TEKS K.5 Matter and energy. The student knows that objects have properties and patterns. The student is expected to:

(A) observe and record properties of objects, including relative size and mass, such as bigger or smaller and heavier or lighter, shape, color, and texture; and

(B) observe, record, and discuss how materials can be changed by heating or cooling

Background Knowledge

Students should be able to describe objects in terms of the materials they are made as well as their physical properties. Students should be able to describe verbally as well as with drawings the changes to an object when it is heated up and cooled down (i.e., water, chocolate, ice cream, etc.)

Essential Questions

What are the properties of matter?
(The properties of matter are the words used to describe and identify matter, such as its color, texture, size, and mass.)

What words can we use to describe the properties of objects?
(We can use the names of the different colors. When describing texture, we can use the words “rough” or “smooth”. When comparing masses, we can use the words “heavy” or “light”. And when comparing sizes, we can use the words “bigger” or “smaller”.)

What happens to liquids, such as water, when we remove heat energy from them or cool them?
(They get colder and can freeze when enough heat is removed.)

What happens to a solid object, such as ice cream, when we add heat energy to it?
(It gets warmer and begins to melt.)

What happens to liquid water when we add heat energy to it?
(The water gets warmer and may eventually evaporate.)

Comparing Objects – Student Descriptive Investigation Part 1

Objectives:

To identify and demonstrate safe practices including using materials appropriately
To demonstrate how to use, conserve and dispose of natural resources and materials
To discuss the importance of safe practices to keep self and others safe and healthy
To ask questions about objects in the natural world
To plan and conduct simple descriptive investigations
To collect data and make observations using simple equipment, including hand lenses, primary balances and non-standard measurement tools (relative measurements where one object is compared relative to another, such as larger or smaller, heavier or lighter, etc.)
To record and organize data and observation using pictures, numbers and words
To communicate observations with others about simple descriptive investigations
To collect information using tools including hand lenses
To observe and record properties of objects, including relative size, shape, color and texture
To use the senses as tools of observation, to identify properties and patterns of objects in the environment (the surroundings)

Materials: (per group)

- a set of 7 small objects (of different shapes, sizes, textures, mass and colors)
  - a circular-shaped disc of colored craft foam
  - larger circular-shaped disc of a different colored felt
  - a 5cm square of colored construction paper (same color as one disc)
  - a large silver metal paperclip
  - a smaller colored paperclip the same color as one of the discs
  - a 6 cm square tan piece of sandpaper
  - a natural wooden popsicle stick
- 5 small shallow plastic or Styrofoam bowls for collecting sorted objects
- hand lens
- a large sheet of white paper folded into 4 equal quarters
- pencils

Safety, appropriate use, conservation and disposal of natural resources and materials

Prior to beginning:

-Instruct students on the appropriate use of the materials.
-Instruct students how to use, conserve and dispose of the materials, including paper, plastic (bowl) and metal

-Discuss the importance of safe practices to keep self and others safe and healthy

including using materials and tools appropriately and why to avoid "horseplay". Monitor and hold students accountable for their behavior!

How to Conduct:

- View the instruction module, Describing Objects, with students. Do the sorting activity that is in the instruction module to provid background information and to support the process for students to construct their own understanding of key concepts and terms.

- We're going to play "I Spy". Choose an object that is clearly visible to all students. Begin by saying, "I spy something that is _____" and fill in the blank with a property that describes the object. Allow students to make a guess after each clue. (Using senses as tools of observation to identify patterns of objects in the environment – their surroundings.)
- Once someone guesses the object. Ask them to pick out another object I the room that is like the first object in some way, and play the game with the student supplying the clues. (Using senses as tools of observation to identify patterns of objects in the environment – their surroundings.) If the objects are small enough, put them close together. Play one more time and group the objects by how they are similar.
- Say, "Name an object that is not the same (color)", or whatever property you were using to sort the first two. Explain that scientists use their senses to observe and identify how objects or organisms are similar and how they are different to put them into groups.
- Write the word "property" on the board. Tell students the properties of an object describe the object. They may describe its shape, color, size, how it feels (texture), how it tastes,how it smells or how it sounds. Give each group of 3-4 students a large sheet of white paper, a set of the objects and pencils.
- Have the students use their senses and the hand lenses as tools of observation to exoplore and identify the properties of the objects.
- On one quarter section of the white paper, have the students trace around each object on the large sheet of white paper and write simple descriptive words for each one, such as the shape, the color, the texture, it's relatve size – smaller or larger, texture-smooth or rough. (Record and organize data and observations using pictures and words.)
- Ask each group to tell (communicate) one of their observations of the group of objects.
- Say, "What question can we ask about one of the properties of the objects that will help us put the objects into smaller groups?" Students may say many

different questions. Honor them all, but when a student says, "How are the objects alike in (whatever property)?"use this question as the question for this descriptive investigation. For example, "How are they alike in color?"

- Have students pick one of the properties to plan and then conduct their descriptive investigation. Suggest they use the bowls as tools to collect and organize the objects as they sort them into smaller groups.
- Once sorted, have them use another quarter of the paper.
    1. Take each bowl, remove the objects one-by-one but keep them together in the same area of the quarter section of paper to show they are grouped.
    2. Once they are lying on the paper in small groups and write the property used to put them into these smaller groups.
    3. Have students count and write the number of objects in each small group on the white paper.
    4. Have students in each group verbally communicate by which property they sorted the objects. How many groups they made and how many objects are in each smaller group.
- Have the groups choose another question to help put the objects into smaller groups and repeat the process.
- In the 4th quarter of the paper, have the students choose another property to sort the objects in another way, but not tell what question they are investigating.
- When done, allow students to do a "gallery walk" to observe how other groups have sorted the objects and to try to guess the property they used.
- Students demonstrate how to conserve and dispose of natural resources and materials made from them as directed.

Causing Changes By Heating And Cooling

Objective:

To observe, record, and discuss how materials can be changed by heating or cooling.

Materials:

- 10–15 semisweet chocolate chips
- Hot plate
- Shallow aluminum pan
- Hot pads or protective gloves for handling warm pan
- Journals
- Timers
- Goggles (Have student wear goggles as they observe the chocolate heating, and also to model safety.)

How to Conduct:

Demonstrate how solid chocolate melts when heat is added, but turns to a solid again when heat is removed.

- Have students observe, draw, and describe verbally a group of semisweet chocolate chips that have been placed in a shallow pan or dish.
- Place the shallow dish and chips on a hot plate that is turned on low. Explain that the hot plate is adding heat energy to the dish and the chocolate chips.
- During melting, and once melted, have students observe, draw, and describe the chocolate and how it changes. Use a timer to gather data during melting.
- Place the shallow dish of melted chocolate in a pan of ice cubes so the dish is sitting on the ice. Use a timer to gather data as the melted chocolate changes to a solid.
- Once solid again, lift the chocolate from the dish, and have students observe, draw, and describe the changes that have taken place as heat was removed (cooling). Use the terms “Solid” and “Liquid” to describe the change in state.