Science Education

E-MODULE 3
(PHYSICS 10)

iLab

An e-module based on Deped CARAGA LEAST LEARNED COMPETENCIES with Internet-Based Laboratory Activities

Arranged by :

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MAED Physics

$d = V_0 t + \frac{1}{2} a t^2$ $V = \frac{d}{t}$ $F = m \cdot a$ $KE = \frac{1}{2} m v^2$ $\rho = \frac{M}{V}$ $W = mg$ $E = m \cdot c^2$

Welcome to the Future of Learning Physics! Explore, Experiment, and Discover the Wonders of the Physical World!

To the Facilitator

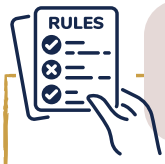
Welcome to this e-module with an Internet-Based Laboratory Activities in Physics 10, an interactive and comprehensive learning resource designed to enhance your understanding of the fundamental concepts in physics.

- As a facilitator, you are expected to orient the learners on how to use this e-module. You also need to keep track of the learners' progress while allowing them to manage their own learning at home. Furthermore, you are expected to encourage and assist the learners as they do the tasks included in the e-module.

Thank you for choosing this iLab as your learning resource. We hope your journey through this e-module is both delightful and richly rewarding.

To the Learner

Welcome to the exciting world of digital learning! As a learner, you must learn to become responsible of your own learning. We hope that this e-module will serve as a valuable tool in your learning journey, providing you with the knowledge and skills you need to excel in your studies. We encourage you to take full advantage of this resource, explore all its features, and actively participate in the interactive activities.



iLab Policies

As you go through the different activities of this e-module be reminded of the following:

Remember, the goal is not just to complete the module, but to truly understand and absorb the information it provides. Always bear in mind that you are not alone. We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. Happy learning!

Rule 1:
Active Participation: Engage actively with all the materials and activities. The more you interact, the more you learn.

Rule 2:
Pace Yourself: Don't rush through the content. Take your time to understand each concept before moving on to the next.

Rule 3:
Note-Taking: Keep a notebook handy for jotting down important points or questions that arise during your learning.

Rule 4:
Utilize Resources: Make full use of additional resources provided in this module. It is there to enhance your understanding.

Rule 5:
Reflect: After completing each section, take a moment to reflect on what you've learned and how you can apply it.

How to use these e-modules?

The e-module is compose of the following parts.

01

OVERVIEW

This provides you with the general information about the e-module.

02

PRE-TEST

This determines your background knowledge of the lesson.

03

MOTIVATIONAL ACTIVITY

This is an activity before proceeding to the lesson proper.

04

LESSON PROPER

This is the part where you can find the basic concepts about the lessons discussed

05

ILAB

These are the internet-based laboratory activities to be performed by you which will enrich your understanding of the lessons or concepts.

06

POST-TEST

This is the part that intends to determine how much you have learned from the lesson.

07

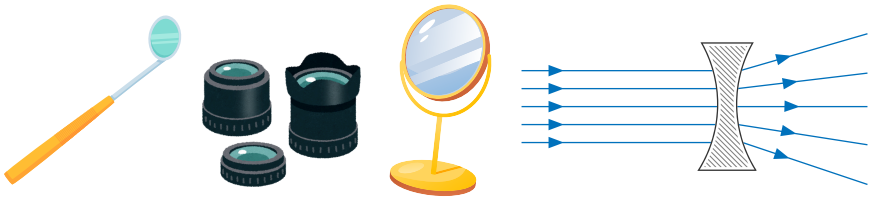
ANSWER KEY

This is the part that presents the answers to the activities included in the module.

Overview

Understanding Mirrors and Lenses

Learning Competency:
predict the qualitative characteristics (orientation, type, and magnification) of images formed by plane and curved mirrors and lenses. **(S10FE-IIg-50)**



Mirrors and lenses play an essential role in our daily lives, from the simple reflection in a mirror to the complex optics of eyeglasses, cameras, and telescopes. Understanding how these optical devices form images helps us grasp fundamental principles in physics and their applications in technology and nature.

Expected Outcomes:
After reading this e-module and performing the activities you should be able to:

- Investigate the reflective properties of light using plane mirrors;
- Differentiate plane and curved mirror;
- Apply ray diagramming techniques in describing images formed by mirrors;
- Analyze how the refraction is applied on concave and convex lenses;
- Distinguish between converging and diverging lenses;
- Apply ray diagramming technique in describing images formed by lenses;

Pre-Test

Before we delve into our upcoming lesson, it's crucial to establish a foundational understanding of the topic at hand. This not only primes your mind for new information but also allows you to connect new knowledge with what you already know.

To facilitate this, we have prepared a set of questions designed to gauge your existing knowledge on the subject matter. These questions are not a test, but a tool to help you and us understand your current familiarity with the topic.

We encourage you to answer these questions thoughtfully and honestly. There's no need to rush - take your time to reflect on each question. Remember, the goal here is not to get all the answers right, but to provide an accurate snapshot of your current understanding.

So, let's embark on this journey of discovery together. Your responses will guide us in tailoring the upcoming lessons to your learning needs, ensuring a more effective and enjoyable learning experience.

Ready? Let's begin!

Directions: Read and understand each question carefully and encircle the letter of the best answer.

1. Consider the image of a person standing in front of a plane mirror. Which statement correctly describes the image?

A. The image is real and inverted.
B. The image is virtual, upright,
and the same size as the object.
C. The image is real and magnified.
D. The image is virtual and smaller than the object.

2. A concave lens is used to view an object. Which type of image will be produced?
A. Real, inverted, and magnified.
B. Virtual, upright, and reduced.
C. Real, upright, and reduced.
D. Virtual, inverted, and magnified.

3. What happens when an object is placed far from a convex lens?
A. The image is real, inverted, and smaller than the object.
B. The image is virtual, upright, and larger than the object.
C. The image is real, upright, and the same size as the object.
D. The image is virtual and inverted.

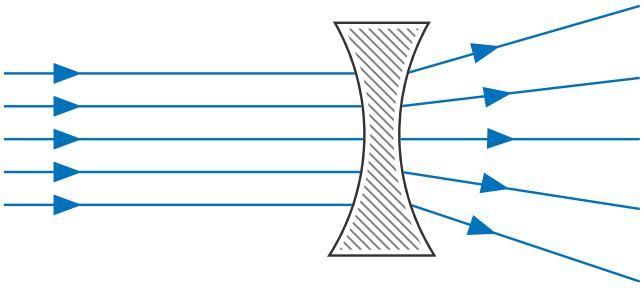
4. If the object is moved closer to a convex lens, how does the image change?
A. The image becomes virtual, upright, and magnified.
B. The image becomes real, inverted, and magnified.
C. The image becomes smaller and inverted.
D. The image disappears.

5. What type of image does a concave lens form when the object is placed beyond the focal point?
A. Real, upright, and reduced.
B. Virtual, inverted, and magnified.
C. Virtual, upright, and reduced.
D. Real, inverted, and magnified.

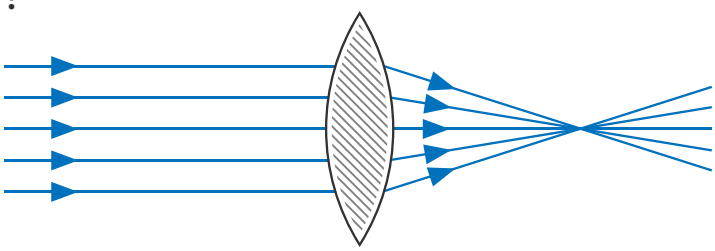
6. What happens to the image in a plane mirror when you move closer to it?
A. The image becomes smaller and inverted.
B. The image moves closer to you.
C. The image becomes larger.
D. The image disappears.

7. Which of the following applications best utilizes a convex mirror?
A. Side-view mirrors in cars.
B. Magnifying glasses.
C. Cameras.
D. Telescopes.

