

## Quarter 2: Module 3. Qualitative Characteristics of Images

**LLC:** Predict the qualitative characteristics(orientation, type, and magnification) of images formed by the plane and curve mirrors and lenses(S10FE-11g-50)

### Game Format Overview: “OptiLearn”

- **Type:** Level-based educational quiz adventure
- **Goal:** Progress through levels by correctly answering questions on mirrors and lenses
- **Features:** Multiple-choice, button-based selections
- **Progression:** Students must pass a level (80% correct) to unlock the next level
- **Auto Randomization** once 80% is not met.
- **Motivation:** Earn badges, unlock hints, and view progress on a “Quest Map”
- **Badge Collection:** Each level completion earns a badge that can be displayed in a “Trophy Room.”
- Perfect Correct answer in each level earn **OptiHints (1)** —they can use this answer other level or questions.

---

### Level Design, Names, and Badges

Level	Theme / Name	Badge Reward
1	Optics Explorer	 “Finder” Badge
2	Reflection Rookie	 “Mirror Novice” Badge
3	Ray Tracker	 “Ray Ranger” Badge
4	Mirror Mapper	 “Mirror Mapper” Badge
5	Reflection Specialist	 “Reflection Expert” Badge
6	Lateral Inverter	 “Lateral Wizard” Badge
7	Curved Mirror Champion	 “Curvature Conqueror” Badge
8	Image Identifier	 “Image Inspector” Badge
9	Plane Mirror Pro	 “Plane Pro” Badge
10	Focal Finder	 “Focal Master” Badge
11	Real or Virtual?	 “Vision Virtuoso” Badge
12	Mirror Match	 “Mirror Matcher” Badge
13	Lens Learner	 “Lens Luminary” Badge
14	Mirror Life	 “Reflector Pro” Badge
15	Final Quest	 “Optics Legend” Badge + Certificate of Completion

---

### Level 1: Optics Explorer

1. Light is a natural agent that stimulates \_\_\_\_\_ and makes things possible.
  - A. Hearing
  - B. **Sight**
  - C. Movement
  - D. Touch
  
2. Light is a type of energy known as \_\_\_\_\_.
  - A. Chemical energy
  - B. Thermal energy
  - C. **Electromagnetic radiation**
  - D. Kinetic energy
  
3. Light is made up of tiny packets of energy called \_\_\_\_\_.
  - A. Protons
  - B. **Photons**
  - C. Electrons
  - D. Neutrons
  
4. Unlike sound waves, light does not need any material to travel because it can move through a \_\_\_\_\_.
  - A. Solid
  - B. Gas
  - C. **Vacuum**
  - D. Liquid
  
5. Light waves travel outward from their source in straight lines called \_\_\_\_\_.
  - A. Beams
  - B. Waves
  - C. Streams
  - D. **Rays**
  
6. When light strikes matter and part of it is converted into heat, the process is called \_\_\_\_\_.
  - A. Reflection
  - B. **Absorption**

- C. Transmission
- D. Refraction

7. When light passes through a transparent material and continues to the other side, it is \_\_\_\_\_.

- A. Absorbed
- B. Reflected
- C. Scattered
- D. **Transmitted**

8. When light hits a smooth surface such as a mirror, it bounces back in one direction. This is called \_\_\_\_\_.

- A. **Reflection**
- B. Refraction
- C. Absorption
- D. Transmission

9. When light hits a rough surface and bounces in many directions, it is called \_\_\_\_\_.

- A. Absorption
- B. **Scattering**
- C. Reflection
- D. Transmission

10. Light allows us to see objects because it \_\_\_\_\_.

- A. Travels slowly through the air
- B. Is absorbed by the eyes directly
- C. **Reflects off objects into our eyes**
- D. Passes through solid materials

---

### Level 2: Reflection Rookie

1. The Law of Reflection states that the angle of incidence ( $i$ ) is \_\_\_\_\_.

- A. Always greater than the angle of reflection
- B. Always less than the angle of reflection
- C. **Equal to the angle of reflection**
- D. Not related to the angle of reflection

