

States of Matter and Chemical/Physical Changes Stations

4th or 5th Grade

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Benchmarks:

(4th) SLC 1: Students will construct simple classification keys for others to use to distinguish between objects, organisms or phenomena.

(4th) SLC 8: A.) Students will evaluate and provide written observations of experiments (including measurements, attributes, etc.) from a variety of sources (i.e., other students, books, media, etc.) and determine if results are derived from direct observations or inferences. B.) Students will use observations and data when explaining answers and formulating conclusions.

(4th) SLC 11: A.) Students will identify a chemical change as the formation of a new substance and describe signs that a chemical change is occurring. (e.g., burning, rotting fruit, digestion, etc.) B.) Students will distinguish between physical change, and chemical change, and changes that are chemical as well as physical.

(5th) SLC 8: Students will identify physical and chemical changes and compare their properties.

Objectives:

This lesson will provide a review, reinforcement of ideas, and more examples of states of matter, chemical changes, physical changes and the differences between the changes.

Materials:

States of matter station:

At least one object fitting the following categories (examples)-

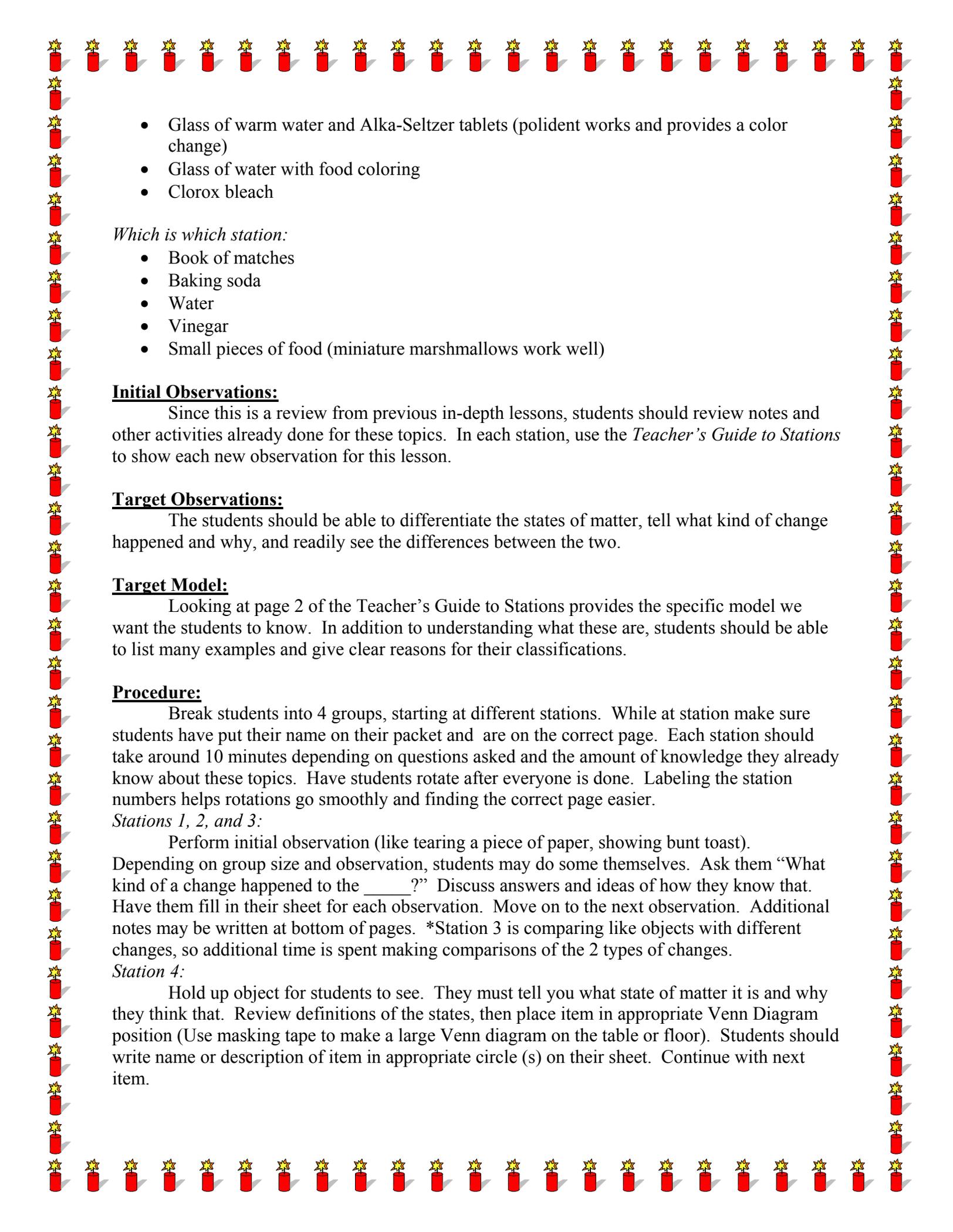
- Solid (rock)
- Liquid (drop of water)
- Gas (breathing out of mouth)
- Solid and liquid (glass of water)
- Solid and gas (balloon filled with air)
- Liquid and gas (bubbles)
- Solid, liquid and gas (bottle of soda)
- Masking tape (for large Venn diagram on table or floor)