8. Which of the following best describes the image formed by a concave lens in this ray diagram?
A. Real, inverted, and magnified.
B. Virtual, upright, and reduced.
C. Real, upright, and magnified.
D. Virtual, inverted, and reduced.



9. If an object is placed between the focal point and a convex lens, what type of image will be produced?
A. Real, inverted, and magnified.
B. Virtual, upright, and magnified.
C. Real, upright, and smaller.
D. Virtual, inverted, and smaller.



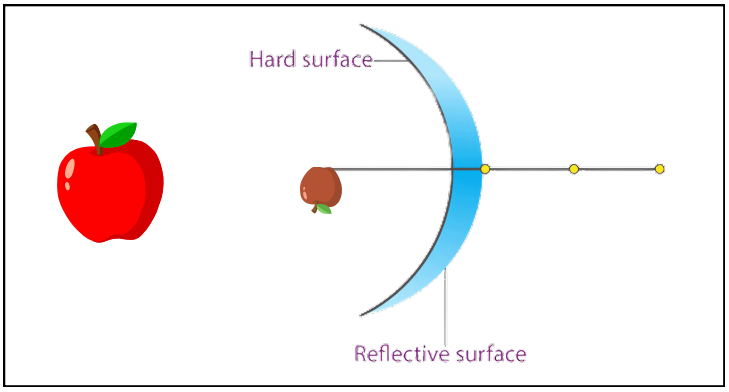
10. How does the position of the object affect the magnification of a convex lens?
A. The closer the object is to the focal point, the greater the magnification.
B. The farther the object is from the focal point, the greater the magnification.
C. Magnification is the same regardless of object position.
D. Magnification is always greater than 1.

Motivational Activity

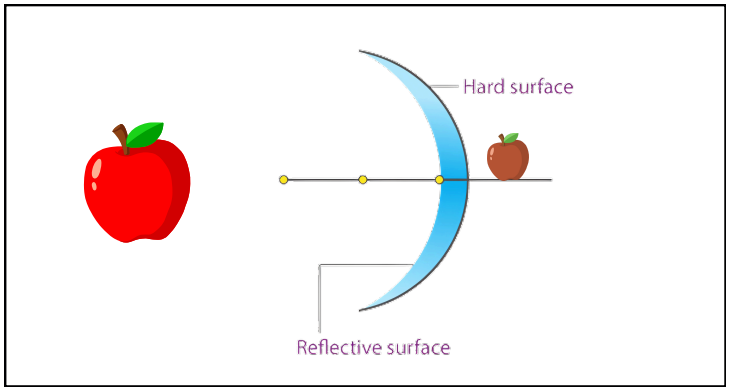
Mirror Sorting Game

Directions: For each of the following diagrams (provided below), predict the image's characteristics by describing the image as real or virtual, upright or inverted, and magnified or reduced by underlining the correct answer.

1. Which of the following is the correct characteristics based on the image shown?



Real image /Virtual image



Real image /Virtual image

2. Which of the following is the correct characteristics based on the image shown?

Upright / Inverted

Upright / Inverted

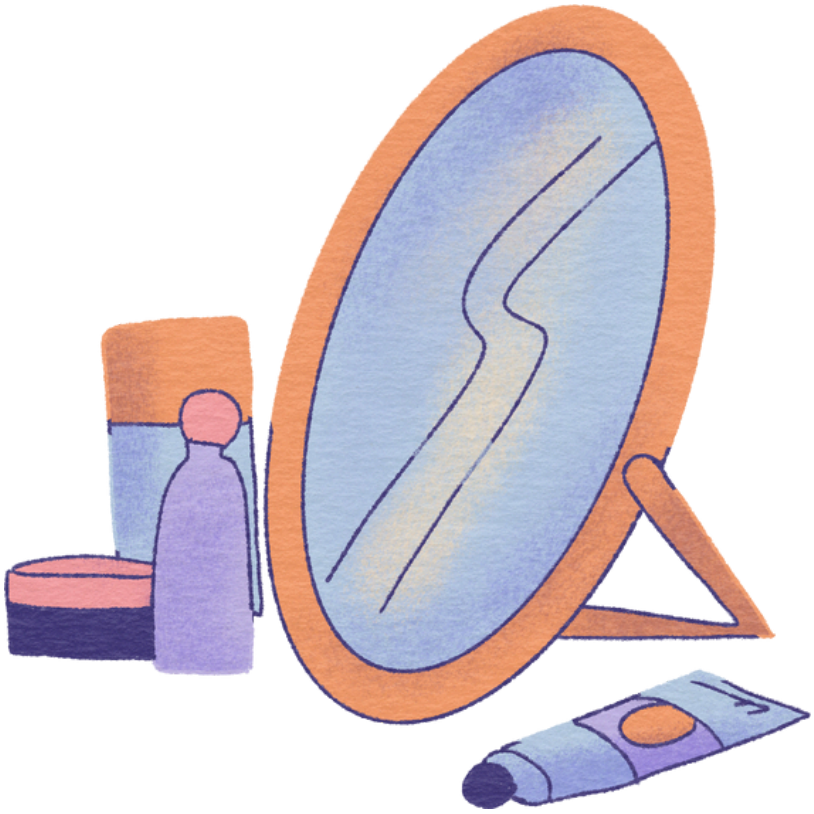
3. Which of the following is the correct characteristics based on the image shown?

Magnified / Reduced

Magnified / Reduced

Lesson Proper

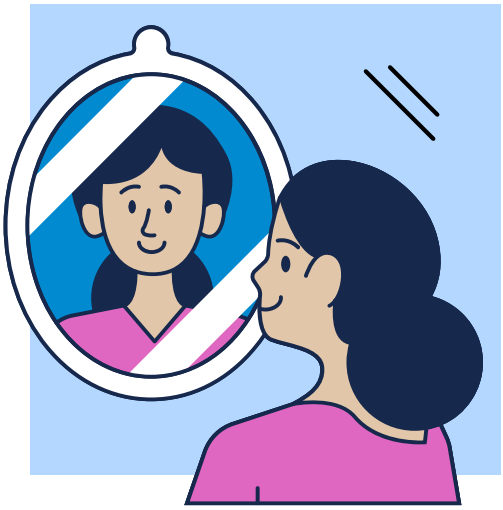
Understanding Mirrors and Lenses



Mirrors and lenses are essential optical devices that manipulate light to form images. The way an image appears —its orientation (upright or inverted), type (real or virtual), and magnification (enlarged, reduced, or same size)— depends on the object's position relative to the optical element's focal point.

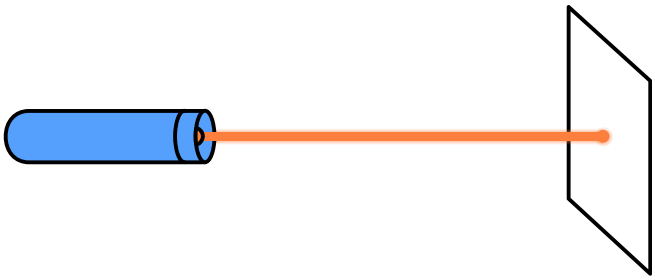
This lesson will help you predict the qualitative characteristics of images formed by plane and curved mirrors as well as converging (convex) and diverging (concave) lenses.

MIRROR, MIRROR



Have you ever snuck a peek at your reflection in a spoon or the mirrored surface of a tall building? How would you describe the characteristics of the images you see?

Mirrors work on the principle of **reflection**, where light bounces off surfaces.



THE RAY MODEL OF LIGHT

Light travels in straight lines called rays. Rays also have arrows to indicate the direction of travel of light. An example of a ray is the beam of light from a laser.

We can represent how light interacts with materials using a ray diagram. It represents the possible paths light can take from a source or an object to an observer or a screen.

