



AL NOOR INTERNATIONAL SCHOOL  
Riyadh, Saudi Arabia

# Physical Science Workbook

Name: \_\_\_\_\_

Grade 7 - \_\_\_\_\_

Academic Year: \_\_\_\_\_

# Chapter 1 Solids, Liquids, and Gases

## States of Matter

### Understanding Main Ideas

Answer the following questions in the space provided.

1. What are the general characteristics of a solid?

\_\_\_\_\_

2. How do crystalline solids differ from amorphous solids?

\_\_\_\_\_

3. How are liquids described in terms of shape and volume?

\_\_\_\_\_

4. Explain why a sewing needle can float on the surface of water in a glass.

\_\_\_\_\_

\_\_\_\_\_

5. What determines the shape and volume of a gas inside a container?

\_\_\_\_\_

### Building Vocabulary

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

6. \_\_\_\_\_ Rubber and glass, which become softer as they are heated, are examples of crystalline solids.

7. \_\_\_\_\_ When you see steam, fog, or clouds, you are seeing water in the liquid state.

8. \_\_\_\_\_ The volume of a gas is the force of its outward push divided by the area of the walls of the container.

9. \_\_\_\_\_ A(n) gas has a definite volume but no definite shape.

10. \_\_\_\_\_ A(n) fluid has a definite shape and volume.

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# States of Matter

**Fill in the blank to complete each statement.**

1. The amount of space that matter fills is its \_\_\_\_\_.
2. A state of matter with a definite volume, but no definite shape is a(n) \_\_\_\_\_.
3. A(n) \_\_\_\_\_ will always take the shape and volume of its container.
4. The \_\_\_\_\_ is a measure of the average speed of the particles in a substance.
5. A(n) \_\_\_\_\_ has a definite volume but no shape of its own.
6. The \_\_\_\_\_ of a gas is the force of its outward push divided by the area of the walls of its container.

**If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.**

7. \_\_\_\_\_ Viscosity is the inward force among the molecules of a liquid.
8. \_\_\_\_\_ A(n) amorphous solid has a definite melting point.
9. \_\_\_\_\_ Both gases and liquids are fluids.
10. \_\_\_\_\_ All solids have a closely packed, fixed arrangement of particles.

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Changes of State

## Understanding Main Ideas

Fill in the blank to complete each statement.

1. Both sublimation and \_\_\_\_\_ occur only on the surface of a substance.
2. The \_\_\_\_\_ of melting is freezing.
3. When butter is heated it melts, and when that melted butter cools and solidifies the process is called \_\_\_\_\_.
4. When a gas turns to a liquid, the energy of the particles \_\_\_\_\_.
5. Vaporization is the reverse of \_\_\_\_\_.

## Building Vocabulary

Match each term with its definition by writing the letter of the correct definition in the right column on the line beside the term in the left column.

- |                   |  |
|-------------------|--|
| 6. ___ melting    | a. the change from a liquid to a gas   |
| 7. ___ freezing   | b. the change from a solid to a liquid |
| 8. ___ condensing | c. the change from a solid to a gas    |
| 9. ___ vaporizing | d. the change from a gas to a liquid   |
| 10. ___ subliming | e. the change from a liquid to a solid |

# Changes of State

Write the letter of the correct answer on the line at the left.

1. \_\_\_\_ Which of the following describes the process of freezing?
  - A Freezing occurs when the temperature of a substance drops to 0°C.
  - B Freezing occurs when the particles of a solid vibrate so fast that they break free.
  - C Freezing occurs when the temperature drops enough a gas turns into a solid.
  - D Freezing occurs when the particles in a liquid slow down and take fixed positions.
2. \_\_\_\_\_ The process that makes ice cubes shrink as they sit in a freezer is called
  - A sublimation
  - B condensation
  - C freezing
  - D boiling
3. \_\_\_\_ The temperature at which a liquid turns to a gas is
  - A called the freezing point
  - B called the boiling point
  - C 100°C
  - D the same for an amorphous or a crystalline solid
4. \_\_\_\_ Particles of which of the following have the greatest thermal energy?
  - A a liquid
  - B a crystalline solid
  - C a gas
  - D an amorphous solid

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

5. \_\_\_\_\_ Sublimation and boiling both happen at the surface of the substance.
6. \_\_\_\_\_ Vaporization is the reverse of condensation.
7. \_\_\_\_\_ The temperature at which a liquid turns to a gas is called the boiling point.
8. \_\_\_\_\_ Boiling is the reverse of freezing.
9. \_\_\_\_\_ Water particles in gas coming off of a pan of boiling water are moving slower than the particles of the water in the pan.
10. \_\_\_\_\_ Evaporation and condensation are both types of vaporization.

# Gas Behavior

## Understanding Main Ideas

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ If the temperature of a gas is constant, when the pressure is increased, the volume decreases.
2. \_\_\_\_\_ If the air pressure inside an inner tube is constant, when the temperature of the air is increased, the volume decreases.
3. \_\_\_\_\_ The graph of the relationship between the volume of a gas at constant temperature and its pressure is a(n) line.
4. \_\_\_\_\_ If the temperature of a gas inside a sealed, rigid container is decreased, its pressure decreases.
5. \_\_\_\_\_ The graph for Charles's law shows that the volume of a gas at constant pressure is inversely proportional to its temperature.
6. \_\_\_\_\_ If a gas at constant pressure inside a cylinder topped by a movable piston is heated, the volume of the gas will increase and push the piston outward.

## Building Vocabulary

Fill in the blank to complete each statement.

7. When the graph relating two variables is a straight line passing through the origin, the variables are \_\_\_\_\_ proportional.
8. According to \_\_\_\_\_ law, when the pressure of a gas at constant temperature is increased, the volume of the gas decreases.
9. According to \_\_\_\_\_ law, when the temperature of a gas is increased at constant pressure, its volume increases.
10. When the product of two variables is constant, the variables are \_\_\_\_\_ proportional to each other.

# Gas Behavior

Write the letter of the correct answer on the line at the left.

1. \_\_\_\_ At constant temperature, when the volume of a gas is decreased, what happens to its pressure?  
A It decreases.  
B It will vary.  
C It increases.  
D It remains constant.
2. \_\_\_\_ At constant pressure, when the temperature of a gas is decreased, what happens to its volume?  
A It decreases.  
B It will vary.  
C It increases.  
D It remains constant.
3. \_\_\_\_ At constant pressure, how are the temperature and volume of a gas related?  
A They are inversely proportional.  
B They are directly proportional.  
C They are constant.  
D They are indirectly proportional.
4. \_\_\_\_ If the sun shining through windows heats the air in a sealed room, what happens to the air pressure in that room?  
A It decreases.  
B It will vary.  
C It increases.  
D It remains constant.

Fill in the blank to complete each statement.

5. When Martin pushes down on the handle of his bicycle pump, the air pressure within the pump \_\_\_\_\_.
6. \_\_\_\_\_ law describes the relationship between a gas's volume and pressure when its temperature is constant.
7. \_\_\_\_\_ law describes the relationship between a gas's temperature and volume when its pressure is constant.
8. At constant temperature, the pressure and volume of a gas are \_\_\_\_\_ proportional.
9. At constant volume, when the temperature of a gas decreases, the pressure \_\_\_\_\_.
10. When the graph relating two variables is a straight line passing through the origin, the variables are \_\_\_\_\_ proportional to each other.

# Chapter 2 Atoms and Bonding

## Atoms, Bonding, and the Periodic Table

### Understanding Main Ideas

Look at the diagram below. Then answer the following questions in the space provided.



1. How many protons does a nitrogen atom have? \_\_\_\_\_
2. How many valence electrons does a nitrogen atom have? \_\_\_\_\_
3. Is nitrogen reactive or stable? \_\_\_\_\_
4. Neon (Ne), which has an atomic number of 10 is in Group 18 in the periodic table. To which group does nitrogen belong? \_\_\_\_\_
5. The element directly below nitrogen in the periodic table is phosphorus (P). How many valence electrons does phosphorus have? \_\_\_\_\_
6. Will the properties of nitrogen be more similar to the properties of neon or the properties of phosphorus? Explain. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Building Vocabulary

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

7. \_\_\_\_\_ An element's reactivity is determined by the number of protons found in an atom of the element.
8. \_\_\_\_\_ The force of attraction that holds two atoms together is called a chemical bond.
9. \_\_\_\_\_ In a(n) periodic table, dots around an element's symbol indicate the number of valence electrons in an atom.



Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Atoms, Bonding, and the Periodic Table

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ An atom's valence electrons are those electrons that have the highest energy.
2. \_\_\_\_\_ Atoms tend to be stable and nonreactive if they have six valence electrons.
3. \_\_\_\_\_ In the periodic table, the number of valence electrons in each element decreases from left to right across each period.
4. \_\_\_\_\_ The reactivity of a metal depends on how easily it loses its valence electrons.
5. \_\_\_\_\_ Within each period in the periodic table, elements have similar properties because they have the same number of valence electrons.

Fill in the blank to complete each statement.

6. The number of \_\_\_\_\_ in the atom of an element determines its chemical properties.
7. The columns in the periodic table are called \_\_\_\_\_.
8. A(n) \_\_\_\_\_ shows the number of valence electrons in an atom in pictorial fashion.
9. The attractive force that holds two atoms together is called a(n) \_\_\_\_\_.
10. Because it can either lose or share electrons when it combines with other elements, each \_\_\_\_\_ has some of the properties of metals and some of the properties of nonmetals.

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Ionic Bonds

## Understanding Main Ideas

Fill in the blank to complete each statement.

