

Science 8
Unit 3: OPTICS
Topic 6: Light And Reflection In Mirrors

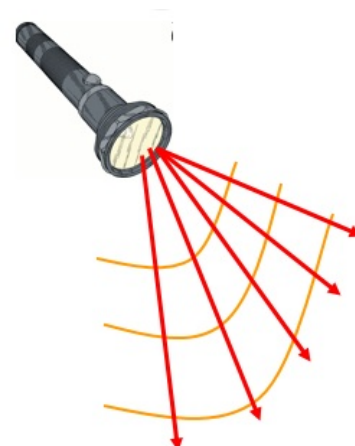


Student Name: _____

The Ray Model of Light

Some properties of light are best described by considering light as a wave. The ray model of light uses a straight line with an arrowhead, or ray, to show the direction the light wave is travelling.

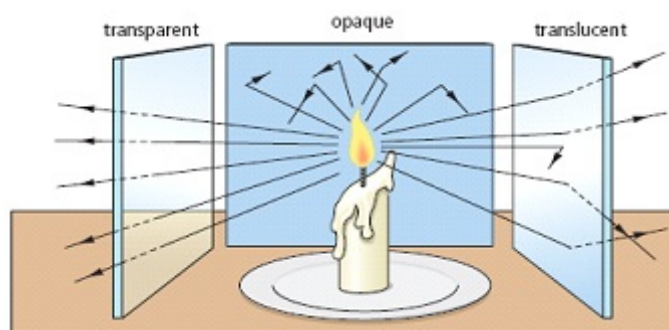
- ray of light is an extremely narrow beam of light.
- All visible objects emit or reflect light rays in all directions
- Our eyes detect light rays
- We see images when light rays converge in our eyes
- Light travels in a straight line. (Rectilinear Propagation)
- A shadow is created when an opaque object absorbs light rays.
- Shadows demonstrate that light travels in straight lines.



Three uses of the Ray Model of Light

- (1) explaining how light passes through different materials
- (2) predicting how shadows are formed.
- (3) explaining how light reflects off mirrors;

Different materials can either transmit, absorb, or reflect light:

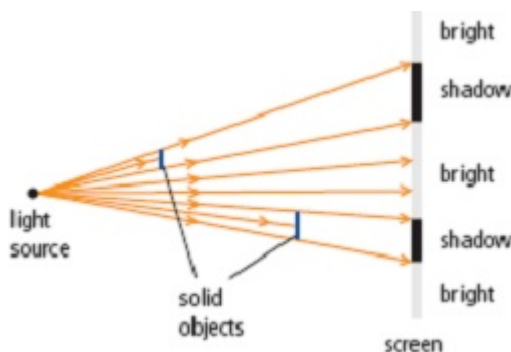


Transparent: materials allows light to pass through freely.

Translucent : materials lets most light through but scatters the light leaving.

Opaque: materials prevent light from passing through.

The farther an object is from a source of light, the smaller its shadow will be.



Light Can be Reflected

Reflection: is when light bounces off of an object. To act like a mirror, the surface must be smooth.

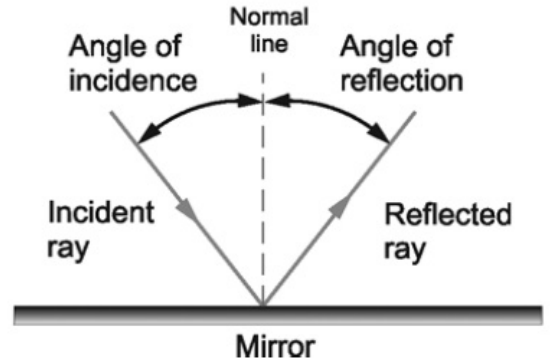
Incident ray: the incoming light ray

Reflected ray: the ray that bounces off the barrier

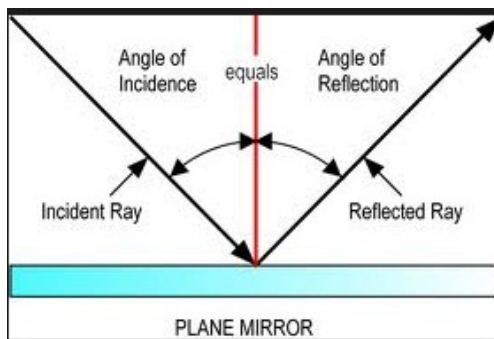
Normal: An imaginary line that is perpendicular to the barrier.

