

SUGGESTED TEACHING STRATEGIES: INVESTIGATIONS & EXPERIMENTS

1. What is an atom?
 - a) Imagine how an atom looks. Now sketch, doodle, or draw it.
 - b) An atom is made of several parts. Describe and explain them.
2. How many kinds of atoms do you think there are in the universe? Investigate. Share your discoveries.
3. The colors we wear can affect people's moods, feelings, and attitudes. Conduct a study about color and its role in social interactions.
 - a) When people are wearing the same color, do they appear to be more friendly toward one another? Do they bond socially?
 - b) When a person wears an exceptionally bright or "loud" color, how do others interact with him/her? Do others gravitate toward the person? If so, do they appear to be happy, friendly, or cheerful? Do others avoid the person?
 - c) Interview people wearing black or dark colors. Ask them how they are feeling.
 - d) Interview people wearing white. Ask them how they are feeling.
4. Light travels at 186,000 miles per second.
 - a) Do you think it would be faster to send information with light or electricity?
5. Optical fibers (or fiber optics) are made of ultra thin strands of glass; light can be transmitted through optical fibers to carry information with it.
 - a) Do you think it would be faster to send information through optical fiber cables or electrical cables? Why?
6. Research fiber optics.
 - a) When did scientists create optical fibers? Why?
 - b) How does light move through optical fibers?
 - c) How do telephone and t.v. companies use optical fiber cables?
 - d) Do airplanes and cars use optical fibers to transmit light? Explain.
 - e) Doctors use fiber optic endoscopes. How do you think these special endoscopes work? Do doctors use them in surgery?

7. Experiment with additive color mixing. Begin with two primary colors. Add another color to these primary colors and mix; then add another color and mix; finally, add another color and mix.

- a) What two primary colors did you start with in your experiment? What color did you add to these? What color resulted?
- b) What other colors did you add and mix? Describe the new colors you created.

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GLOSSARY

Absorbed light: Light that is absorbed or taken into an object.

Additive color mixing: When a color is mixed with two existing primary colors. Each time a color is added to the mixture, the total amount of light reflected back to our eyes increases.

Amplification: When something is made larger.

Apollo 11: A spaceflight to the moon in 1969; American astronaut, Neil Armstrong, became the first person to walk on the moon during this space exploration.

Atom: The smallest particle of an element that can exist either alone or in combination; it consists of protons and neutrons in a central nucleus surrounded by electrons.

Bar code: Label which contains information about a product. A laser beam is used to scan and read this information.

Cyan: A primary color of pigment which reflects blue and green light.

Color separation: The process of separating the primary colors and black into four, separate color images; these images are printed, one on top of the other, to recreate a quality picture.

Compact disk (CD): A disk containing information on its narrow, spiral track. Laser light reads the information and sends an electrical signal back to speakers or receivers; it is then changed into soundwaves.

Electromagnetic spectrum: The whole range of electromagnetic wavelengths, including radio waves, infrared radiation, visible light, ultraviolet radiation, X-rays, and gamma rays.

Emission (of light): To throw or give off light.

Filament: A wire in an incandescent light bulb. When the filament heats up, it produces white light.

Fluorescent light: Light produced when electricity flows through a special gas contained in a tube or bulb; the electricity causes the gas to react with a special coating inside the container to produce white light.

Incandescent light: Light produced from heat.

Laser: A device that produces an intense beam of light containing only one color and one wavelength (Light Amplification by Stimulated Emission of Radiation).

Light: The narrow strip or band of electromagnetic radiation that we can see.

Luminescent light: Light produced when electricity reacts with special gases (Fluorescent and neon lights are luminescent).

Magenta: A primary color of pigment which reflects blue and red light.

Neon light: Light produced when electricity flows through neon gas contained in a tube or bulb; the electric current causes the gas to glow bright red or other special colors.

Opaque objects: Objects which do not produce their own light, but reflect light that hits them.

Pigment: A substance in an object that imparts black, white, or color; pigment determines which colors are absorbed or reflected.

Pointillism: A method of painting where tiny dots of color are painted next to one another to create the effect of a single color image. The tiny dots are not seen when viewed from a distance.

Primary colors of light: The basic colors of light: red, blue, and green.

Primary colors of pigment: The basic colors of pigment: magenta, yellow, and cyan.

Prism: A geometrically shaped piece of glass or other transparent material which separates white light into the colors of the visible spectrum.

Pupil (of eye): The usually round opening in the iris of the eye that contracts and expands to control the amount of light falling on the retina. Light reflected on an object enters the eye here.

Reflected light: Light that is reflected, bounced off, or thrown back from an object.

Refraction: When light bends, travelling from air to a prism, and back to air.

Retina: The inner surface or sensory membrane of the eye which receives the image formed by the lens and transmits information about color to the brain.

Seurat (George): French painter who used a method of painting called Pointillism.

Subtractive color mixing: Mixing many pigments together to subtract colors from the spectrum; when this occurs, fewer colors are reflected to our eyes.

White light: All the colors of light combined.

QUESTIONS FOR THOUGHT, DISCUSSION, AND FURTHER STUDY

1. Can you think of some sources of white light other than the sun?
2. If sunlight is white, why does the sky look blue?
3. Do you think the sun shines in space? Then why does space look black?
4. Some studies have shown that certain colors have an emotional effect on people. Do different colors affect your mood?
5. How many places can you think of where you have seen fluorescent lighting? Do you know why fluorescent lighting is frequently used?
6. If you touched a neon or fluorescent light that was "on," how would it feel?
7. How do you think bright, "neon" colors are made?
8. Based on what you know about color mixing, do you think there are colors that have not been discovered yet?
9. Can you think of ways to make dyes from things found in nature, such as plants, vegetables, or animals?
10. What do you think about Seurat's method of painting called Pointillism? Would you like to try it?
- 11.. What does the word "laser" actually mean? (acronym)
12. How has artificial light changed the way we work and live?
13. How many different machines can you think of that use lasers?
14. What actually happens when a light bulb "burns out?"
15. Does a compact disk use laser light? If so, how does this work?
16. Does a regular light bulb in your house produce incandescent or luminescent light? Which do you prefer? Why?