

Refraction Assignment – Student Edition

I. Online Simulation: Bending of Light

Instructions:

- Visit the online interactive simulation that will allow you to explore how light bends as it interacts with various materials. For this activity, click INTRO and do the simulation.

Link: https://phet.colorado.edu/sims/html/bending-light/latest/bending-light_en.html

- Answer the questions below:

Questions:

1. What happens to light as it hits the surfaces of two media at an angle?

2. What happens to light when it hits straight the surface of one medium to another?

3. How will you describe light refraction as it travels from less dense to a denser material?

4. How will you describe light refraction as it travels from a denser to a less dense material?

5. Will there be a refraction of light when it hits two media of the same kind with same refractive index?

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II. True or False

Decide whether the statement is true or false. If the statement is false, change the underline word/phrase to make the statement true and correct.

1. Refraction happens when light bounces as it hits a smooth surface.

2. The change in speed as light travels through different media causes it to refract.

3. Index of reflection is a dimensionless number that describes how fast light travels through a material.

4. The greater the refractive index of the substance, the lower the light's refraction.

5. Refractive index measures how much light decreases in speed when it passes through a medium.

6. A dense material has a low refractive index.

7. The refracted ray is the ray that passes through an interface between two media and travels into the other side of the interface.

8. Light that moves straight from one medium to another is not refracted.

9. A converging lens bulges at the middle and thins at the edges.

10. A diverging lens always produces a real image when light passes through it.

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III. Compare and Contrast

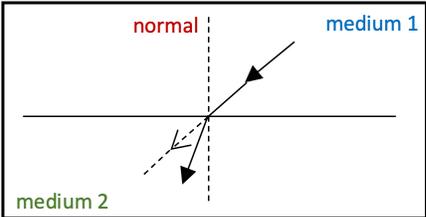
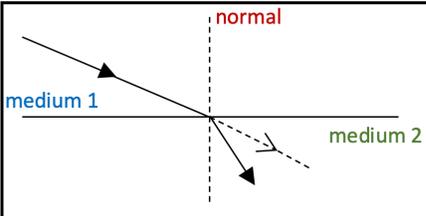
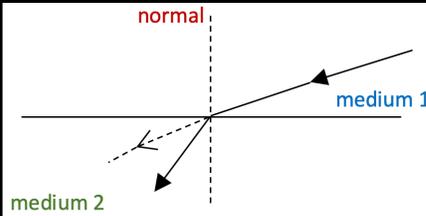
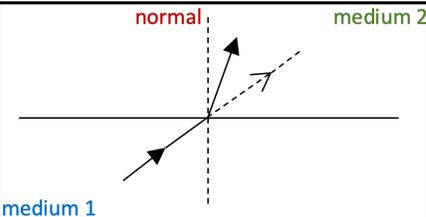
Complete the T-diagram below to compare and contrast converging and diverging lenses.

Converging Lens	Points for Comparison	Diverging Lens
<hr/> <hr/>	<i>Material it is made of</i>	<hr/> <hr/>
<hr/> <hr/>	<i>Shape and appearance of surface</i>	<hr/> <hr/>
<hr/> <hr/>	<i>Types</i>	<hr/> <hr/>
<hr/> <hr/>	<i>Direction of light rays that pass through it</i>	<hr/> <hr/>
<hr/> <hr/>	<i>Behavior of light as it interacts with it</i>	<hr/> <hr/>
<hr/> <hr/>	<i>Image formed as a result of light interaction</i>	<hr/> <hr/>

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IV. Analyzing Diagrams

Analyze and describe how light is refracted in each diagram. *Is the light being refracted toward the normal or away from the normal? Which medium has a high or low refractive index which results in the given direction of refraction of light in each diagram?*

Diagram	Direction of Light Being Refracted	Refractive Index of Media Involved
 <p>A horizontal line separates medium 1 (top) and medium 2 (bottom). A vertical dashed line is labeled 'normal'. An incident ray in medium 1 approaches the interface from the top right. The refracted ray in medium 2 bends away from the normal, moving towards the bottom right.</p>		
 <p>A horizontal line separates medium 1 (top) and medium 2 (bottom). A vertical dashed line is labeled 'normal'. An incident ray in medium 1 approaches the interface from the top left. The refracted ray in medium 2 bends toward the normal, moving towards the bottom left.</p>		
 <p>A horizontal line separates medium 1 (top) and medium 2 (bottom). A vertical dashed line is labeled 'normal'. An incident ray in medium 2 approaches the interface from the bottom left. The refracted ray in medium 1 bends away from the normal, moving towards the top right.</p>		
 <p>A horizontal line separates medium 1 (bottom) and medium 2 (top). A vertical dashed line is labeled 'normal'. An incident ray in medium 1 approaches the interface from the bottom left. The refracted ray in medium 2 bends toward the normal, moving towards the top left.</p>		

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V. Providing Explanations

Identify the type of lens that is used in each material below. Then, briefly explain why that type of lens is best suited for the given material.

Material	Type of Lens Used	Explanation on Why the Lens is Best Suited for It
 <p>binoculars</p>		
 <p>magnifying glass</p>		
 <p>light torch</p>		
 <p>microscope</p>		