1. Negative ions form when atoms \_\_\_\_\_ valence electrons.
2. In the formation of an ionic compound, a metal atom is most likely to \_\_\_\_\_ valence electrons.
3. Ionic compounds form because \_\_\_\_\_ charges attract.

Answer the following questions in the spaces provided. You may use a periodic table.

4. A potassium ion has a charge of  $1+$ . A sulfide ion has a charge of  $2-$ .

What is the chemical formula for potassium sulfide?

\_\_\_\_\_

5. Name the following compound:  $MgO$ .

\_\_\_\_\_

## Building Vocabulary

Write a definition for each of these terms.

6. ion \_\_\_\_\_

\_\_\_\_\_

7. polyatomic ion \_\_\_\_\_

\_\_\_\_\_

8. ionic bond \_\_\_\_\_

\_\_\_\_\_

9. ionic compound \_\_\_\_\_

\_\_\_\_\_

10. chemical formula \_\_\_\_\_

\_\_\_\_\_

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Ionic Bonds

Write the letter of the correct answer on the line at the left.

1. \_\_\_\_ Ionic bonds form between two ions that have  
A ionic compounds  
B negative charges  
C positive charges  
D opposite charges
2. \_\_\_\_ Ions that are made of more than one atom are called  
A ionic compounds  
B crystals  
C polyatomic atoms  
D ionic bonds
3. \_\_\_\_ Which is most likely to form a negative ion?  
A an element from Group 17  
B a metal  
C an element from Group 1  
D an element with atoms that have eight valence electrons
4. \_\_\_\_ Which of the following is the correct name for  $\text{MgCl}_2$ ?  
A magnesium chlorine  
B magnesium dichlorine  
C magnesium chloride  
D magnesium dichloride

Fill in the blank to complete each statement.

5. A(n) \_\_\_\_\_ is an atom or group of atoms that has an electric charge.
6. The attraction between oppositely charged ions is called a(n) \_\_\_\_\_.
7. When an atom loses a valence electron, it becomes a(n) \_\_\_\_\_ ion.
8. In order to have a stable arrangement of 8 valence electrons, metal atoms are likely to \_\_\_\_\_ electrons.
9. In an ionic compound, the total positive charge of all the positive ions \_\_\_\_\_ the total negative charge of all the negative ions.
10. Because the force of attraction between the positive and negative ions is so strong, ionic compounds have \_\_\_\_\_ melting points.

# Covalent Bonds

## Understanding Main Ideas

Answer the following questions in the spaces provided. Use the diagram at right to answer questions 1–5.

1. Circle all of the covalent bonds in the electron dot diagrams.

2. Which bond(s) shown are double bonds?

\_\_\_\_\_

3. Which bond(s) shown are triple bonds?

\_\_\_\_\_

4. Which molecule(s) shown have polar bonds?

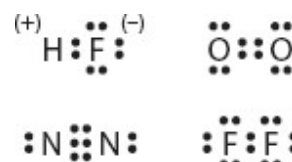
\_\_\_\_\_

5. Compare and contrast O<sub>2</sub> and F<sub>2</sub>.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



## Building Vocabulary

Match each term with its definition by writing the letter of the correct definition in the right column on the line beside the term in the left column.

- |                        |  |
|------------------------|--|
| 6. ____ molecule       | a. the chemical bond formed when two atoms share electrons |
| 7. ____ double bond    | b. a neutral group of atoms joined by covalent bonds       |
| 8. ____ nonpolar bond  | c. a bond in which electrons are shared unequally          |
| 9. ____ polar bond     | d. a bond in which electrons are shared equally            |
| 10. ____ covalent bond | e. a bond in which four electrons are shared               |

# Covalent Bonds

Write the letter of the correct answer on the line at the left.

1. \_\_\_\_ In an electron dot diagram, two pairs of shared electrons represents a  
A single bond  
B double bond  
C triple bond  
D quadruple bond
2. \_\_\_\_ A nitrogen molecule ( $N_2$ ) has one triple bond. How many electrons do the nitrogen atoms share?  
A 1  
B 3  
C 4  
D 6
3. \_\_\_\_ Compared to ionic compounds, molecular compounds generally have  
A good conductivity  
B greater densities  
C more chemical bonds  
D a low boiling point
4. \_\_\_\_ Compared to ionic compounds, molecular compounds generally have  
A stronger chemical bonds  
B poor conductivity  
C a high melting point  
D lower densities

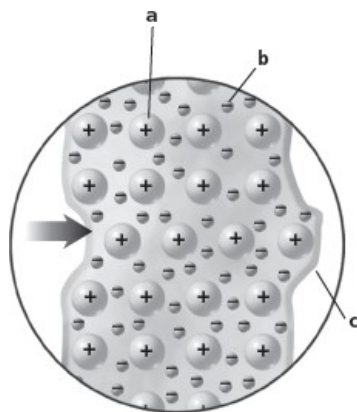
If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

5. \_\_\_\_\_ The chemical bond formed when two atoms share electrons is called a(n) ionic bond.
6. \_\_\_\_\_ Covalent bonds usually form when a nonmetal combines with a(n) metal.
7. \_\_\_\_\_ A(n) ion is a neutral group of atoms joined by covalent bonds.
8. \_\_\_\_\_ If a molecule contains polar bonds, the molecule may or may not be polar overall.
9. \_\_\_\_\_ In a(n) polar bond, one atom pulls on the shared electrons more than the other atom.
10. \_\_\_\_\_ The forces between molecules are much stronger than the forces between ions.

# Bonding in Metals

## Understanding Main Ideas

Use the diagram to answer the following questions .



1. What do points *a* and *b* represent? \_\_\_\_\_
2. What action is modeled by the diagram? Explain. \_\_\_\_\_  
\_\_\_\_\_
3. How does metallic bonding explain the result at point *c*? \_\_\_\_\_  
\_\_\_\_\_

**Match each property of metal with its description by writing the letter of the correct description in the right column on the line beside the property in the left column.**

- |                                |   |
|--------------------------------|---|
| 4. ___ luster                  | a. easily beaten into complex shapes        |
| 5. ___ ductility               | b. conducts electric current well           |
| 6. ___ malleability            | c. shiny and reflective                     |
| 7. ___ thermal conductivity    | d. easily bent and pulled into thin strands |
| 8. ___ electrical conductivity | e. conducts heat well                       |

## Building Vocabulary

Write a definition for each of these terms.

9. metallic bond \_\_\_\_\_  
\_\_\_\_\_
10. alloy \_\_\_\_\_  
\_\_\_\_\_

# Bonding in Metals

Write the letter of the correct answer on the line at the left.

1. \_\_\_\_ Why are alloys generally used to make everyday objects?
  - A Alloys are often stronger and less reactive than pure metals.
  - B Alloys have higher melting points than pure metals.
  - C Alloys are less expensive to produce than pure metals.
  - D Alloys have ionic bonds instead of metallic bonds.
2. \_\_\_\_ Metallic bonding is
  - A a type of covalent bond
  - B a type of ionic bond
  - C an attraction between positive and negative ions
  - D an attraction between positive ions and electrons
3. \_\_\_\_ Which of the following is NOT a property of metals?
  - A ductile
  - B good electrical conductor
  - C good thermal insulator
  - D malleable
4. \_\_\_\_ At room temperature, most metals are
  - A liquid
  - B solid
  - C gas
  - D an alloy

Fill in the blank to complete each statement.

5. An attraction between a positive metal ion and surrounding electrons is a(n) \_\_\_\_ bond.
6. Metals typically have \_\_\_\_\_ melting points.
7. The metal fins that cool a motorcycle's engine make use of the high \_\_\_\_\_ conductivity of metals.
8. Metals are often used to make wire because they are \_\_\_\_\_.
9. Metals are used in electrical wires because they have high \_\_\_\_\_ conductivity.
10. Nonmetals are unlikely to form metallic bonds because their \_\_\_\_\_ are strongly held.

# Chapter 3 Chemical Reactions

## Observing Chemical Change

### Understanding Main Ideas

Complete the following table. Describe changes in properties that you might notice during each process and state whether the changes are chemical or physical.

Changes in Matter		
Event	Observable Changes	Type of Change
Baking a cake	1.	2.
Burning a log	3.	4.
Freezing water	5.	6.

### Building Vocabulary

Fill in the blank to complete each statement.

- Any change that alters a substance without changing it into another substance is a(n) \_\_\_ change.
- \_\_\_\_\_ is anything that has mass and takes up space.
- A reaction that releases energy in the form of heat is called a(n) \_\_\_\_\_ reaction.
- A(n) \_\_\_\_\_ reaction is a reaction in which energy is absorbed.
- A chemical change is also referred to as a(n) \_\_\_\_\_.
- A(n) \_\_\_\_\_ is a solid formed from liquid reactants during a chemical reaction.



# Observing Chemical Change

Write the letter of the correct answer on the line at the left.

1. \_\_\_ Which of the following is true about chemical reactions?  
A They are accompanied by changes in energy.  
B They form new substances with new properties.  
C both A and B  
D neither A nor B
2. \_\_\_ In an endothermic reaction, energy is  
A absorbed  
B released  
C converted to mass  
D synthesized
3. \_\_\_ Which of the following is NOT a physical property?  
A melting point  
B state of matter  
C density  
D flammability
4. \_\_\_ Substances formed as a result of a chemical reaction are called  
A catalysts  
B precipitates  
C products  
D reactants

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

5. \_\_\_\_\_ In an exothermic reaction, products have more energy than reactants.
6. \_\_\_\_\_ Water boils at 100°C. This is an example of a chemical property.
7. \_\_\_\_\_ Substances that enter into a chemical reaction are called products.
8. \_\_\_\_\_ The ability to react with oxygen is an example of a chemical property.
9. \_\_\_\_\_ Another name for a chemical change is a chemical bond.
10. \_\_\_\_\_ In a physical change, some of the physical properties of the substance may be altered and the chemical composition remains the same.

