

Light and Optics - Mirrors and Lenses

Name _____

Date _____

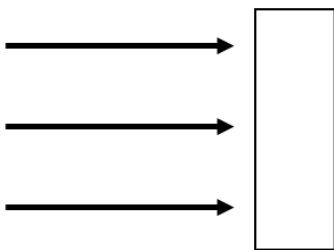
Explaining Light Properties...

- There are two theories to explain how light behaves...
 - The _____ of light that says that light is made up of tiny particles travelling in a _____.
 - The _____ of light that says that light travels in waves, and different colours have different _____ and _____.

Ray Model of Light...

- Light _____ from the source in all directions as straight '_____'.
 - These rays will keep on travelling in a straight line until they are bent (_____), bounced (_____), or _____.
 - The colour of an object depends upon which colours are _____, and which are _____.
 - _____ – light travels right through – objects can be clearly seen on the other side...

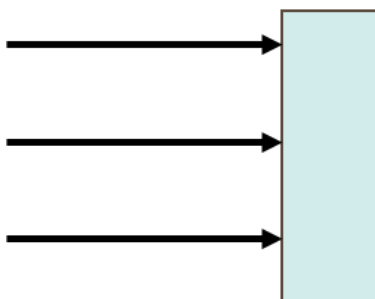
Eg. Regular glass windows.



A. Transparent

- _____ – some light goes through, some gets reflected back, and the image is fuzzy, or completely _____

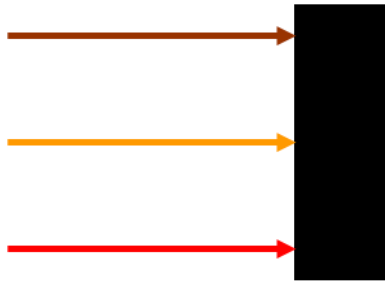
Eg. A shower door



B. Translucent

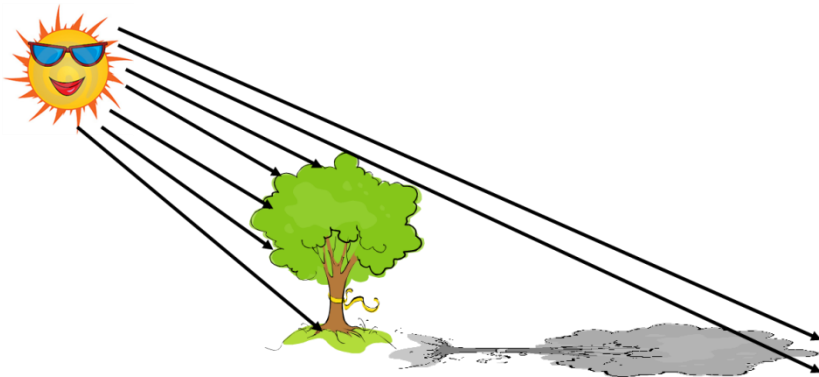
● _____ – No light passes through

— The light is either _____ or _____.



C. Opaque

— Causes shadows...



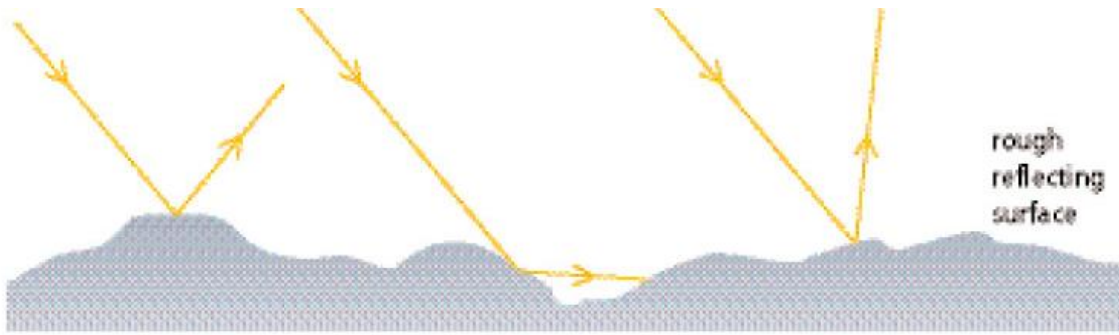
Problem...

● With a ray diagram, show whether your shadow is longer at 1:00pm, or 5:00 pm.



