

KIT TITLE: Lighting and Optics

GRADE LEVEL: 7-12

OBJECTIVES:

- Students will be able to compare the focal length of plane, circular, and parabolic mirror at varying distances from a light source
- Students will be able to compare the optical scattering of square, convex, and concave translucent mediums at varying distances from a light source

Next Generation Science Standards (NGSS)

<p>NGSS Performance Task</p>	<p>MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.</p> <p>HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.</p> <p>HS-PS4-3. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.</p>
<p>NGSS Disciplinary Core Ideas (DSI)</p>	<p>PS4.B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> • An object can be seen when light reflected from its surface enters the eyes. • Photoelectric materials emit electrons when they absorb light of a high-enough frequency. <p>PS4.A: Wave Properties</p> <ul style="list-style-type: none"> • A sound wave needs a medium through which it is transmitted. <p>PS4.B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> • When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object’s material and the frequency (color) of the light.

	<ul style="list-style-type: none"> • The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. • A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. • However, because light can travel through space, it cannot be a matter wave, like sound or water waves. <p>PS4.C: Information Technologies and Instrumentation</p> <ul style="list-style-type: none"> • Multiple technologies based on the understanding of waves and their interactions with matter are part of everyday experiences in the modern world (e.g., medical imaging, communications, scanners) and in scientific research. They are essential tools for producing, transmitting, and capturing signals and for storing and interpreting the information contained in them.
<p>NGSS Cross Cutting Concepts (CC)</p>	<p>CC-2 Cause and Effect</p> <ul style="list-style-type: none"> • Cause and effect relationships are routinely identified. <p>CC-6 Structure and Function</p> <ul style="list-style-type: none"> • Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. <p>HS CC-2 Cause and Effect</p> <ul style="list-style-type: none"> • Systems can be designed to cause a desired effect. <p>Interdependence of Science, Engineering, and Technology</p> <ul style="list-style-type: none"> • Science and engineering complement each other in the cycle known as research and development (R&D). • Influence of Engineering, Technology, and Science on Society and the Natural World • Modern civilization depends on major technological systems.

<p>NGSS Science and Engineering Practices (SEP)</p>	<p>SEP 2- Developing and Using Models</p> <ul style="list-style-type: none">• Use models to describe phenomena. <p>SEP 7- Obtaining, Evaluating and Communicating Data</p> <ul style="list-style-type: none">• Communicate technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).
---	---

Common Core Standards (CC)

<p>CC- ELA/Literacy Standards</p>	<p>SL.4.5</p> <ul style="list-style-type: none"> Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. <i>(4-PS4-2)</i> <p>SL.8.5</p> <ul style="list-style-type: none"> Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. <i>(MS-PS4-2)</i> <p>RST.11-12.8</p> <ul style="list-style-type: none"> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
<p>CC-MATH Standards</p>	<p>MP.2</p> <ul style="list-style-type: none"> Reason abstractly and quantitatively. <p>MP.4</p> <ul style="list-style-type: none"> Model with mathematics