2. Light is a form of energy that travels through a vacuum at an approximate speed of:

- A.  $3 \times 10^6$  m/s
- B.  $8 \times 10^8$  m/s
- C.  $3 \times 10^8$  m/s**
- D.  $8 \times 10^6$  m/s

3. When light hits a smooth object and \_\_\_\_\_ off, the phenomenon is called reflection.

- A. is transmitted
- B. is absorbed
- C. refracts
- D. bounces**

4. A mirror that has a flat reflective surface and always produces a virtual image is specifically called a \_\_\_\_\_.

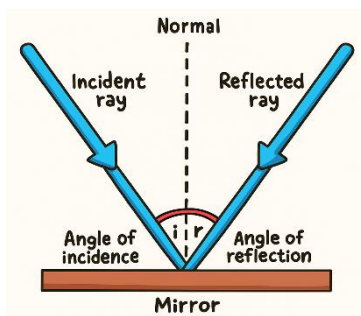
- A. plane mirror**
- B. concave mirror
- C. convex mirror
- D. parabolic mirror

5. An image that can be projected onto a screen and is formed by the actual intersection of reflected light rays is known as a \_\_\_\_\_ image.

- A. virtual
- B. real**
- C. magnified
- D. specular

---

### Level 3: Ray Tracker



Reflection of a Light ray on a Plane

1. Reflection that forms clear images occurs on \_\_\_\_\_ surfaces.

- A. Rough
- B. Smooth**

- C. Curved
- D. Transparent

2. The line drawn perpendicular to the reflecting surface at the point of incidence is called the \_\_\_\_\_.

- A. Reflected ray
- B. Normal line**
- C. Incident ray
- D. Ray of sight

3. The ray of light that comes from the light source and strikes the surface is known as the \_\_\_\_\_.

- A. Reflected ray
- B. Refracted ray
- C. Incident ray**
- D. Normal ray

4. The ray of light that bounces off from the mirror surface is called the \_\_\_\_\_.

- A. Incident ray
- B. Reflected ray**
- C. Normal line
- D. Transmitted ray

5. The incident ray, reflected ray, and normal line all lie \_\_\_\_\_.

- A. At right angles
- B. In different planes
- C. Randomly
- D. In the same plane**

---

#### Level 4: Mirror Mapper



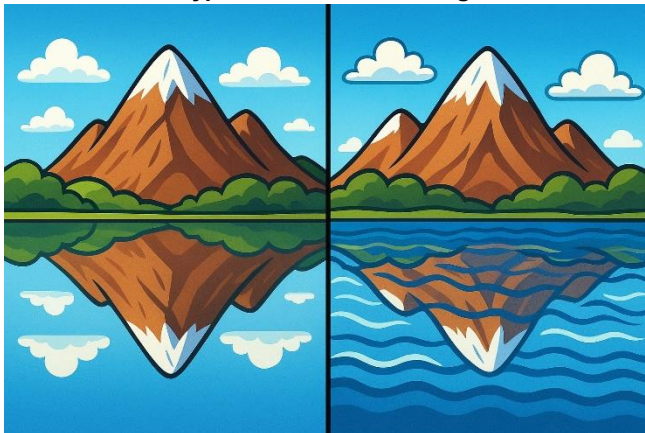
1. What type of image is formed by a plane mirror?

- A. Real
- B. Inverted
- C. Enlarged
- D. Virtual**

2. The image formed by a plane mirror is \_\_\_\_\_ as the object.
- A. Smaller than
  - B. The same size**
  - C. Larger than
  - D. Upside down
3. How is the orientation of the image compared to the object in a plane mirror?
- A. Same orientation**
  - B. Upside down
  - C. Tilted
  - D. Opposite direction vertically
4. The image appears to be \_\_\_\_\_ the mirror as the object is in front of it.
- A. Farther behind
  - B. Closer behind
  - C. At the same distance behind**
  - D. On the surface of
5. When light hits an object and reflects in all directions, we are able to \_\_\_\_\_.
- A. Produce sound
  - B. Absorb heat
  - C. See the object**
  - D. Block the light
- 

