

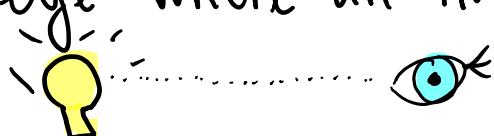
5.1 Notes

March 31, 2020 9:44 AM


Science 8

5.1: The Ray Model of Light

The Particle Model of Light: a model that represents light as a stream of small, fast moving particles that travel in a straight line to the eye where an image is formed



The Ray Model of Light: * This is the model we use in class a model that represents light as a straight line (called a RAY), indicating the path of a beam of light.



What Happens to Light When it Strikes Matter?

- Light travels in a Straight line. It moves at up to 300,000 km/s.
- Light needs no medium to travel, it can move through a vacuum where there is no matter!

When light strikes matter, three things can happen:



1. Light is ABSORBED by the material
 - a. Some objects absorb light better than others. Black objects are the best for absorbing light (remember that black materials will absorb all light that strikes them!)
2. Light is REFLECTED by the material
 - a. A mirror works by reflection. Light strikes an object. The light reflects off the object onto the mirror. The light then reflects off the mirror and into your eyes.

3. Light passes through the material



- a. Only certain substances transmit light. Substances that transmit light are said to be Transparent (See-through)
 - i. Windows, water and air are transparent
- b. Some substances transmit and scatter the light. Substances that transmit and scatter light are said to be translucent (sort of see-through)
 - i. Wax paper and frosted glass are translucent.
- c. Some substances do not transmit light. We cannot see through them at all. These substances are OPAQUE
 - i. Wood and metal are opaque.

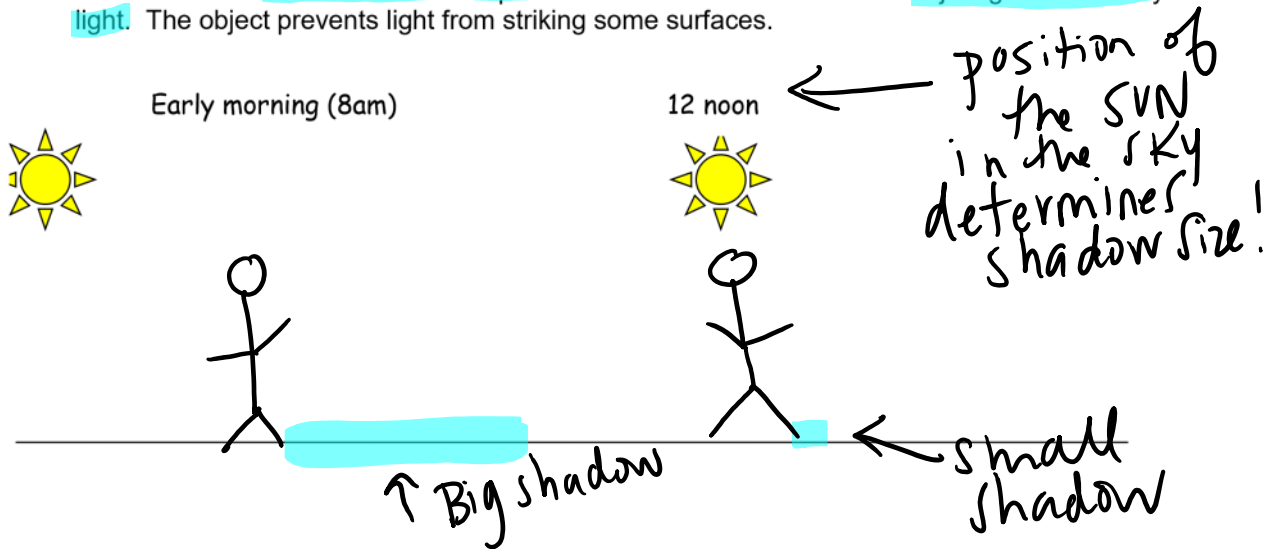
What is a Shadow?

A shadow is a dark area caused by blocked light



If you are walking along the street on a sunny day you see shadows of lampposts, fences, buildings and cars. You can see your own shadow too, and it follows you as you walk. If a cloud was to block the sun, your shadow would disappear!