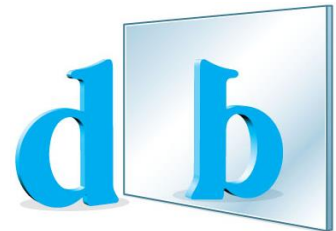
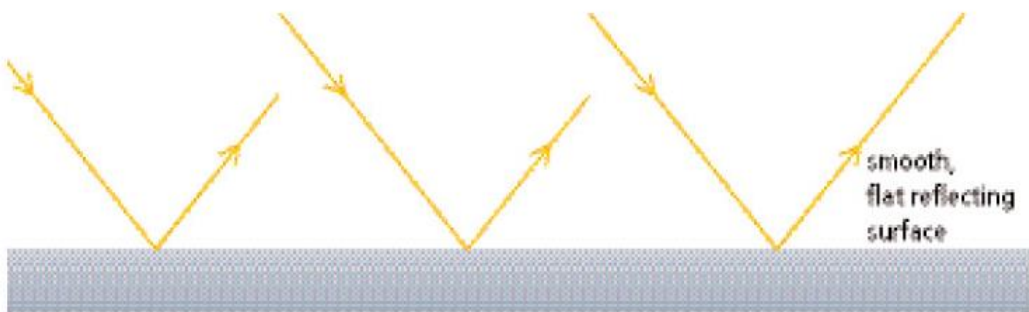
Reflection:

- If an object is _____, light is _____ at all different angles...



(C) Rough surfaces appear to reflect light randomly.

- The surface is unequal, so the light gets bounced all over the place. No _____ is _____.
- _____ will produce a visible image because all the rays reflect at the same _____.



(A) Smooth surfaces reflect all light uniformly.

Law of Reflection...

- _____

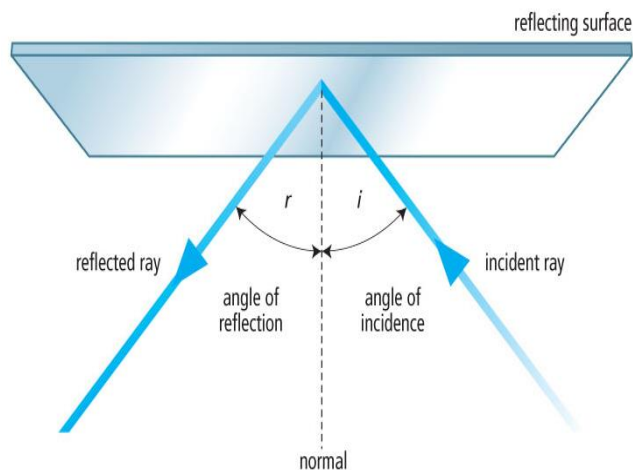
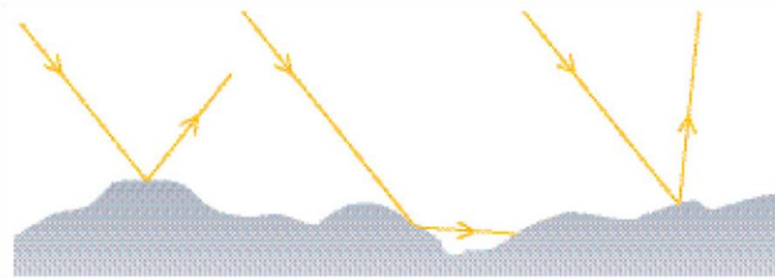


Figure 5.9 Light reflected from any surface follows the law of reflection.

- The law of reflection applies even for uneven surfaces.



Refraction:

- When light enters a more dense substance (_____), it will _____, and _____, or ' _____ ' towards the ' _____ '.
- When it enters a less dense substance, it will _____, and bend _____ from the normal.

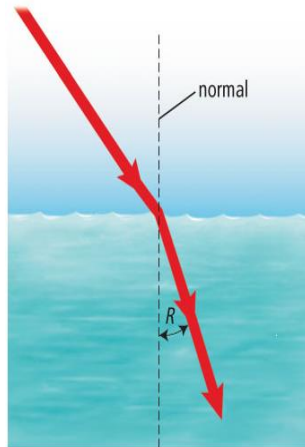


Figure 5.11A When light rays travel from air to water, they slow down and bend toward normal. R is the angle of refraction.

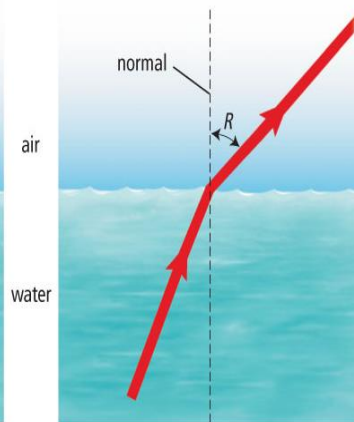
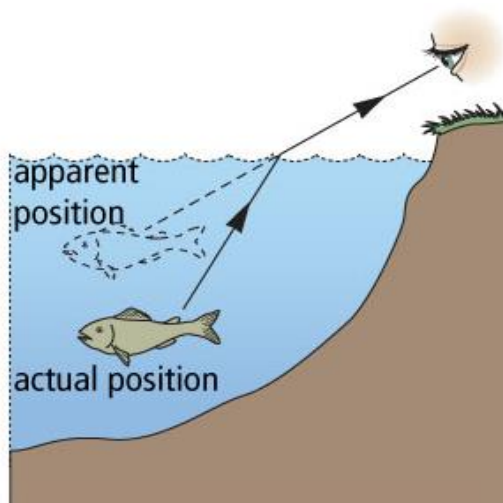


Figure 5.11B When light rays travel from water to air, they speed up and bend away from normal.

- This is seen when you look at a fish in the water – the fish looks _____ than it really is because your eyes and brain don't account for the refraction.



Mirrors:

- _____ (flat) mirrors reflect exactly what is in front of them.
- Your eyes and brain don't account for the mirror, so it looks like the object is _____.
- The distance from the object to the mirror is the _____ as the apparent distance of the _____.

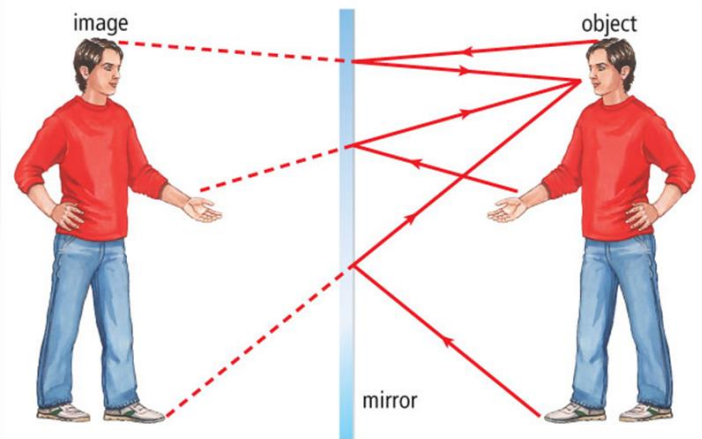
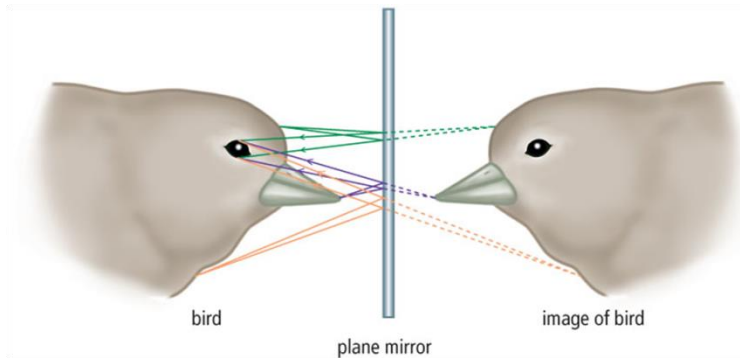


Figure 5.16 When the boy blinks his right eye, the left eye of his image blinks.

Concave Mirrors:

- Mirrors that curve inward are called '_____ ' mirrors.
- When light hits them, it gets reflected inwards, or '_____ ' to a '_____ ' or '_____ '.

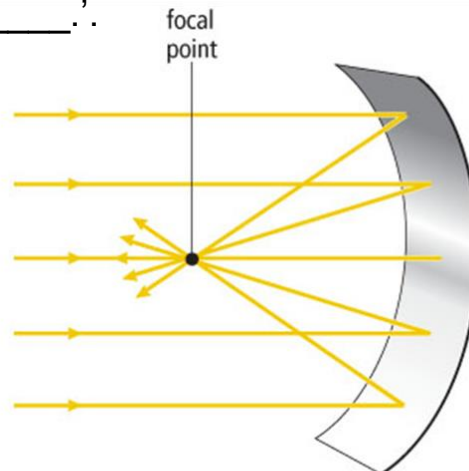
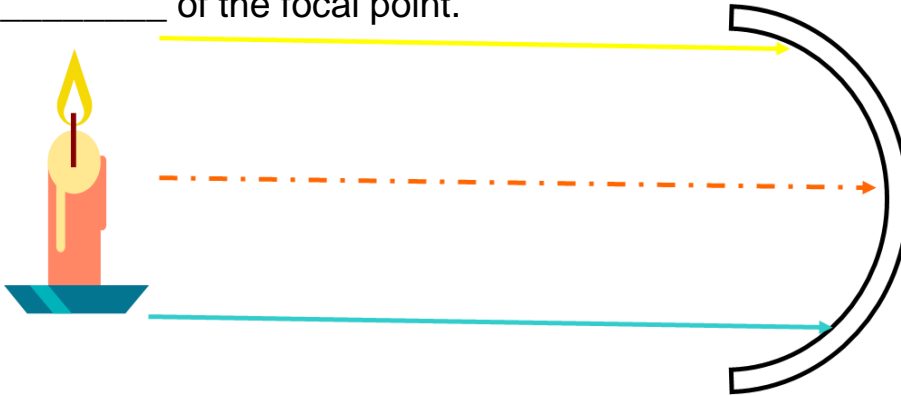


Figure 5.17 Light rays collected by a concave mirror converge on a focal point before spreading out again.

