



Science in the Dark

About:

When most of us head inside for the evening, the world continues to have much to explore! Use these activities to learn all about how we can feel more comfortable in the darkness of night.

Objective:

To use Social Emotional Development and NGSS informed practices to help youth explore their self-awareness while understanding more about their environment and how their eyes respond to light.

Age: 12-18

Expected time: 10 minutes/activity

Activities to do in total darkness outside (or in your dark bathroom)

1. Disappearing Head

Materials & Setting: 2 people, total darkness

- Pair up and focus on your partner's face.
- Partners will notice their each others heads begin to disappear.
- What happens when you shift your eyes back and forth after the head disappears?
- **The reasoning why:** We have "cones" in the middle of our eyes, which are really powerful and help us tell colors and read, but they need light to work. When it's dark we actually have a blind spot in our vision, which is what you just experienced. In the colored part of our eyes, we have rods. These rods are much more sensitive and can function without as much light. When you see at night you're actually using your peripheral vision, and once you start moving your eyes your brain puts the image you see together.

2. Lifesavers

Materials & Setting: Wint-o-Green Lifesaver Mints (In the green package),

2 people, total darkness

- Pair up, one person put the mint in their mouth and chew with their mouth open. The partner without mints is watching for sparks!
- Switch roles
- What happens if you use more than one?
- **The reasoning why:** The sparks are essentially bolts of lightning in your mouth. Plenty of other substances also give off light when rubbed, crushed, or broken, we just wouldn't put them in our mouths. This is called triboluminescence (Try-bo-loom-in-es-cents). When sugar is fractured (like chewing the lifesaver) separate patches of charge form on the new surfaces or on opposite sides of the crack. The difference in charge compels electrons to leap across the gap, back and fourth and neutralize the patches. When these jumping electrons come in





contact with nitrogen in the air (our air is 78% nitrogen) they emit tiny blue-white bolts of light at the same wave length as natural lighting.

3. Light and Color Activity

Materials & Setting: 1 person, a crayon without the paper, scrap paper, total darkness

- In total darkness examine the crayon and determine the color (don't get fancy with the color name, just basic red/green/blue/etc.)
- Write the name of the color on their piece of paper
- Turn on the light. Were the guesses correct? Most of the time no, the majority of guesses will be wrong if in actual darkness.
- **The reasoning why:** Your retina has two types of cells: rods and cones. Cones see in color, but their number is much smaller and they aren't very sensitive. Rods are much more numerous and sensitive, but they don't see color. Therefore, when you're in the dark you only see with your rods: you can make out shapes that your cones would never pick up, but you lose the capacity to distinguish color.

4. The Brightest Light in the Universe

Materials: 2 people, flashlight

- Do this activity after you've been in the dark at least 10 minutes.
- Cover one eye completely with your hand. The other eye is uncovered.
- Turn on your flashlight. Look at the flashlight for 15-20 seconds.
- After you turn off the light look around with the uncovered eye.
- Now close the eye which was exposed to light and look around with the eye that was closed. Note the difference between the two eye sights.
- **The reasoning why:** Looking with their closed eye, things should appear clearer and brighter. This is due to a chemical called rhodopsin. Our eye produces this chemical in low-light situations to improve our night vision. Within 5 minutes of being dark we can see 1000 times better than when we initially went into the dark. When our eyes are exposed to light all the rhodopsin we've been producing instantly is destroyed making our night vision poor again. Our eyes will not be able to produce rhodopsin again until we are out of the light.



Fun Fact: Pirates didn't just have a lot of crew members with missing eyes which they needed to wear eye patches for. They did a lot of going above and below (where it was dark) the ship. Wearing an eye patch allowed them to see both above and below board with just a flip of the patch. This gave them an advantage especially when attacking a ship.

Wrap Up:

- What did you learn?
- What was your favorite experiment? Why?
- How does light play a role in how our eyes function?
- Tell me about why our bodies function differently in the light and in the dark?