### Level 5: Reflection Specialist

Types of Reflection of Light



(a) Specular/Regular

(b) Diffused/Irregular

1. What happens in diffused reflection?
- A. Light reflects in one direction
  - B. Light scatters in many directions**

- C. Light is absorbed
- D. Light passes through

2. Reflection from a smooth surface is called \_\_\_\_\_.

- A. Irregular reflection
- B. **Specular reflection**
- C. Scattered reflection
- D. Diffused reflection

3. Rough surfaces cause light rays to \_\_\_\_\_.

- A. Stay parallel
- B. Not reflect
- C. **Scatter**
- D. Focus

4. Which situation best shows specular reflection?

- A. Light bouncing off calm water.
- B. Light reflecting on wrinkled paper.
- C. **Light reflecting on a polished metal or mirror.**
- D. Light hitting a rocky mountain.

5. A clear image is formed only in which type of reflection?

- A. **Specular reflection**
- B. Diffused reflection
- C. Irregular reflection
- D. Scattered reflection

---

### Level 6: Lateral Inverter



1. Why is the word “AMBULANCE” written in reverse on the front of ambulances?

- A. For decoration
- B. To look unique
- C. **So it appears correctly in a rear-view mirror**
- D. To confuse drivers

2. The phenomenon where left appears right and right appears left in a mirror is called \_\_\_\_\_.

- A. Reflection of light
- B. **Lateral inversion**
- C. Diffused reflection
- D. Mirror distortion

3. What type of mirror causes lateral inversion?

- A. Concave mirror
- B. Convex mirror
- C. **Plane mirror**
- D. Two-way mirror

4. In a plane mirror, the image formed is \_\_\_\_\_.

- A. Real and inverted
- B. **Virtual and laterally inverted**
- C. Magnified and real
- D. Diminished and upright

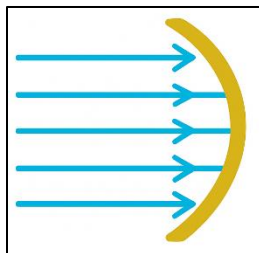
5. What happens when you raise your right hand in front of a mirror?

- A. The image raises its right hand
- B. **The image raises its left hand**
- C. The image raises both hands
- D. The image doesn't move

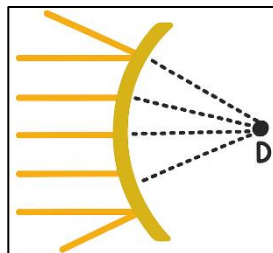
---

### Level 7: Curved Mirror Champion

#### Two Kinds of Spherical Mirrors



(a) Concave / Converging Mirror



(b) Convex / Diverging Mirror

1. What are mirrors with a curved surface called?

- A. Plane mirrors
- B. Flat mirrors
- C. **Spherical mirrors**
- D. Parabolic mirrors

2. A concave mirror is also known as a \_\_\_\_\_ mirror.
- A. Diverging
  - B. **Converging**
  - C. Plane
  - D. Reflective
3. What does a concave mirror do to light rays?
- A. Spreads them apart
  - B. **Reflects them inward to a focal point**
  - C. Makes them parallel
  - D. Absorbs them
4. Which type of mirror is used to see a wider view, such as in vehicles?
- A. Concave mirror
  - B. **Convex mirror**
  - C. Plane mirror
  - D. Parabolic mirror
5. What happens to light rays when they hit a convex mirror?
- A. **They spread out or diverge**
  - B. They focus at a point
  - C. They get absorbed
  - D. They reflect inward
- 

### **Level 8: Image Identifier**

1. When light rays after reflection, what type of image is formed?
- A. **Real image**
  - B. Virtual image
  - C. Upright image
  - D. Enlarged image
2. A real image is always \_\_\_\_\_ with respect to the object.
- A. Erect
  - B. **Inverted**
  - C. Magnified
  - D. Smaller
3. A virtual image is formed when light rays \_\_\_\_\_ after reflection.
- A. Actually meet
  - B. Pass through the mirror

