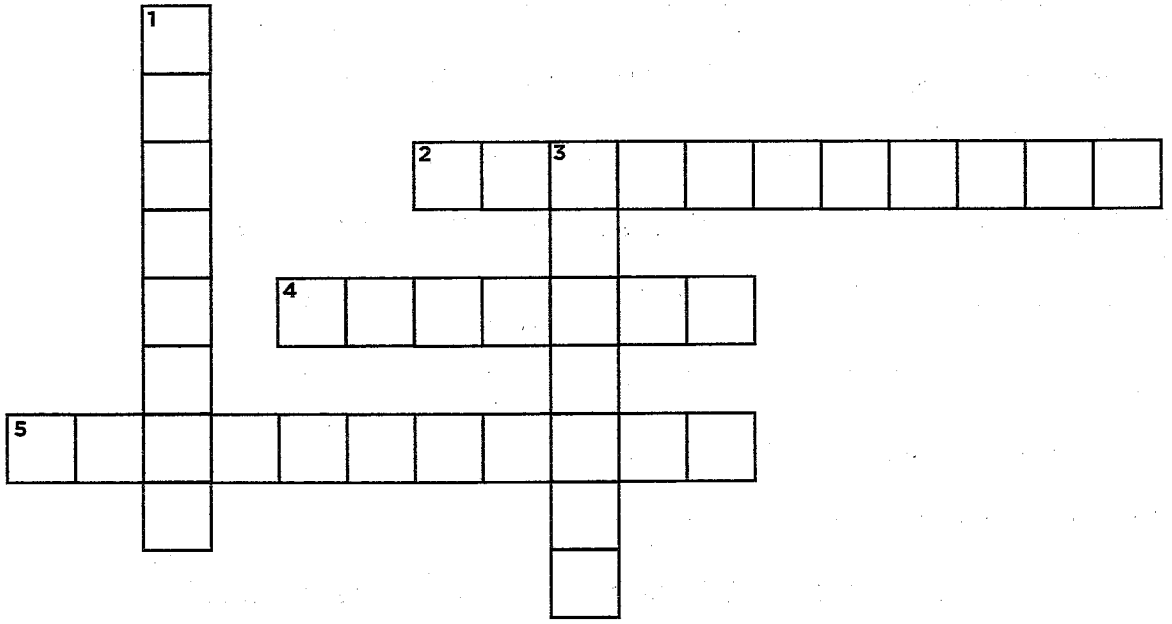
LESSON
Vocabulary

Name _____ Date _____

Changes of State

Choose words from the word box below to finish the crossword puzzle.

boiling	freezing	sublimation
contraction	melting	



Across

2. A change from a solid to a gas.

4. The temperature at which water changes from a solid to a liquid is the _____ point.

5. A decrease in an object's volume because of a change in temperature is thermal _____.

Down

1. The temperature at which water changes from a liquid to a solid is its _____ point.

3. The temperature at which water changes from a liquid to a gas is the _____ point.

Name _____ Date _____

LESSON
Cloze Activity

Changes of State

Fill in the blanks.

boiling point	heat energy	solid
freezing point	liquid	sublimation
gas	melting point	temperature

All substances have three common forms called physical states. These states are _____, liquid, and _____. The physical state of matter is changed when _____ is added or taken away. A measure of the average heat energy that a substance has (the average vibration of its molecules) is its _____. When a solid is heated to its _____, its molecules start moving faster, and the solid changes into a(n) _____. When the liquid is heated to its _____, its molecules move even faster, and the liquid turns into a gas. The melting point of water is 0°C, and its boiling point is 100°C. Sometimes a solid changes directly into a gas without passing through the liquid state, a process called _____. When a liquid is cooled to its _____, it becomes a solid. When a gas is cooled, it condenses and becomes a liquid.

LESSON Outline

Name _____ Date _____

Mixtures

Use your textbook to help you fill in the blanks.

What are mixtures?

1. A physical combination of substances that remain the same is a(n) _____ .
2. Mixtures can be _____ into their original substances.
3. Mixtures with different parts that can be plainly seen with the naked eye are called _____ mixtures.
4. Mixtures that look smooth to the naked eye but speckled under a microscope are called _____ .
5. Over time, one or more parts of a suspension can _____ .
6. A heterogeneous mixture with parts that do not settle out is called a(n) _____ .

What are solutions?

7. A mixture that looks the same everywhere, even under a microscope, is called a(n) _____ .
8. The part of a solution that is dissolved is the _____ .
9. The part of a solution that dissolves the other substance is called the _____ .

Name _____ Date _____

LESSON
Outline

10. A solution of two or more solids is a(n) _____ .

11. Because it can dissolve many things, water is called the _____ .

How can you take mixtures apart?

