**Lesson 2-Reflection of Light**

Why am I seeing the buildings in the water?

Why am I seeing the buildings in the water?

A calm body of water can create a clear reflection because the smooth surface of the water acts like a mirror and reflects the light straight into your eyes.

Choose an object in this classroom that you think will be completely opaque. (Will not reflect any light)

Test it using a "ray box"

Choose an object in this classroom that you think will be translucent. (Will not reflect any light)

Test it using a "ray box"

Choose an object in this classroom that you think will be transparent.  (Will not reflect any light)

Test it using a "ray box"

Where is the most common place for you to see a reflection?

Where is the most common place for you to see a reflection?

A mirror!

Here is where we mix math and science :)

Using a ray box that produces one narrow ray of light, so the light ray strikes a flat (also called a plane) mirror.

What happens to the light ray if it strikes the mirror at a 90degree angle? (Think back to math. This means it is facing direct towards the mirror.) Where is the reflected ray?

What happens if you change the angle that the light strikes the mirror?

Can you arrange a group of mirrors together so that the reflected light displays a geometrical shape?

How could you arrange the mirrors so that light could be reflected forever?

## The Law of Reflection

When a ray of light hits a mirror straight on (at a right angle) it bounces straight back.

When a light ray hits the mirror at an angle to the mirror, it'll bounce back at an angle.

In a ray diagram, the line perpendicular to the mirror is called the **normal**.

The incoming ray is the **incident ray**.

The angle between the incident ray and the normal, is the **angle of incidence.**

The angle between the reflected ray and the normal, is the **angle of reflection.**

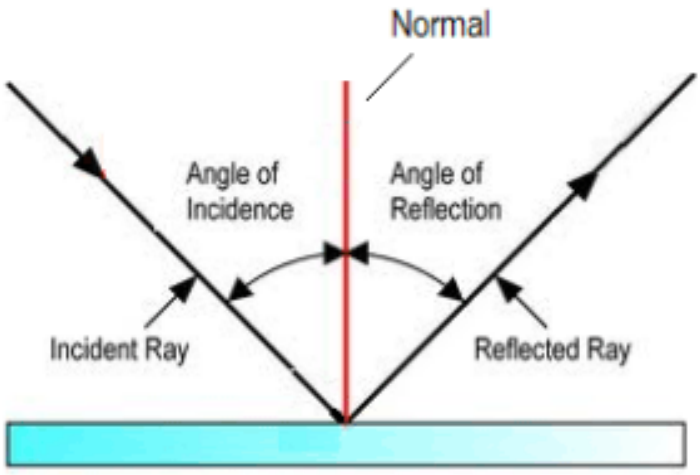


**Fig. 1**

**In the next activity we'll discover how the angle of incidence and angle of reflection are related.**

Let's REFLECT on the Activity:

8. What did you observe with respect to the angle of incidence and the angle of reflection?

9. What happens to the angle of reflection when you increase the angle of incidence?

10. How does your drawing compare with the illustration? (This is the diagram we drew in class)

11. Why is it helpful to know how light reflects? How could you use this information?

12. How is the information about light reflection helpful in designing and creating technology for our use?

13. Describe applications of the law of reflection in everyday life.

15. Write a conclusion to answer the question, "How does the angle of incidence compare to the angle of reflection?"

# Specular and Diffuse Reflection

When you bounce a ball on a flat surface, can you somewhat predict where the ball will bounce?

What about if you bounce the ball on a rough surface like grass or a rocky path?

Light behaves in the same way.

**Specular Reflection:** reflection off smooth surfaces.

(examples: mirrors, smooth metal surfaces, or calm water will create specular reflection)

**Diffuse reflection:** a rough surface causes reflected light to scatter in many directions. (for example, if light reflects off an uneven surface such as the ocean surface, diffuse reflection occurs)

# Specular and Diffuse Reflection

## Activity

Predict what will happen when you shine a flashlight on a smooth piece of aluminum foil.

Will this produce specular or diffuse reflection?

Predict what will happen when you shine a flashlight on a crinkled piece of foil. Will this produce specular or diffuse reflection?

Using your cell phone flashlight or an ipad, shine the flashlight on the smooth piece. Does your observation match your prediction? Now crinkle the piece of foil and do the same. Does your observation match your prediction?

**Lesson 2-Reflection of Light**

What do we see in different types of mirrors?

Predict answers to the following questions on a piece of paper, and then use mirrors and any object (your finger, a pencil, etc) to test your predictions)

**In a plane mirror:**

Size: Is the size of the image the same size as the object?

Orientation: Is the image upright or upside down?

**In a convex mirror:**

Size: Is the size of the image the same size as the object? Is it larger or smaller?

Orientation: Is the image upright or upside down?

Distance: What happens to the size and orientation of the image when the object is placed closer and further from the mirror?

**Concave Mirror:**

Size: Is the size of the image the same size as the object? Is it larger or smaller?

Orientation: Is the image upright or upside down?

Distance: What happens to the size and orientation of the image when the object is placed closer and further from the mirror?