



Thread the Needle

Did you know you are able to perceive depth because your left and right eye see things slightly differently? What type of adjustments would you have to make if you only had vision in one eye? Explore how your brain creates a three-dimensional image of the world in this eye-opening activity.

TEKS:

SCI 7.3 B: The student is expected to use models to represent aspects of the natural world such as human body systems and plant and animal cells.

SCI 7.12 A: The student is expected to investigate and explain how internal structures of organisms have adaptations that allow specific functions such as gills in fish, hollow bones in birds, or xylem in plants.

Materials:

- Modeling clay
- Pencil (or dowel)
- Washer with a hole that is a little larger than the pencil's diameter (so the pencil can fit through it)

How To:

1. Use a small piece of modeling clay to stand the washer on its edge.
2. Hold the clay with the washer in one hand and the pencil in the other. Hold the washer so that the edge is facing you (NOT the hole) and extend your arm in front of you.
3. Close one eye and try to put the pencil through the hole in the washer. Were you able to do it?
4. Switch eyes and try again. Were you able to put the pencil through the hole this time?
5. Now try to put the pencil through the hole in the washer with both eyes open. Was it easier?

STEM Explanation:

In order to judge distance and depth, your brain uses the difference between what your left eye sees and what your right eye sees. Pick an object to stare at. Cover up your left eye and look at it, then switch to covering up your right eye. Did the object seem to shift? Your brain combines these different views to create a three-dimensional picture of the world. Take this experiment further. Close one eye and, at the same time,

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move your head from side to side as you try to put the pencil through the washer. Does this change anything? Your eyes work as lenses to focus light and then create an image that is sent to your brain. When a person only has vision in one eye, they aren't able to see depth in the same way as someone with vision in both eyes because they do not receive two inputs at one time (one from the left eye and one from the right). Instead, they perceive depth by comparing the different views they get from one eye at two separate times. Because people with vision in only one eye don't receive two image inputs at once, they cannot perceive depth as well as a person with vision in both eyes.

Career Connection:

Optical engineers design components of optical instruments such as lenses, microscopes, telescopes, and other equipment that use properties of light. They must have knowledge about the physics of light and how light reacts to the outside world and materials in order to control, direct, and manipulate light to behave in a certain way. Optical engineers can work in research or product development. They may make an existing product better or invent something new. Optical engineers may work at electronics, computer manufacturing, and medical equipment companies.

Resources:

<http://www.exploratorium.edu/snacks/thread-needle>

<https://www.youtube.com/watch?v=syaQgmx5i0>

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