

Assessment and Student Activity Masters





Preliminary Assessment

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. Matter is made up of small _____.
2. _____ is found in all three phases on earth.
3. _____ is the fourth phase of matter and is common in our sun and stars.
4. Solids have a definite shape and definite _____.
5. Table salt is a _____ solid.
6. _____ have a definite volume and no definite shape.
7. The resistance of a liquid to flow is called _____.
8. Particles in _____ are packed very loosely.
9. A _____ change involves the change of matter from one state to another.
10. _____ occurs when a liquid is boiled.

crystalline
gases
liquids
particles
phase

plasma
vaporization
viscosity
volume
water



Preliminary Assessment

Directions: Decide whether the answer is True (T) or False (F).

- | | | |
|---|---|---|
| 11. There are seven phases of matter. | T | F |
| 12. All living things are made of matter. | T | F |
| 13. Water exists in the gas phase as water vapor. | T | F |
| 14. Volume is the amount of length an object takes up. | T | F |
| 15. Plasma is found in the sun and stars. | T | F |
| 16. The particles in solids are packed quite loosely. | T | F |
| 17. Most liquids have a definite shape. | T | F |
| 18. The volume of a given amount of gas can adjust to fill the volume of a container. | T | F |
| 19. Water freezes at 20° Celsius. | T | F |
| 20. Condensation is the process of a gas changing to a liquid. | T | F |



Video Review

Directions: During the course of the program, answer the questions as they are presented in the video. Answer the Video Quiz questions at the end of the video.

You Decide!

1. What is matter made of?

You Compare!

2. How are the particles in liquids packed differently than those in solids?

You Predict!

3. What do you feel when you push the balloon?

You Decide!

4. At what temperature does water freeze?

Video Quiz:

1. Matter is made up of small _____.
2. There are _____ phases of matter.
3. _____ is the amount of space something takes up.
4. A _____ is a regular repeating pattern of particles.
5. _____ have definite volume and no definite shape.
6. _____ refers to the resistance of a liquid to flow.
7. The air above us creates a downward _____.
8. _____ involves the change of a liquid to a solid.
9. Water boils at _____ degrees Celsius.
10. Water freezes _____ degrees Celsius.



Post Assessment

Directions: Decide whether the answer is True (T) or False (F).

1. All living things are made of matter. T F

2. There are seven phases of matter. T F

3. Plasma is found in the sun and stars. T F

4. Water exists in the gas phase as water vapor. T F

5. The particles in solids are packed quite loosely. T F

6. Water freezes at 20° Celsius. T F

7. Most liquids have a definite shape. T F

8. Volume is the amount of length an object takes up. T F

9. The volume of a given amount of gas can adjust to fill the volume of its container. T F

10. Condensation is the process of a gas changing into a liquid. T F



Post Assessment

Directions: Fill in the blank with the correct word. Choose from the list of possible answers at the bottom of the page.

11. _____ is found in all three phases on Earth.
12. A _____ change involves the change of matter from one state to another.
13. Matter is made up of small _____.
14. _____ have definite volume and no definite shape.
15. Table salt is a _____ solid.
16. Solids have definite shape and definite _____.
17. The resistance of a liquid to flow is called _____.
18. _____ is the fourth phase of matter and is common in our sun and stars.
19. Particles in _____ are packed very loosely.
20. _____ occurs when a liquid is boiled.

crystalline
gases
liquids
particles
phase

plasma
vaporization
viscosity
volume
water



Phase Changes of Water

Background: Water can be found everywhere on the planet. About 70% of Earth's surface is covered with water. The oceans cover much of the surface of earth. The north and south poles are blanketed with water in the form of ice. And even the air we breathe contains water vapor. Water is the most abundant substance on Earth that is commonly found in all three phases: as a solid, liquid, and a gas!

Temperature is the main factor determining whether water exists as a solid, liquid, or gas. Liquid water freezes at 0° Celsius (32° Fahrenheit). Below that temperature fresh water exists as a solid in the form of ice. In turn ice melts at 0° Celsius (32° Fahrenheit). Water exists as a liquid between 0° Celsius and 100° Celsius. At 100° Celsius (212° Fahrenheit) liquid water boils, changing from a liquid to a gas.

In this activity you will observe and record the phase changes of water. You will record the temperature of water throughout these phase changes, and graph the temperature readings.