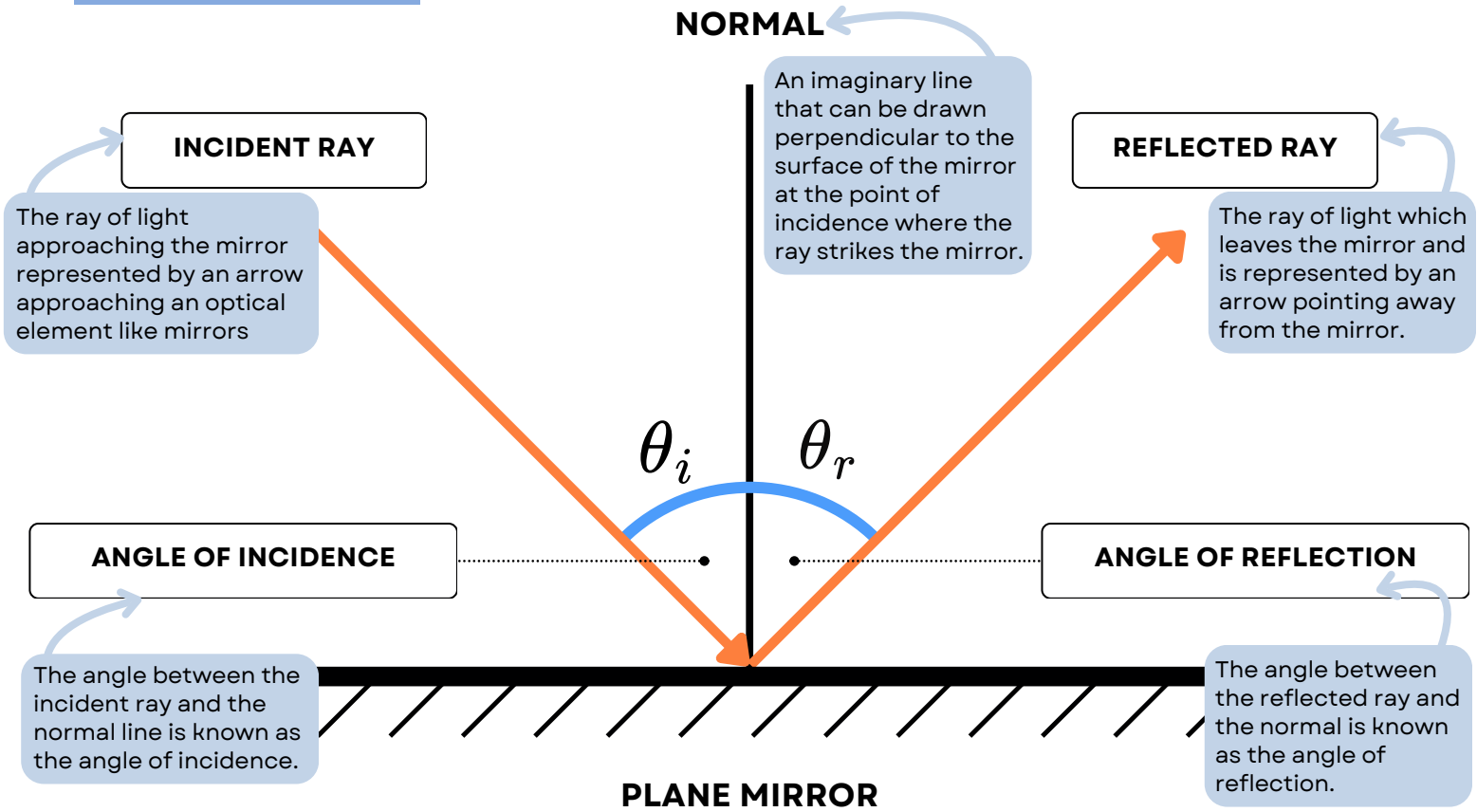
LAW OF REFLECTION

This process is guided by the law of reflection, which states that:

- The incident ray, the normal at the point, and the reflected ray, all lie on the same plane
- The angle of incidence and the angle of reflection are always equal.

LAW OF REFLECTION

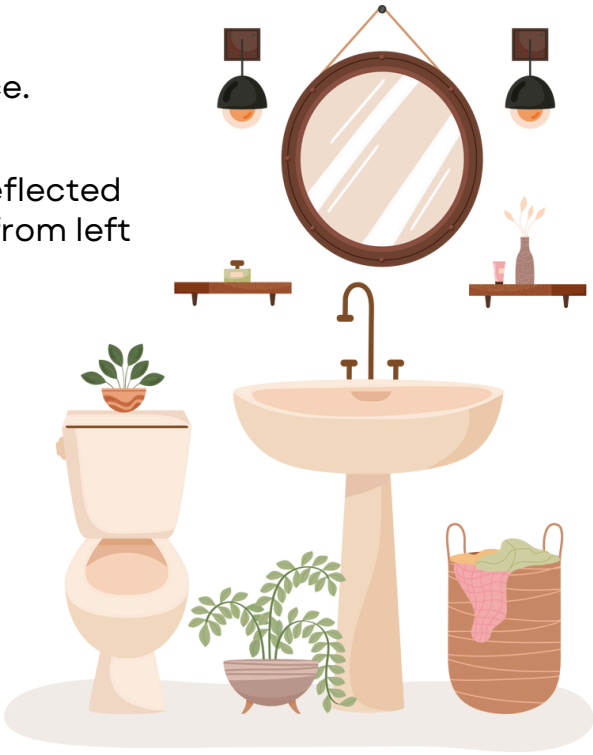
$$\theta_i = \theta_r$$



TYPES OF MIRRORS

Mirrors are one of those common objects that can reflect light properly because of its smooth surface. There are two types of mirrors: plane and curved mirrors. Mirrors are described to be curved because of their shape and the types of curved mirror (concave and convex) depends on the location of the reflecting surface

PLANE MIRRORS



- A plane mirror is a type of mirror with a flat surface. These are the most widely used mirrors
- The images formed from a plane mirror are the reflected images in their normal proportions but reversed from left to right.
- Plane mirrors are commonly used in bathrooms, bedrooms, and for decorative purposes

CONCAVE MIRRORS

- A curved mirror where the reflecting surface is on the inner side of the curved shape.
- Concave mirrors are also converging mirrors because they cause light rays to converge or come together after reflection.
- Concave mirrors are used in a variety of applications, from shaving mirrors that magnify images to large telescopes that gather light from distant stars.

CONVEX MIRRORS

- A curved mirror with the reflecting surface on the curved shape's outer side.
- Convex mirrors are also diverging mirrors because they cause light rays to diverge or spread out after reflection.
- Convex mirrors are commonly used in security mirrors, side-view mirrors, and road safety mirrors for a wider field of view.

