

Using a Light Sensor to Measure Absorption

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Subject: Physics

Grade Level: 3-8

Standards: Next Generation Science Standards (www.nextgenscience.org)

MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

Schedule: 2-3-60 minute classes

<p><u>Objectives:</u></p> <p>Learn about properties of light (absorption, transmission, and reflection) and use a light sensor to test different solutions and materials.</p>	<p><u>Vocabulary:</u></p> <p>Absorption Scattering Reflection Transmission Refraction</p>
<p><u>Students Will:</u></p> <p>Learn more about how light behaves.</p> <p>Use experimental observations to define new vocabulary.</p> <p>Learn how to use a light sensor to measure absorption.</p> <p>Design and run an experiment to test a variable and see its effects on light absorption.</p>	<p><u>Materials:</u></p> <ul style="list-style-type: none"> - Phone or Chromebook w/Light Sensor (Arduino Science Journal App): https://science-journal.arduino.cc/sj/module/getting-started-1/lesson/setting-up-experiments - Measuring cup - Clear glass or plastic cup - Various household liquids - Various materials (eg: paper, cardboard . .)
<p>Safety</p>	<p>There are no safety concerns with this activity</p>



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Science Content for the Teacher:

“Light” (more precisely, *visible* light) is the type of electromagnetic radiation that is detectable by the human eye. Light, as with all matter, can be described either as a wave or as a particle (a “photon”). On this page we will describe some of the wave behaviors of light.

Have students go to the following sight to learn about 3 properties of light (absorption, transmission, and reflection):

“Reflection, Absorption, & Transmission.” *Maggie’s Science Connection*,
maggiesscienceconnection.weebly.com/reflection-absorption--transmission.html

Procedure:

Have students follow the setting up experiments tutorial for the Arduino Science Journal:
<https://science-journal.arduino.cc/sj/module/getting-started-1/lesson/setting-up-experiments>

Experiment 1 - Measuring and Observing Light Absorbance using a Light Sensor

Have the students follow the *Properties of Light* activity and perform the demos, investigating how the properties of light are manifested through studying different materials.

Experiment 2 - Measuring and Observing Light Absorbance of Different Materials

Before starting, review terms from Activity 1 again to make sure students understand what they mean and what examples best describe these phenomena.

Use the presentation to introduce the activity to students, and guide them through the various parts to investigate further the properties they learned about in the first activity.

Experiment 3 - Testing a Variable to See How it Affects Light Absorbance

Students will design and run an experiment to test how a variable affects the absorption of light.

Resources:

Illustrations of absorption, reflection, transmission for different colors of light: [goo.gl/H44ShM](http://www.easycoursesportal.com/basicphotographycourseiii/coursec/Less-8.htm)
<http://www.easycoursesportal.com/basicphotographycourseiii/coursec/Less-8.htm>

Additional Activity “Make a Light Fountain”: [goo.gl/4eECRj](http://www.optics4kids.org/home/content/classroom-activities/medium/make-a-light-fountain/)
<http://www.optics4kids.org/home/content/classroom-activities/medium/make-a-light-fountain/>



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