Materials: protective eye glasses or goggles, 250-ml beaker, hot plate, thermometer, crushed ice, stirring rod, beaker tongs

Instructions:

1. **Put on protective eye glasses or goggles. Keep this protective eyewear on during the course of the experiment.**
2. Your teacher will provide you with crushed ice. Fill the beaker up to the 150-mL mark with crushed ice.
3. Place a thermometer in the beaker of ice. Let it sit there for 1 minute. Record the temperature in the data table.
4. Carefully place the beaker on the hot plate. The thermometer should still be in it. Turn on the hot plate.
5. Record the temperature of the water every minute, and write the value in the data table. Also stir the mixture a little bit every 30 seconds. **Hold the beaker with the beaker tongs while stirring. Be very careful not to tip over the beaker!**
6. Continue to take readings every minute until the water boils. This may take 30 to 40 minutes.
7. Once the water has boiled turn off the hot plate.
8. Using the data in your table, create a line graph in the space provided.
9. Once you have completed your graph, answer the questions that follow.



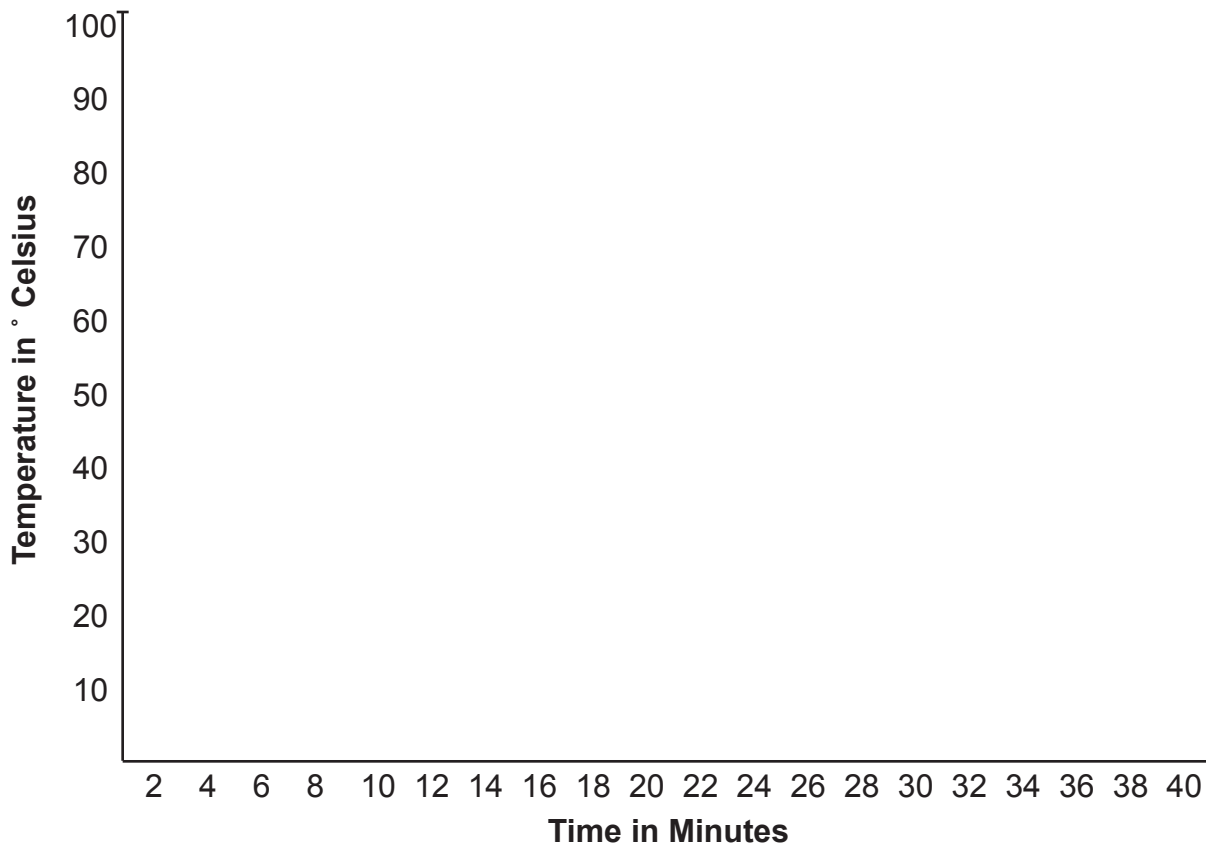
Phase Changes of Water (cont.)