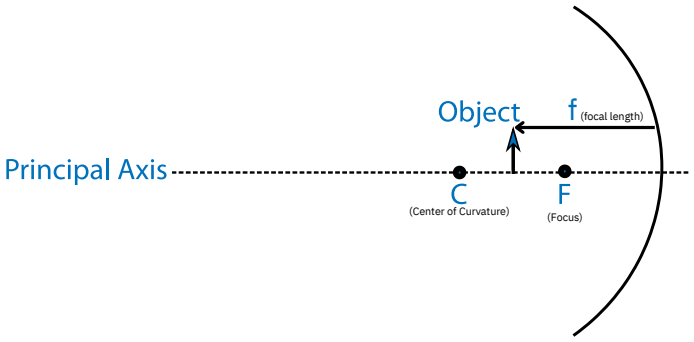
RAY DIAGRAMMING TECHNIQUES IN CURVED MIRRORS

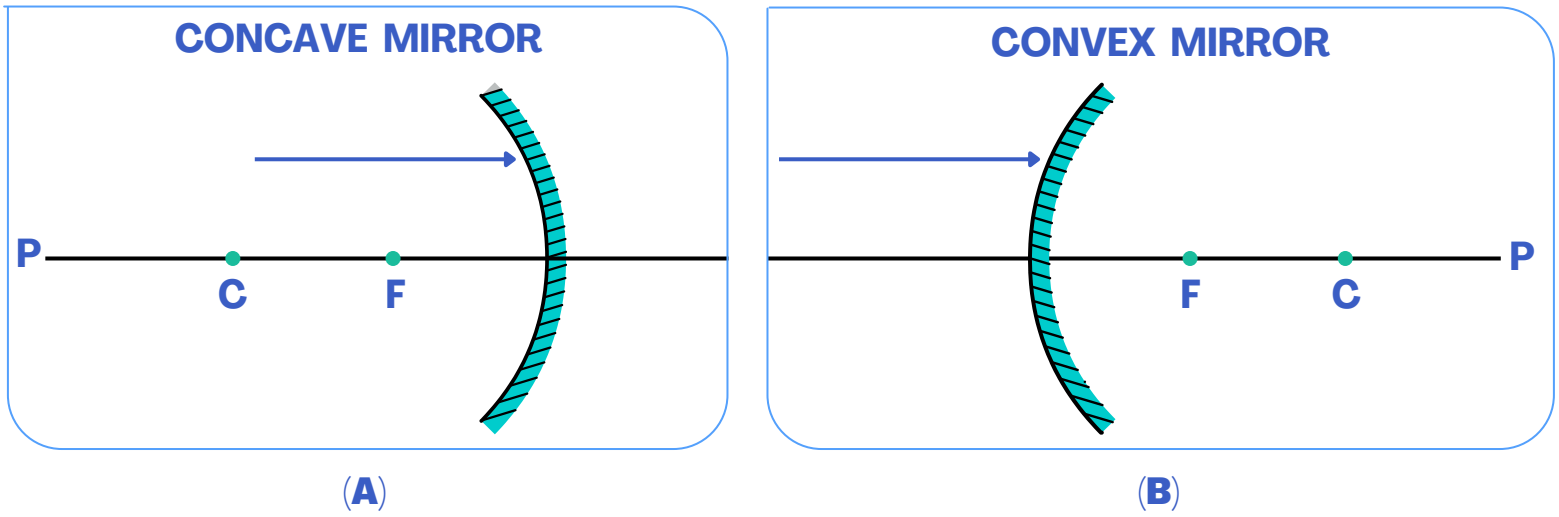
Images formed by plane, converging, and diverging mirrors strictly follow the law of reflection, and one convenient way of analyzing it is the use of ray diagramming techniques.

THINGS THAT TO BE FOLLOWED AND CONSIDERED:

1. Parts of the diagram

Mirror – It can be a concave or convex mirror.
Focus (F): The point where parallel light rays converge after reflecting from the mirror.
Center of Curvature (C): The center of the spherical shape of the mirror. The distance from the mirror's surface to the center of curvature is twice the focal length (2F).
Focal Length (f): The distance between the mirror's surface and the focal point.



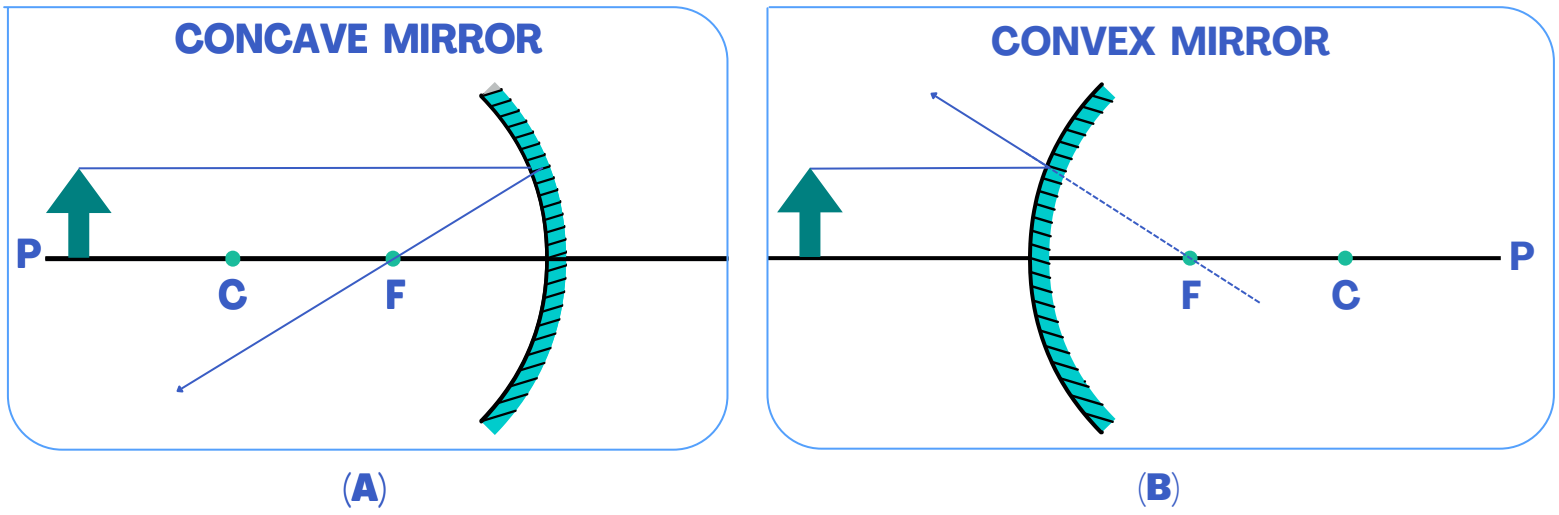


(A) (B)

Parts of the diagram used in (A) concave mirror and (B) convex mirror

2. Rays to be used

A. An incident ray PARALLEL TO THE PRINCIPAL AXIS and when it reflects, it will (A) pass TOWARDS THE FOCUS; (B) follow the path AWAY FROM THE FOCUS

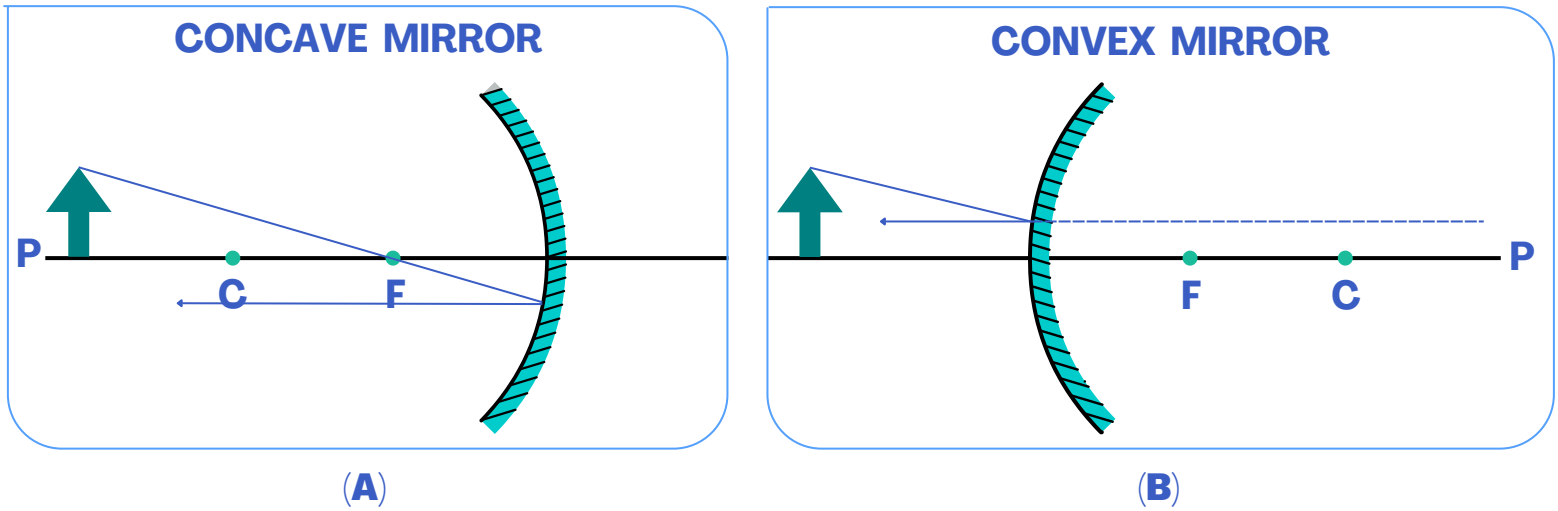


(A) (B)

