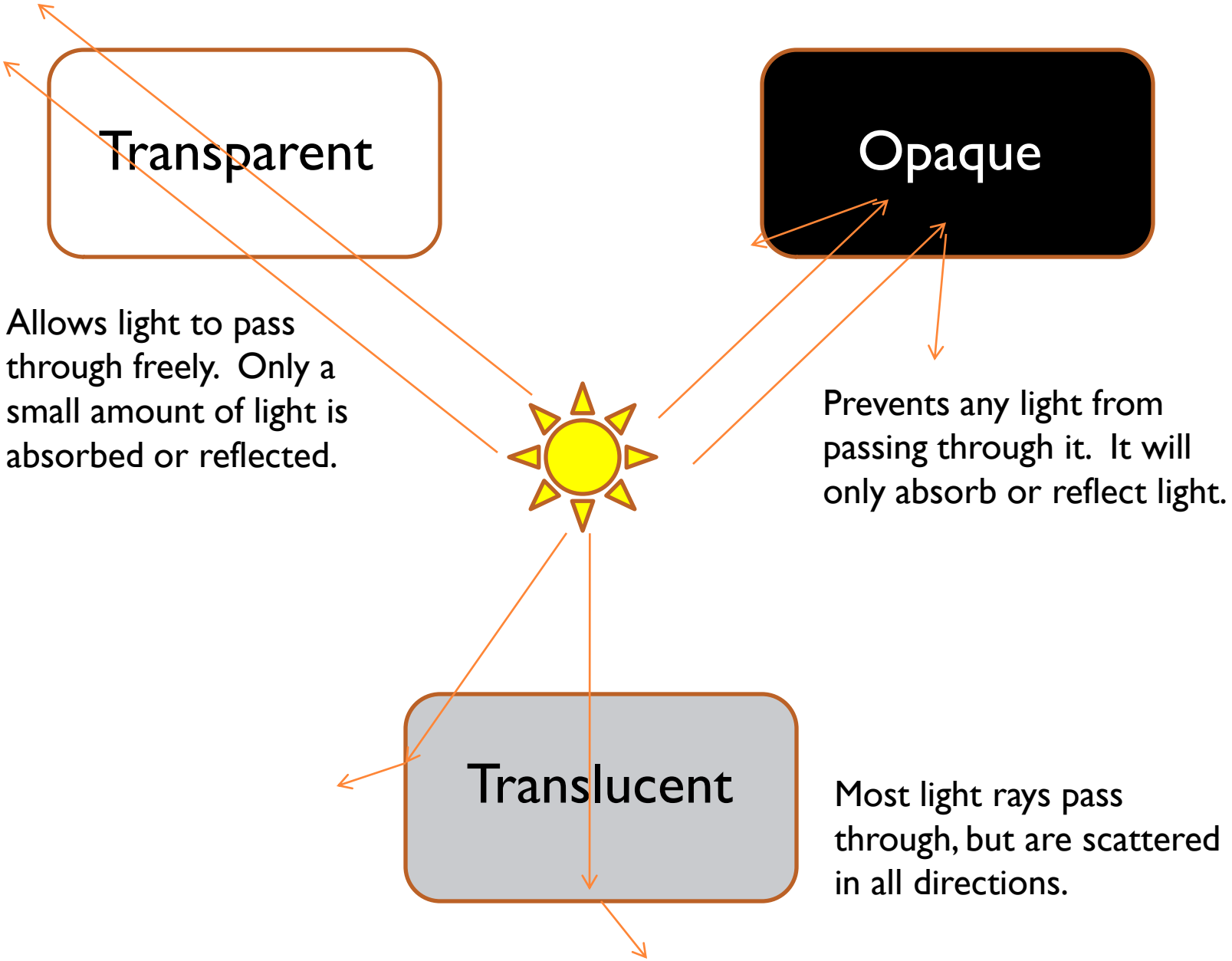
Grade 8 Science
Unit 2: Optics

Chapter 5: The law of reflection allows mirrors to form images.

The Ray Model of Light

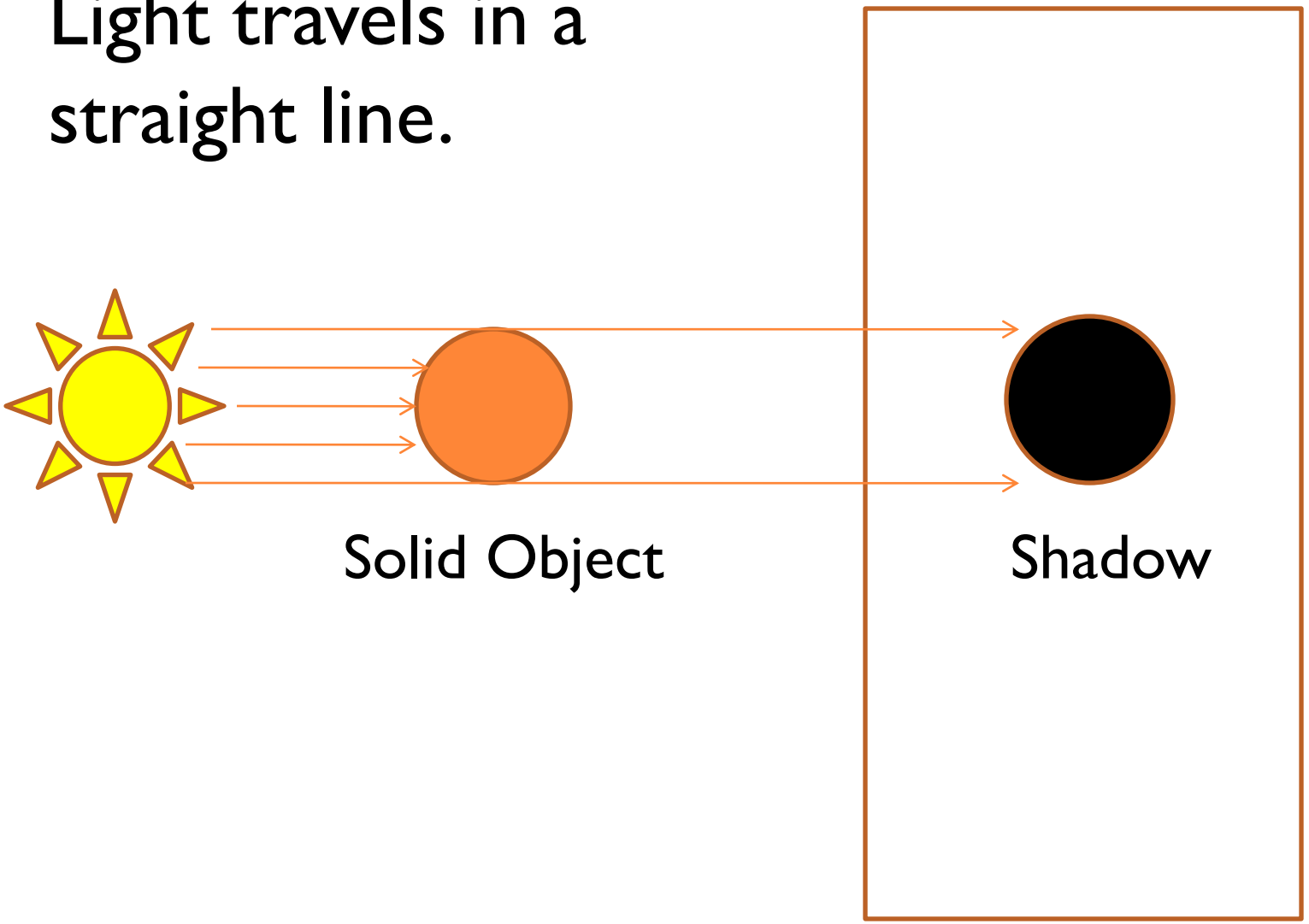
- Used to study the behaviour of light when it meets a surface.
- Light is represented by a straight line or ray that shows the direction the light is travelling.