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.



Law of Reflection: states that when an object hits a surface, its angle of incidence will equal the angle of reflection.



Comparing the two types of reflection:

Specular Reflection	Diffuse Reflection
Occurs on smooth, shiny surfaces	Occurs on rough, dull surfaces
Light is not scattered in all directions	Light is scattered in different directions
Smooth surfaces such as mirrors or a calm body of water	Rough surfaces such as clothing, paper, and the asphalt
Clear image is produced	Image is distorted

PART A: MULTIPLE CHOICE.

Instruction: Circle the correct answer below each question. Also, transfer your answers to the bubble sheet provided.

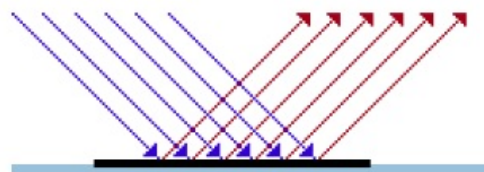
1. What can be used to represent light?
 - (A) Ray only
 - (B) Ray or wave
 - (C) Wave, ray and angles
 - (D) Wave only
2. In the ray model of light, light is represented by
 - (A) A series of curves.
 - (B) Circles.
 - (C) Continuous waves.
 - (D) Straight lines.
3. What terms is used to describe materials through which objects can be seen clearly?
 - (A) Translucent
 - (B) Opaque
 - (C) Transparent
 - (D) Non-luminous
4. Light cannot pass through this type of object
 - (A) Translucent
 - (B) Opaque
 - (C) Prism
 - (D) Transparent
5. From left to right in the image, the two cups are best described as

- (A) Transparent and translucent.
- (B) Transparent and opaque.
- (C) Translucent and opaque.
- (D) Opaque and translucent



6. The illustration below demonstrates how light travels. What name is given to this diagram?

- (A) Light sketch
- (B) Light diagram
- (C) Ray sketch
- (D) Ray diagram

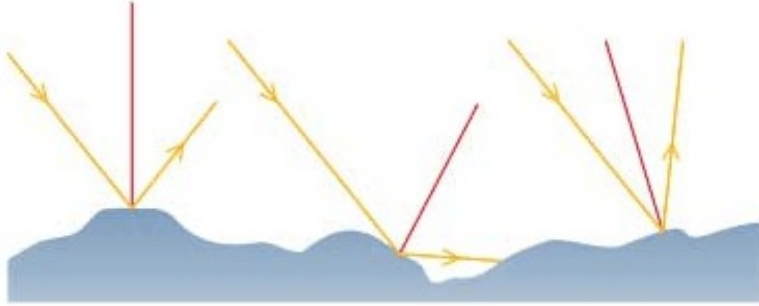


7. Which property light allows you to see yourself in a mirror?

- (A) Absorption
- (B) Dispersion
- (C) Reflection
- (D) Refraction

Use the following information and diagram to answer questions 8 and 9

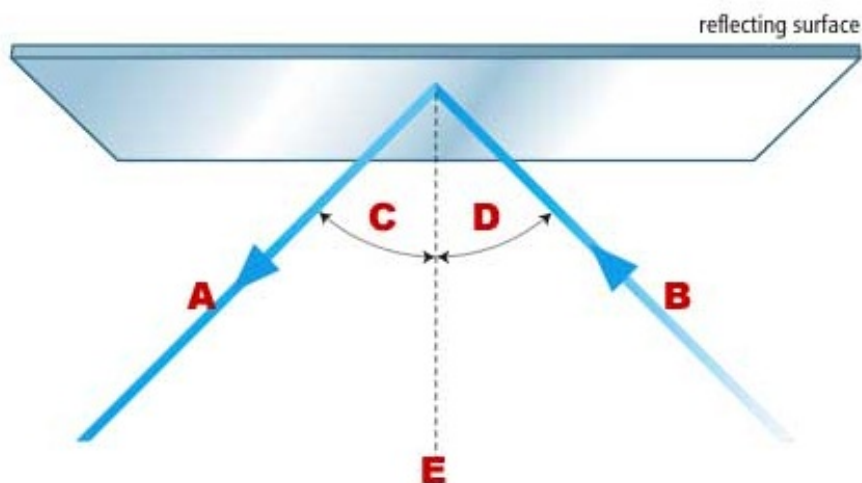
A rough surface will scatter incoming light rays in different directions, as shown by the yellow light rays in this diagram