12. To separate one part of a mixture from another, you can use a(n) _____ .

13. When two liquids in a mixture have different boiling points, they can be separated by _____ .

14. Because liquids travel at different speeds through an absorbent paper, they can be separated by _____ .

How are mixtures used?

15. Cheese, gelatin, marshmallows, and paint are all examples of useful _____ .

16. Copper is alloyed with zinc to make _____ .

Critical Thinking

17. Suppose you were to mix together salt, water, and mud. Identify the type of mixture you have made. Describe how you could separate the parts of the mixture from one another.

_____

_____

_____

_____

_____

_____

LESSON Vocabulary

Name _____ Date _____

Mixtures

Who am I? What am I?

Choose a word from the word box below that answers each question.

a. alloy	**c.** distillation	**e.** solubility	**g.** solution
b. colloid	**d.** mixture	**f.** solute	**h.** solvent

1. _____ I am smoke, cheese, and foam. I am a mixture that does not settle. Who am I?

2. _____ I am the water in sugar water. Who am I?

3. _____ I am the sugar in sugar water. Who am I?

4. _____ I am steel and I am brass. Who am I?

5. _____ I am the maximum amount of solute that can go into a solvent. What am I?

6. _____ Using evaporation and condensation, I can separate the liquids in a mixture. What am I?

7. _____ I am a combination of two or more materials, but none of my parts are chemically combined. What am I?

8. _____ I can be made with solids, liquids, and gases. All my parts blend so that I look the same everywhere, even under a microscope. Who am I?

Name _____ Date _____

LESSON
Cloze Activity

Mixtures

Fill in the blanks.

alloys	distillation	liquids
boiling points	heterogeneous	solids
condensing	homogeneous	suspensions

Several substances that are physically mixed together but not chemically combined are called mixtures. Mixtures can include various combinations of solids, liquids, and gases. Liquids in a mixture may have different _____ . Boiling and _____ the liquids, a process called _____ , can be used to separate them.

There are two kinds of mixtures: those that are the same throughout (_____) and those that are not (_____). Homogeneous mixtures, such as sugar water, are called solutions. Gases form solutions more easily than _____ do, and liquids form solutions more easily than _____ do. Solutions of two or more solids are called _____ .

The different parts of some heterogeneous mixtures can clearly be seen by the naked eye. These are called _____ . Some suspensions settle to the bottom.

LESSON Outline

Name _____ Date _____

Compounds and Chemical Changes

Use your textbook to help you fill in the blanks.

What are compounds?

1. A combination of two or more elements is called a(n) _____ .
2. A compound has different properties than do the _____ that formed it.
3. Rust is a combination of iron and _____ .
4. The chemical name for rust is _____ .
5. The chemical formula for rust is _____ .

What are chemical changes?

6. Changing one substance into another is a(n) _____ .
7. When atoms break their old links and form new links with other atoms, a(n) _____ has occurred.
8. Chemists keep track of which substances are used and created in a chemical reaction by writing _____ .
9. Chemicals on the left side of a chemical equation are called _____ ; chemicals on the right side are called _____ .
10. In every chemical reaction, the total mass of the reactants always equals the total mass of the products. This fact is known as the _____ .

Name _____ Date _____

LESSON
Outline

How can you spot a chemical change?

11. A color change on metal that is caused by a chemical change is called _____ .

12. Bubbles form when baking soda and vinegar are mixed, indicating that a _____ has taken place.

13. A solid that forms when two solutions are mixed is called a(n) _____ .

14. If a chemical reaction produces heat and light, then reversing the reaction should _____ .

How can you use chemical changes?

15. Plants use a chemical reaction called _____ to produce sugars from sunlight, water, and carbon dioxide.

16. Plants and animals use a chemical reaction called _____ to burn sugars for energy.

17. Chemical reactions are used to produce a variety of products, such as _____ .

Critical Thinking

18. Write the equation for the chemical change that produces water from two hydrogen molecules and one oxygen molecule. Label the reactants and the products. (Hint: Remember to take into account the conservation of mass.)

_____

_____

_____

LESSON
Vocabulary

Name _____ Date _____

Compounds and Chemical Changes

Use the words in the word box to fill in the blanks.

chemical	photosynthesis	reactants
compound	precipitate	tarnish
equations	products	

1. The _____ are on the left side of a chemical equation.
2. The _____ are on the right side of a chemical equation.
3. The chemical reaction that plants use to produce sugar is known as _____ .
4. A solid that is a product of a chemical reaction is called a(n) _____ .
5. Atoms break their old links and form new links during a(n) _____ change.
6. Chemists keep track of chemical reactions by using chemical _____ .
7. A color change in metal caused by a chemical change is called _____ .
8. A chemical combination of two or more elements is a(n) _____ .

