TOOLKIT

TOOLKIT: UNDERSTANDING RAINBOWS

THEME: LIGHT
SUBJECT: SCIENCE
ARTIST: DANNY BRACKEN / JAMES TURRELL
GRADE: recommended 1st-4th grade

OBJECTIVES

Students learn about light, rainbows and their connection to each other.
Students experiment with light and prisms.
Students learn about the color spectrum.

VOCABULARY

Dispersion: The separation of all the colors of light. Dispersion is what happens when sunlight passes through a prism and is split up into the colors of the rainbow.
Prism: A clear object, usually glass, that light passes through to make a rainbow (raindrops can be prisms; that's how rainbows are made)
Spectrum: the colors we see in a rainbow: red, orange, yellow, green, blue, indigo, violet
White Light: colorless light (i.e. ordinary daylight). This contains all the wavelengths of the visible spectrum at equal intensity.

KEY QUESTIONS

1. When do you see a rainbow?
2. What colors are in a rainbow?
3. What natural elements create a rainbow?
4. Where do the colors come from?

VISUAL REFERENCES

1. *What Does it Mean?* (2014) by Danny Bracken
2. *Again and Again* (2014) by Danny Bracken
3. *Is Always* (2014) by Danny Bracken
3. *Catso, Red,* (1994) by James Turrell
4. *Danaë*, (1983) by James Turrell

ACTIVITY

Spend time together as a group talking about *white light* and how Isaac Newton discovered that all the colors of the rainbow are in sunlight but we cannot see them until they are separated or *dispersed.* Then take a *prism* into the sunlight and see if you can make your own rainbow by allowing the sun to shine through the *prism*. What happens when you move around or look at different sides of the *prism*? You can also try to shine different types of light through the *prism* to see what happens. Discuss how a rain droplet is a tiny *prism*, and how a rainbow is made through hundreds of rain droplets. Explain how each color bends a little differently; that is how the colors separate and is also what decides the color order: red, orange, yellow, green, blue, indigo, and violet. Each student can draw his or her own *prism* and rainbow.

TOOLKIT

PENNSYLVANIA CORE STANDARDS
***SCIENCE** / Chemistry and Physics*

1st Grade
(3.2.1.B5)
-compare and contrast how light travels through different materials
-explore how mirrors and prisms can be used to redirect a light beam

3rd Grade
(3.2.3.B5)
-recognize that light travels in a straight line until it strikes an object or travels from one material to another

4th Grade
(3.2.4.B5)
-demonstrate how vibrating objects make sound and sound can make things vibrate
-demonstrate how light can be reflected, refracted, or absorbed by an object

1st Grade-4th Grade
(3.3.1.B7-3.3.4.B7)
-distinguish between scientific fact and opinion
-ask questions about objects, organisms, and events
-understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known
-plan and conduct a simple investigation and understand that different questions require different kinds of investigations
-use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information
-use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge
-communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists