ScienceExpeditionaryForce
Bringing the Fun of Science to Everyone

Unknown Investigation

CONTENT STANDARD: Scientific Method

CONTENT TOPIC: Investigating Unknown Objects

CONCEPT: Scientists do not always know or understand what they are investigating. They use scientific methods, observation and inquiry to study these unknown objects.

CONTENT OBJECTIVE: To identify and learn about scientific methods.

INSTRUCTIONAL OBJECTIVES: The learner will:

- define a scientific method.
- list and observe the characteristics of matter.
- research unknown objects using tools and methods.

OUTLINE OF CONTENT:

I. Define a scientific method
II. Apply the method(s) to unknown objects
III. Observe and Identify possible explanations for each object
IV. Draw conclusions based on observations.

GOAL: To enable students to demonstrate the process of science by posing questions and investigating phenomena through language, methods and instruments of science

THEME: Observing and Explaining- The senses are used to develop an awareness of an event or object and the properties thereof.

STANDARD(S): The learner will understand that:

The human senses and technological instruments are used to gather information from the environment.

BENCHMARK Information is gathered by using human senses and various instruments such as magnifying lenses, microscopes, telescopes, thermometers, magnets, scales, and balances.

CLASSROOM CONNECTORS

TIME REQUIRED: 30 minutes

MATERIALS: a number of objects that could be in the containers, unknown objects placed in numbered film containers, magnets and scales

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SET/ INSTRUCTION:
Introduce self and let them know you will be using the hand signals and social contract that is in their classroom. (It is really important that the kids understand the teachers know their routine. This will help kids focus more on science when they feel that the routine will be followed).

Introduce the lesson by talking about **SAFETY** when doing science experiments. Invite students to share reasons for safety rules **!!!** Talk about what might happen if they did not know what is in each container. **Stress to them that if they don't know what it is, bring it to an adult!!** It might be a good idea to have one of the objects be something harmless that they have never seen before (like a washer or a set of wires) to give them the opportunity to practice bringing unknown objects to an adult. Also, it is important for the teacher to know how to respond (like, "Thank you for bring that to me. I will be happy to take that one since we don't know what it is." Rather than, "Oh, it's OK. You can keep it."

Share with students that safety is especially important because scientists do not always know what they are studying. They must make many observations and study unknowns (unfamiliar things) a great deal before they can draw any type of conclusion (figure something out). Today we are going to study some unknown objects. Each container holds one of these example objects (show the students the objects: cotton ball, screw, bean, etc.). Your job is to try to figure out what is in these containers WITHOUT OPENING THEM.

Before we pass out these containers, can you name some tools a scientist might use to study something (Stress the vocabulary words! Hold up some of the tools you brought along. Possible answers: magnet, scales, magnifying glass, microscope, ruler, thermometer, etc.)? Scientists use many different types of tools to study and observe unknowns. Using some of these tools you will try to discover which of these objects is in each numbered container.

Discuss with the students that: The study of science includes simple classroom and field investigations to help students develop the skills of asking questions, gathering information, making measurements using non-standard units, with tools such as a hand lens or balance scale to extend their senses, constructing explanations, and drawing conclusions.

During the experiment:

Kinder and 1st grade:

- **Encourage students to share their Observation and to ASK QUESTIONS!!! (such as: it makes noise when you shake it, it doesn't make noise, there doesn't feel like there is anything in here, what can I use to see in here, how much does it weigh, is it magnetic, etc.)**
- Based on their observations draw conclusions about what might be in the containers. For example, if a student is observing a cotton ball, ask if anyone has ever seen something that has these attributes (or something that the observer is describing). Ask where they saw it, how it was used, etc.

- Try to describe these conclusions. Why did they make their decision? For example, because the objects is white, has strands, is light, etc. we think there is a cotton ball in this container. We have several students who have seen a cotton ball like this, so that is why we all agree it is a cotton ball.

2nd-5th grades (same as above)**:**

- **Observe and ASK QUESTIONS!!!**
- Based on their observations draw conclusions.
- Try to describe these conclusions. Why did they make their decision?

ACTIVE PARTICIPATION:

Explain to the class that you are going to divide them into six groups to observe. Once everyone is ready, then they will start observing. (Divide the class into six groups.)

K-1 only: Since most students in grades K-1 haven't used notebook paper a lot (or at least appropriately), they will need explanation of what their science notebooks are, that they start at the first page, that the top of the book is the part of the paper with the big white space. Also, most will not write on the back of the paper unless you tell them to.

Experiment: Investigating the Unknown:

1) Show the students the possible objects that are in the containers
2) Give each team one of each numbered container (1-4)
3) Give each team a set of tools
4) Have each student write down a number for each container in their science notebook.
5) As they study each container write down any observations (For K-1st have them draw pictures or use any information they can write or draw to help them).
6) Based on their observations have them write down (or draw pictures) what they think is in each container and why they think so.
7) Once they have made their conclusions gather them back into one group and tell them what is in each numbered container. (To settle the kids down and bring a closure to their independent observation behavior).

CLOSURE:

Bring the students' focus back to the importance of SAFETY!!! Talk about what might happen if they did not know what might be in each container. **If they don't know what it is, bring it to an adult!!** Great opportunity to ask if any groups brought a container to the teacher. Ask why they did that. Praise the choice to bring the unknown object to an adult.

1) What other tools might help identify what is in the container? X-ray, magnetic resonance, bright light, open the container (may not always be possible or a good idea. What if what is inside is dangerous?)
2) What if we open the container and still don't know what's inside? (Further observation and study using more tools. What if it's an unknown powder or liquid? For grades 3-5, it might be great to put salt and/or sugar in the containers to let them explore this. They will have more time since K-1 will be VERY slow to write down or draw their observations.
3) Draw or write some ideas you think might help identify different things that you know nothing about? Say a student found an egg shell outside, a dead insect or a small metal container, what should they do with it?