Ray A used in (A) concave mirror and (B) convex mirror

RAY DIAGRAMMING TECHNIQUES IN CURVED MIRRORS

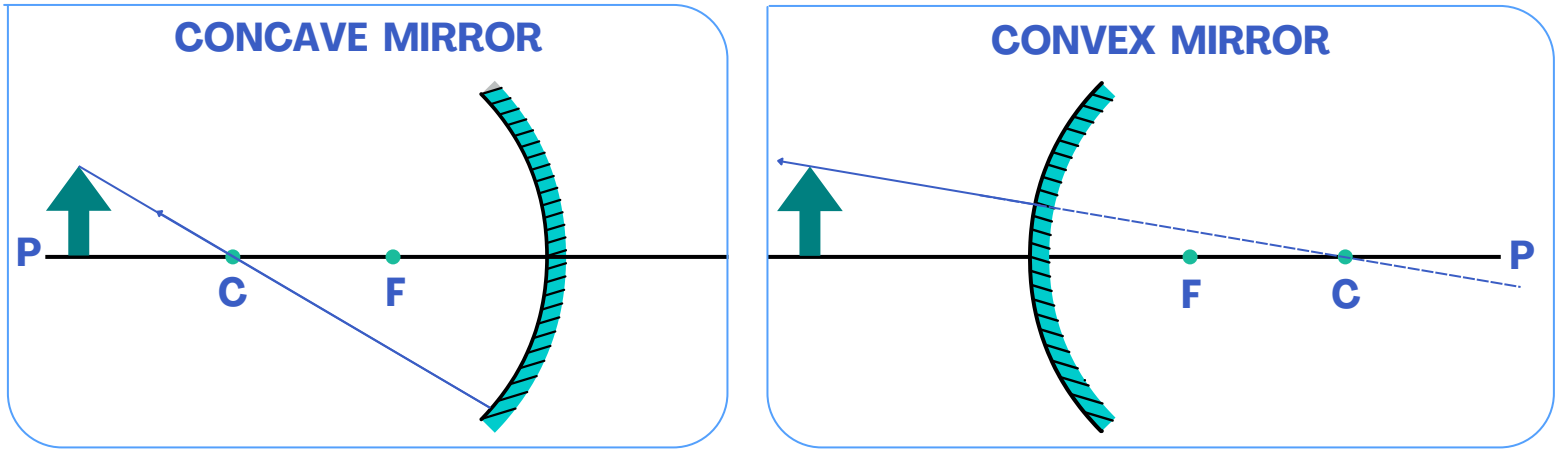
B. An incident ray (A)PASSING THROUGH THE FOCUS or (B)MOVING TOWARDS THE FOCUS and when it hits the mirror, it will reflect PARALLEL TO THE PRINCIPAL AXIS.



(A) (B)

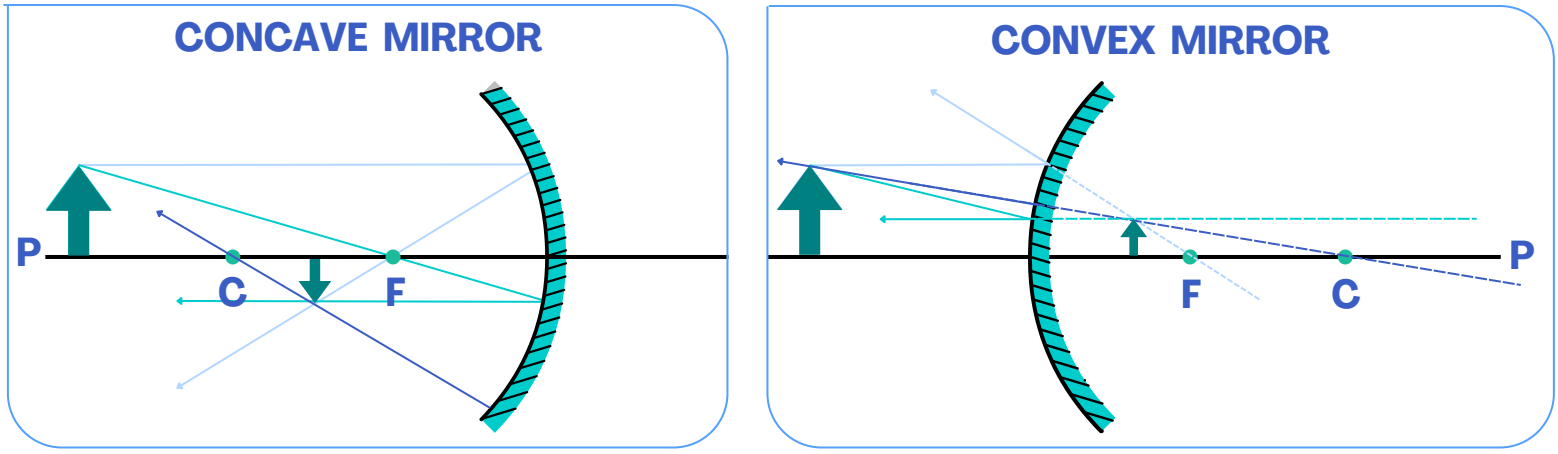
Ray B used in (A) concave mirror and (B) convex mirror

C. An incident ray (A)PASSING THROUGH THE CENTER or (B)MOVING TOWARDS THE CENTER and when it hits the mirror, it will reflect TOWARDS/ALONG THE CENTER.



(A) (B)

Ray C used in (A) concave mirror and (B) convex mirror



(A) (B)

Combining **Ray A, B, C** used in (A) concave mirror and (B) convex mirror

RAY DIAGRAMMING TECHNIQUES IN CURVED MIRRORS

4. Description of the Image

The image is formed at the intersection of the reflected rays and it can be described based on its Size, Orientation, Location, and Type (S.O.L.T). (Note: If in case there is no intersection because the reflected rays are parallel to each other, no image is formed.)

- A. **Size (S)** – It describes the height of the image as compared to the object's height. It can be described as SMALLER/REDUCED/ DIMINISHED/DECREASED, SAME SIZE, or LARGER/ MAGNIFIED.

- B. **Orientation (O)** – It describes the orientation of the image when compared to the object. It can be UPRIGHT if it has the same orientation as the object and INVERTED if otherwise. (Note that if the object is initially inverted, and the image is also inverted, it should be described as upright.)

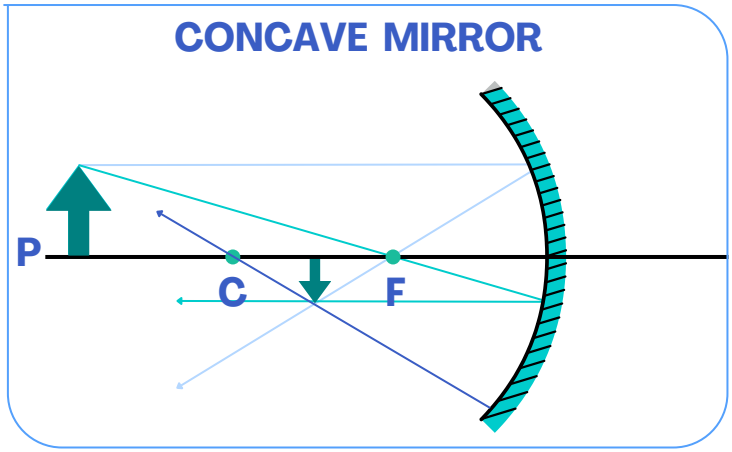
- C. **Location (L)** – It describes where the image is formed. It can be IN FRONT OF THE MIRROR or BEHIND THE MIRROR.