Different Materials



Rectilinear Propagation

Light travels in a straight line.



Reflection…

Incident light ray:

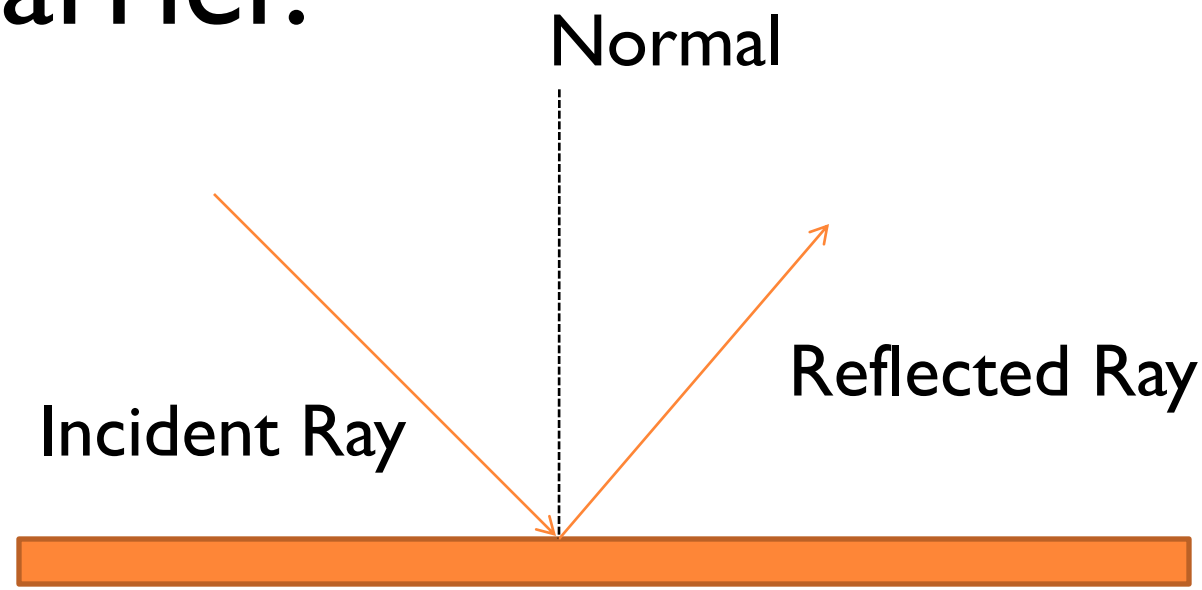
- the incoming light ray

Reflected light ray:

- the ray that bounces off the barrier

Normal:

- An imaginary line that is perpendicular to the barrier.



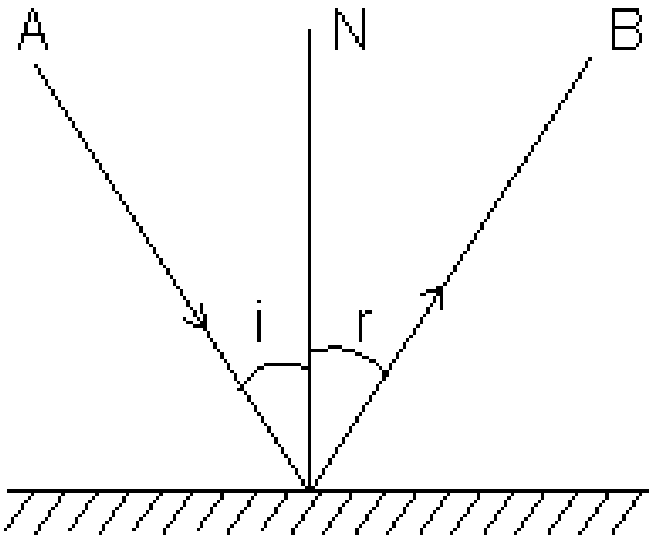
Angle of incidence:

- The angle formed by the incident ray and the normal.

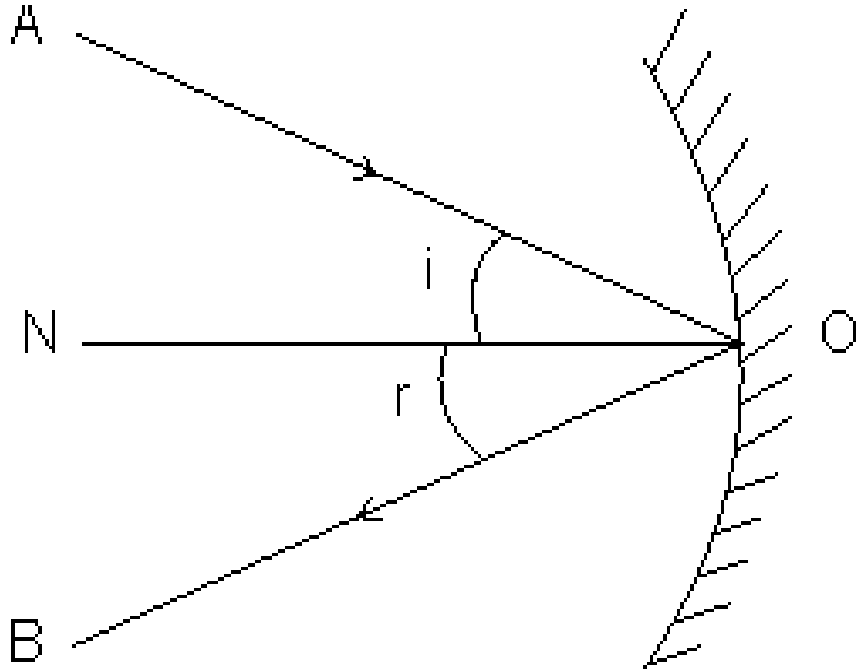
Angle of reflection:

- The angle formed by the reflected ray and the normal.

