

“BLACK BOX” ACTIVITY

This activity is designed to simulate what it feels like to be a researcher trying to learn about something that cannot be seen or tested directly. Scientists can have the feeling that they are “working in the dark” as they puzzle over the results of their experiments, having no idea what caused the reactions they are observing. Sometimes it takes a special tool to observe, so examples of things that are impossible to observe will depend on the technology available. Before the invention of the microscope, the world of microbes was unobservable. Before the invention of the electron microscope, atoms were unobservable. Even now, the center of the earth is a place we will never be able to examine directly.

In this activity, the place you can't observe directly will be the inside of a box. You will be limited to the tools you have at hand, such as your eyes, your ears, your fingers, and perhaps a magnet or pin. You will be designing simple experiments to test your guesses as to what is inside the box.

Time allowance: Variable-- you can play for a short time or a long time.

Number of participants: This activity can be done with only two people, or you do it with a small group and let the participants share ideas and do brain storming.

You will need:

- an empty box, or boxes
- large rubber band or some tape to keep the box closed (if necessary)
- Optional: pin or magnet
- various items from around the house

What to do:

- 1) One person will be the “knower” and all others will be guessers (playing the part of researchers).
- 2) The knower secretly chooses an object and places it in the box. Ideas for objects you might want to use: rubber band, paper clip, marshmallow, pencil, crayon, spool of thread, paper towel, spoon, dice, several pennies, spaghetti noodles, marble, golf ball, small book, etc. NOTE: The item chosen must be one that the guessers know about. You can't choose something that the guessers have never seen before.
- 3) The knower makes sure the item is securely in the box. Use a rubber band or tape if necessary. You don't want the item falling out if the box is shaken (which it will be).
- 4) The guesser(s) then take the box and think of ways to gain information about what is inside. For example: Does it roll? Is it heavy? Does it slide slowly if you tip the box just a bit? Will it roll one way but not the other? Does its position inside the box cause different results? If you have a magnet, you can do this test right through the cardboard. Make sure the magnet is strong enough. If the guesser permits, perhaps you might be allowed to stick a pin into the box and try to poke the object.
- 5) OPTION: You might want to allow the guessers to ask “yes or no” questions, such as “Will it float if I fill the box with water?” or “Will it melt if I put the box out in the sun or in the oven?” or “Will it change shape if I could take all the air out of the box and create a vacuum?” or “Would it be unusable if it became wet?” If the knower doesn't know, the answer can be, “I don't know.” Sometimes researchers don't get all their questions answered!
- 6) You may want to set a time limit for guessing, such as one minute or five minutes.

Another variation you can try:

Line up a set of objects that are similar in shape/size. (For example, you could cut bread into cubes or rectangles or triangles. Or you could find objects of similar size or weight such as spool, marshmallow, ping pong ball, small ball of string, fuzzy pom pom, clump of rubber bands, soft cat toy, etc) Put the objects into a bag so no one will see which is missing. The guessers might be surprised how challenging it is to figure out the puzzle, even knowing the options ahead of time.