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# Matter Detectives: The Case of the Mystery Objects

## Materials Needed

- A "Mystery Bag" (a pillowcase or non-see-through bag)
- A collection of 8-10 small, safe household objects with varied properties (e.g., a cotton ball, a rock, a toy car, a piece of sandpaper, a rubber eraser, a crayon, a leaf, a wooden block, a piece of foil)
- A "Detective's Sorting Station" (a large piece of paper or a tray divided into four sections with tape)
- Labels for the sorting station: "Color," "Shape," "Size," and "Texture"
- A "Detective's Notebook" (a few sheets of paper or a small notebook) and a pencil/crayons
- An empty shoebox or small cardboard box for the final activity ("Mystery Matter Box")

## Learning Objectives

By the end of this lesson, the student will be able to:

- Identify and describe at least four observable properties of matter: **color**, **shape**, **size** (big/small), and **texture** (rough/smooth/soft/hard).
- Sort a group of objects based on a single, given property.
- Create a "Mystery Matter Box" and provide descriptive clues about the object inside using property words.

## Curriculum Alignment

This lesson aligns with the **Next Generation Science Standards (NGSS) 2-PS1-1**: "Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties."

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## Lesson Procedure

### Part 1: The Hook - The Mystery Bag (5-10 minutes)

1. **Introduce the Mission:** "Today, you are a Matter Detective! Your first mission is to investigate a mystery object... using only your sense of touch."
  2. **The Investigation:** Place one interesting object from your collection (like the piece of sandpaper or the cotton ball) into the "Mystery Bag." Do not let the student see it.
  3. **Gather Clues:** Ask the student to reach into the bag without looking and describe what they feel. Guide them with questions:
    - "Does it feel rough or smooth?"
    - "Is it hard or soft?"
    - "Can you tell what shape it is?"
    - "Is it big or small in your hand?"
  4. **The Big Reveal:** After they have given a good description, let them guess what it is and then pull it out of the bag. Celebrate their detective work!
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## Part 2: Explore & Explain - Detective Training (15-20 minutes)

1. **Introduce Key Terms:** Explain that they were just describing the object's **properties**. "Properties are like clues that tell us about an object. All the 'stuff' in the world is called **matter**, and every piece of matter has properties."
2. **Set Up the Sorting Station:** Lay out the large paper or tray and place the labels ("Color," "Shape," "Size," "Texture") in the four sections.
3. **The Object Line-Up:** Place all the collected household objects in a pile next to the sorting station.
4. **Guided Sorting:** Work through the properties one by one.
  - **Texture:** "Let's be texture detectives first! Touch each object. Put all the **rough** objects in one pile and all the **smooth** objects in another." After they sort, have them move those objects into the "Texture" section of the station. Discuss other texture words like soft, hard, bumpy, etc.
  - **Color:** "Great work! Now, let's be color detectives. Put all the objects back. Can you sort them by color?" (They can make a pile for red objects, blue objects, etc. in the "Color" section).
  - **Shape:** "Next up, shape! Find all the objects that are round. Now find all the objects that are square or have straight sides." Place these in the "Shape" section.
  - **Size:** "Last one! Sort the objects into a 'big' pile and a 'small' pile." Place these in the "Size" section.
5. **Detective's Notebook:** Have the student choose their favorite object. In their "Detective's Notebook," ask them to draw it and write down three "clues" (properties) about it. For example, for a rock: "It is gray. It is hard. It is bumpy."

## Part 3: Elaborate & Create - The Mystery Matter Box (15 minutes)

1. **The Final Challenge:** "Detective, you've been fully trained! Now it's your turn to create a mystery for me. Your mission is to create a 'Mystery Matter Box'."
2. **Create the Box:** Give the student the empty shoebox. Ask them to secretly choose one object from the collection and place it inside the box without you seeing.
3. **Write the Clues:** On a piece of paper, have the student write (or dictate to you) three clues about the object inside. The clues must be about its observable properties. For example, if they chose the toy car:
  - Clue 1: It is smooth.
  - Clue 2: It is blue.
  - Clue 3: It has circles for wheels (shape).
4. **Solve the Mystery:** The student presents you with the box and reads the clues aloud. You must use their clues to guess what is inside! Make it fun by thinking out loud ("Hmm, it's smooth AND blue... what could it be?").

## Assessment (Evaluation)

Your "Matter Detective" has successfully completed the mission if they can:

- **(Formative)** Correctly sort the objects by texture and size during the "Detective Training" activity.
- **(Formative)** Use at least two property words (e.g., "rough," "round," "small") when describing objects during the activities.
- **(Summative)** Successfully create a "Mystery Matter Box" and provide three relevant property-based clues that help you identify the hidden object.

## Differentiation and Inclusivity

- **For Extra Support:** Provide a chart with pictures and words for different properties (e.g., a picture of a feather next to the word "soft," a picture of a brick next to the word "rough"). Focus on just two properties, like texture and color, before adding more.
- **For an Extra Challenge:** Introduce more complex properties like **flexibility** (can it bend?), **temperature** (is it cool or warm to the touch?), or **magnetism** (is it magnetic? - provide a magnet). Ask the student to sort by two properties at once (e.g., "Find all the objects that are small AND smooth").

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