



## Teacher Lesson Plan 4 Creating a Probe for an Unknown Planet

### Overview

Students will create a probe used for characterizing the unknown world. The probes students make will depend on available materials and scientific background.

### Time

One 45 minutes class

### Objectives

Students will

- Determine properties for observation
- Design a probe that will test for the properties in #1
- Analyze the effectiveness of the probe
- Create a scanning system for recording data
- Make a key of the recording system

### Materials

#### *For the teacher*

- Master copies of the Student Guide 4
- Scoring Guide for each student (optional)
- Materials that will be made available to the students
- Scoring Guide for the overhead

#### *For the student groups (Ideas)*

- Height probe - maybe
- Glue
- Magnetic Probe - maybe
- Textured objects such as sandpaper, small old bristle brushes
- Thin sticks or toothpicks
- Clay
- Rigid wire
- Plastic bags
- Tape
- Paper

#### *Material ideas for specific content area studies*

- Litmus or pH probe - litmus paper or pH paper.
- Electrical conductivity probe - wire, tiger clips, battery, light
- Temperature probe – thermometer, ice to cool the world
- Elasticity probe – tube and small ball – can record how high a ball bounces



## Probing the Unknown

### Getting Ready

Organize the materials that the students will use to make their probes. When you are getting the materials prepared for designing a probe, remember to include materials and instruments that students have used in the past.

If you have studied:

Acids and bases - make a litmus probe

Electricity- make a circuit to test for materials that conduct

Temperature changes - students may want to keep the world in a freezer and then with a probe, test the temperature at different levels/times.

Copy the student guides for the students and make sure there is enough material for each. Place the materials in a space where the students will have easy access to them.

### MODIFICATION:

1. As a class determine the properties of the materials before using them.
  - a. Make a chart of the materials/properties.
  - b. Write in the list of properties that are easily identifiable - color, magnetic
  - c. Add to the list of properties that might tell you something if you couldn't see it – electrical conductivity, pH, elasticity, hardness, sound, etc.
2. As a class, brainstorm a list of probes. Assign students into groups to make the probes.
3. Or take a probe that was used in the past and improve it. Height probe – put in notches for easy measuring. Take a magnet probe and try to figure out a way to record the level of its force.

### Motivator – Use a “Sound Probe” around your room

As students are entering the room, tap objects with a stick. Do not say anything. As students continue to enter keep tapping. Record your observations of tapping noises on the board. Ask students if they can identify what you are doing. Tell them that you are identifying the sounds different objects make when tapped with the stick. Then tap something that they cannot see. Ask the students if they can identify the kind of object it is or the structure of the object.



**Brainstorming Ideas for Probes**

***Student Guide 4, Procedure 1***

Now you want to get the students thinking about the kinds of probes that they are going to make.

Begin with a Brainstorm Session:

*Say: You have an unknown world, what kind of information would you want to learn about the world:*

<b>Possible student answers</b>	<i>Teacher response</i>
Size	<i>How can we find that out? Height probe?</i>
Materials it is made out of	<i>What were our options? How can we identify them if we can see or touch them with our hands?</i>
How it sounds	<i>What could we do to hear the sound?</i>
Is it hard? Soft?	
Adhesive or Cohesive properties?	
Do any of the materials conduct electricity?	
Do any of the materials change with temperature?	

**Making the Probe**

***Student Guide 4, Procedures 2-3***

*Say: Write down a property that you would like to discover about the world. Record it on the student guide.*

Students, working two per group, design a probe that can be used to determine the properties for the characteristic that they would like to observe. Again – this may be a challenge for students. Modification: Improve the height and magnet probes and scanning system.

**Testing the Probe**

***Student Guide 4, Procedure 3***

Before students use their probes on an unknown world, students should test it on the world that they have made.

Possible Obstacle: If the students develop a probe that cannot be inserted into the hole in the box.

Possible Solutions: Holes can be enlarged or students can be blindfolded and the lid removed from the box.



### **Create a Scanning System**

#### ***Student Guide 4, Procedure 4***

Students need to devise a recording system and the **range of properties** that they are testing with the probe. Example: If students made a probe that would check texture with a bristle on the end. They may want to identify a range of properties such as smooth, rough and very rough. The scanning key could be:

Smooth	I
Rough	II
Very rough	III

### **Scanning your World**

#### ***Student Guide 4, Procedure 5***

You will need to decide how long you want students to record their scans. If the students create an accurate scan of their world, this can serve as an answer key when students exchange probes in Lesson 5.

### **Analyze your Probe**

#### ***Student Guide 4, Procedure 6***

Some of the probes students choose to make will not work the way the students had intended. You will need to decide how much time students should take to perfect their probe. Is it more important that their probe works or that they can analyze the problems? You decide.