Reflection

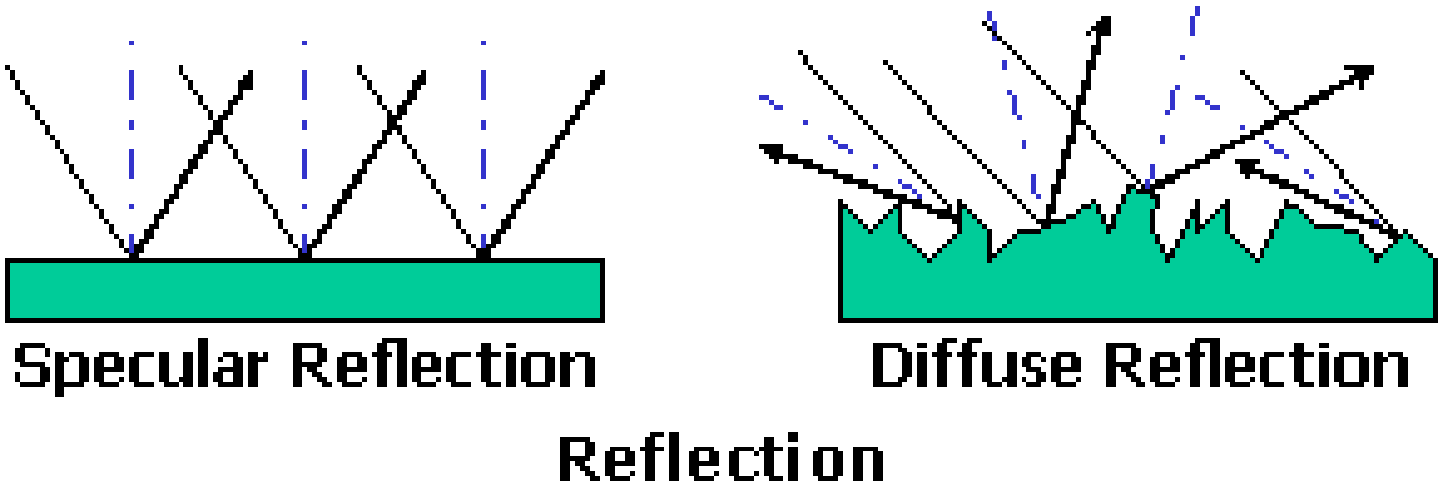


Plane Mirror



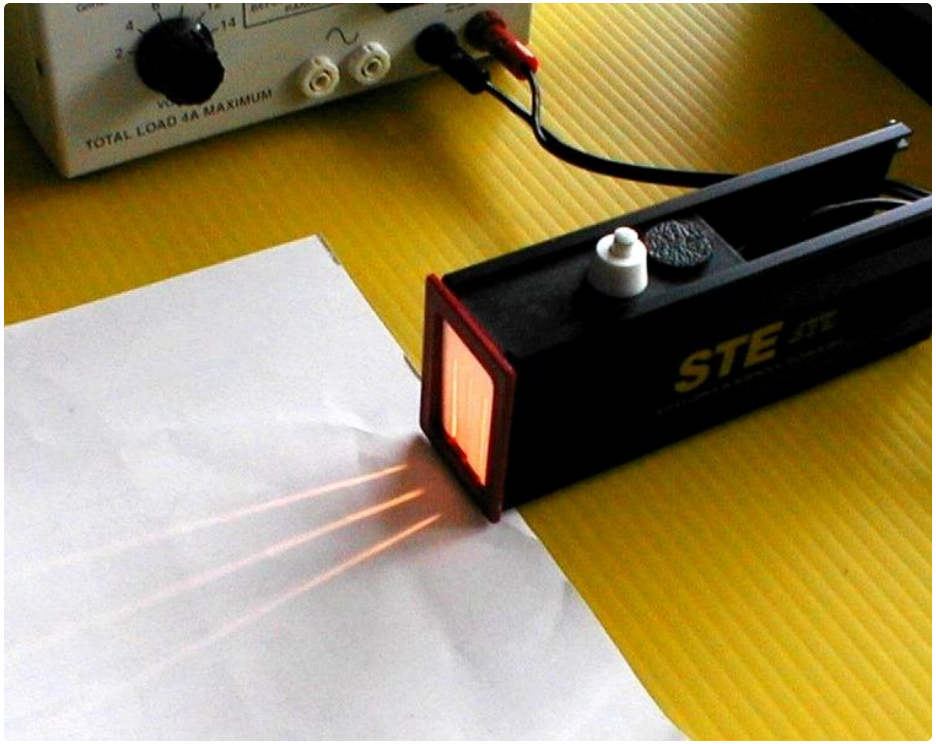
Concave Mirror

Specular vs. Diffuse Reflection



Applications of Specular and Diffuse Reflection:

- Countertop surfaces
- Furniture or car wax
- Glazed vs, unglazed ceramics
- Matte vs. Glossy finish on photographs or in paint

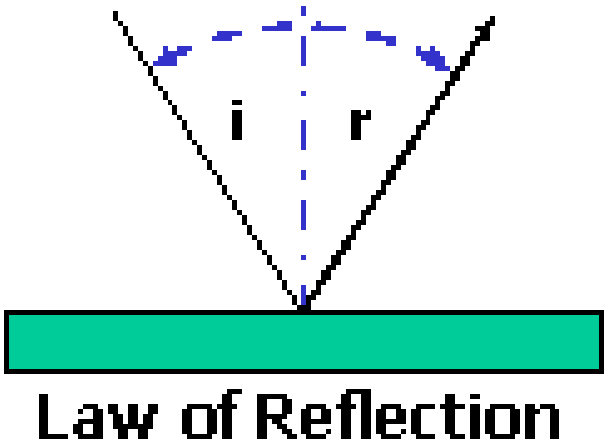


Using a Ray Box

Determining the Laws of Reflection

Laws of Reflection

The angle of incidence equals the angle of reflection.



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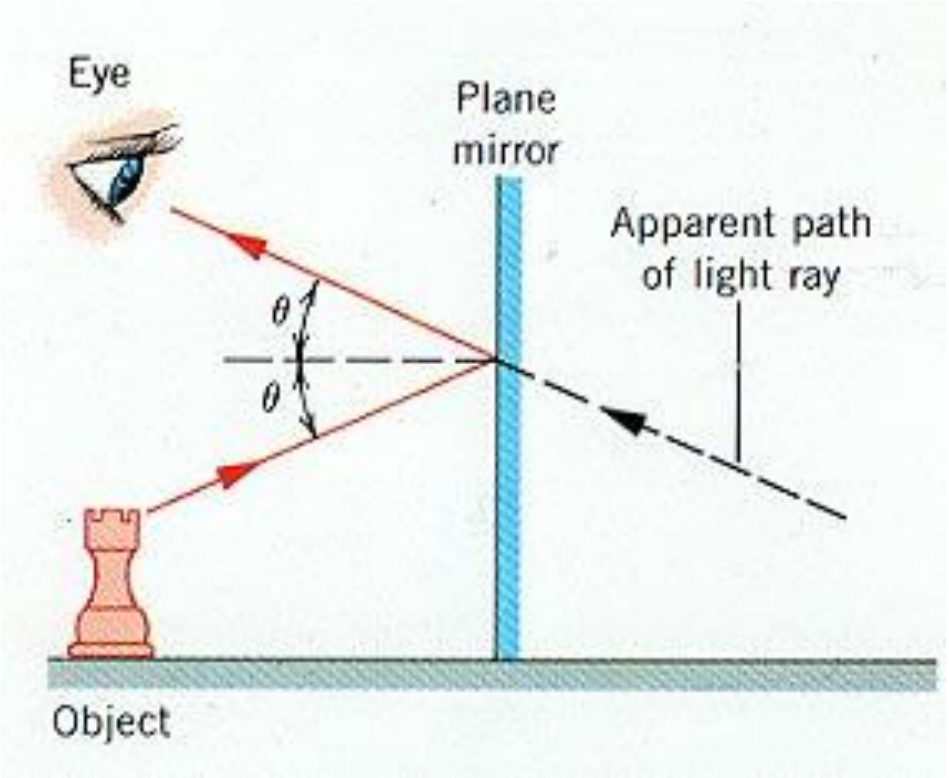
"DEMONSTRATING THE LAWS OF REFLECTION"