# Describing Chemical Reactions

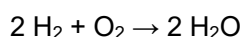
## Understanding Main Ideas

Complete the table. Balance each equation. Then indicate whether the reaction is a synthesis, decomposition, or replacement reaction.

	Given Equation	Balanced Equation	Type of Reaction
1.	$\text{FeS} + \text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2\text{S}$	a.	b.
2.	$\text{Na} + \text{F}_2 \rightarrow \text{NaF}$	a.	b.
3.	$\text{HgO} \rightarrow \text{Hg} + \text{O}_2$	a.	b.

Answer questions 4 and 5 on a separate sheet of paper.

4. Describe in words the reaction represented by the equation and include a description of the composition of each kind of molecule.



5. Use the law of conservation of mass to explain why the equation in question 4 is balanced.

## Building Vocabulary

Match each term with its definition by writing the letter of the correct definition in the right column on the line beside the term in the left column.

- |                                   |  |
|-----------------------------------|--|
| 6. ____ chemical equation         | a. substance present after a reaction  |
| 7. ____ decomposition<br>reaction | b. reaction in which substances combine to form a more<br>complex compound                     |
| 8. ____ coefficient               | c. principle that states that matter is not created or destroyed<br>during a chemical reaction |
| 9. ____ product                   | d. reaction in which one element replaces another in a compound                                |
| 10. ____ reactant                 | e. substance present before a reaction   |
| 11. ____ synthesis reaction       | f. number telling how many molecules of a substance are involved<br>in a chemical reaction     |
| 12. ____ replacement reaction     | g. reaction in which compounds are broken down into simpler<br>substances                      |
| 13. ____ conservation of mass     | h. uses symbols and formulas to show chemical reactions  |

# Describing Chemical Reactions

Write the letter of the correct answer on the line at the left.

1. \_\_\_\_ In a balanced chemical equation,
  - A atoms are conserved
  - B coefficients are equal
  - C molecules are equal
  - D energy is not conserved
2. \_\_\_\_ When the equation  $\text{Al} + \text{Br}_2 \rightarrow \text{AlBr}_3$  is balanced, the coefficient for Al is
  - A 1
  - B 2
  - C 3
  - D 4
3. \_\_\_\_ The reaction in which hydrogen and oxygen are produced by running an electric current through water is an example of
  - A single replacement
  - B decomposition
  - C synthesis
  - D double replacement
4. \_\_\_\_ A reaction that has two compounds as reactants and two compounds as products is most likely a
  - A synthesis reaction
  - B single replacement reaction
  - C double replacement reaction
  - D decomposition reaction

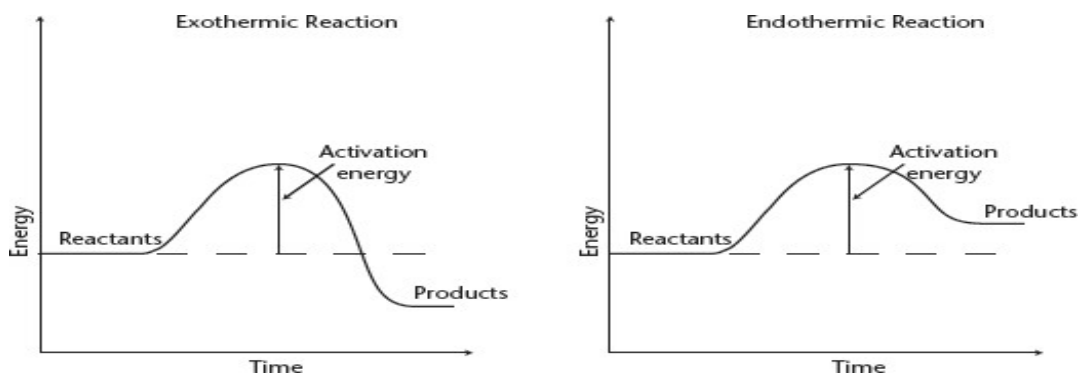
Fill in the blank to complete each statement.

5. A number written in front of a chemical formula is a(n) \_\_\_\_\_.
6. The principle that states that matter is neither created nor destroyed during a chemical reaction is called the law of \_\_\_\_\_.
7. The production of carbon dioxide during the burning of a fuel is an example of a(n) \_\_\_\_\_ reaction.
8. In a chemical equation, the arrow is read as \_\_\_\_\_.
9. In the balanced chemical equation for the formation of ammonia ( $\text{NH}_3$ ) from nitrogen ( $\text{N}_2$ ) and hydrogen ( $\text{H}_2$ ), the sum of the coefficients is \_\_\_\_\_.
10. The law of conservation of mass was first demonstrated by the French chemist \_\_\_\_\_.

# Controlling Chemical Reactions

## Understanding Main Ideas

Use the figures below to answer questions 1–3. Write your answers on a the space provided.



- Use what you know about endothermic and exothermic reactions to explain the differences in the graphs above. \_\_\_\_\_  
\_\_\_\_\_
- Why is the activation energy pictured as a hill in the two diagrams? \_\_\_\_\_  
\_\_\_\_\_
- Explain how adding heat to the reactions shown in the diagrams would change the rate of these chemical reactions. Name two other ways to change the rate of a chemical reaction.  
\_\_\_\_\_  
\_\_\_\_\_

## Building Vocabulary

Write a definition for each of these terms on the lines below.

- concentration \_\_\_\_\_  
\_\_\_\_\_
- enzyme \_\_\_\_\_  
\_\_\_\_\_
- inhibitor \_\_\_\_\_  
\_\_\_\_\_

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Controlling Chemical Reactions

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ Increasing the surface area of the reactants will decrease the rate of the reaction.
2. \_\_\_\_\_ The amount of a substance in a given volume is the concentration of the substance.
3. \_\_\_\_\_ The effect of a catalyst on a reaction is to raise the activation energy.
4. \_\_\_\_\_ Only some reactions require activation energy.
5. \_\_\_\_\_ A(n) inhibitor decreases the rate of a reaction.

Fill in the blank to complete each statement.

6. The burning of fuels, such as coal, natural gas, or oil, involves a(n) \_\_\_\_\_ reaction.
7. In an endothermic reaction, the energy of the products is \_\_\_\_\_ than the energy of the reactants.
8. Increasing the temperature of a reaction will \_\_\_\_\_ the rate of the reaction.
9. The amount of a substance in a given volume is called \_\_\_\_\_.
10. Biological catalysts in the human body are called \_\_\_\_\_.

# Chapter 10 Minerals and Rocks

## Properties of Minerals

### Understanding Main Ideas

Answer the following questions on a separate sheet of paper.

1. List the five characteristics necessary for a substance to be a mineral.
2. In general, what are three ways in which minerals form?

Fill in the missing properties in the table below.

Mineral Property	Test
3.	Perform scratch test
Color	Observe surface of mineral
4.	Observe color of mineral's powder
Luster	Observe how mineral reflects light
5.	Find mass per unit volume
6.	Observe number and angle of crystal faces
Cleavage and Fracture	Break mineral apart to see if it splits along flat surfaces

### Building Vocabulary

Match each term with its definition by writing the letter of the correct definition in the right column on the line beside the term in the left column.

- |                             |  |
|-----------------------------|--|
| 7. ____ streak              | a. formed from materials that were not a part of living things |
| 8. ____ fracture            | b. the property of splitting easily along flat surfaces        |
| 9. ____ Mohs hardness scale | c. how a mineral breaks apart in an irregular way              |
| 10. ____ crystal            | d. the repeating pattern of a mineral's particles in a solid   |
| 11. ____ cleavage           | e. the color of a mineral's powder                             |
| 12. ____ inorganic          | f. a ranking of minerals from softest to hardest               |
| 13. ____ solution           | g. a mixture in which one substance is dissolved in another    |

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Properties of Minerals

Fill in the blank to complete each statement.

1. A mineral's streak is the color of its \_\_\_\_\_.
2. Quartz, gold, and calcite are examples of \_\_\_\_\_, but coal is not.
3. Geologists use the \_\_\_\_\_ test to determine the hardness of a mineral.
4. The repeating pattern of a mineral's particles forms a solid called a(n) \_\_\_\_\_.
5. A narrow channel or slab of a mineral that is different from the surrounding rock is called a(n) \_\_\_\_\_.
6. Slow cooling of hot magma leads to the formation of \_\_\_\_\_ crystals.

Write the letter of the correct answer on the line at the left.

- |   |   |
|---|---|
| <p>7. ____ Which is <i>not</i> an essential characteristic of any mineral?</p> <p>A crystal structure<br/>B solid<br/>C formed by inorganic processes<br/>D naturally occurring</p> | <p>8. ____ Which is <i>not</i> a method by which minerals form?</p> <p>A organic processes<br/>B water evaporation from a solution<br/>C cooling of magma or lava<br/>D decrystallization</p>   |
| <p>9. ____ Which term describes how a mineral looks when it breaks apart in an irregular way?</p> <p>A fracture<br/>B cleavage<br/>C luster<br/>D crystallization</p>               | <p>10. ____ Which lists the minerals in the correct order from softest to hardest?</p> <p>A talc, diamond, calcite, feldspar<br/>B diamond, feldspar, calcite, talc<br/>C talc, calcite, feldspar, diamond<br/>D calcite, feldspar, talc, diamond</p> |

# Classifying Rocks

## Understanding Main Ideas

Answer the following questions on the space provided.

