Lesson Topic: Pure Substances

Objective:
Students will be able to:

1. Differentiate between a pure substance, homogeneous mixture and a heterogeneous mixture.
2. Identify properties of a pure substance.

Time Required: 75 minutes

Materials Needed:

- Teacher computer with internet access
- Projector/Smartboard
- 1 computer/laptop/iPad per student with internet access
- Pure Substance examples (all of these examples could be an image instead)
    - Tin
    - Sulfur
    - Diamond
    - Water
    - Salt
    - Baking soda
- Examples of pure substance, heterogeneous mixture and homogeneous mixture
    - Cup of water
    - Cup of lemonade
    - Bowl of cereal or a bowl of ice-cream with various chunks of chocolate etc.
- Pure substances for stations:
    - Oil and water mixture
    - Chalk
    - Copper wire
    - Water
    - Koolaid mixed with water
    - Rocks and sand mixed
    - Aluminum foil
    - Air in a balloon
    - Any element (if possible)
- Pure Substances Handout (attached)
- Station name cards (attached)

Teacher Preparation:

- Assign a Legends of Learning Instructional Quick Play playlist for the day(s) you will be teaching the lesson.
    - Instructional - Middle School - Pure Substances
- Assign a Legends of Learning Content Review Quick Play playlist for the day(s) you will be teaching the lesson.
    - Content Review - Middle School - Pure Substances
- Make copies of Pure Substances Worksheet (1 per student)

- Print and cut out station name cards.
- Gather all needed materials and set up stations around the room with pure substances and name cards listed above.

Engage (10 minutes):

1. Have the following materials/images on display:
    a. Tin
    b. Sulfur
    c. Diamond
    d. Water
    e. Salt
    f. Baking soda
2. Ask students “what do all of these materials have in common?”
    a. Think/pair/share
    b. Write down student ideas on the board.
3. Tell students “All of these materials are pure substances. Today we will explore more about what pure substances are and the different types of pure substances that exist.”

Explore (20 minutes):

1. Have your students sign in to Legends of Learning. Instruct students to complete the Instructional playlist.
1. As students complete the assigned game, students should fill out the definitions in Part 1 of the Pure Substances Handout.
2. Assist students as needed during game play, pause playlist if you need to address content or questions to the entire class.

Explain (15 minutes):

1. Review Part 1 of the Pure Substances Worksheet and go through the vocabulary definitions.
    a. Pure substance - Any single type of material that is made of only one type of atom or only one type of molecule.
    b. Mixture - material made up of two or more substances that are physically mixed but not chemically combined.
        i. Homogeneous mixture - things are completely dissolved and the particles that make up the mixture are very small and not recognizable.
        ii. Heterogeneous mixture - made up of different substances that are stay physically separate.
2. Write the word “pure substance” in the middle of the blackboard and draw a circle around it. Create a word web of facts about pure substances by drawing lines and circles stemming from the main word: pure substance. Students can fill it in on their handout.
    a. Each pure substance has chemical and physical properties that help to identify it.
    b. A pure substance can exist in 3 states of matter and have no change in particles except how they are arranged.
    c. All elements are pure substances because they are made of only one atom.
    d. Other various compounds are also pure.

e. Some examples - elements, pure compounds (water, baking soda, salt etc).

3. Hold up three substances: a cup of water, a cup of lemonade, and a bowl of cereal with milk (any of these substances could be substituted for other examples if they are more easily accessible).
4. Ask students “With the person sitting next to you, decide which of these is an example of a pure substance, a homogeneous mixture and a heterogeneous mixture.”
5. After students are done discussing, review the correct answers.
    a. Water is a pure substance. It is a compound and has all the characteristics that are found in our web (reference the board).
    b. Lemonade is a homogeneous mixture. The ingredients are completely dissolved and not recognized in the liquid.
    c. The cereal is a heterogeneous mixture. All of the parts of the mixture can be seen and easily separated.

Elaborate (15 minutes):

1. Set up stations around the room.
    a. Oil and water (hetero mixture)
    b. Chalk (pure)
    c. Copper wire (pure)
    d. Water (pure)
    e. Koolaid (homo mixture)
    f. Rocks and sand (hetero mixture)
    g. Aluminum foil (pure)
    h. Air in a balloon (pure)
    i. Any element (if possible). (pure)
2. At each station, have a substance that the students have to determine as a pure substance, a homogeneous or heterogeneous mixture.
3. Tell students “Around the room you will find 9 stations. At each one, you will need to figure out and write down on your handout if the substance is pure, or a heterogeneous or homogeneous mixture.”
4. After students are finished, go through the answers together as a class.
5. Clarify any questions or common mistakes.

Evaluate (15 minutes):

1. Have your students sign in to Legends of Learning. Instruct students to complete the Content Review playlist.
2. Analyze student results to determine what concepts need to be a focus for reteaching.