C. **Do not actually intersect**

D. Absorb into the surface

4. What type of mirror forms a **virtual and erect image**?

A. **Convex mirror**

B. Concave mirror

C. Plane mirror

D. Spherical mirror

5. An image that can be **formed on a screen**?

A. Virtual image

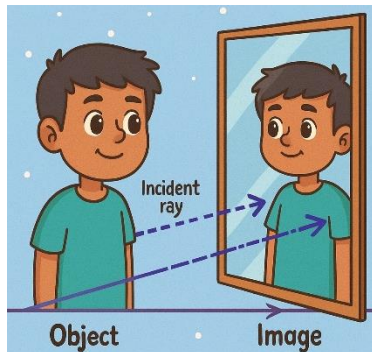
B. **Real image**

C. Enlarged image

D. Magnified image

---

### Level 9: Plane Mirror Pro



1. Where does the image formed by a plane mirror appear?

A. In front of the mirror

B. On the surface of the mirror

C. **Behind the mirror**

D. Inside the mirror

2. What is the **orientation** of the image formed by a plane mirror?

A. Inverted

B. **Upright**

C. Sideways

D. Reversed vertically

3. The image formed by a plane mirror is \_\_\_\_ in size compared to the object.

A. Smaller

B. Larger

C. **The same**

D. Variable

4. The type of image produced by a plane mirror is \_\_\_\_\_.

A. Real

B. **Virtual**

C. Enlarged

D. Inverted

5. How is the image in a plane mirror formed?

A. By absorption of light

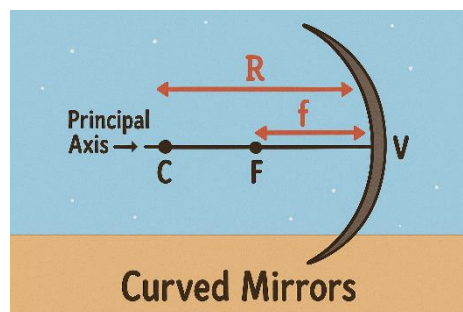
B. **By reflection of light rays that appear to meet behind the mirror**

C. By refraction of light through glass

D. By scattering of light in all directions

---

### Level 10: Focal Finder



1. What is the orientation of an image formed by a plane mirror?

A. Inverted

B. Laterally inverted

C. Upright

D. **Real**

2. Which term describes the point where the principal axis meets the curved mirror?

A. Center of Curvature (C)

B. Focal Point (F)

C. **Vertex (V)**

D. Radius of Curvature (R)

3. If the Radius of Curvature (R) of a curved mirror is 20 cm, what is its focal length (f)?

A. 5 cm

**B. 10 cm**

C. 20 cm

D. 40 cm

4. The image formed by a plane mirror is always classified as Virtual because:

A. It is inverted.

B. It is smaller than the object.

C. It is formed by the actual intersection of light rays.

**D. It is formed by the apparent intersection of the extended reflected rays.**

5. The distance between the Focal Point (F) and the Vertex (V) on a curved mirror is known as the:

A. Center of Curvature (C)

B. Radius of Curvature (R)

**C. Focal Length (f)**

D. Principal Axis

---

### **Level 11: Real or Virtual?**

#### **REAL OR VIRTUAL**

**Which type of image can always be projected onto a screen?**

**A. Real Image**

B. Virtual Image

**An image described as upright (same orientation as the object) is usually a:**

• A. Real Image

• **B. Virtual Image**

**Which image type is formed when reflected light rays do not actually converge, but only appear to come from a point behind the mirror?**

• A. Real Image

• **B. Virtual Image**

**If an image is inverted (upside down) with respect to the object, it must be a:**

• **A. Real Image**

• B. Virtual Image

**An image that is formed on the same side of a mirror as the object (in front) is considered a:**

• **A. Real Image**

• B. Virtual Image

---

### Level 12: Mirror Match

**Plane Mirror, Concave Mirror, Convex Mirror (button with these three option each number)**

1. Which type of mirror always forms reduced images?
2. Which type of mirror can form either real or virtual images?
3. Which type of mirror always forms virtual images?
4. Which type of mirror is flat and smooth?
5. Which type of mirror can form images that are upright or inverted?