- D. **Type (T)** – It describes the type of image formed. It can be described as REAL if the image is formed by the actual reflected ray and located at the front of the mirror. VIRTUAL if the image is formed by the extended reflected ray and located behind the mirror.

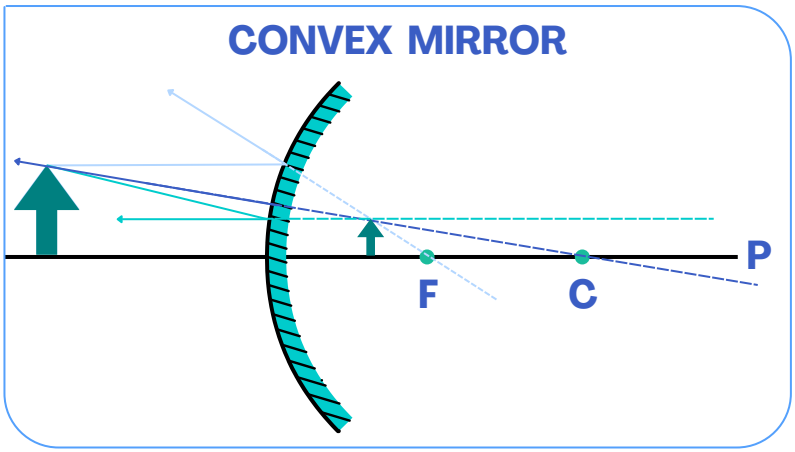
Here is an example of how ray diagramming techniques are used to locate and describe the image formed by an object

Description of the image:
S – reduced/ smaller
O – inverted
L – in front of the mirror
T - real

Description of the image:
S – reduced/ smaller
O – upright
L – behind of the mirror
T - virtual



(A)

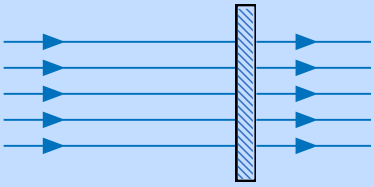
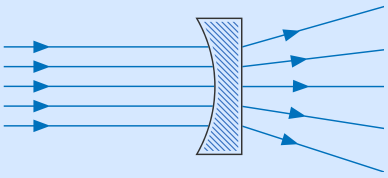
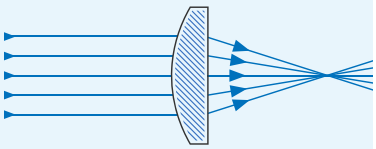


(B)

Combining **Ray A, B, C** used in (A) concave mirror and (B) convex mirror

IMAGE FORMED BY MIRRORS

Images are formed when light from the object hits the mirror and reaches the eyes ,the images formed differ from one mirror to another.

DESCRIPTION OF THE IMAGE	PLANE MIRRORS	CONCAVE MIRRORS	CONVEX MIRRORS
			
SIZE	• Same size	Depends on the distance of the object from the mirror. • Near – larger • Very far – smaller	• Smaller
ORIENTATION	• Same orientation	Depends on the distance of the object from the mirror. • Near – same orientation • Far – inverted	• Same orientation
TYPE	• Virtual	Depends on the distance of the object from the mirror. • Near – Virtual • Far – Real	• Virtual
DISTANCE FROM THE MIRROR	• Same distance from the mirror	Depends on the distance of the object from the mirror. • Near – image appears farther to the mirror • Far – image appears farther to the mirror • Very far – image appears nearer to the mirror.	• Same distance from the mirror

SPHERICAL LENSES

Spherical lenses are lenses formed by connecting two spherical transparent surfaces. In general, there are two types of spherical lenses. So, lenses formed by binding two spherical surfaces bulging outward are known as convex lenses, while the lenses formed by binding two spherical surfaces such that they are curved inward are known as concave lenses. This is one of the basic differences between concave and convex lenses.

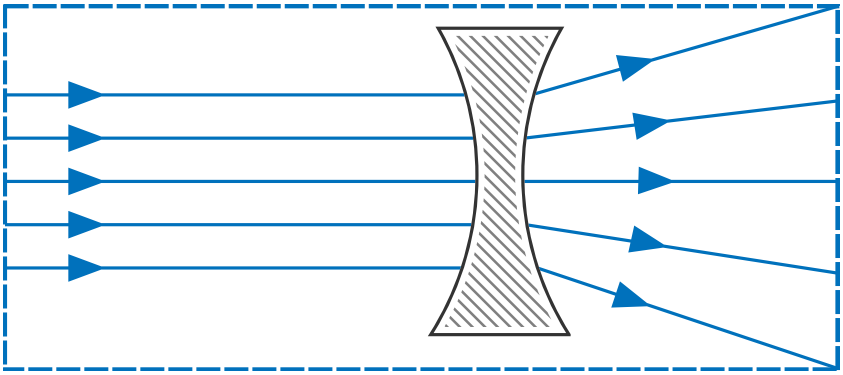
CONCAVE LENSES

- A concave lens is also referred to as a diverging lens since it "diverges" light rays that are incident on it.
- The lens surface is concave in nature
- This lens is thinner in the center and thicker at the edges

Telescope

Peepholes

Eye Glasses



CONVEX LENSES

- A convex lens is also referred to as a converging lens since it "converges" light rays that are incident on it
- The lens surface is convex in nature.
- This lens is thicker at the centre and gets thinner as we move towards the edges.