Physical Change station:

- Paper
- Pencil with eraser
- Ice cube in cup
- Popcorn kernel and popped piece of popcorn

Chemical Change station:

- Burnt toast and regular bread
- Rusted penny and regular penny

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- Glass of warm water and Alka-Seltzer tablets (polident works and provides a color change)
 - Glass of water with food coloring
 - Clorox bleach

Which is which station:

- Book of matches
- Baking soda
- Water
- Vinegar
- Small pieces of food (miniature marshmallows work well)

Initial Observations:

Since this is a review from previous in-depth lessons, students should review notes and other activities already done for these topics. In each station, use the *Teacher's Guide to Stations* to show each new observation for this lesson.

Target Observations:

The students should be able to differentiate the states of matter, tell what kind of change happened and why, and readily see the differences between the two.

Target Model:

Looking at page 2 of the Teacher's Guide to Stations provides the specific model we want the students to know. In addition to understanding what these are, students should be able to list many examples and give clear reasons for their classifications.

Procedure:

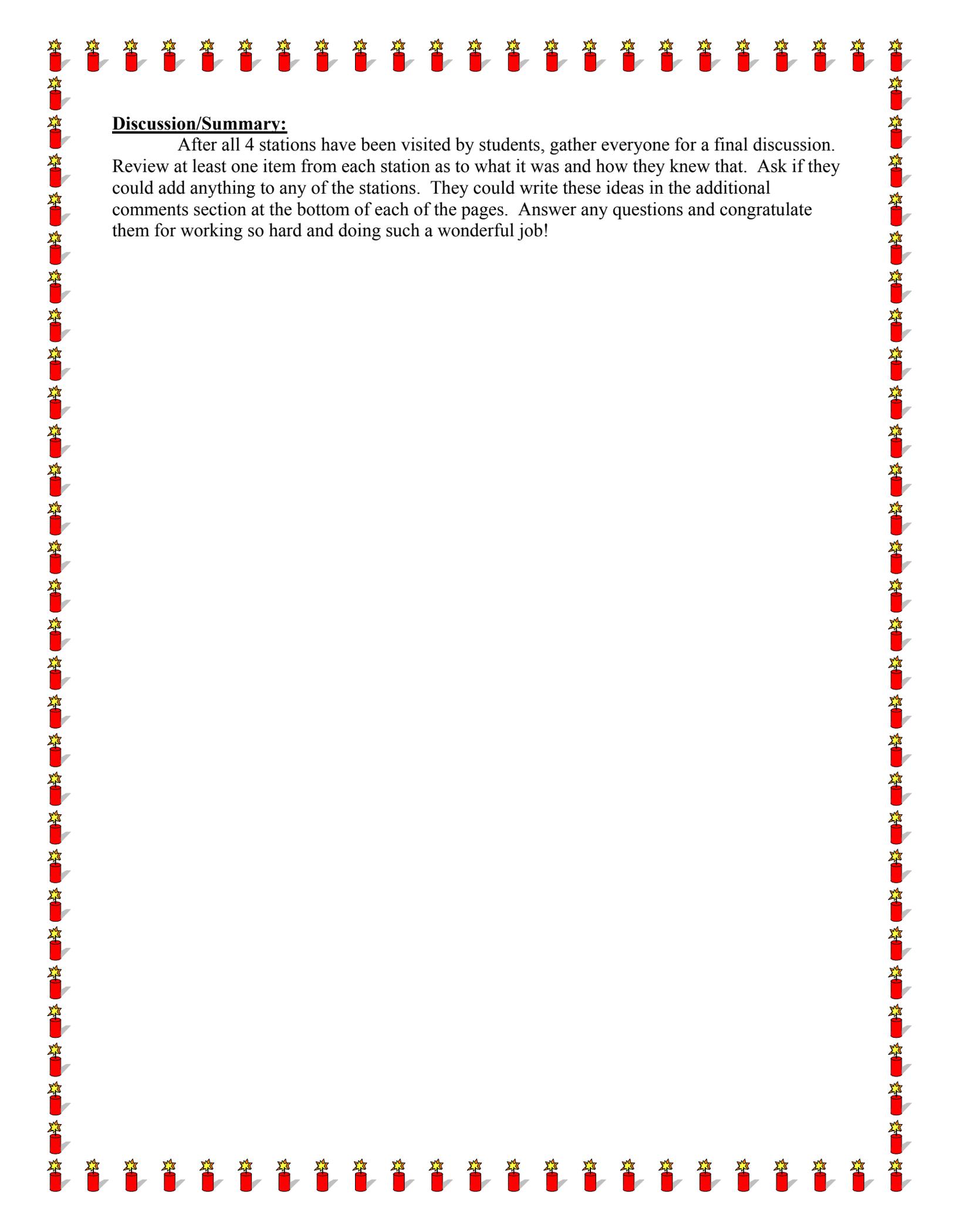
Break students into 4 groups, starting at different stations. While at station make sure students have put their name on their packet and are on the correct page. Each station should take around 10 minutes depending on questions asked and the amount of knowledge they already know about these topics. Have students rotate after everyone is done. Labeling the station numbers helps rotations go smoothly and finding the correct page easier.