Additional Lesson Strategies:

- To use Legends for additional instruction, create a custom playlist with an instructional game and pre and post assessment.
- To use Legends for a quick formative assessment, create a 5-question assessment in a playlist.
- To use Legends for a student-directed experience, create a targeted freeplay playlist.

- Encourage students to play on their own at home in Legends of Learning: Awakening for a student-driven experience including avatars, battling, and quests all centered around topics they are covering in class.

Name: _____

Pure Substances

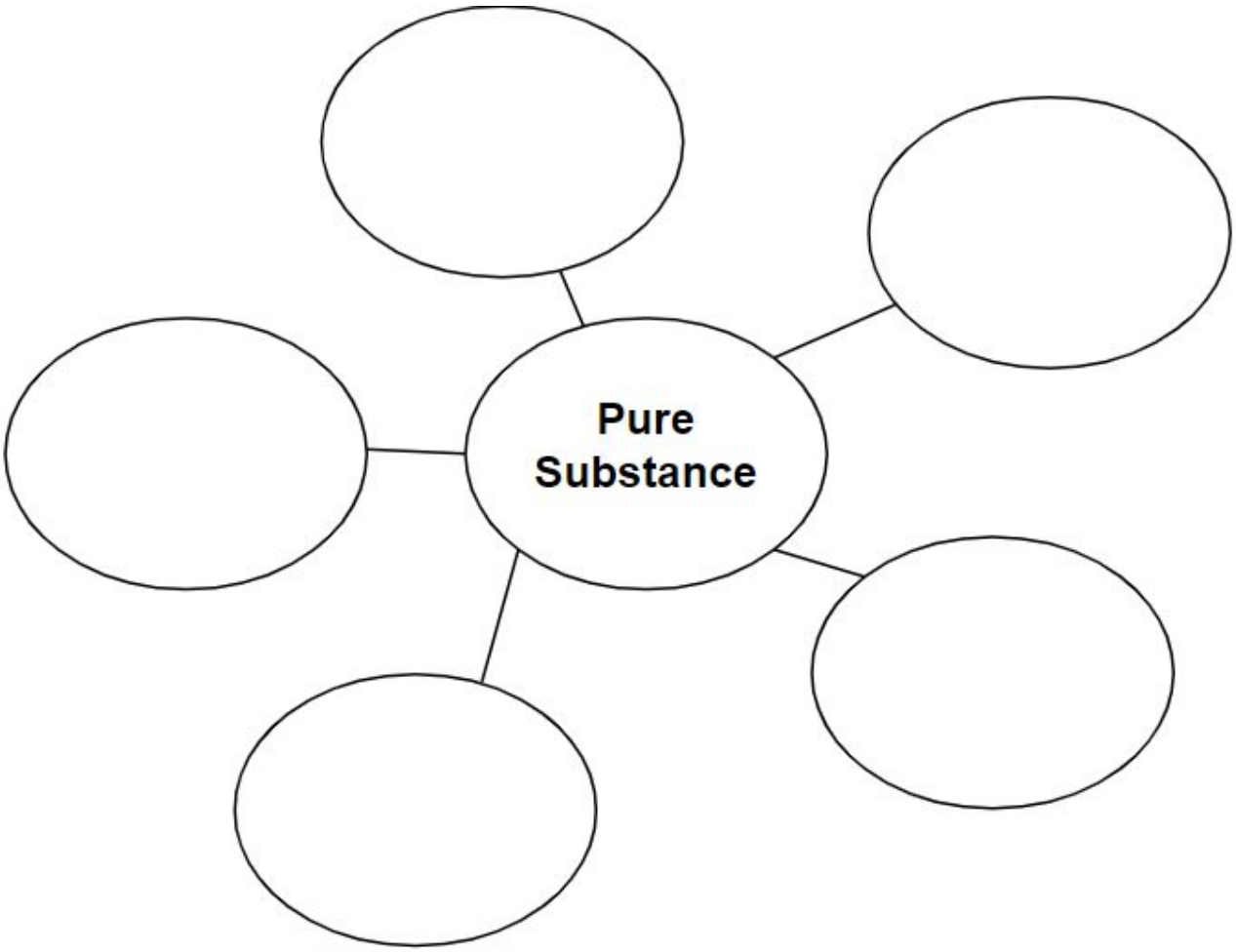
Part 1: Write in the definitions to the following key terms.

Pure Substance -

Mixture -

Homogeneous Mixture -

Heterogeneous Mixture -



Check out each of the stations around the room. Write down the substance, then label it as **pure substance, homogeneous mixture, or heterogeneous mixture** for each substance.

1.
2.
3.
4.
5.
6.
7.
8.
9.

Station Name Cards

Oil and water

Chalk

Copper wire

Water

Koolaid

Rocks and sand

Aluminum Foil

Air in a balloon

Element _____