Types of Mirrors

1. Plane Mirrors

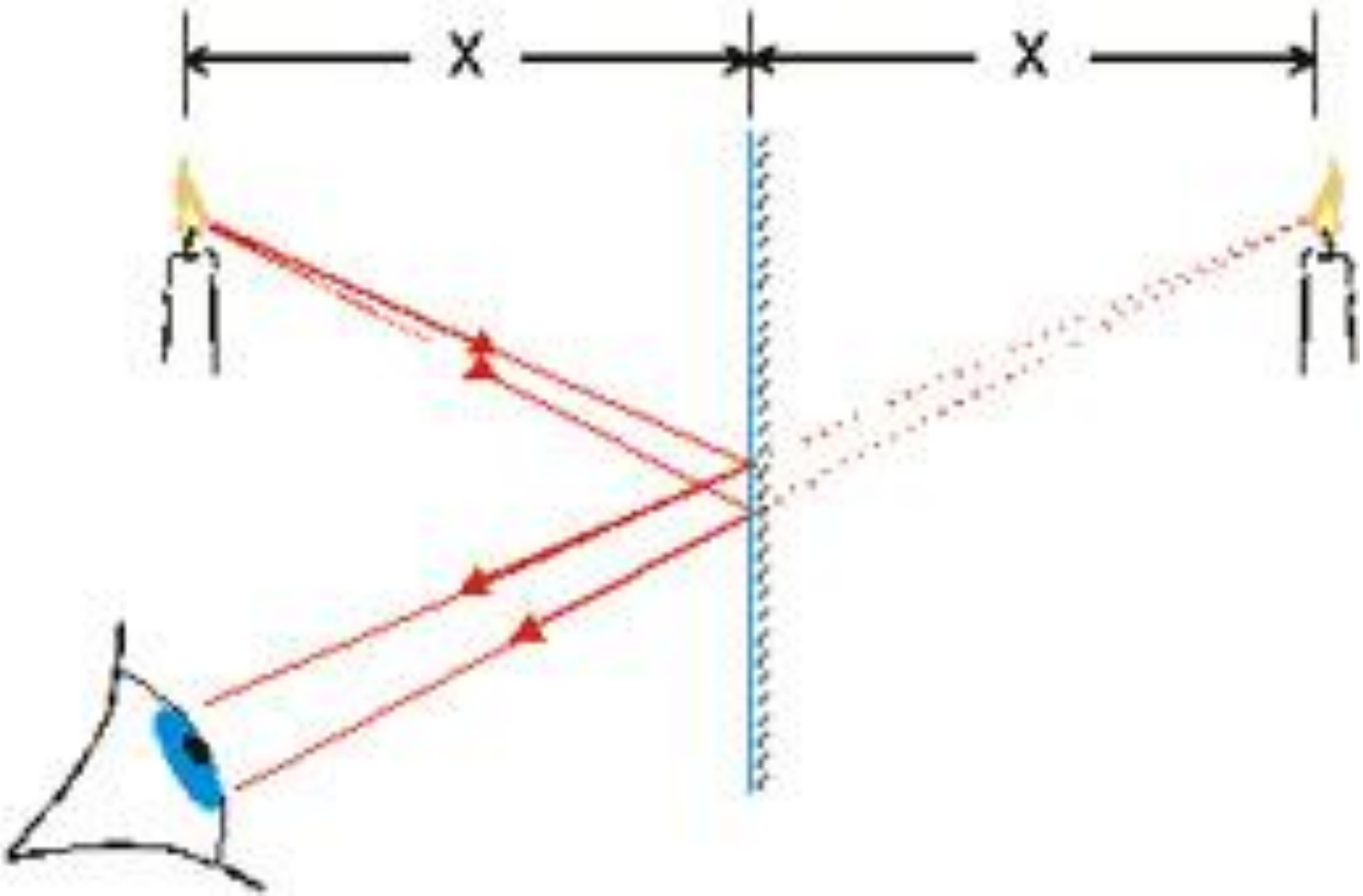
- A flat, smooth mirror



Characteristics of images using plane mirrors:

1. Image size is equal to object size
2. Image distance is equal to object distance
3. The image is upright
4. The image is virtual

Plane Mirrors

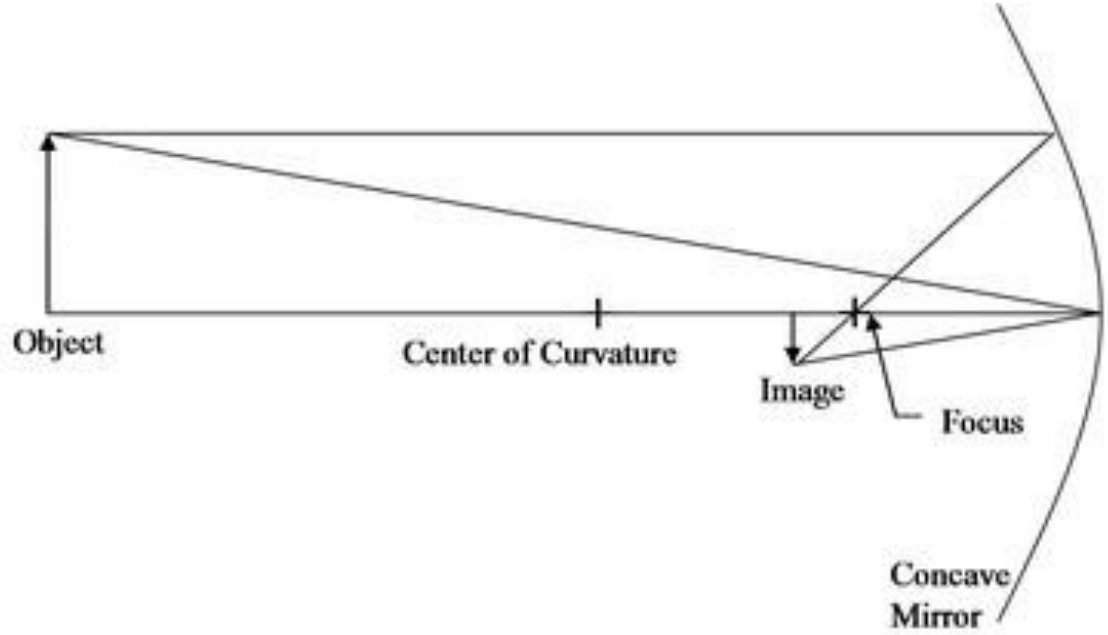


Examples of plane mirrors:

- Bathroom mirrors
- Rear view mirrors
- Dentist mirror for looking at teeth
- Periscopes

2. Concave Mirrors

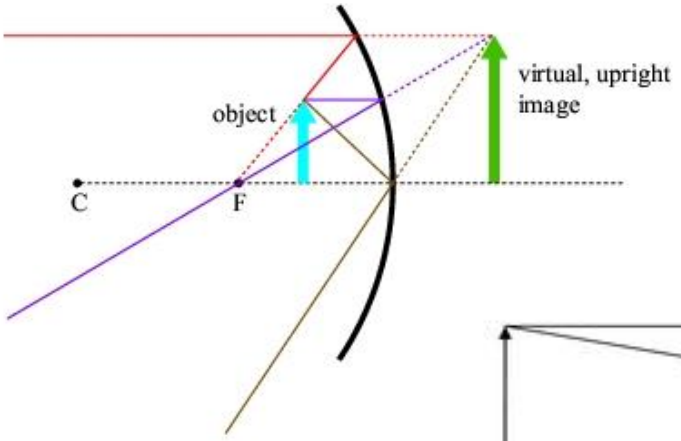
- Have a reflecting surface that curves inward like the inside of a bowl.