Name _____ Date _____

LESSON
Cloze Activity

Compounds and Chemical Changes

Fill in the blanks.

chemical equations	$C_6H_{12}O_6$	H_2O
chemical formulas	compounds	left
CO_2	elements	

A chemical change results in one or more products that are different from the reactants. Atoms break their links and form new links with other atoms to form new _____. Chemists describe what goes on in a chemical change by writing _____. The substances to the _____ of the arrow in a chemical equation are the reactants; the substances to the right of the arrow are the products. The compounds in a chemical equation are written as _____. A chemical formula tells which _____ are in a compound and how many atoms there are of each. For example, the chemical formula for water is _____, and the chemical formula for carbon dioxide is _____. The chemical equation for photosynthesis is $6H_2O + 6CO_2 \rightarrow$ _____ $+ 6O_2$. The numbers of atoms of each element are the same on each side of the equation.

Name _____ Date _____

The Case of the Mystery Compounds

Write About It

Do research and write a report about how scientists can test water for pollutants and dangerous chemical compounds. Which chemical reactions do they use to perform the test? Give the steps of the process in order.

Getting Ideas

As you do research on how scientists test water, fill out the chart below. Write the steps in order.

First
↓
Next
↓
Last

Planning and Organizing

Organize the steps that Sean wrote about testing water for chlorine.

1. Chlorine will turn the litmus paper red, then white. _____
2. Place a sample of the water in a test tube. _____
3. Dip blue litmus paper in the water. _____

Name _____ Date _____

Writing in Science

Drafting

Write a sentence to begin your report. Tell an important idea about testing water for pollutants and dangerous chemical compounds.

_____

_____

_____

Now write your report. Use a separate piece of paper. Begin with the sentence you wrote above. Then tell the steps scientists follow to test water. Be sure to include important facts and details about chemical reactions.

Revising and Proofreading

Here are some sentences Sean wrote. They are very wordy. Read each pair. Combine each pair into one sentence by cutting out unnecessary words. Write the new sentence on the line.

1. Make sure the test tube you use is clean. It must be sterile.

   _____

2. The chemical reaction may produce changes in color. It may produce changes in smell.

   _____

3. Test the sample quickly. Do the test within two hours.

   _____

Now revise and proofread your writing. Ask yourself:

- Did I tell the steps of testing water in order?
- Did I explain the chemical processes involved?
- Did I correct all errors?

LESSON Outline

Name _____ Date _____

Acids, Bases, and Salts

Use your textbook to help you fill in the blanks.

What are acids and bases?

1. A substance that tastes _____, turns blue litmus to red, and reacts with metals to make _____ is a(n) _____.
2. When acids dissolve in water, they release _____.
3. An atom or a molecule that has lost or gained one or more electrons is a(n) _____.
4. Hydrogen ions have a positive charge because they have lost an _____.
5. Our stomachs produce _____, which helps digest food.
6. A substance that tastes _____, is slippery to the touch, and turns red litmus to blue is a(n) _____.
7. When bases dissolve in water, they release _____, which have a(n) _____ charge.
8. _____ is used to make fertilizers.
9. Sodium hydroxide (NaOH), also called _____, is used to make textiles, detergents, and some plastics.

Name _____ Date _____

LESSON
Outline

How can indicators identify acids and bases?

10. A dye that reacts chemically with acids and bases to produce one color in acids and another color in bases is called

a(n) _____ .

11. A low number on the pH scale indicates _____ ;

a high number indicates _____ .

12. A pH of 7 means that the solution is _____ .

What are salts?

13. Mixing an acid with a base produces _____ and water.

14. Acids and bases combine to form pH neutral solutions,

a process called _____ .

15. A compound that has positive and negative ions in a regular

pattern or crystal is a(n) _____ .

16. Acids, bases, and salts dissolve in water to form a(n)

_____ .

Critical Thinking

17. Compare and contrast acids and bases. Tell what happens when they are mixed together.

_____

_____

_____

_____

_____

LESSON
Vocabulary

Name _____ Date _____

Acids, Bases, and Salts

Who am I? What am I?

Choose a word from the word box below that answers each question.

a. acid	**c.** alkalinity	**e.** electrolyte	**g.** neutralization
b. acidity	**d.** base	**f.** ion	**h.** pH

1. _____ I can dissolve in water to form ions, which allows me to conduct electricity. Who am I?

2. _____ I have lost or gained electrons, which gives me a positive or negative charge. Who am I?

3. _____ I represent the strength of an acid. What am I?

4. _____ I taste sour and turn blue litmus red. In water I produce H^+ ions. Who am I?

5. _____ I can tell you how acidic or basic a substance is. What am I?

6. _____ I am the strength of a base. What am I?

7. _____ I taste bitter and feel soapy. In water I produce OH^- ions. Who am I?

8. _____ I can occur when acids and bases are mixed together. What am I?