8. Why does the light scatter?
- (A) The rough surface refracts light rays.
 - (B) The light rays are absorbed when they strike a rough surface.
 - (C) The light rays strike the rough surface at different angles.
 - (D) The light rays do not obey the law of reflection on a rough surface.
9. The lines in the diagram without arrows are known as
- (A) Incident rays.
 - (B) Angles of incidence.
 - (C) Normal lines.
 - (D) Reflected rays

Use the following information and diagram to answer questions 10, 11, and 12.

A light ray striking a shiny surface will reflect.



10. What does the letter "C" in the diagram indicate?
- (A) Angle of incidence
 - (B) Angle of refraction
 - (C) Reflected ray
 - (D) Angle of reflection
11. What does the letter "B" in the diagram indicate?
- (A) Normal
 - (B) Incident Ray
 - (C) Angle of incidence
 - (D) Reflected ray

12. What does the letter "E" in the diagram indicate?

- (A) Angle of reflection
- (B) Incident ray
- (C) Normal
- (D) Reflected ray

13. The angle of reflection is measured relative to the _____.

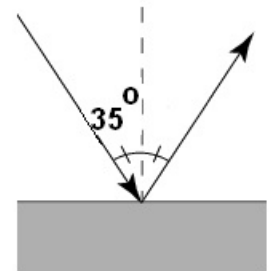
- (A) Normal
- (B) Surface
- (C) Light ray origin
- (D) Angle of incidence

14. The law of _____ states that the angle of reflection is equal to the angle of _____.

- (A) Mirrors, the normal
- (B) Reflection, incidence
- (C) Mirrors, incidence
- (D) Reflection, refraction

15. Use the diagram below, what is the measure of the angle of reflection?

- (A) 0°
- (B) 35°
- (C) 55°
- (D) 65°

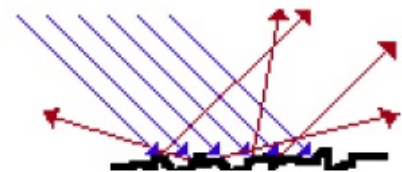


16. _____ reflection occurs when light reflects off of _____ surfaces.

- (A) Diffuse, smooth
- (B) Specular, rough
- (C) Smooth, specular
- (D) Diffuse, rough

17. This illustration demonstrates a type of reflection referred to as ...

- (A) Regular
- (B) Crooked
- (C) Diffuse
- (D) Specular



PART B: WRITTEN RESPONSE

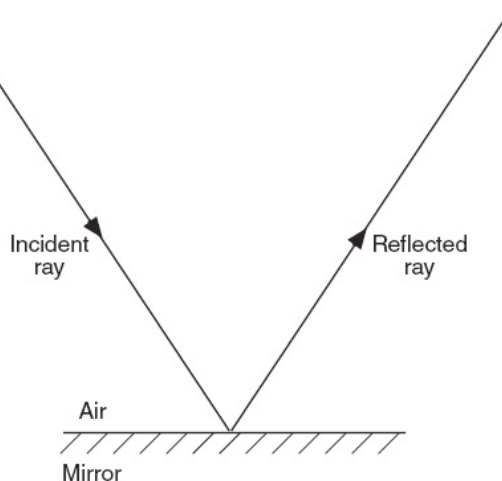
1. What are three uses for the ray model?

2. How is an opaque material different from a translucent material

3. Is a glass of water with red food colouring in it translucent or transparent? Explain.

4. What is the relationship between the size of the shadow and the distance of the object from the light source?

5. The diagram below shows an incident ray hitting a plane mirror.



- (A) Using a protractor and ruler, construct and label the normal to the mirror at the point of incidence on the diagram on your answer paper.
- (B) Using a protractor, measure the angle of incidence and angle of reflection to the nearest degree

6. Explain the difference between specular and diffuse reflection