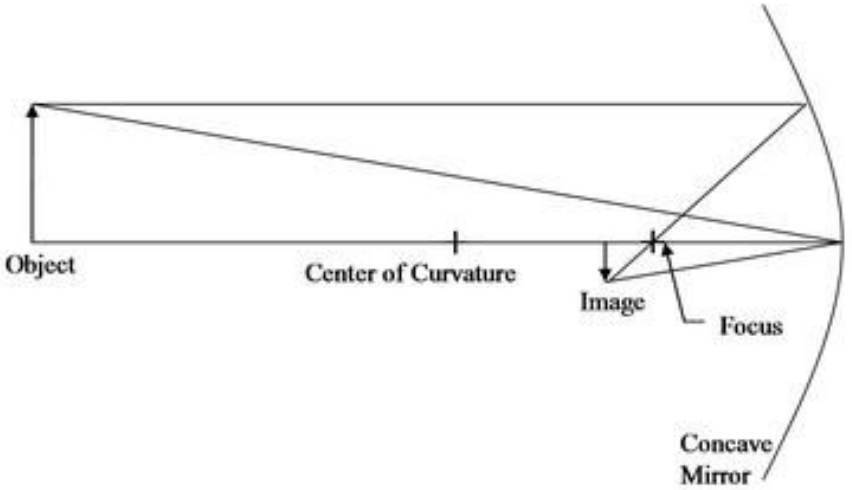


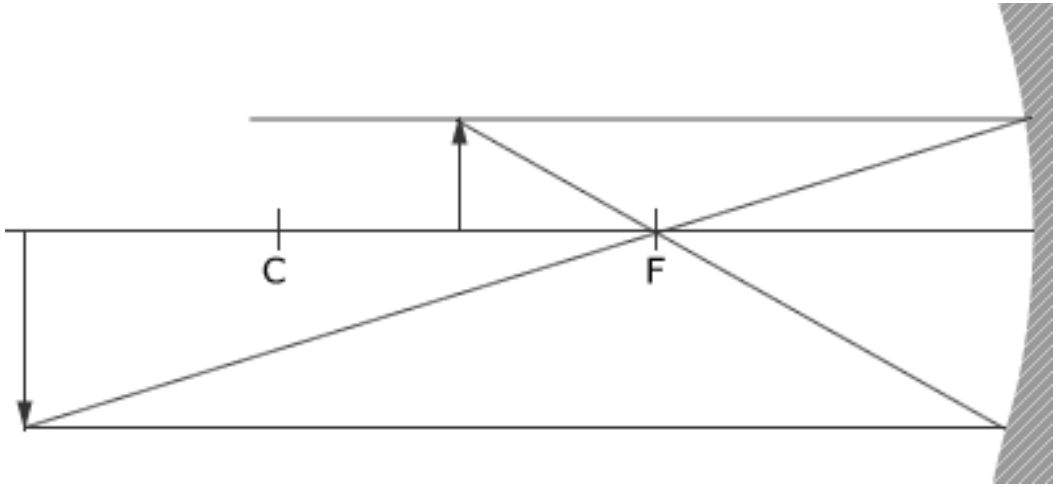
Characteristics of images using concave mirrors (depends on the position of the object):

1. It can be smaller, larger or the same size
2. It can be upright or inverted
3. It can be actual or virtual

Concave Mirrors





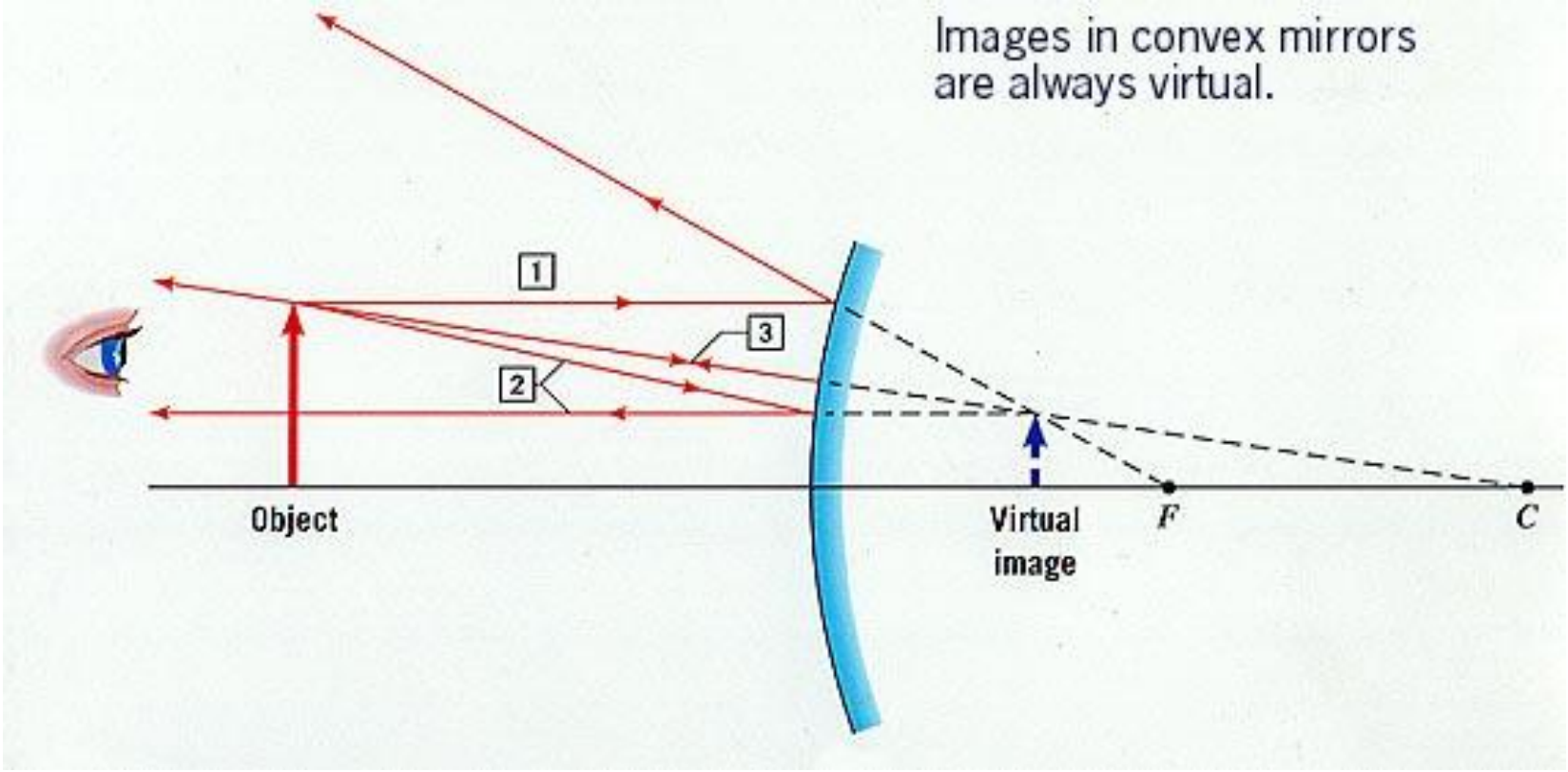


Examples of concave mirrors:

- Inside a metal spoon
- Spotlights
- Overhead projectors
- Flashlights
- Car headlights
- Lighthouses
- Satellite dishes

3. Convex Mirrors

- Curved outward like the outside of a bowl.