Microscopes

Magnifying glass

Camera

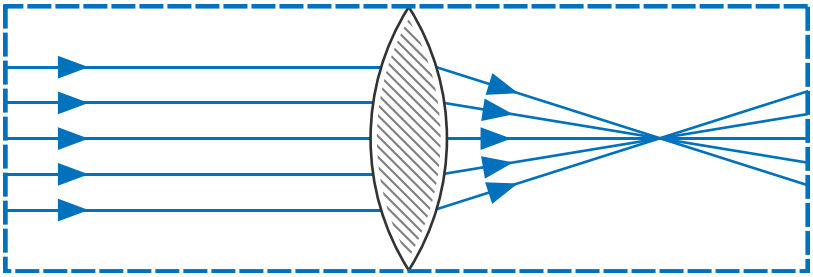


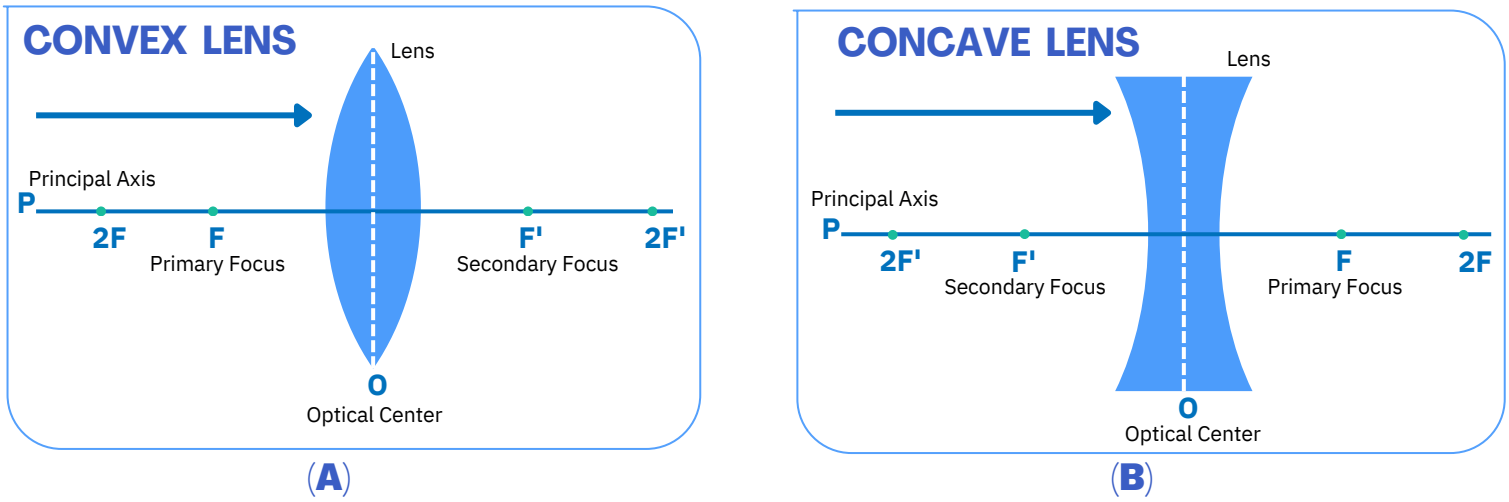
IMAGE FORMATION BY CONCAVE AND CONVEX LENSES

1. When a ray strikes concave or convex lenses obliquely at its optical centre, it continues to follow its path.
2. When a ray, parallel to the principal axis strikes concave or convex lenses, the reflected ray passes through a focus on the principal axis.
3. When a ray, passing through focus strikes concave or convex lenses, the reflected ray will pass parallel to the principal axis.

THINGS TO BE FOLLOWED AND CONSIDERED:

1. Parts of the diagram

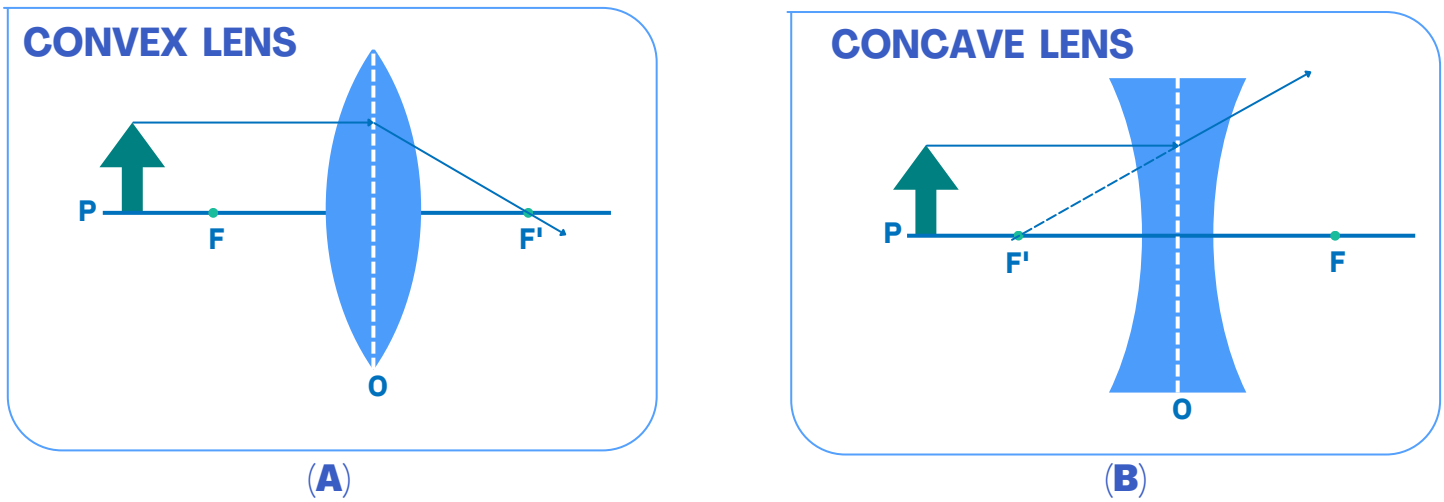
A. **Lens** – It can be a concave or convex lens.
B. **Principal Axis (P)** – An imaginary line that bisects the spherical lenses horizontally.
C. **Primary Focus (F)** - Located along the principal axis. Depends on the type of lens – for a convex lens, it is on the same side with the object and for a concave lens, it is on the opposite side of the object.
D. **Secondary Focus (F')** - Located along the principal axis. Depends on the type of lens – for a convex lens, it is on the opposite side of the object and for a concave lens, it is on the same side with the object.
E. **Optical Center (O)** – Located at the intersection of the principal axis and the lens.



Parts of the diagram of (A) Convex Lens (B) Concave Lens

2. Rays to be used

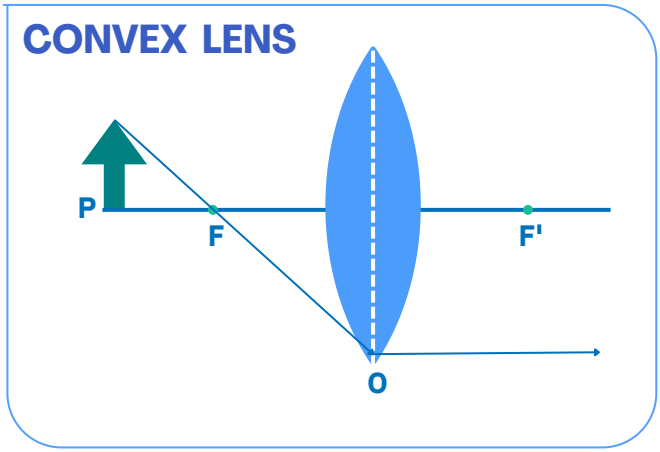
A. Incident ray **PARALLEL TO THE PRINCIPAL AXIS** and when it refracts, it will **(A) MOVE TOWARDS THE SECONDARY FOCUS** or **(B)FOLLOW THE PATH ALONG THE SECONDARY FOCUS (F').**



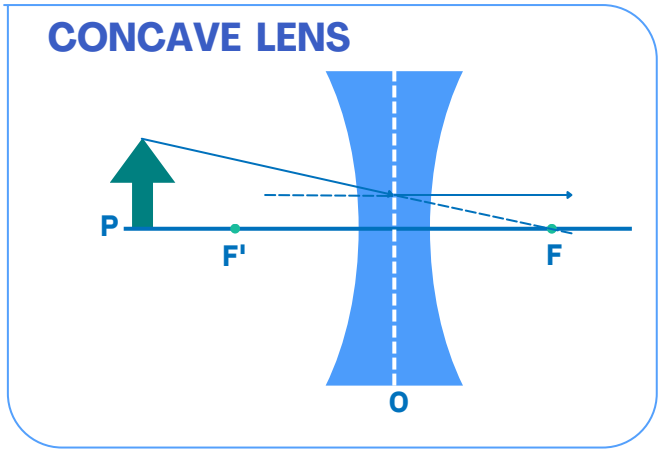
Ray A used in (A) Convex Lens (B) Concave Lens

IMAGE FORMATION BY CONCAVE AND CONVEX LENSES

B. Incident ray **(A)PASSING THE PRIMARY FOCUS** or **(B) MOVING TOWARDS THE PRIMARY FOCUS** and when it hits the mirror,it will refract **PARALLEL TO THE PRINCIPAL AXIS.**



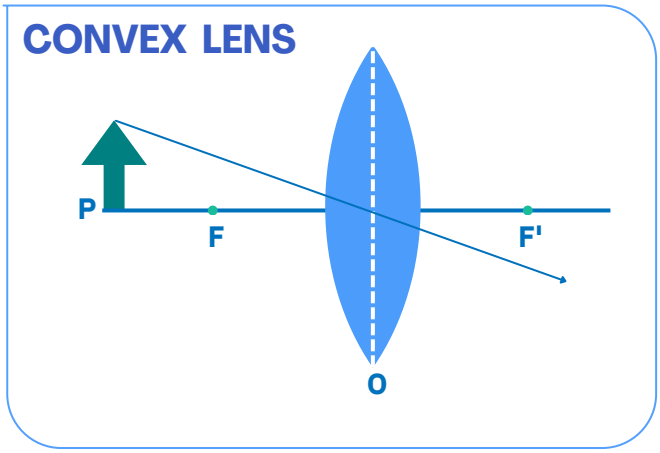
(A)