1. What characteristics do geologists observe when studying a rock sample? \_\_\_\_\_  
\_\_\_\_\_
2. Name the three major groups of rocks and describe how each forms. \_\_\_\_\_  
\_\_\_\_\_

Fill in the missing information in the table below.

Grain Property	Description	Texture
Size	Large, easy to see	3.
Size	4.	Fine-grained
Shape	Mineral crystals	Crystalline
5.	Rock fragments	Rounded or jagged
6.	Layered or random grains	Banded or nonbanded

## Building Vocabulary

Fill in the blank to complete each statement.

7. \_\_\_\_\_ is a dark-colored rock with a relatively low silica content.
8. The look and feel of a rock's surface is its \_\_\_\_\_.
9. The particles of minerals or other rocks that make up a rock are called \_\_\_\_\_.
10. The 20 minerals that make up most of the rocks of Earth's crust are known as \_\_\_\_\_.
11. \_\_\_\_\_ is generally a light-colored rock with a high silica content.
12. \_\_\_\_\_ rock forms when rock particles get pressed and cemented together.
13. \_\_\_\_\_ rock forms when a rock is changed by heat or pressure.
14. \_\_\_\_\_ rock forms when magma or lava cools and hardens.



# Classifying Rocks

Write the letter of the correct answer on the line at the left.

- |   |  |
|---|--|
| <p>1. ___ About how many rock-forming minerals make up most of the rocks of Earth's crust?</p> <p>A 2</p> <p>B 20</p> <p>C 200</p> <p>D 2,000</p>                             | <p>2. ___ Which generally describes granite?</p> <p>A dark-colored rock with low silica content</p> <p>B dark-colored rock with high silica content</p> <p>C light-colored rock with low silica content</p> <p>D light-colored rock with high silica content</p> |
| <p>3. ___ Which is a kind of rock that forms when heat or pressure change an existing rock?</p> <p>A sedimentary</p> <p>B igneous</p> <p>C inorganic</p> <p>D metamorphic</p> | <p>4. ___ Which term describes how a rock's surface looks and feels?</p> <p>A density</p> <p>B streak</p> <p>C texture</p> <p>D fracture</p>   |

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

5. \_\_\_\_\_ Color alone does not provide enough information to identify a rock.
6. \_\_\_\_\_ To study a rock sample, geologists observe the rock's mineral composition, color, and temperature.
7. \_\_\_\_\_ The way in which each of the three major groups of rocks forms is different.
8. \_\_\_\_\_ A rock's pigments give the rock its texture.
9. \_\_\_\_\_ Rocks that have large grains you can easily see are described as fine grained.
10. \_\_\_\_\_ Rocks that are nonbanded have grains that lie in a pattern of flat layers or form swirls.

# Igneous Rocks

## Understanding Main Ideas

Answer the following questions on a separate sheet of paper.

1. How are igneous rocks classified?
2. What is the most common type of extrusive rock?
3. What is the most common type of intrusive rock?
4. Explain how the silica content of molten material affects the color of igneous rocks.
5. What qualities of igneous rocks have long made them useful for tools and building materials?
6. Describe one use each for the igneous rocks granite, obsidian, and pumice.

Fill in the missing textures in the table below.

Origin of Igneous Rock	Resulting Texture
Slow cooling of magma far beneath Earth's surface	7.
Rapid cooling of lava in which tiny crystals form	8.
Extremely rapid cooling of lava in which no crystals form	9.

## Building Vocabulary

Fill in the blank to complete each statement.

10. Igneous rock formed from lava that erupted onto Earth's surface is called \_\_\_\_\_ rock.
11. Igneous rock that formed when magma hardened beneath the surface of Earth is called \_\_\_\_\_ rock.

# Igneous Rocks

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ People throughout history have used igneous rock for tools and building materials.
2. \_\_\_\_\_ Basalt is used for cobblestones and in landscaping.
3. \_\_\_\_\_ Extrusive rock forms beneath Earth's surface.
4. \_\_\_\_\_ Magma that is low in silica usually forms light-colored rocks, such as granite.
5. \_\_\_\_\_ Igneous rocks are classified by their origin, texture, and mineral composition.
6. \_\_\_\_\_ Extrusive rocks have larger grains than intrusive rocks.

Write the letter of the correct answer on the line at the left.

- |   |  |
|---|--|
| <p>7. ____ Which terms best describe igneous rocks?</p> <ul style="list-style-type: none"><li>A light and easily broken</li><li>B soft and smooth</li><li>C hard and dense</li><li>D soft and dense</li></ul> | <p>8. ____ How do coarse-grained igneous rocks form?</p> <ul style="list-style-type: none"><li>A from sedimentary rocks changed under pressure</li><li>B from large rock particles cemented together</li><li>C from rapidly cooling lava</li><li>D from slowly cooling magma</li></ul> |
| <p>9. ____ Which igneous rock is mixed with soil and used for starting vegetable seeds?</p> <ul style="list-style-type: none"><li>A perlite</li><li>B granite</li><li>C obsidian</li><li>D basalt</li></ul>   | <p>10. ____ Which igneous rock is an extrusive rock?</p> <ul style="list-style-type: none"><li>A porphyry</li><li>B rhyolite</li><li>C pegmatite</li><li>D granite</li></ul>   |

# Sedimentary Rocks

## Understanding Main Ideas

Answer the following question on the space provided.

1. In order, list the sequence of processes through which sedimentary rocks form. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Classify each of the following sedimentary rocks by writing *clastic, organic, or chemical* in the blank beside it.

- |          |                            |          |  |
|----------|----------------------------|----------|--|
| 2. _____ | sandstone                  | 6. _____ | breccia                                  |
| 3. _____ | limestone made from shells | 7. _____ | limestone made from precipitated calcite |
| 4. _____ | conglomerate               | 8. _____ | rock salt                                |
| 5. _____ | coal                       | 9. _____ | shale                                    |

## Building Vocabulary

Match each term with its definition by writing the letter of the correct definition in the right column on the line beside the term in the left column.

- |                        |  |
|------------------------|--|
| 10. ____ clastic rock  | a. small, solid pieces of material from rocks or living things                         |
| 11. ____ sediment      | b. the process that presses sediments together   |
| 12. ____ cementation   | c. sedimentary rock formed from remains of plants and animals                          |
| 13. ____ organic rock  | d. the process by which running water, wind, or ice carry away bits of broken-up rock  |
| 14. ____ compaction    | e. the process in which dissolved minerals crystallize and glue sediment together      |
| 15. ____ chemical rock | f. sedimentary rock that forms when rock fragments are squeezed together               |
| 16. ____ deposition    | g. the process by which sediment settles out of water or wind                          |
| 17. ____ erosion       | h. sedimentary rock that forms when minerals dissolved in a water solution crystallize |

# Sedimentary Rocks

Fill in the blank to complete each statement.

1. Geologists classify sedimentary rocks into three major groups: \_\_\_\_\_ rock, chemical rock, and organic rock.
2. \_\_\_\_\_ is a sedimentary rock formed from the remains of swamp plants buried in water.
3. \_\_\_\_\_ is a sedimentary rock formed from coral, shells, and skeletons that piled up on the ocean floor.
4. \_\_\_\_\_ is the process by which sediments get pressed together.
5. Sand grains, pebbles, mud, shells, and leaves are all examples of \_\_\_\_\_.
6. Clastic rocks are grouped by the \_\_\_\_\_ of the rock fragments of which they are made.

Write the letter of the correct answer on the line at the left.

- |   |   |
|---|---|
| 7. ____ Which is the process that breaks up rock on Earth's surface?<br>A deposition<br>B erosion<br>C compaction<br>D weathering | 8. ____ Which forms when minerals dissolved in a water solution crystallize?<br>A clastic rock<br>B organic rock<br>C chemical rock<br>D sediment |
| 9. ____ Which is an example of an organic rock?<br>A breccia<br>B coal<br>C rock salt<br>D shale                                  | 10. ____ Which rock can be a chemical or an organic rock?<br>A limestone<br>B sandstone<br>C shale<br>D conglomerate                              |

# Chapter: 11 Plate Tectonics

## Lesson 1 Drifting Continents

### Understanding Main Ideas

Answer the following questions in the spaces provided. Use a separate sheet of paper if you need more room.

1. State the hypothesis of continental drift.

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2. Describe the land features that provided evidence for Wegener's hypothesis.

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3. What role did the fossil *Glossopteris* play in Wegener's hypothesis?

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4. How did Wegener use climate evidence to support his hypothesis?

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5. Why did most scientists reject Wegener's theory for nearly half a century?

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### Building Vocabulary

Fill in the blank to complete each statement.

6. All the continents were joined together in a supercontinent that Wegener called \_\_\_\_\_.

7. A(n) \_\_\_\_\_ is any trace of an ancient organism preserved in rock.

8. Wegener's idea that the continents slowly moved over Earth's surface became known as \_\_\_\_\_.

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Lesson 1 Drifting Continents

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ Pangaea is the supercontinent that Wegener suggested occurred on Earth about 300 million years ago.
2. \_\_\_\_\_ Wegener inferred that the ancient plants *Mesosaurus* and *Lystrosaurus* once lived on a single landmass that has since split apart.
3. \_\_\_\_\_ Wegener used evidence from land features, fossils, and climate to support his theory of continental drift.
4. \_\_\_\_\_ Oceanic drift is the idea that the continents slowly moved over Earth's surface.
5. \_\_\_\_\_ Most geologists of Wegener's time accepted his idea of drifting continents.