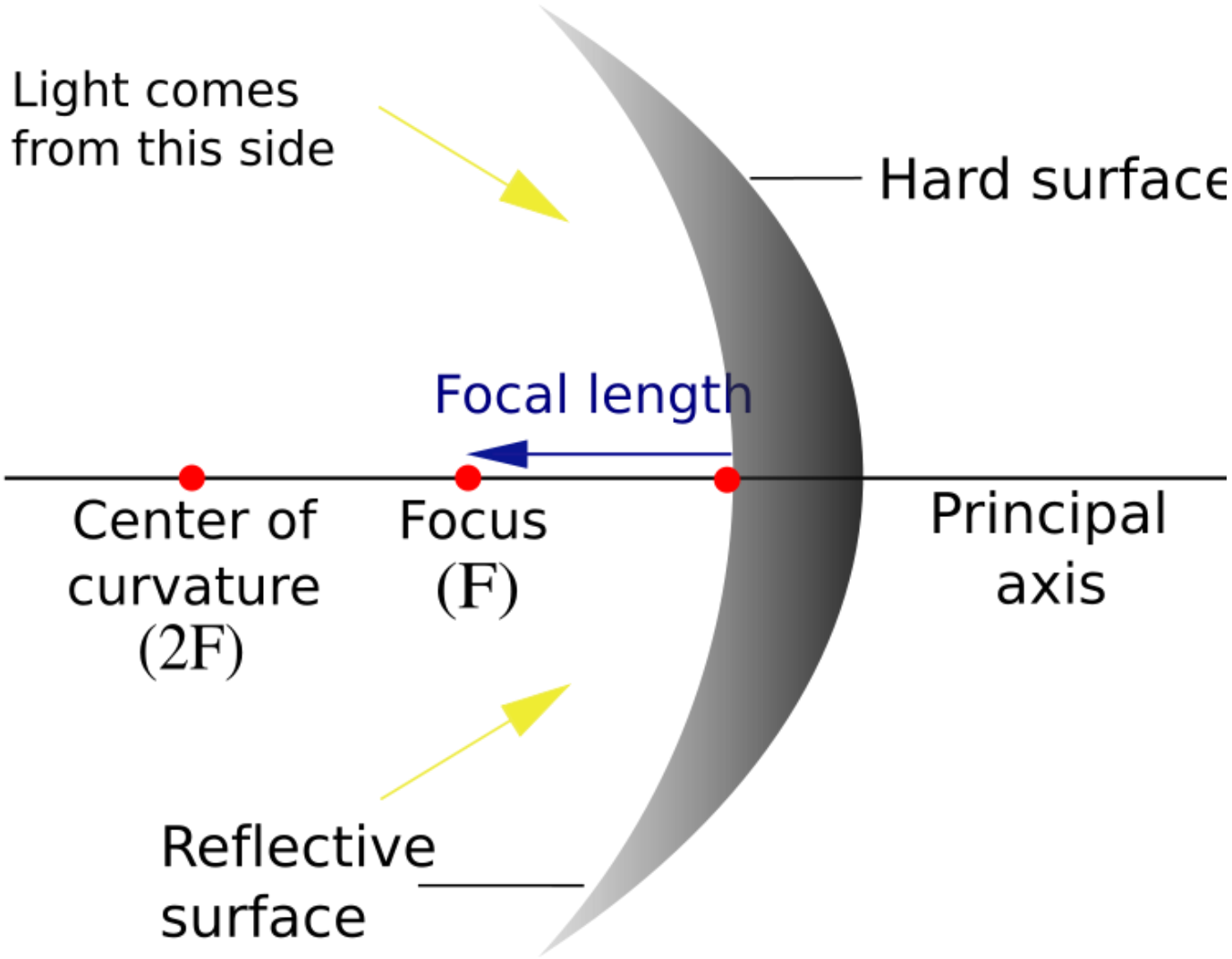
Characteristics of images using convex mirrors:

1. The image is smaller than the object.
2. The image distance is smaller than the object distance.
3. The image is upright.
4. The image is virtual.

Examples of convex mirrors:

- Safety mirrors at the front of a bus
- Side view mirrors of vehicles
- Disco balls

Ray Diagrams...*parts to know*



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RAY DIAGRAMS USING CONCAVE MIRRORS

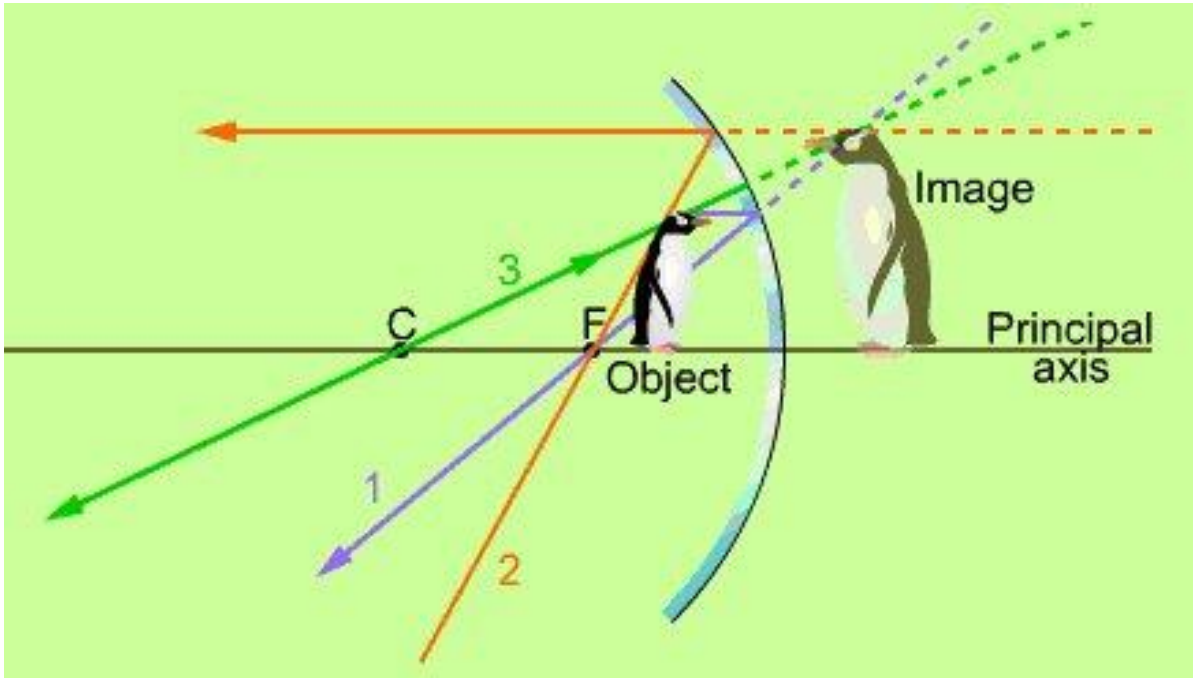
Real Vs. Virtual Images

Real Image:

- Formed when reflected rays (not extended rays) meet
- Located in the front of the mirror
- You need a screen to see the real image