### Answer Key

1. Convex Mirror
2. Concave Mirror
3. Plane Mirror
4. Plane Mirror
5. Concave Mirror

---

### Level 13: Lens Learner

**CONCAVE LENS or CONVEX LENS (2 BUTTON OPTION)**

1. In which lens does the curve face inward?
2. In which lens does the curve face outward?
3. Which lens is used for the correction of nearsightedness or myopia?
4. Which lens is used for the correction of farsightedness or hyperopia?
5. Which lens is a converging lens that brings refracted rays together?

Answer

1. Concave Lens
2. Convex Lens
3. Concave Lens
4. Convex Lens
5. Convex Lens

---

### Level 14: Mirror Life

**CONCAVE MIRROR or CONVEX MIRROR (2 BUTTON OPTION)**

No.	Object	Type of Mirror
1.	Vehicle side view mirror	<b>Convex</b>
2.	Headlight of motorcycle	<b>Concave</b>
3.	Inner surface of glasses	<b>Concave</b>
4.	Lunch plates	<b>Concave</b>

5.	Globe	<b>Convex</b>
----	-------	---------------

### Level 15: Final Quest

1. Light is a form of energy that can travel even through a vacuum because it is \_\_\_\_\_.

- A. Chemical energy
- B. Thermal energy
- C. Electromagnetic radiation**
- D. Sound energy

2. Light travels in straight lines called \_\_\_\_\_.

- A. Beams
- B. Rays**
- C. Streams
- D. Waves

3. When light strikes a smooth surface and bounces back, the process is called \_\_\_\_\_.

- A. Refraction
- B. Reflection**
- C. Absorption
- D. Transmission

4. When light hits a rough surface and scatters in many directions, it produces a \_\_\_\_\_ reflection.

- A. Specular
- B. Regular
- C. Diffused**
- D. Irregular

5. According to the Law of Reflection, the angle of incidence is \_\_\_\_\_ the angle of reflection.

- A. Greater than
- B. Less than
- C. Equal to**
- D. Not related to

6. Which of the following surfaces would form a clear reflected image?

- A. Rough wood
- B. Wrinkled paper
- C. Polished metal**
- D. Cloth

7. What type of image is produced by a plane mirror?

- A. Real and inverted

**B. Virtual and upright**

- C. Magnified and real
- D. Reduced and inverted

8. When you raise your right hand in front of a mirror, the image raises its \_\_\_\_\_ hand.

- A. Right
- B. Left**
- C. Both
- D. Neither

9. A concave mirror is also known as a \_\_\_\_\_ mirror.

- A. Diverging
- B. Converging**
- C. Plane
- D. Flat

10. A convex mirror is useful as a vehicle side mirror because it \_\_\_\_\_.

- A. Produces real images
- B. Provides a wider field of view**
- C. Magnifies the object greatly
- D. Focuses light rays to a point

11. Which type of image can be projected onto a screen?

- A. Real image**
- B. Virtual image
- C. Upright image
- D. Enlarged image

12. The distance between the focal point and the vertex of a curved mirror is called the \_\_\_\_\_.

- A. Radius of curvature
- B. Center of curvature
- C. Focal length**
- D. Principal axis

13. Which lens is used to correct nearsightedness (myopia)?

- A. Convex lens
- B. Concave lens**
- C. Cylindrical lens
- D. Plane lens

14. Which lens brings parallel light rays together to a single point?

- A. Concave lens

**B. Convex lens**

C. Diverging lens

D. Flat lens

15. The mirror that always forms virtual, erect, and smaller images is the \_\_\_\_\_ mirror.

A. Plane

B. Concave

**C. Convex**

D. Parabolic