- Images seen in a concave mirror are _____, unless you are in _____ of the focal point.



- This kind of mirror is used in _____, and _____, and in _____ – if you are close up, you will see a _____, more detailed image.

Convex Mirrors

- Curved _____
- When light hits them, the rays _____, or spread out.



Note: There is still a focus, but it is 'invisible.'

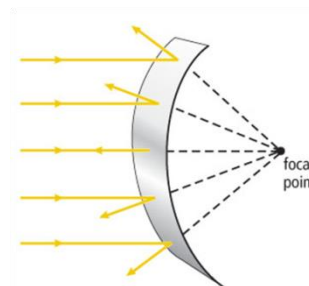


Figure 5.20 The reflected rays from a convex mirror diverge and do not meet.

- Images in convex mirrors appear to be _____ or _____ than they really are
eg. Side view mirror in car
- There is also a wider ' _____ ' – you can see more in a convex mirror than you can in a plane mirror.
- Used as _____ mirrors.

Concave Lenses:

- Curved _____ -
- Make light rays ' _____ '.
- Make images _____ and _____.
- Used in some types of eyeglasses, and some _____.
- Note – again, there is an 'invisible' focus.

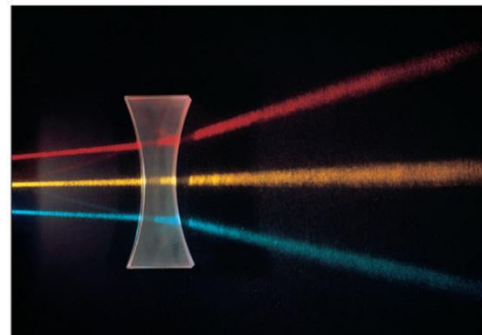
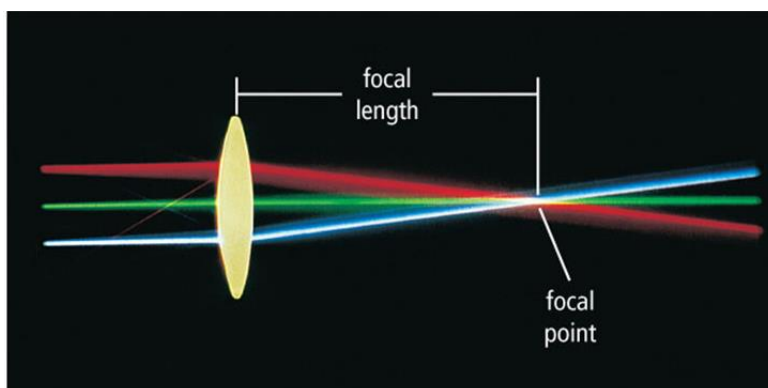


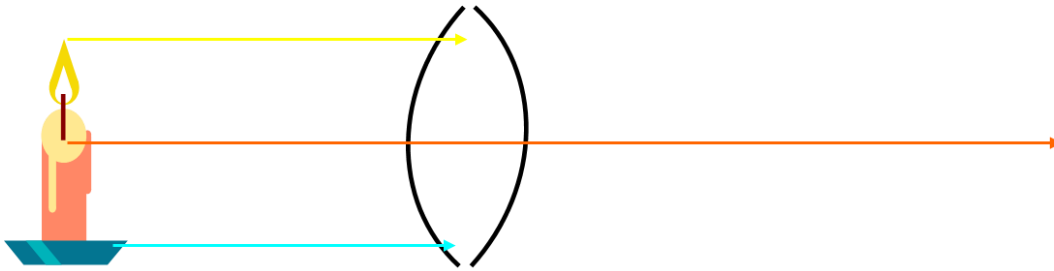
Figure 5.22 Light rays diverge when they pass through a concave lens.

Convex Lenses:

- Curved _____ – _____ in the _____.
- Causes light to ' _____ ' to a focus.



- Again, the image will be _____, unless you are looking at the image in _____ of the focal point.



- These lenses are used anywhere you want to '_____ ' something
 - Eg. Microscopes, magnifying glasses, some eyeglasses