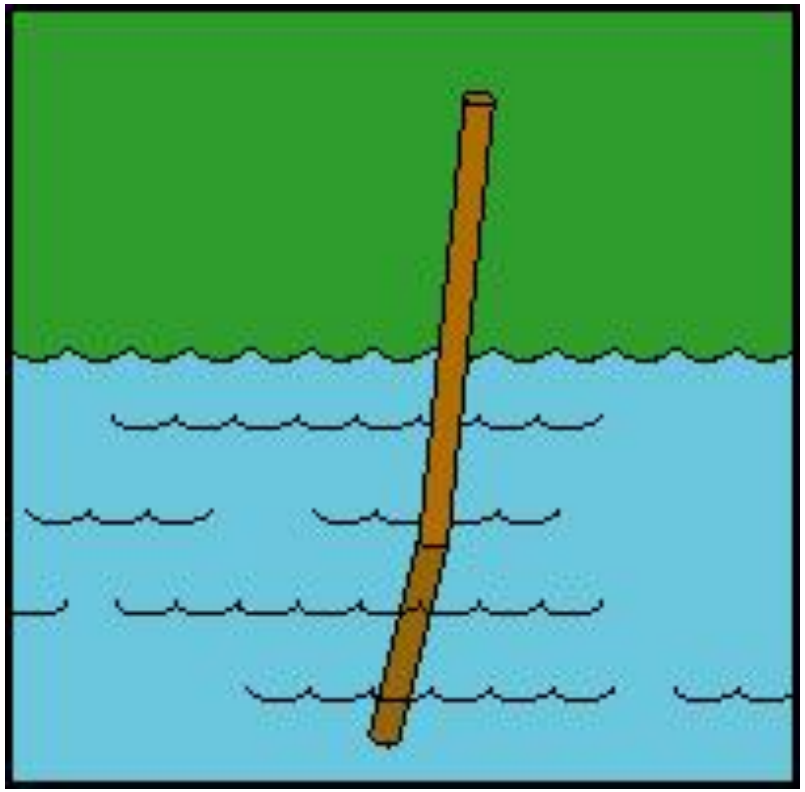
Virtual Image:

- Formed when the reflected rays are extended
- Located behind the mirror



Refraction...

The bending of a wave when it travel from one medium to another.



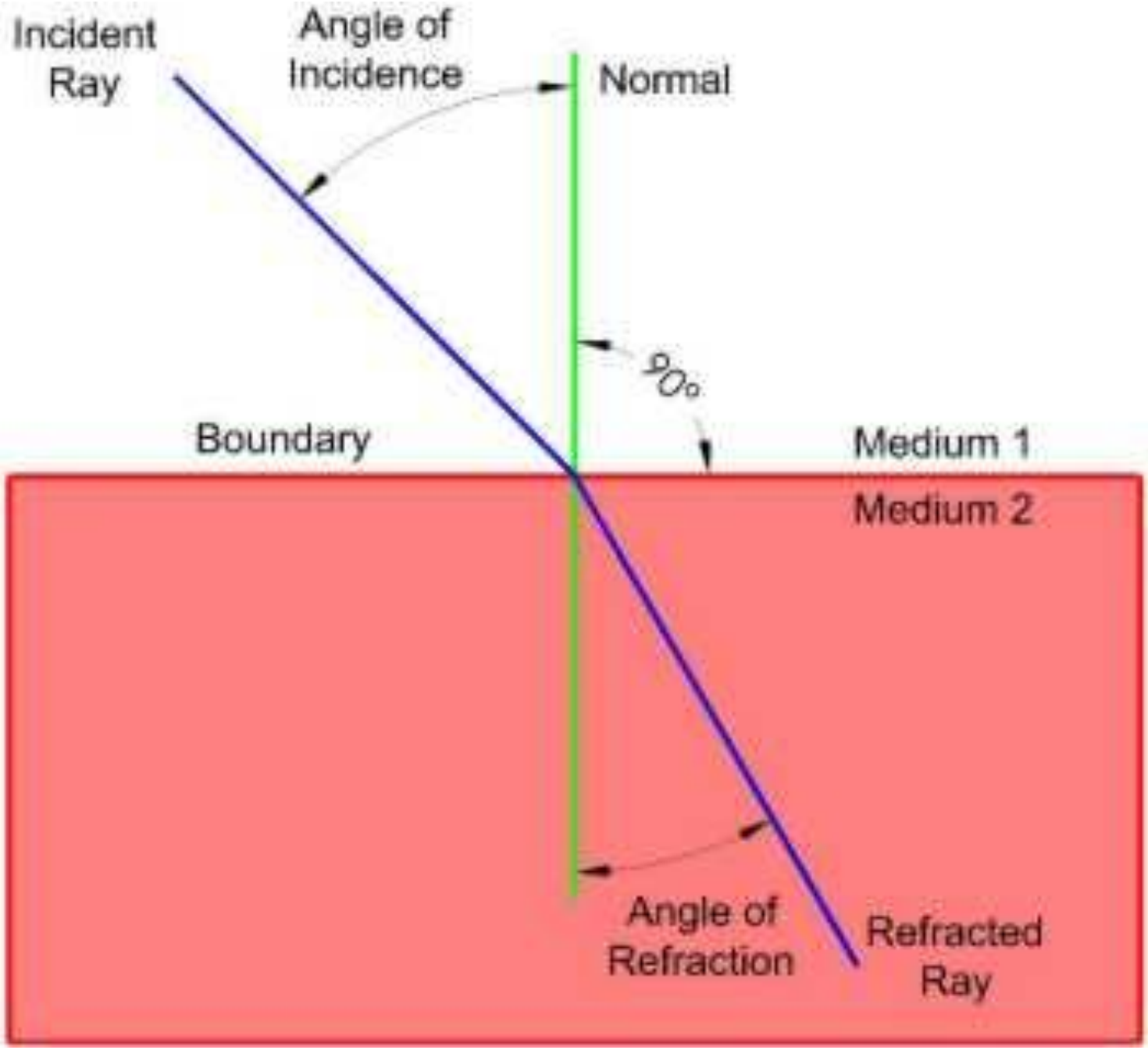
Refracted ray:

- is in the second medium travelling in a different direction than the incident ray.

Angle of refraction:

- The angle between the normal and the refracted ray.

Refraction


Incident Ray
Angle of Incidence
Normal
90°
Boundary
Medium 1
Medium 2
Angle of Refraction
Refracted Ray

What happens...

As light travels from a less dense medium to a more dense medium (ie. Slows down)?

The ray bends towards the normal.

As light travels from a more dense medium to a less dense medium (ie. Speeds up)?

The ray bends away from the normal.

Why is the object not where you think it is?

If the light travels through two different media before it reaches your eyes, it does not travel in a straight line.

The object is not where your brain thinks it is.