A shadow is an area of darkness or partial darkness. It forms when an object gets in the way of light. The object prevents light from striking some surfaces.



Reflection



Ray – a single beam of light

Incident Ray – the ray that strikes an object

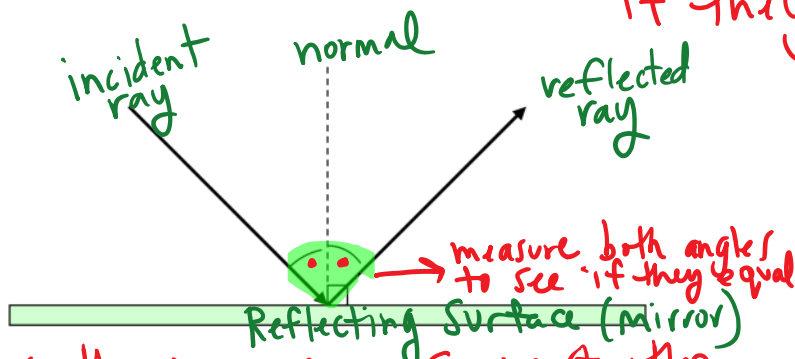
Normal – a 90° angle to the reflecting surface

Angle of incidence – the angle created by incident ray and normal

Reflected Ray – the ray that bounces off an object

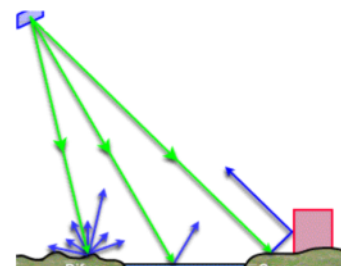
Angle of Reflection – the angle created by reflected ray and normal

Law of Reflection – the angle of incidence = the angle of reflection
* measure w/ a protractor to see if they are equal *



Does the image support the Law of Reflection ???

Note that only smooth surfaces follow the law of reflection. Rough surfaces reflect light in many different directions

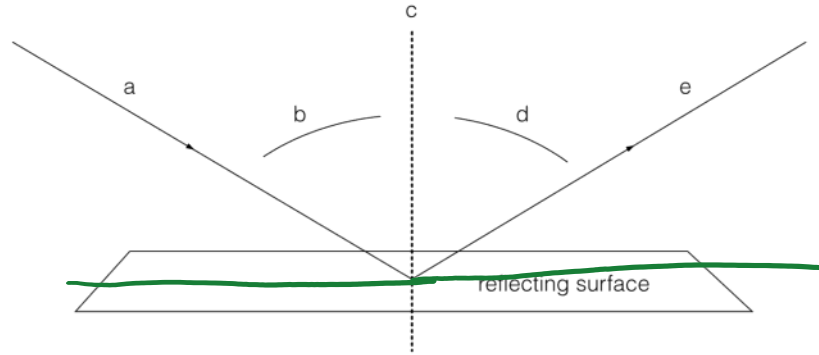


Reflection Activity

Try this!

Name _____
Date _____

1. Label the diagram below using the following terms: reflected ray, normal, angle of reflection, angle of incidence, and incident ray.



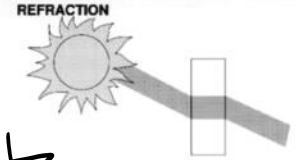
- (a) _____
(b) _____
(c) _____
(d) _____
(e) _____

2. Measure the two angles with your protractor.

Angle of incidence = _____ Angle of reflection = _____

3. Compare the sizes of the angles of incidence and reflection.

Refraction



Light travels in straight lines, but it can also bend.

refracts

When light travels from one medium to another, it _____ (bends)

Refraction causes us to see objects at positions different from their actual positions.

- If you were to look at your hand through a glass of water, would it look the same?

Refraction occurs because light travels at different speeds through different mediums.

Ex. Vacuum – $300\,000\text{ km/s}$ (FAST)
Water – $225\,000\text{ km/s}$ (SLOW)

- The speed at which light travels depends on the density of the medium, the more dense the slower it travels.
- Density is a measure of how closely packed the molecules of a substance are.
 - Gas is less dense than a liquid which is less dense than a solid (with a couple of exceptions like ice!)