Name _____ Date _____

LESSON
Cloze Activity

Acids, Bases, and Salts

Fill in the blanks.

acid-base indicator	bitter	pH scale
acidity	blue	neutralize
alkalinity	high	
bases	low	

Compounds that give off hydrogen ions (H^+) when dissolved in water are called acids. They taste sour, sting to the touch, and turn red an _____ called litmus. Compounds that give off hydroxide ions (OH^-) when dissolved in water are called _____. They usually taste _____, feel soapy, and turn litmus _____. The _____ measures the strength of an acid (known as _____) and the strength of a base (known as _____). Highly acidic solutions have a(n) _____ pH; very alkaline solutions have a(n) _____ pH. When acids and bases are mixed together, they produce a salt and water. Acids and bases _____ each other. The process in which an acid and a base combine to form a pH-neutral solution is called neutralization.

Name _____ Date _____

Meet Christina Elson

Read the Reading in Science feature in your textbook.

Infer

Fill in the Infer graphic organizer below. Use the clues and what you know to draw conclusions about Aztec artifacts.

Clues	What I Know	What I Infer
Large pots have been found with salt crystal residue in them.	Aztecs had to boil salty water to get salt crystals.	
In one Aztec town, thousands of fragments of clay pots were found.	Salt was sold and transported in this Aztec town.	
Salt helps pigment "cling" to cloth.	Cloth was dyed with pigment in a hot, watery dye bath.	

Name _____ Date _____

Write About It

Infer

1. How did the Aztecs change a mineral resource into a finished product?
2. What would happen to the colors in Aztec cloth when washed if salt were not part of the dye-bath?

What I Know

Fill in the blanks to complete each of the steps in the salt-making process. Use clues from the reading passage. Then answer the questions that follow.

a. Salt deposits are found in dried _____ .

b. Salty _____ is collected by

_____ .

c. Then, _____ is filtered through the

_____ and collected in large _____ .

d. Finally, the water in the large pots is _____ ;

it _____ , leaving behind salts.

1. How did the Aztecs change a mineral resource into a finished process?

_____

_____

_____

2. What would happen to the colors in Aztec cloth if salt were not part of the dye-bath?

_____

CHAPTER Vocabulary

Name _____ Date _____

Physical and Chemical Changes

Choose the letter of the best answer.

1. Which of the following is a physical change?
   - **a.** paper burning
   - **b.** egg frying
   - **c.** water boiling
   - **d.** baking soda and vinegar fizzing

2. Snow changing to water vapor is an example of
   - **a.** sublimation.
   - **b.** boiling.
   - **c.** melting.
   - **d.** thermal contraction.

3. When most liquids freeze, they undergo
   - **a.** thermal expansion.
   - **b.** thermal contraction.
   - **c.** condensation.
   - **d.** sublimation.

4. When a gas loses heat, it
   - **a.** evaporates.
   - **b.** boils.
   - **c.** sublimates.
   - **d.** condenses.

5. The temperature at which alcohol changes to a gas is its
   - **a.** sublimation point.
   - **b.** freezing point.
   - **c.** boiling point.
   - **d.** melting point.

6. Steel is an example of a(n)
   - **a.** alloy.
   - **b.** colloid.
   - **c.** heterogeneous mixture.
   - **d.** suspension.

7. Which of the following can form a solution most easily?
   - **a.** two liquids
   - **b.** two gases
   - **c.** two solids
   - **d.** a gas and a liquid

8. In a saltwater solution, the salt is a(n)
   - **a.** alloy.
   - **b.** colloid.
   - **c.** solvent.
   - **d.** solute.

9. Which of the following is an example of a colloid?

a. gelatin

b. brass

c. sugar water

d. orange juice

10. Which of the following is a compound?

a. brass **c.** iron

b. rust **d.** steel

11. In the chemical reaction called photosynthesis, which of the following is a reactant?

a. sunlight

b. oxygen

c. carbon dioxide

d. sugar

12. Which of the following indicates that a chemical change has taken place?

a. a change from a liquid to a gas

b. an increase in the volume of a substance

c. a change from a solid to a liquid

d. a change in the color of a substance

13. Which of the following is a property of bases?

a. tastes bitter

b. tastes sour

c. stings the skin

d. reacts with metal to make hydrogen gas

14. Which of the following releases hydrogen ions when dissolved in water?

a. sodium hydroxide

b. hydrochloric acid

c. sodium chloride

d. baking soda

15. What happens when an acid and a base are mixed?

a. A gas is given off.

b. A salt forms.

c. A color change occurs.

d. Heat is given off.

UNIT
Literature

Name _____ Date _____

The Great Jump in China

Read the Literature feature in your textbook.

Write About It

Response to Literature This article describes how an athlete used a ramp to jump over a large object. If you were a professional athlete, what other kinds of devices might you use? Write a fictional narrative describing your device and its uses.