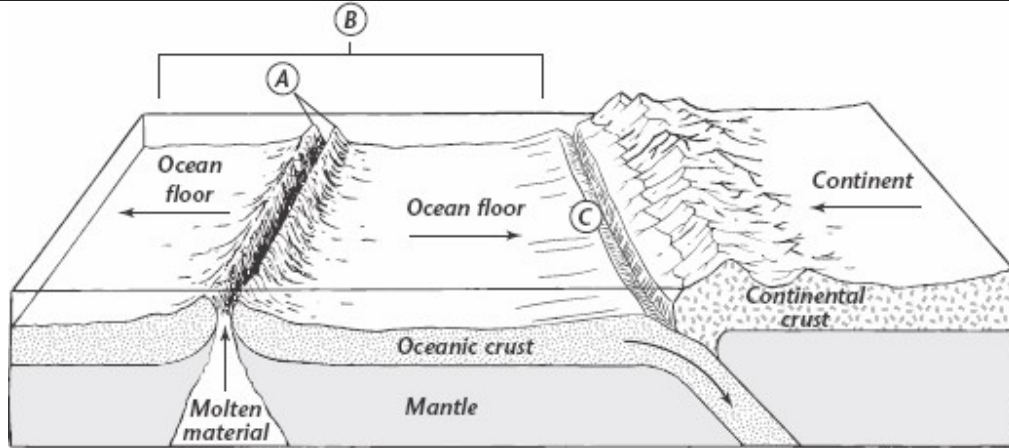
Fill in the blank to complete each statement.

6. \_\_\_\_\_ of the plant *Glossopteris* provided evidence for Wegener's hypothesis for continental drift.
7. The idea of continents moving slowly over Earth's surface was developed by German scientist \_\_\_\_\_.
8. Wegener noticed that mountain ranges on the continents of South America and \_\_\_\_\_ line up.
9. As a continent moves \_\_\_\_\_ the poles, its climate gets colder.
10. As a continent moves toward the equator, its climate gets \_\_\_\_\_.

# Lesson 2 Sea-Floor Spreading

## Understanding Main Ideas

Use the diagram below to answer Questions 1–5 on a separate sheet of paper.



1. Name and describe the feature of the ocean floor shown at A.  
\_\_\_\_\_  
\_\_\_\_\_
2. Name the process occurring at B, and explain what results from it.  
\_\_\_\_\_  
\_\_\_\_\_
3. What happens to old oceanic crust as new molten material rises from the mantle?  
\_\_\_\_\_  
\_\_\_\_\_
4. The arrows on the diagram show the ocean floor spreading from the ridge. What are three kinds of evidence scientists have found to support this idea?  
\_\_\_\_\_  
\_\_\_\_\_
5. What process is shown occurring at C, and why does it occur?  
\_\_\_\_\_  
\_\_\_\_\_

## Building Vocabulary

Fill in the blank to complete each statement.

6. A canyon on the ocean floor at which the crust bends downward is called a(n) \_\_\_\_\_
7. The process that continually adds new material to the ocean floor is called \_\_\_\_\_
8. The process by which the ocean floor sinks into the mantle is known as \_\_\_\_\_
9. A chain of underwater mountains along which sea-floor spreading occurs is a(n) \_\_\_\_\_



Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

## Lesson 2 Sea-Floor Spreading

Write the letter of the correct answer on the line at the left.

1. \_\_\_\_ Which features form the longest mountain ranges on Earth?  
A the mid-ocean ridges  
B the deep-ocean trenches  
C the Rockies  
D the Andes
2. \_\_\_\_ Which process adds more crust to the ocean floor?  
A suction  
B sea-floor spreading  
C subduction  
D magnetic stripe
3. \_\_\_\_ Where does subduction occur?  
A along the middle of some ocean floors  
B down the middle of mountain ranges  
C on continents  
D at deep-ocean trenches
4. \_\_\_\_ Which process or processes change the size and shape of the oceans?  
A subduction only  
B sea-floor spreading only  
C both subduction and sea-floor spreading  
D both drilling for samples and subduction

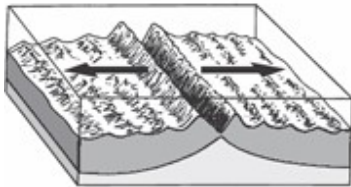
If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

5. \_\_\_\_\_ Sonar is a device that scientists use to map the ocean floor.
6. \_\_\_\_\_ A deep-ocean trench is an underwater mountain.
7. \_\_\_\_\_ Molten material erupts inside the central valley of mid-ocean ridges.
8. \_\_\_\_\_ The farther from a mid-ocean ridge a rock sample is taken, the younger the rock is.
9. \_\_\_\_\_ Sea-floor spreading occurs at mid-ocean ridges.
10. \_\_\_\_\_ The pattern of magnetic stripes in rocks on either side of a mid-ocean ridge is the same.

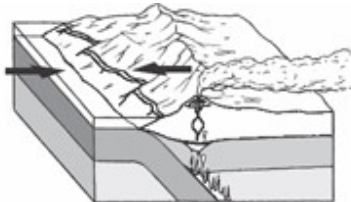
# Lesson 3 The Theory of Plate Tectonics

## Understanding Main Ideas

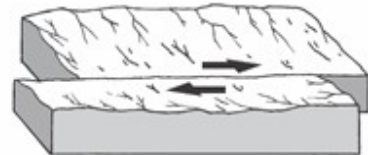
Label each diagram by writing the type of plate boundary it shows.



1. \_\_\_\_\_



2. \_\_\_\_\_



3. \_\_\_\_\_

Answer the following questions on a separate sheet of paper.

4. Describe what happens when (a) two plates carrying oceanic crust collide, (b) two plates carrying continental crust collide, and (c) a plate carrying oceanic crust collides with a plate carrying continental crust.

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5. Explain what force caused the movement of the continents from one supercontinent to their present positions.

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## Building Vocabulary

Fill in the blank to complete each statement.

6. At a(n) \_\_\_\_\_, plates come together.
7. Breaks in Earth's crust where rocks have slipped past each other are called \_\_\_\_\_.
8. The lithosphere is broken into separate sections called \_\_\_\_\_.
9. A(n) \_\_\_\_\_ is a deep valley on land that forms along a divergent boundary.
10. The geological theory that states that pieces of Earth's crust are in constant, slow motion is called \_\_\_\_\_.
11. At a(n) \_\_\_\_\_, plates slip past each other.
12. Plates move apart along a(n) \_\_\_\_\_.

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

## Lesson 3 The Theory of Plate Tectonics

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ Earth's plates meet at boundaries.
2. \_\_\_\_\_ Breaks in the crust called faults form where plates meet.
3. \_\_\_\_\_ Plates slide past each other at convergent boundaries.
4. \_\_\_\_\_ A(n) rift valley forms where plates diverge on land.
5. \_\_\_\_\_ Ocean currents drive Earth's plates.
6. \_\_\_\_\_ Most transform boundaries where plates move apart occur along the mid-ocean ridges.

Write the letter of the correct answer on the line at the left.

- |   |   |
|---|---|
| 7. ___ Which theory describes the motion of and force driving Earth's plates?<br>A first law of motion<br>B third law of motion<br>C continental drift<br>D plate tectonics | 8. ___ What is the motion of Earth's plates like?<br>A fast and in stages<br>B slow and in stages<br>C fast and constant<br>D slow and constant |
| 9. ___ The San Andreas fault is an example of which kind of boundary?<br>A transform<br>B divergent<br>C oceanic<br>D convergent  | 10. ___ Which feature forms at convergent boundaries?<br>A mountain range<br>B trench<br>C rift valley<br>D mid-ocean ridge                     |

# Chapter: 12 Earthquakes

## Lesson 1 Forces in Earth's Crust

### Understanding Main Ideas

Use the diagrams below to complete items 1–9.

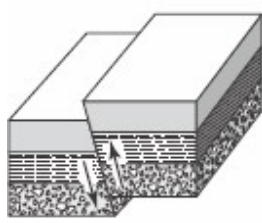


Diagram A

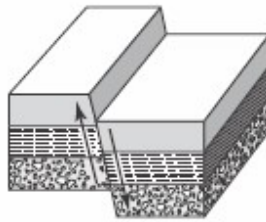


Diagram B

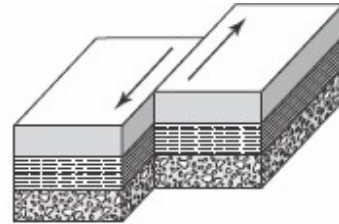


Diagram C

#### Diagram A

1. Type of Fault: \_\_\_\_\_
2. Stress Force: \_\_\_\_\_
3. Movement Along Fault: \_\_\_\_\_

#### Diagram B

4. Type of Fault: \_\_\_\_\_
5. Stress Force: \_\_\_\_\_
6. Movement Along Fault: \_\_\_\_\_

#### Diagram C

7. Type of Fault: \_\_\_\_\_
8. Stress Force: \_\_\_\_\_
9. Movement Along Fault: \_\_\_\_\_

### Building Vocabulary

Write a definition for each of these terms on a separate sheet of paper.

10. shearing \_\_\_\_\_

\_\_\_\_\_

11. plateau \_\_\_\_\_

\_\_\_\_\_

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Lesson 1 Forces in Earth's Crust

**Fill in the blank to complete each statement.**

1. Stress is a(n) \_\_\_\_\_ that acts on rock to change its shape or volume.
2. The collision of two plates causes the formation of \_\_\_\_\_ mountains.
3. When two plates move away from each other \_\_\_\_\_ faults are created.
4. A large area of flat land elevated high above sea level is a(n) \_\_\_\_\_.
5. Tension can cause the formation of fault-block mountains or \_\_\_\_\_.
6. A fold in rock that bends upward into an arch is a(n) \_\_\_\_\_.