Phase Change Data Table

Minutes	Temperature in ° Celsius	Minutes	Temperature in ° Celsius
1		21	
2		22	
3		23	
4		24	
5		25	
6		26	
7		27	
8		28	
9		29	
10		30	
11		31	
12		32	
13		33	
14		34	
15		35	
16		36	
17		37	
18		38	
19		39	
20		40	



Phase Changes of Water (cont.)



Questions:

1. At what temperature did water exist as a solid?
2. At what temperature were the readings level early in your experiment?
3. Why did the temperature stay at 0° Celsius for many minutes?
4. What did you observe in the beaker at 100° Celsius?
5. Describe the two phase changes you observed in this activity.
6. Describe the phase changes that would occur if you reversed the process.



Gas in Action

Background:

As you probably already know there are four phases of matter: solid, liquid, gas and plasma. The fourth phase of matter, plasma, is not very common on Earth. But it is commonly found in stars and in our sun. Solids, liquids, and gases are quite common on Earth. Water exists in all three of those phases. Solids, such as this piece of paper, have a definite shape and a definite volume. While liquids have a definite volume, they do not have a definite shape. They take on the shape of whatever container they are poured into. Gases are somewhat unique in that they do not have a definite shape and do not have a definite volume. This is what makes gases so interesting.

Gases take on the shape of their container. If you put a certain amount of a gas in a jar, it would fill the jar. When the same amount of gas is put into a box, it will take the shape of the box. What makes gases unusual is that their volume can also vary. Gases can readily expand or contract. Variations in temperature and pressure can affect the volume of a given amount of gas. In this experiment we will see how temperature and pressure can affect the volume of gas.

Materials: balloon, tape measure, light bulb or sunny windowsill, bell jar, thermometer

Instructions:

1. Obtain a balloon from your teacher. Blow up the balloon and tie it off.
2. Measure the circumference (distance around) of the balloon with a tape measure. Be sure to measure in the same place on the balloon each time this circumference is measured.
3. Measure the air temperature with a thermometer. Record the value in the data table.
4. Next, place the balloon in a freezer. Place a thermometer in the freezer at the same time.
5. Wait at least 30 minutes then open the freezer door and read the value on the thermometer. Record the temperature in the data table.
6. Next, take the balloon out of the freezer and measure its circumference with the tape measure. Work quickly so that it doesn't have time to warm up. Record the value in the data table.
7. Place the balloon under a warm light bulb or in a sunny window. Leave it there for at least 30 minutes.
8. Measure its circumference with a tape measure and record the temperature.
9. Now let's experiment how pressure can affect the volume of a gas.
10. Get a fresh balloon. Blow it up and tie it off.
11. With both hands, observe what happens when you slowly squeeze the balloon. Record your observations in the data table.
12. If a bell jar apparatus is available, place the balloon inside it. Turn on the motor and observe what happens to the balloon. Record your observations.



Gas in Action (cont.)

Data Table

Circumference of balloon at start Temperature: _____ ° Celsius	
Circumference of balloon in freezer Temperature: _____ ° Celsius	
Circumference of balloon in heat Temperature _____ ° Celsius	
Observations of balloon when squeezed	
Observations of balloon in bell jar	

Questions:

1. What happened to the size of the balloon after it was cooled?
2. What accounts for this decrease in size?
3. What happened to the balloon's circumference when it became warm?
4. What accounts for this increase in size?
5. What happened to the volume of the balloon when pressure is increased?
6. What happened to the volume of the balloon when pressure was decreased?



Vocabulary of “Solids, Liquids, and Gases”

Directions: Unscramble the vocabulary words in the first column. Match the words to the definitions in the second column.

- | | |
|-----------------------------|--|
| _____ 1. tmreat _____ | a. the fourth phase of matter, found in the sun and stars |
| _____ 2. diuliq _____ | b. a phase change from a liquid to a solid |
| _____ 3. sga _____ | c. a phase change from a solid to a liquid |
| _____ 4. salmpa _____ | d. a measure of a liquid's resistance to flow |
| _____ 5. ioysvstci _____ | e. occurs when a vapor cools and changes to a liquid |
| _____ 6. neimgtl _____ | f. substance that takes the shape of its container but has definite volume |
| _____ 7. zfeqrnei _____ | g. anything that takes up space and has mass |
| _____ 8. ziarvaonopit _____ | h. a phase change that creates vapor; it occurs when a liquid is boiled |
| _____ 9. sdceonnitnoa _____ | i. the different forms matter can take; there are four |
| _____ 10. hpsesa _____ | j. adjusts to fill the volume of whatever container it's in and has no definite volume |