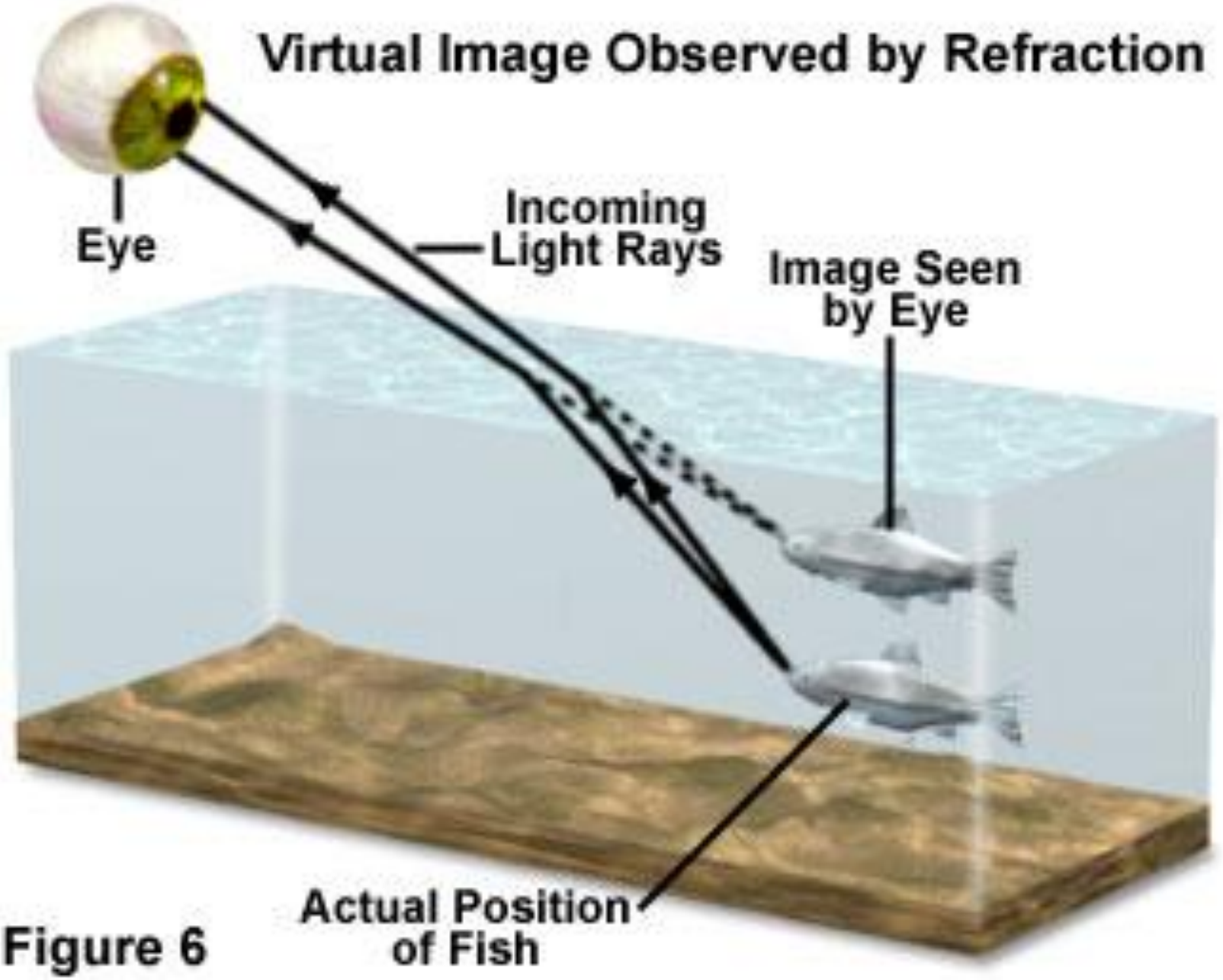

Virtual Image Observed by Refraction
Eye
Incoming
Light Rays
Image Seen
by Eye
Actual Position
of Fish

Figure 6

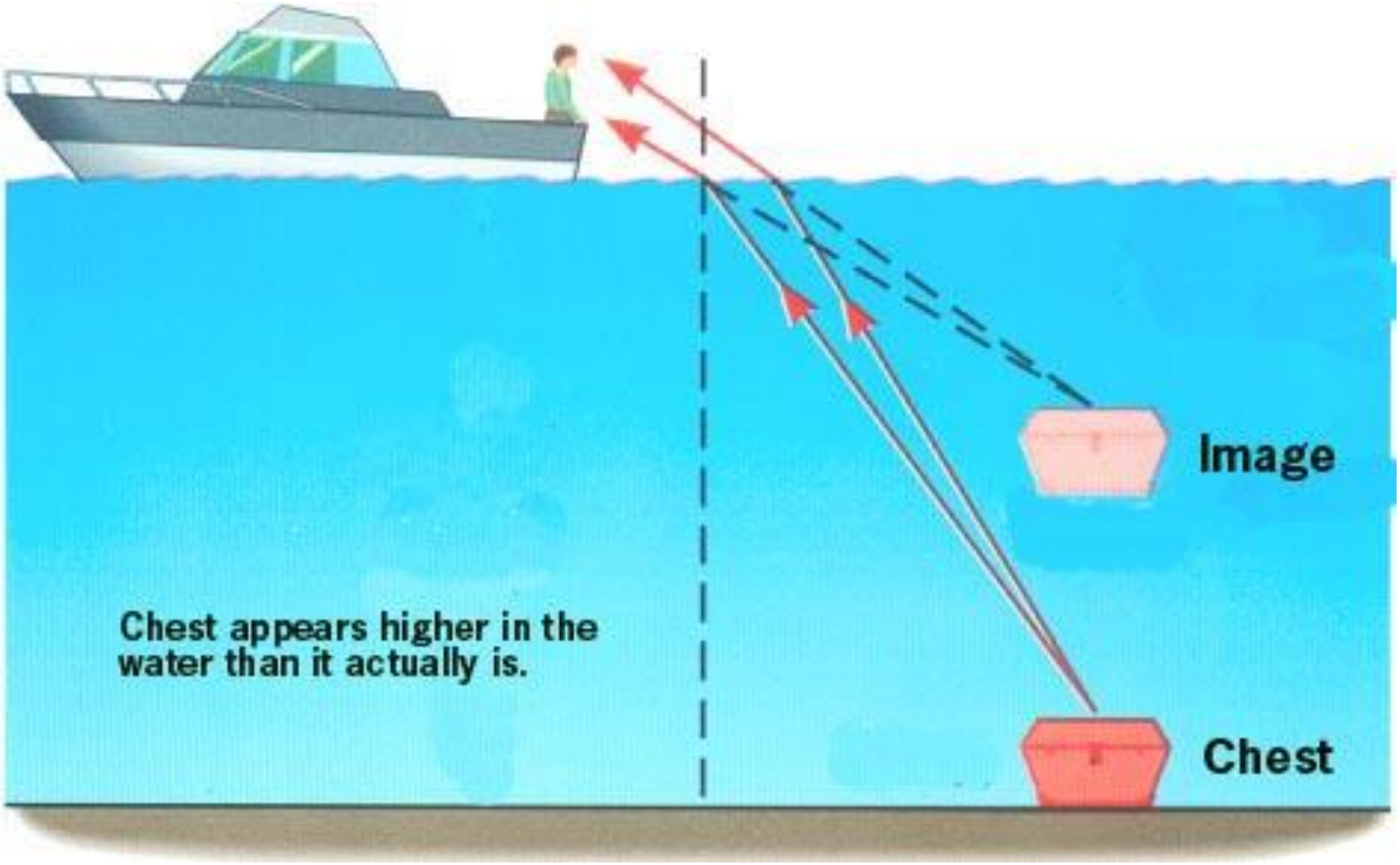


Image
Chest appears higher in the water than it actually is.
Chest

CORE LAB ACTIVITY 5-1D

"FOLLOW THAT REFRACTED RAY!"