**Write the letter of the correct answer on the line at the left.**

- |  |  |
|--|--|
| <p>7. ____ The stress force that pulls on the crust and thins rock in the middle is</p> <p>A shearing<br/>B compression<br/>C tension<br/>D uplifting</p>                                      | <p>8. ____ The stress force that squeezes rock until it folds or breaks is</p> <p>A shearing<br/>B compression<br/>C tension<br/>D uplifting</p>                             |
| <p>9. ____ A fault in which the rocks on either side of the fault move sideways past each other is a</p> <p>A slip-strike fault<br/>B normal fault<br/>C hanging fault<br/>D reverse fault</p> | <p>10. ____ Compression causes the formation of</p> <p>A only anticlines<br/>B only synclines<br/>C both anticlines and synclines<br/>D neither anticlines nor synclines</p> |

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Lesson 2 Earthquakes and Seismic Waves

## Understanding Main Ideas

Answer the following questions on a separate sheet of paper.

1. What are seismic waves? \_\_\_\_\_  
\_\_\_\_\_
2. In what order do the three types of seismic waves arrive at a seismograph?  
\_\_\_\_\_
3. Which type of seismic wave produces the most severe ground movement?  
\_\_\_\_\_
4. Describe the moment magnitude scale, and explain why it is useful in measuring earthquakes.  
\_\_\_\_\_  
\_\_\_\_\_
5. How do geologists locate the epicenter of an earthquake?  
\_\_\_\_\_  
\_\_\_\_\_

## Building Vocabulary

Match each term with its definition by writing the letter of the correct definition in the right column on the line beside the term in the left column.

- |                       |   |
|-----------------------|---|
| 6. ____ focus         | a. records ground movements caused by seismic waves as they move through Earth                    |
| 7. ____ epicenter     | b. slowest seismic waves  |
| 8. ____ surface waves | c. the point beneath Earth's surface at which rock under stress breaks and triggers an earthquake |
| 9. ____ seismograph   | d. the point on the surface directly above the point at which an earthquake occurs                |

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

## Lesson 2 Earthquakes and Seismic Waves

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ The shaking and trembling that results from movement of rock beneath Earth's surface is called an earthquake.
2. \_\_\_\_\_ Earthquakes are caused by the forces of mountain movement.
3. \_\_\_\_\_ The epicenter of an earthquake is below the focus.
4. \_\_\_\_\_ P waves can become surface waves when they reach Earth's surface.
5. \_\_\_\_\_ The Modified Mercalli scale rates the amount of damage from an earthquake.
6. \_\_\_\_\_ To locate the epicenter of an earthquake, geologists need data from two or more seismographs.

Fill in the blank to complete each statement.

7. Seismic waves are \_\_\_\_\_ that are similar to sound waves.
8. The \_\_\_\_\_ of an earthquake is the point where rock under stress begins to break or move.
9. The seismic waves that move fastest are \_\_\_\_\_.
10. Geologists use the moment magnitude scale to rate the total \_\_\_\_\_ released by an earthquake.

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Lesson 3 Monitoring Earthquakes

## Understanding Main Ideas

Answer the following questions in the spaces provided.

1. How does a seismogram show earthquake waves?

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2. What data do geologists use to see where earthquakes are most common?

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3. What is the main factor in determining the risk that a location might have an earthquake?

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4. What is the Ring of Fire?

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## Building Vocabulary

Write a definition for the following term on the lines below.

5. Seismogram

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Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

## Lesson 3 Monitoring Earthquakes

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ In a seismograph, seismic waves cause the pen to vibrate, which produces a pattern of zig-zag lines.
2. \_\_\_\_\_ On a seismogram, higher lines drawn in the paper indicate weaker seismic waves.
3. \_\_\_\_\_ The first waves shown on a seismogram are the P waves.
4. \_\_\_\_\_ The highest risk of earthquakes in the United States is along the west coast.
5. \_\_\_\_\_ The Ring of Fire is an area of seismic activity around the Atlantic Ocean.
6. \_\_\_\_\_ Russia and Canada have had very few earthquakes.

Fill in the blank to complete each statement.

7. Earthquakes occur most often along \_\_\_\_\_ boundaries.
8. On a seismogram, smaller waves that occur after the earthquake indicate a(n) \_\_\_\_\_
9. The weight and pen of a seismograph resist \_\_\_\_\_ during an earthquake.
10. Geologists cannot yet predict \_\_\_\_\_ and where an earthquake will occur.

# Chapter: 13 Erosion and Deposition

## Lesson 1 Mass Movement

### Understanding Main Ideas

Identify each of the examples below by writing *landslide*, *mudslide*, *slump*, or *creep* on the line beside it.

- \_\_\_\_\_ Watery clay soil slides down a mountain.
- \_\_\_\_\_ A telephone pole leans downhill.
- \_\_\_\_\_ Rock at the top of a steep cliff quickly falls.
- \_\_\_\_\_ After a heavy rainfall, rock and soil on a desert hill slide to the bottom.
- \_\_\_\_\_ After many years, a gravestone on a hillside falls over.
- \_\_\_\_\_ Rock and soil suddenly slip downhill in one large mass.
- \_\_\_\_\_ Where a new road was just built, rock and soil move down a slope.

Answer the following questions on a separate sheet of paper.

- What causes mass movement? \_\_\_\_\_  
\_\_\_\_\_
- Describe how three processes act together to wear down and build up Earth's surface.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Building Vocabulary

Fill in the blank to complete each statement.

- The agents of erosion lay down sediment in new locations in a process called \_\_\_\_\_
- The material moved by erosion is called \_\_\_\_\_.
- The process by which natural forces move weathered rock and soil from one place to another is called \_\_\_\_\_.
- \_\_\_\_\_ includes several processes caused by gravity that move sediment downhill.
- \_\_\_\_\_ is the force that pulls objects downward.

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Lesson 1 Mass Movement

Write the letter of the correct answer on the line at the left.

1. \_\_\_\_ Which type of mass movement happens very slowly?  
A slump  
B creep  
C landslide  
D mudslide
2. \_\_\_\_ By which process is sediment laid down?  
A erosion  
B deposition  
C weathering  
D mountain building
3. \_\_\_\_ Which of these is *not* an agent of erosion?  
A water  
B gravity  
C waves  
D sediment
4. \_\_\_\_ In which type of mass movement can soils behave like a liquid and start flowing?  
A slump  
B creep  
C landslide  
D mudslide

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

5. \_\_\_\_\_ The cycle of erosion and deposition is never-ending.
6. \_\_\_\_\_ Gravity moves rocks and soil uphill.
7. \_\_\_\_\_ Landslides happen slowly.
8. \_\_\_\_\_ Slump is an example of mass movement.
9. \_\_\_\_\_ Weathering is the process by which rock and soil are moved from place to place.
10. \_\_\_\_\_ Sediment may consist of pieces of rock or soil, or the remains of organisms.

# Lesson 2 Water Erosion

## Understanding Main Ideas

Answer the following questions on a separate sheet of paper.

1. What role has moving water played in shaping Earth's surface?

\_\_\_\_\_

2. What are five landforms formed by river erosion?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. What are two landforms formed by river deposition?

\_\_\_\_\_

4. How does groundwater cause erosion?

\_\_\_\_\_  
\_\_\_\_\_

## Building Vocabulary

Fill in the blank to complete each statement.

5. A bend in a river shaped like a loop is called a(n) \_\_\_\_\_.

6. Where a stream leaves a mountain range you'll find a(n) \_\_\_\_\_, a wide, sloping deposit of sediment.

7. A(n) \_\_\_\_\_ is a channel along which water is continually flowing down a slope.

8. The water that moves over the land and carries particles with it is called \_\_\_\_\_.

9. A cone-shaped deposit that rises from the floor of a cave is known as a(n) \_\_\_\_\_.

10. A(n) \_\_\_\_\_ is a large groove, or channel in the soil that carries runoff after a rainstorm.

11. A type of landscape in rainy regions where caverns, sinkholes, and deep valleys are common is called \_\_\_\_\_.

12. A(n) \_\_\_\_\_ is a deposit that hangs from the roof of a cave.

13. When runoff travels downhill, it forms tiny grooves in the soil called \_\_\_\_\_.

14. The term geologists use for underground water is \_\_\_\_\_.

15. A river's \_\_\_\_\_ is the flat, wide area of land along side of it.

## Lesson 2 Water Erosion

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ Vegetation, such as grasses, increases runoff.
2. \_\_\_\_\_ An oxbow lake is a meander that has been cut off from the river.
3. \_\_\_\_\_ Groundwater can cause erosion through chemical weathering.
4. \_\_\_\_\_ A(n) alluvial fan forms when sediment gets laid down where a river flows into an ocean.
5. \_\_\_\_\_ Waterfalls and rapids occur where rivers meet and flow over hard rock.
6. \_\_\_\_\_ Deltas and alluvial fans form at the point of river erosion.

Write the letter of the correct answer on the line at the left.

7. \_\_\_\_ What is a channel with continually flowing water that flows into a larger river called?  
A gully  
B flood plain  
C rill  
D tributary
8. \_\_\_\_ Which increases runoff?  
A planting crops  
B cutting down crops  
C flattening land  
D replacing pavement with trees
9. \_\_\_\_ What is a meander?  
A a bend in a river  
B the wide area of land along a river  
C a fan-shaped sediment deposit  
D a large groove in the soil
10. \_\_\_\_ Which features are common in areas of karst topography?  
A streams  
B alluvial fans  
C sinkholes  
D deserts

# Lesson 3 Glacial Erosion

## Understanding Main Ideas

Answer the following questions on a separate sheet of paper.