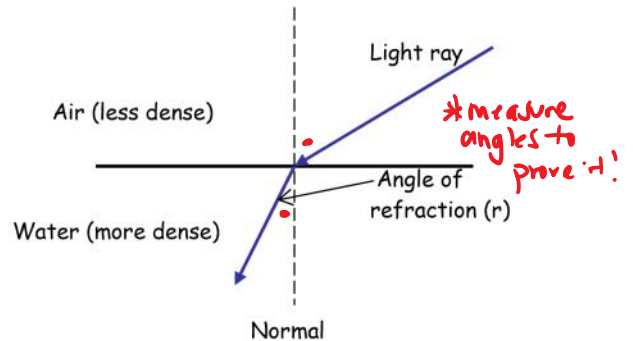


refraction makes this pencil look bent! (it's not...)

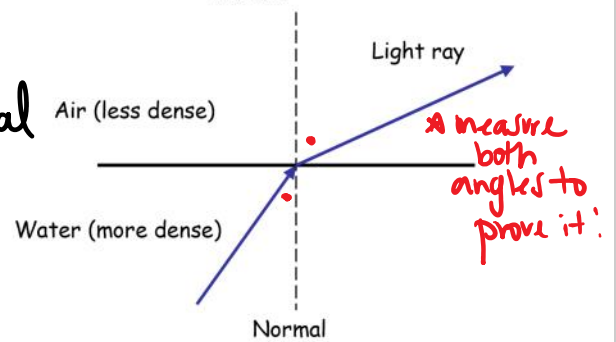
Laws of Refraction

1. Light moves at an angle from a less dense medium to a more dense medium.
Light ray bends toward the normal
(The second medium slows the light down)

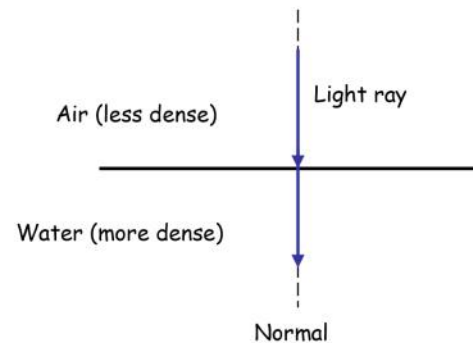
Note: The angle of refraction, r , is always the angle between the refracted light ray and the normal.



2. Light that moves at an angle from a more dense medium to a less dense medium.
ray bends away from the normal
(The second medium speeds the light up)



3. Light that moves straight on from one medium to another.
continues along. It is not refracted.



Science 8

Refraction of light in water

Draw and label the diagram 5.12 on page 175 of your textbook

Refraction of light in air

When light travels through air of different temperatures, refraction occurs.

Warm air is less dense than cold air.

The refraction of light can result in a **mirage** – a misleading appearance or illusion.




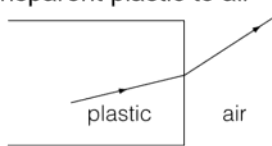


Try this!

Name _____
Date _____

When light moves from one medium (such as air) to another (such as water), the light bends. This is called refraction. The light bends because it changes speed when it moves between materials that have different densities.

For each diagram, draw the normal at the point of contact. Measure the incident angle and the angle of refraction. Then complete the sentences using greater, less, toward, or away from.

<p>1. Air to glass</p>  <p>(a) The angle in air is _____ than the angle in the glass.</p> <p>(b) The light entering the glass bends _____ the normal.</p>	<p>2. Water to air</p>  <p>(a) The angle in air is _____ than the angle in the water.</p> <p>(b) The light entering the air bends _____ the normal.</p>
<p>3. Air to water</p>  <p>(a) The angle in air is _____ than the angle in the water.</p> <p>(b) The light entering the water bends _____ the normal.</p>	<p>4. Transparent plastic to air</p>  <p>(a) The angle in air is _____ than the angle in the plastic.</p> <p>(b) The light entering the air bends _____ the normal.</p>