What's the Matter Unit Study Guide **Name:** Answer Key

Complete the following questions, using your notes. This is to prepare you for both the Quarter ~~1~~ benchmark.

Objective 1: All matter is made up of atoms and atoms with the same properties are the same elements.

Use the following chart to answer questions 1-6:

A	50g Gold
B	25g Gold
C	25g Aluminum — 2.7 g/mL
D	50g Aluminum — 2519°C

1. Describe which substances have the same mass.

Substances A + D have a mass of 50g + Substances B + C have a mass 25g

2. Describe which substances would be made of identical atoms.

A + B because they are both Gold (same atoms)
C + D because they are both Aluminum (same atoms)

3. Substance A has a melting point of 1064°C. What is its freezing point? Why?

8R It's freezing point is 1064°C because the melting + freezing points are the same
Solid ⟶ liquid (melting) Liquid ⟶ solid (freezing)

4. Which other substance would have the same melting and freezing point as Substance A? Why?

Substance B because they are the same. (same atoms, elements, properties)

5. Substance C has a density of 2.7 g/mL. Using that information, what is true about the density of Substance D?

Substance D has a density of 2.7 g/mL because it is the same substance.

6. Substance D has a boiling point of 2519°C, which other substance has that same boiling point? Why?

Substance C because it's the same.

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7. Name any SOLID object answers will vary.

Describe the atoms that make up your object (how do they move, how would you describe their shape, volume): Shape = Fixed They vibrate
Volume = Fixed

What would happen if ALL of the atoms in your object were removed?

it would not exist

Fill in the chart with examples of matter for each question 8-15. Also, in the last column, decide whether each of your examples is a solid, liquid, gas, or plasma.

answers will vary

Examples of Matter

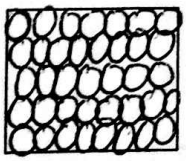
	Your example	Solid/Liquid/Gas/Plasma
8. Something that is **living.**	myself	solid
9. Something that is **non-living.**	door	Solid
10. Something that **makes a sound.**	radio	solid
11. Something that **does not make a sound.**	grass	solid
12. Something that **takes up space.**	people	solid
13. Something that **can be seen with the naked eye.**	box	solid
14. Something that **cannot be seen with the naked eye.**	water vapor	gas
15. Something that **has mass.**	air	gas

16. Write a definition of matter in general that addresses all of the criteria used in questions 8-15.

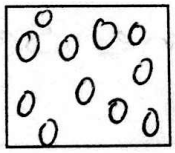
matter is anything that has mass and volume.

Objective 2: Know how ~~heat~~ energy affects the motion of atoms and what happens to particles during a change in phase.

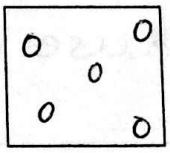
17. Draw a representation of a solid, liquid and a gas. These drawings should reflect the relative positions of the atoms.



Solid



Liquid



Gas

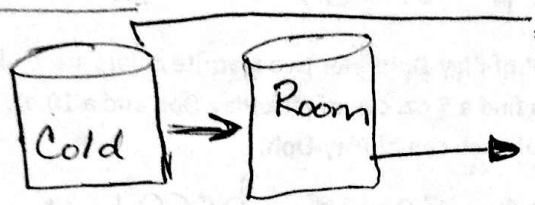
18. What happens to atoms of a substance when the substance is heated? Be sure to explain energy, the relative speed of atoms and the relative distance between the atoms.

When atoms are heated, atoms move faster because they have gained energy. The atoms spread out.

19. What happens to atoms of a substance when the substance is cooled? Be sure to explain energy and the relative distance between the atoms.