1. What are the two kinds of glaciers, and how are they different?

\_\_\_\_\_

2. How do glaciers form?

\_\_\_\_\_

\_\_\_\_\_

2. How do glaciers move?

\_\_\_\_\_

\_\_\_\_\_

3. By what processes do glaciers erode the land? \_\_\_\_\_

5. When do glaciers deposit sediment?

\_\_\_\_\_

Complete the table by writing *erosion* or *deposition* for each landform.

	Glacial Landform	Result of Erosion or Deposition?
6.	Moraine	
7.	Horn	
8.	Cirque	
9.	Kettle	
10.	U-shaped valley	
11.	Arête	
12.	Drumlin	

## Building Vocabulary

Fill in the blank to complete each statement.

13. A glacier picks up rocks through a process called \_\_\_\_\_.

14. Times when continental glaciers cover large parts of Earth's surface are called \_\_\_\_\_.

15. A(n) \_\_\_\_\_ is any large mass of ice that moves slowly over land.

16. The sediments deposited by a glacier are called \_\_\_\_\_.

## Lesson 3 Glacial Erosion

Write the letter of the correct answer on the line at the left.

1. \_\_\_\_ What makes up till?
  - A clay only
  - B sand only
  - C silt and sand only
  - D clay, silt, sand, gravel, and boulders
2. \_\_\_\_ Which landform is formed by glacial deposition?
  - A moraine
  - B cirque
  - C horn
  - D arête
3. \_\_\_\_ A glacier begins to move when the snow and ice build to which thickness?
  - A 10 to 20 meters
  - B 20 to 30 meters
  - C 30 to 40 meters
  - D 100 to 200 meters
4. \_\_\_\_ By which process does a glacier pick up rocks?
  - A abrasion
  - B plucking
  - C melting
  - D deposition

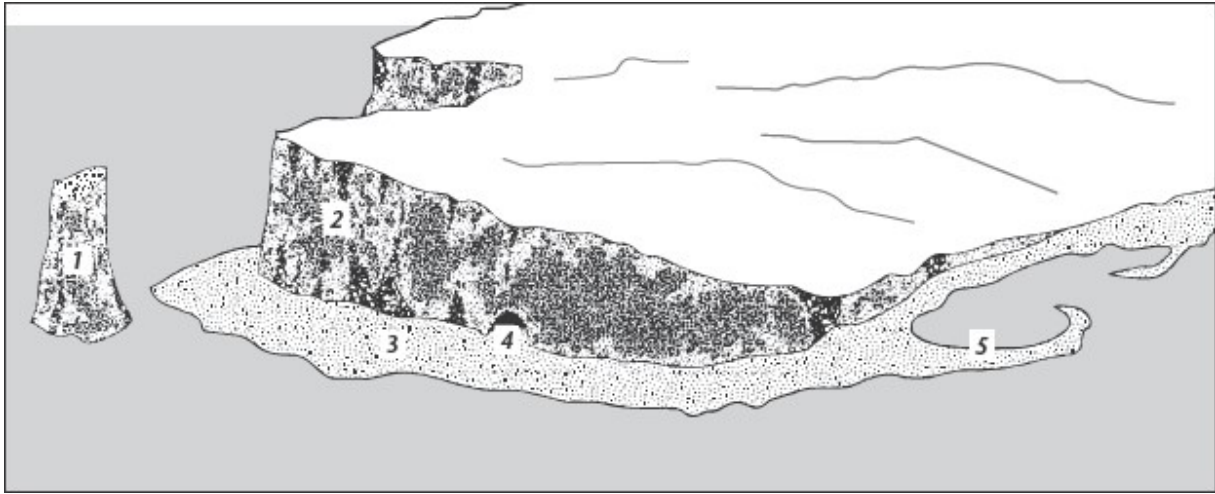
If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

5. \_\_\_\_\_ A continental glacier flows in all directions.
6. \_\_\_\_\_ Glaciers gouge and scratch bedrock through the process of abrasion.
7. \_\_\_\_\_ A small depression called a kettle forms when a chunk of ice is left in glacial till.
8. \_\_\_\_\_ During the ice ages, valley glaciers covered large parts of Earth's surface.
9. \_\_\_\_\_ A glacier is any large mass of ice that moves quickly over land.
10. \_\_\_\_\_ A glacier deposits sediment when it freezes.

# Lesson 4 Wave Erosion

## Understanding Main Ideas

On a separate sheet of paper, identify each numbered landform in the diagram below and describe how it formed.



Answer the following questions on a separate sheet of paper.

1. What are two ways in which waves erode the land?
2. Explain how waves eventually even out a shoreline.
3. What are four features formed by wave erosion?

## Building Vocabulary

Fill in the blank to complete each statement.

4. The process by which beach sediment moves down the beach with the current is called \_\_\_\_\_.
5. An area of wave-washed sediment along a coast is a(n) \_\_\_\_\_.
6. A(n) \_\_\_\_\_ is a beach that projects like a finger out into the water.
7. A(n) \_\_\_\_\_ is a part of the shore that sticks out into the ocean.



# Lesson 4 Wave Erosion

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ Sometimes, when a sea arch collapses, a sea cave remains.
2. \_\_\_\_\_ Where coastal rock is softer, waves erode the land faster.
3. \_\_\_\_\_ When waves speed up, wave deposition occurs.
4. \_\_\_\_\_ Waves erode the land by abrasion and deposition.
5. \_\_\_\_\_ In the process called longshore drift, beach sediment gets moved down a beach with the current.
6. \_\_\_\_\_ Waves change direction as they approach shore because they begin to drag.

Write the letter of the correct answer on the line at the left.

7. \_\_\_ As waves approach the shore and change direction, on which landform is most of their energy concentrated?  
A headlands  
B beaches  
C sandbars  
D sea caves
8. \_\_\_ Which process occurs when waves carrying sediment wear away rocks along a coast?  
A deposition  
B abrasion  
C impact  
D chemical weathering
9. \_\_\_ Which landform is a long, narrow island parallel to the coast?  
A sandbar  
B headland  
C barrier beach  
D spit
10. \_\_\_ Which is a coastal feature formed by wave erosion?  
A sandbar  
B spit  
C beach  
D sea arch

# Lesson 5 Wind Erosion

## Understanding Main Ideas

Answer the following questions in the spaces provided.

1. Describe the process by which wind causes erosion.

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2. Describe how wind moves different sizes of sediment.

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3. How does a sand dune form?

---

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4. How are the sediments in loess deposits different from the sediments in a sand dune?

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## Building Vocabulary

Fill in the blank to complete each statement.

5. The process by which wind removes surface materials is \_\_\_\_\_.
6. Fine sediment deposited by wind is \_\_\_\_\_.
7. A deposit of windblown sand is called a(n) \_\_\_\_\_.

# Lesson 5 Wind Erosion

Write the letter of the correct answer on the line at the left.

1. \_\_\_ What is desert pavement?  
A wind-blown clay  
B wind-blown clay and silt  
C an area of rock fragments exposed by wind  
D an area of sand deposits exposed by wind
2. \_\_\_ What happens when wind slows down or meets an obstacle?  
A erosion  
B chemical weathering  
C deposition  
D mechanical weathering
3. \_\_\_ What makes up loess?  
A clay only  
B clay and silt  
C sand only  
D clay, silt, sand, and gravel
4. \_\_\_ Which size particles does the wind usually skip and bounce for short distances?  
A sand  
B boulders  
C clay and silt  
D clay

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

5. \_\_\_\_\_ When wind blows over the land, it picks up the smallest particles of sediment.
6. \_\_\_\_\_ Loess helps to form fertile soil.
7. \_\_\_\_\_ Abrasion by wind-carried sand causes much erosion.
8. \_\_\_\_\_ Plant roots do help to anchor sand dunes in one place.
9. \_\_\_\_\_ The shape of a sand dune is determined by the speed of the wind.
10. \_\_\_\_\_ The weaker the wind, the larger the particles that it can pick up.

# Chapter: 14 A Trip Through Geologic Time

## Lesson 1 Fossils

### Understanding Main Ideas

Fill in the blanks in the table below. Answer the questions that follow on a separate sheet of paper.

Type of Fossil	Description
1. Petrified fossil	Fossils in which _____ replace all or part of an organism
2. _____	A hollow area in sediment in the shape of an organism
3. _____	A solid copy of the shape of the organism
4. Carbon film	An extremely thin coating of _____ on rock
5. Trace fossils	Evidence of the _____ of ancient organisms
6. _____	Remains of organisms in tar, amber, or ice

7. Describe how a mold is related to a cast.

---



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8. What can a paleontologist tell from fossil footprints of a dinosaur?

---

9. What does the fossil record reveal about the evolution of life on Earth?

---

### Building Vocabulary

Match each term with its definition by writing the letter of the correct term in the right column on the line beside the definition in the left column.

- |  |                            |
|--|----------------------------|
| 10. _____ no longer and never again existing as an organism on Earth   | <b>a.</b> evolution        |
| 11. _____ the preserved remains or traces of living things   | <b>b.</b> sedimentary rock |
| 12. _____ the process by which all the different kinds of living things have changed over long periods of time | <b>c.</b> extinct          |
| 13. _____ the type of rock that is made of hardened sediment   | <b>d.</b> paleontologist   |
| 14. _____ an extremely thin coating of carbon on rock  | <b>e.</b> fossils          |
| 15. _____ a scientist who studies fossils  | <b>f.</b> carbon film      |

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

# Lesson 1 Fossils

Write the letter of the correct answer on the line at the left.

