Name_____ **Study Guide**
Date_____ Grade 6

Please do not only study from the study guide, use your ebooks and worksheet as well.

Lesson 1 *Describing and classifying matter.*

1. Matter

Matter is anything that occupies space and has mass.

Examples: Gold, iridium, peanuts, people, and postage stamps are all examples of matter.

2. Mass and Weight

Mass: Mass is the quantity of matter in an object and doesn't change with location.

Weight: Weight is the force due to gravity and changes with location. An astronaut's weight differs on Earth and the moon.

We use kilograms (kg) to measure mass and pounds (lb) to measure weight.

3. Properties

Physical property: a property that is observed with senses and is determined without destroying matter

Chemical property: a property that indicates how a substance reacts with something else, matter will be changed into a new substance after the reaction

Physical Properties	Chemical Properties
1. Can be measurable without changing the composition of matter. 2. In the measurement the identity of the matter does not change. 3. Example- mass.density.boiling point etc.	1. The chemical composition changes when measuring the chemical properties. 2. When you measure the chemical properties, identity of matter changes. 3. Examples - oxidation state, coordination number etc.

4. **Elements**

The simplest pure substances that cannot be broken down further.

Examples: Oxygen (O2), carbon (C), and hydrogen (H) are elements.

5. **Atoms**

The tiny particles that make up elements. Atoms consist of a nucleus (containing protons and neutrons) and electrons orbiting the nucleus.

6. **Compounds**

Substances formed when two or more different elements chemically combine.

Example: Water (H2O) is a compound formed by the chemical combination of hydrogen

and oxygen.

7. **Molecules**

A group of two or more atoms that are bonded together by a chemical bond

Example: A water molecule (H2O) is made up of two hydrogen atoms and one oxygen atom.

8. **Chemical Bonding**

The force that holds atoms together in compounds.

9. **Mixtures**

Combinations of different substances that are not chemically bonded.

Homogeneous Mixtures: Appear uniform throughout (e.g., saltwater).

Heterogeneous Mixtures: Have different visible parts (e.g., salad with separate vegetables).

10. **Separating Mixtures**

Filtration: Used to separate solid-liquid mixtures (e.g., sand in water).

Distillation: Separates mixtures based on differences in boiling points (e.g., separating salt from water).

Magnetic Separation: Separates magnetic materials from non-magnetic ones (e.g., separating iron from a mixture).

Evaporation: Used to separate a solute (e.g., salt) from a solvent (e.g., water) by evaporating the solvent.

Atom	Molecule	Element	Compound
The smallest particle of a chemical substance	A particle made of several atoms that are bonded together	A substance that consists of the only type of atoms	A pure substance made of the same type of molecules, which are made of several types of atoms

Lesson 2 *Measuring Matter*

1. **Mass**

The amount of matter in an object, usually measured in grams (g) or kilograms (kg).

Tool: A balance or scale is used to measure mass.

2. **Volume**

The amount of space an object occupies or the amount of a substance contained within a given space.

Tool: To measure the volume of regular-shaped objects, you can use a ruler or formula. For irregular-shaped objects or liquids, you can use a graduated cylinder or displacement method.

How to measure volume Regular-Shaped Objects:

- Use a ruler to measure the length (L), width (W), and height (H) of an object.
- Multiply these three measurements together (V = L x W x H) to find the volume.

3. **Density**

The amount of mass per unit volume of a substance.

Formula: Density (D) = Mass (M) / Volume (V)

Units: Typically measured in grams per cubic centimeter (g/cm^3) or kilograms per cubic meter (kg/m^3).

4. **Comparing Mass, Volume, and Density**

Mass vs. Weight: Mass is the amount of matter, while weight is the force of gravity acting on that matter.

Volume vs. Density: Volume is the space an object takes up, while density is how tightly the matter is packed within that space.

5. **Understanding Density**

Denser materials have more mass in a given space and will sink in less dense fluids.

Less dense materials have less mass in a given space and will float in denser fluids.

Weight (W) = Mass (m) x gravity (g)

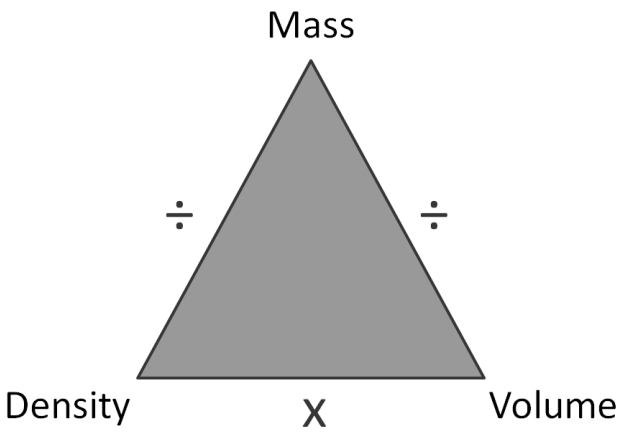
W = m x g

Mass is measured in kilograms (kg)

Gravity on earth is a constant: 9.8 m/s²

Weight is measured in Newtons (1 N = 1 kg m/s²)

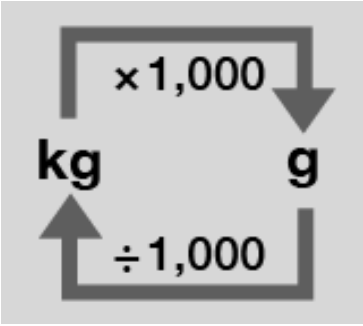
Use the following formula to solve for Density:



Density = $\frac{\text{Mass}}{\text{Volume}}$

Volume = $\frac{\text{Mass}}{\text{Density}}$

Mass = Density x Volume



Mass is measured in kilograms (kg)

Volume is measured in cubic meters (m^3)

Density is measured in kg/m^3

*When density **increases**, the temperature **decreases**.*

*When density **decreases**, temperature **increases**.*

Lesson 3 *Changes in Matter*

Physical changes are limited to changes that result in a difference in display without changing the composition. Some common changes (but not limited to) are:

Texture

Color

Temperature

Shape

Change of State (Boiling Point and Melting Point)

Chemical change occurs when the substance's composition is changed. When bonds are broken and new ones are formed a chemical change occurs. The following are indicators of chemical changes:

Change in Temperature

Change in Color

Noticeable Odor (after reaction has begun)

Formation of a Precipitate

Formation of Bubbles

Conservation of mass

The law implies that mass can neither be created nor destroyed.