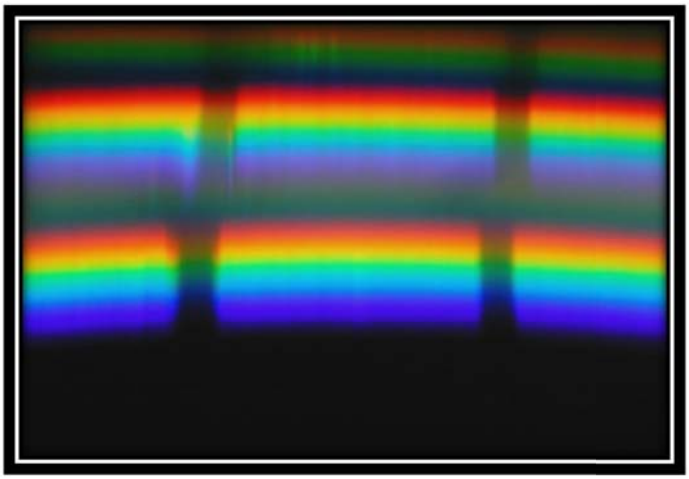
PHYSICS OF LIGHT

GRADE 1

ASSESSMENT PACKET

Dip into the fascinating field of light by learning about illumination, brightness, refraction, reflection, beam scattering, optical density, and more as you use lenses, mirrors and filters to build cameras, telescopes, microscopes, a scientific optical bench and more.



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This curriculum is aligned with the National State Standards and STEM for Science.

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Educational Goals

Energy can take one of two forms: matter and light (called electromagnetic radiation). Matter is what stuff is made from, like a chair or a table, and we'll talk a lot more about matter when we get to chemistry.

Light is energy that can travel through space and through some kinds of matter, like glass. Another word for light is "electromagnetic radiation". Light can have high energy, lower energy, or anything in between… kind of like high energy kids (the ones who race all over the playground), lower energy kids (the ones reading a book in a corner), and kids whose energy is somewhere in the middle.

Scientists usually refer to the light energy you can see with your eyes as "visible light", or just "light", and it has middle-of-the-road amounts of energy – not high, not low. Just average. That kind of electromagnetic radiation is called "light".

Here are the scientific concepts:

- Light has a source and travels in a direction.
- Sunlight can be blocked to create shadows.
- Light is reflected from mirrors and other surfaces.
- The color of light striking an object affects how our eyes see it.
- We see objects when light traveling from an object enters our eye.
- Light can travel through a vacuum, like space.
- Light can change speeds, but the maximum speed is through a vacuum (186,000 miles per second).
- Prisms un-mix light into its colors or wavelengths.
- Light changes speeds when it passes through a different material.
- Lenses work to bend light in a certain direction, called refraction.
- Concave lenses work to make objects smaller and convex lenses make them larger.

Physics of Light Grade 1 Evaluation

Teacher Section

Overview: Kids will demonstrate how well they understand important key concepts from this section. Some kids at this level are not reading quite yet, so you'll need to work together with them and observe them carefully as you go in order to understand what they know as they may not be able to tell you directly.

Suggested Time: 20-30 minutes

Objectives: Students will be tested on the key concepts:

- Light has a source and travels in a direction.
- Sunlight can be blocked to create shadows.
- Light is reflected from mirrors and other surfaces.
- We see objects when light traveling from an object enters our eye.
- Light can travel through a vacuum, like space.
- Prisms un-mix light into its colors or wavelengths.
- Light changes speeds when it passes through a different material.
- Lenses work to bend light in a certain direction, called refraction.

Physics of Light Grade 1 Explorations

Teacher's Outline with Answers

Teacher/Parent: This is not a quiz. This is a chance for you to explore the key concepts with your student to you can understand what they know and where they still need work. Read each question aloud and do the action and invite the students discuss their answers with you to help them answer the questions. Answers and/or experiment references given in parenthesis. If you've completed the lab experiments, then you should have no trouble answering these questions. Feel free to grab the materials you used in the lab experiments as you go through the questions together.

Materials:

- Glass of water
- Pencil
- Pinch of flour or drops of milk
- Four flashlights (white, red, green, and blue)
- Two handheld magnifiers
- Dollar bill

Questions to Explore Together:

1. What three colors of light make up white light? (Red, blue, and green.)
2. Demonstrate how water can be used as a prism. (Refer to *Liquid Prism* Experiment.)
3. Dip the pencil in the glass of water, and explain why the pencil appears broken depending on the way you look at it. (Refer to *Light Tricks* Experiment on refraction.)
4. Take a few drops of milk or a pinch of flour and add it to the glass of water. Now shine a strong flashlight on the jar (turn all other lights off) and use this to explain why the sky is blue and why sunsets are red. (Particles in the atmosphere determine the color we see for the sky. Look for a color tint as you angle the flashlight through the jar. The color of the sky of different planets depends on the color light the star gives off as well as what's in the atmosphere of the planet.)
5. Show an adult the own on the dollar bill by making a microscope for them to look through. (Refer to *Microscopes and Telescopes* Experiment.)

Physics of Light Grade 1 Evaluation

Student Worksheet

(Teacher: You'll need to go over the instructions with the kids and work with them on this part.)

Overview: You're going to show your teacher how much of this science stuff you already know. Choose one of the following activities:

a. Make up a short story about light from the point of view of the rainbow or light wave. You can act it out if you want to with costumes and everything.
b. Draw a poster that teaches the main concepts of light and how it works (reflection, refraction, etc.). When you're finished, you'll use it to teach your parent or teacher and demonstrate what you've learned.
c. Invent a light show machine that displays different colors and shapes on the wall using flashlights, lenses, mirrors, and transparent objects (like water bottles, soap bubbles, plastic wrap, etc). Put on a show and describe how it works to your audience.