1. \_\_\_ A hollow area in sediment in the shape of an organism or part of an organism is  
A a cast  
B a mold  
C a trace fossil  
D a petrified fossil
2. \_\_\_ A solid copy of the shape of an organism is  
A a mold  
B a carbon film  
C a cast  
D a fossil record
3. \_\_\_ What type of fossils provide evidence of the activities of ancient organisms?  
A molds and casts  
B petrified fossils  
C trace fossils  
D carbon films
4. \_\_\_ Which of the following substances is *not* able to preserve entire organisms?  
A sticky tar  
B water  
C amber  
D ice

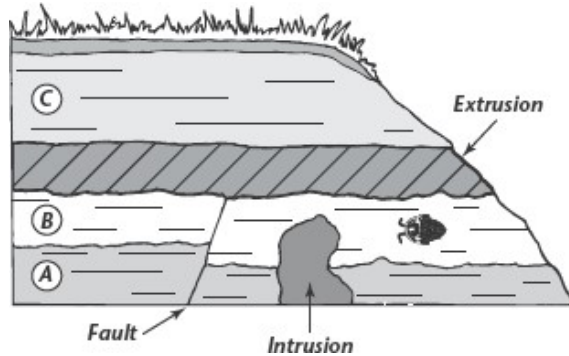
Fill in the blank to complete each statement.

5. Most fossils form when living things die and are buried by \_\_\_\_\_ that hardens into rock over time.
6. A(n) \_\_\_\_\_ is an extremely thin coating of carbon on rock.
7. The term \_\_\_\_\_ is used to identify a scientist who studies fossils.
8. Scientists study the \_\_\_\_\_ to learn about the history of life, past environments on Earth, and how different groups of organisms have changed over time.
9. \_\_\_\_\_ is the gradual change in living things over long periods.
10. An organism is \_\_\_\_\_ if it no longer exists and will never live again on Earth.

## Lesson 2 The Relative Age of Rocks

### Understanding Main Ideas

Look at the diagram below. Then answer the questions that follow on a separate sheet of paper.



1. What is the youngest rock layer? Explain.

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---

2. Is the extrusion older or younger than rock layer B? Explain.

---



---

3. Is the fault older or younger than rock layer A? Explain.

---



---

4. How could a geologist use the fossil in rock layer B to date a rock layer in another location?

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### Building Vocabulary

Match each term with its definition by writing the letter of the correct definition in the right column on the line beside the term in the left column.

- |                             |  |
|-----------------------------|--|
| 5. ___ fault                | a. the number of years since a rock has formed                                   |
| 6. ___ extrusion            | b. a break in Earth's crust  |
| 7. ___ unconformity         | c. the way to determine relative ages of rocks                                   |
| 8. ___ relative age         | d. a hardened layer of magma beneath Earth's surface                             |
| 9. ___ law of superposition | e. the age of a rock compared with the age of other rocks                        |
| 10. ___ intrusion           | f. fossils used to help geologists match rock layers                             |
| 11. ___ absolute age        | g. the surface where new rock layers meet a much older rock surface beneath them |
| 12. ___ index fossils       | h. a hardened layer of lava on Earth's surface                                   |

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

## Lesson 2 The Relative Age of Rocks

Write the letter of the correct answer on the line at the left.

1. \_\_\_\_ The number of years that have passed since the rock formed is the rock's  
A relative age  
B law of superposition  
C absolute age  
D index fossil
2. \_\_\_\_ The age of a rock compared to the ages of other rocks is the rock's  
A absolute age  
B geologic age  
C sedimentary age  
D relative age
3. \_\_\_\_ A formation of igneous rock on Earth's surface is known as  
A a gap  
B an intrusion  
C a fault  
D an extrusion
4. \_\_\_\_ A break in Earth's crust is called  
A an intrusion  
B a fault  
C a layer  
D an index fossil

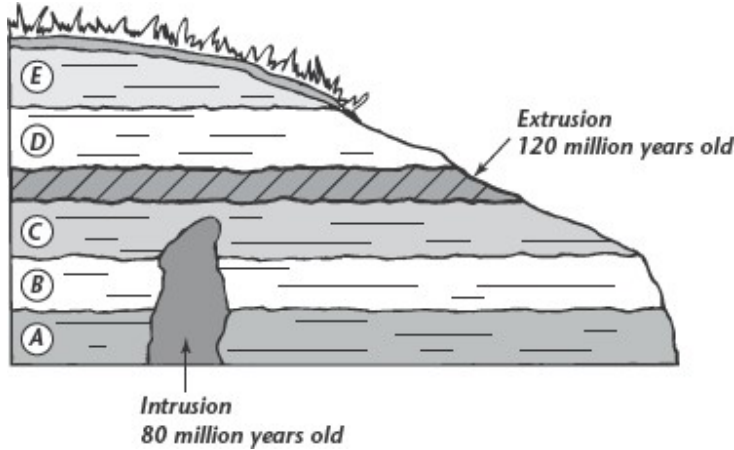
Fill in the blank to complete each statement.

5. Geologists use the law of \_\_\_\_\_ to determine the relative ages of sedimentary rock layers.
6. A mass of igneous rock below the Earth's surface is called a(n) \_\_\_\_\_.
7. Because of \_\_\_\_\_, most of the geologic record of sedimentary rock layers has been lost.
8. A gap in the geologic record is known as a(n) \_\_\_\_\_.
9. The position in which rock layers appear can be changed by gaps in the geologic record and by \_\_\_\_\_.
10. According to the law of \_\_\_\_\_, in horizontal sedimentary rock layers the oldest layer is at the bottom and the youngest layer is at the top.

# Lesson 3 Radioactive Dating

## Understanding Main Ideas

Look at the diagram below. Then answer the questions that follow on a separate sheet of paper.



1. Can geologists use radioactive dating to find the absolute ages of sedimentary layers A, B, C, D, and E? Explain why or why not.

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2. Can geologists use radioactive dating to find the absolute ages of the extrusion or the intrusion? Explain why or why not.

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---

3. What is the relative age of rock layer C? Explain how you determined its age.

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4. Explain the natural process on which radioactive dating is based.

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## Building Vocabulary

Fill in the blank to complete each statement below.

5. During a natural process called \_\_\_\_\_, the atoms of one element break down to form atoms of another element.

6. The elements formed after atoms have broken down and reformed are said to be \_\_\_\_\_.

7. The time it takes for half of the atoms in a sample of a radioactive element to decay is called the element's \_\_\_\_\_.



Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

## Lesson 3 Radioactive Dating

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ Most elements do not change.
2. \_\_\_\_\_ Some elements can decay over time.
3. \_\_\_\_\_ The rate of decay of any radioactive element changes frequently.
4. \_\_\_\_\_ Radioactive elements occur naturally in sedimentary rocks.
5. \_\_\_\_\_ Geologists use radioactive dating to determine the absolute ages of rocks.
6. \_\_\_\_\_ All plants and animals contain carbon.

Fill in the blank to complete each statement.

7. An element that has broken down and released particles and energy is said to be \_\_\_\_\_.
8. \_\_\_\_\_ is a method of determining the absolute ages of rocks.
9. \_\_\_\_\_ is the time it takes for half of the radioactive atoms in an element to decay.
10. During \_\_\_\_\_, the atoms of one element break down to form atoms of another element.

# Lesson 4 The Geologic Time Scale

## Understanding Main Ideas

Put the following items in order from oldest (D) to most recent (A) by writing a letter in the blank beside each one.

1. \_\_\_\_ Mesozoic Era
2. \_\_\_\_ Precambrian Time
3. \_\_\_\_ Cenozoic Era
4. \_\_\_\_ Paleozoic Era

Answer the following questions on a separate sheet of paper.

5. Why is the geologic time scale used to show Earth's history?
6. How would you rewrite the following sentence to make it true?  
*Geologists subdivide periods into eras.*
7. What methods did geologists use when they first developed the geologic time scale?
8. How did geologists decide where one division of the geologic time scale ends and the next begins?

## Building Vocabulary

Match each term with its definition by writing the letter of the correct term in the right column on the line beside the definition in the left column.

- |  |                               |
|--|-------------------------------|
| 9. ____ a unit of geologic time that subdivides eras   | <b>A.</b> period              |
| 10. ____ a long unit of time used to divide the time between Precambrian Time and the present          | <b>B.</b> geologic time scale |
| 11. ____ a record of the geologic events and the evolution of life forms as shown in the fossil record | <b>C.</b> era                 |

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

## Lesson 4 The Geologic Time Scale

If the statement is true, write *true*. If the statement is false, change the underlined word or words to make the statement true.

1. \_\_\_\_\_ The geologic time scale is a record of the geologic events and the evolution of life forms as shown in the fossil record.
2. \_\_\_\_\_ The first step in developing the geologic time scale was studying rock layers and index fossils worldwide.
3. \_\_\_\_\_ Scientists divided the time between Precambrian Time and the present into four units of time, or eras.
4. \_\_\_\_\_ Periods are subdivided into units of geologic time called eras.

Fill in the blank to complete each statement.

5. Because the time span of Earth's past is so great, geologists use the \_\_\_\_\_ time scale to show Earth's history.
6. Scientists chose where units of geologic time began and ended based on major changes in \_\_\_\_\_ at certain times.
7. The long span of time that begins geologic time is called \_\_\_\_\_.
8. Geologists divided the time between Precambrian Time and the present into three long units of time called \_\_\_\_\_.
9. The Triassic Period, the Jurassic Period, and the Cretaceous Period occurred in the \_\_\_\_\_ Era.
10. \_\_\_\_\_ for many of the geologic periods come from places around the world where geologists first described the rocks and fossils of that period.