When a substance is cooled it loses energy, loses speed, and the atoms move closer together

20. Describe what happens to a cup of cold water as it warms up to room temperature. In your responses include what happens to the size of the molecules, the distance between the molecules and the relative energy level of the molecules.



close together; low energy

farther apart; higher energy

same size molecules

21. Describe what happens to a solid as it cools down. In your responses include what happens to the size of the molecules, the distance between the molecules and the relative energy level of the molecules.

as it cools → molecules move closer together; loses energy

same size molecules

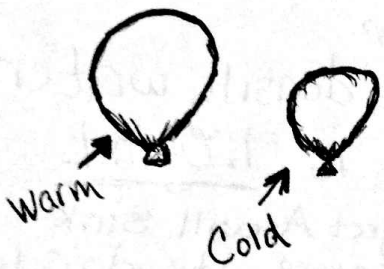
22. Describe what would happen to the energy level and the temperature of a liquid if you stirred the liquid rapidly for 5 minutes.

The energy would increase + the temperature would increase.

23. Consider a glass of water. Describe the speed of water molecules in relation to each other. Are they moving at the same speed, different speeds, etc.

They are moving at the same speed. (based on amount of energy/temperature)

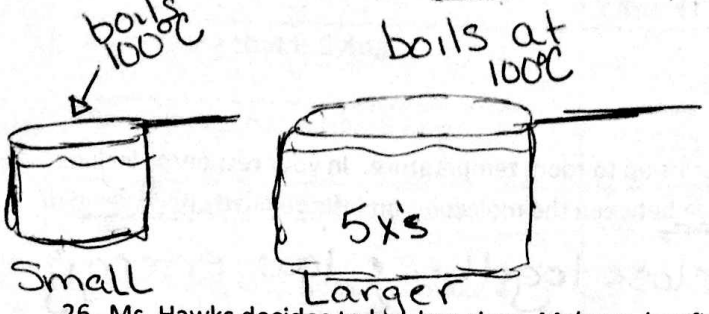
24. Describe why a balloon left outside on a cold night appears smaller in the morning.



temp decreases
↓
atoms losing energy
↓
atoms slowing down
↓
atoms come closer together

Objective 3: Physical properties such as density, solubility, melting point, boiling point, and freezing point do not depend on how much of the material is present.

25. You are cooking for your family and decide to make two different types of pasta. You put two different pots on the stove to cook the two types of pasta. The larger pot holds five times more water than the smaller pot. The smaller pot of water boils at 100°C. At what temperature does the larger pot boil? Explain your reasoning.



Both will boil @ 100°C. It does not matter how much water is present

26. Ms. Hawks decides to buy her niece, Makena, her first set of Play-Doh. Her two favorite colors are pink and purple. When going to the store, Ms. Hawks was able to find a 5 oz. can of pink Play-Doh and a 10 oz. can of purple Play-Doh. Explain the difference of the densities of each can of Play-Doh.

The densities are the same because they are the same material

27. Looking at the 5 mystery substances in the table, which 2 substances could be the same? Explain why.

	Mass	Freezing Point	Density	Flammable
Substance 1	10g	0°C ✓	1.0 g/cm^3 ✓	No ✓
Substance 2	10g	-5°C	1.5g/cm^3	Yes
Substance 3	100g	0°C ✓	1.0 g/cm^3 ✓	No ✓
Substance 4	100g	-5°C	1.5g/cm^3	No
Substance 5	10g	-3°C	.75g/cm^3	Yes

Substances 1 and 3 (mass doesn't matter) They have the same Freezing Point, Density, and both are not flammable.

28. How do you determine the density of an object? What are the units?

$D = \frac{m\ (g)}{V\ (mL \text{ or } cm^3)}$

g/mL g/cm^3.

29. The densities of 4 objects are listed ~~above.~~ below. Which object will sink in water? Why?

Object	Density
A	3.5g/mL
B	0.5g/mL
C	1.0g/mL
D	0.7g/mL

density water is 1.0g/mL

Object A will sink because its density is greater.

30. Look at the 4 containers below. List two containers that have a different amount of matter (the dots = molecules in a closed container). Explain your reasoning.

A + B ; A + C ; B + C ; B + D ; C + D

Each container has a different # of molecules (amount of matter)

Compare the densities of container C to container D. Explain your reasoning.

Container C has less molecules than Container D.

Container C is less dense ; Container D is more dense

↓ less matter is a certain space

↓ more matter in a certain space