Stations 1, 2, and 3:

Perform initial observation (like tearing a piece of paper, showing bunt toast). Depending on group size and observation, students may do some themselves. Ask them "What kind of a change happened to the _____?" Discuss answers and ideas of how they know that. Have them fill in their sheet for each observation. Move on to the next observation. Additional notes may be written at bottom of pages. *Station 3 is comparing like objects with different changes, so additional time is spent making comparisons of the 2 types of changes.

Station 4:

Hold up object for students to see. They must tell you what state of matter it is and why they think that. Review definitions of the states, then place item in appropriate Venn Diagram position (Use masking tape to make a large Venn diagram on the table or floor). Students should write name or description of item in appropriate circle (s) on their sheet. Continue with next item.



Discussion/Summary:

After all 4 stations have been visited by students, gather everyone for a final discussion. Review at least one item from each station as to what it was and how they knew that. Ask if they could add anything to any of the stations. They could write these ideas in the additional comments section at the bottom of each of the pages. Answer any questions and congratulate them for working so hard and doing such a wonderful job!

States of Matter!

Solids are objects that have a definite shape and definite volume.

Liquids have a definite volume, but take the shape of their container.

Gases can take the shape of any container and also fill any volume.

Changes:

Physical Change: A change in the size, shape or state without forming a new substance

Chemical Change: A change in matter in which one or more different kinds of matter form

Teacher's Guide to Stations!

Physical Changes:

- Tearing paper = size and shape change
- Erasing pencil = eraser changes shape, but is still eraser bits
- Ice to water = phase change
- Popping popcorn = size, shape, smell, color, but still corn!

Chemical Changes (look for new substance in **bold**):

- Burnt toast = **ash** is not toast and cannot change back

- Rusted penny = **rust** is from penny's oxidized material
- Alka-seltzer = **bubbles** are given off and when water is evaporated a different material is left behind
- Clorox and dyed water = Food coloring can never go back to color (molecular structure break down)

Which is which?

- Tearing out a match = physical (Shape change)
- Burning a match = chemical (**smoke, ash, heat** formed)
- Mixing baking soda with water = physical (no new substances)
- Mixing baking soda with vinegar = chemical (gaseous **bubbles**, no longer baking soda when dry)
- Chewing/Cutting food = physical (same materials)
- Eating food = chemical (**waste** is formed, water taken out and used elsewhere, no longer food product)