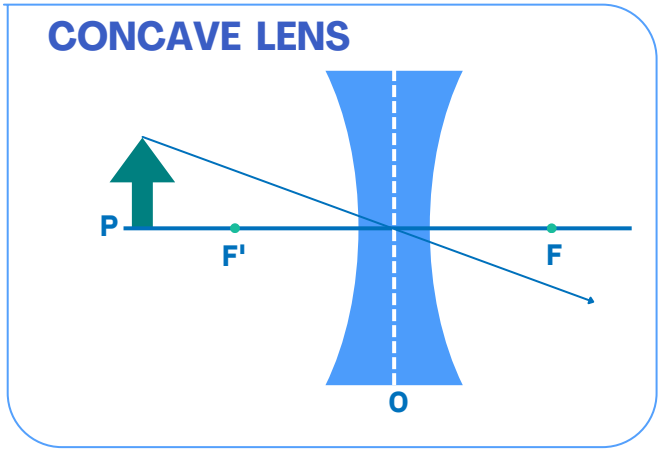
(B)

Ray B used in (A) Convex Lens (B) Concave Lens

C. Incident ray **PASSING THE OPTICAL CENTER** and it will continue its path because there will be no refraction.



(A)



(B)

Ray C used in (A) Convex Lens (B) Concave Lens

IMAGE FORMATION BY CONCAVE AND CONVEX LENSES

3. Description of the Image

The image is formed at the intersection of the reflected rays and it can be described based on its Size, Orientation, Location, and Type (S.O.L.T). (Note: If in case there is no intersection because the reflected rays are parallel to each other, no image is formed.)

- A. **Size (S)** – It describes the height of the image as compared to the object's height. It can be described as SMALLER/REDUCED/ DIMINISHED/DECREASED, SAME SIZE, or LARGER/ MAGNIFIED.

- B. **Orientation (O)** – It describes the orientation of the image when compared to the object. It can be UPRIGHT if it has the same orientation as the object and INVERTED if otherwise. (Note that if the object is initially inverted, and the image is also inverted, it should be described as upright.)

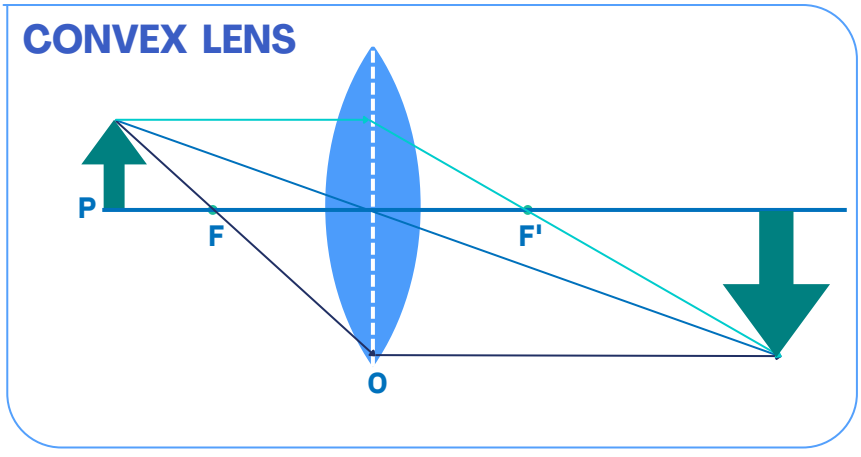
- C. **Location (L)** – It describes where the image is formed. It can be IN FRONT OF THE MIRROR or BEHIND THE MIRROR.

- D. **Type (T)** – It describes the type of image formed. It can be described as REAL if the image is formed by the actual reflected ray and located at the front of the mirror. VIRTUAL if the image is formed by the extended reflected ray and located behind the mirror.

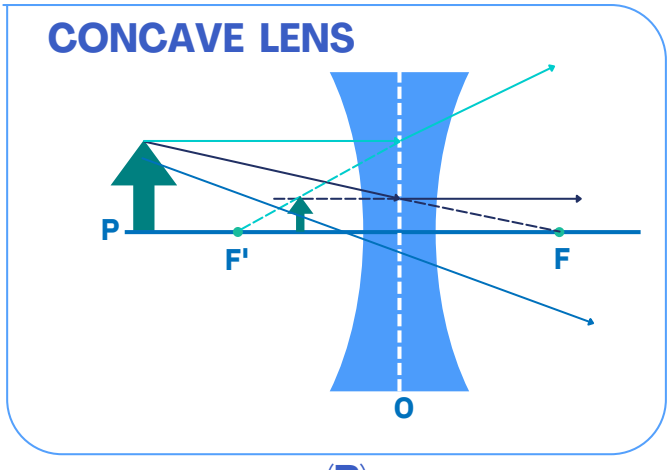
Here is an example of how ray diagramming techniques are used to locate and describe the image formed by an object

Description of the image:
S – enlarged/magnified
O – inverted
L – behind the mirror
T - virtual

Description of the image:
S – reduced/ smaller
O – upright
L – in front of the mirror
T - real



(A)



(B)

Combining **Ray A, B, C** used in (A) convex lens and (B) Concave lens

iLab (Internet-Based Laboratory Activity)

Exploring Image Formation with Mirrors and Lenses

Objective:

1. To predict the image's characteristics (type, orientation, magnification) by adjusting the position of the object in front of a concave mirror.

Materials Needed:

- A computer or tablet with internet access.
- Access to the Interactive Simulation:
- PhET Geometric Optics Simulation;

https://phet.colorado.edu/sims/html/geometric-optics/latest/geometric-optics_all.html

Pre-Laboratory Preparation:

• Watch the Introduction Video:

https://youtu.be/b_R6t-q4ALc?feature=shared

Activity Instructions:

1. Access the PhET Geometric Optics Simulation:
Go to the provided link for the Geometric Optics simulation by PhET.

2. Set Up the Experiment:

- Select "Mirrors" or "Lenses" based on the optical element you want to investigate.

Choose the appropriate type:

Mirrors: Concave or Convex

Lenses: Convex or Concave

- Adjust the position of the object to see how the image changes by dragging it to different locations.

3. Observe the Image:
As you move the object, observe the characteristics of the image formed. Pay attention to:

- **Size: Is the image magnified or reduced?**
- **Orientation: Is the image upright or inverted?**
- **Location:is it in front of the mirror or behind the mirror.**
- **Type: Is it real or virtual?**

4. Record Your Observations:
After each adjustment of the object, record the image characteristics in the table provided below. For each position, note the size, orientation, location, and type of the image.

Object Position	**Size (Magnified/ Reduced)**	**Orientation (Upright/ Inverted)**	**Location (in front of the mirror /behind the mirror)**	**Image Type (Real/Virtual)**
1. Object beyond the center of curvature (2F)				
2. Object at the center of curvature (C)				
3. Object between the center of curvature (C) and the focal point (F)				
4. Object at the focal point (F)				
5. Object between the focal point (F) and the mirror				

Post-Test

As we conclude our lesson, it's important to assess your understanding of the topic we've just explored. This step not only helps reinforce your new knowledge but also enables you to connect the concepts you've learned with your existing understanding.

To assist in this, we've prepared a set of questions designed to gauge how well you've grasped the key points of the lesson. These questions are not a test, but a valuable tool to help both you and us assess your progress.

Take your time to reflect on each question and answer thoughtfully. There's no rush – the goal here is not to get every answer right, but to give an honest and accurate snapshot of your current understanding.

This process will guide us in refining future lessons to better meet your learning needs, ensuring a more effective and enjoyable experience moving forward.

So, let's continue on this journey of discovery! Ready? Let's begin!

Directions: Read and understand each question carefully and encircle the letter of the best answer.

1. A person stands in front of a plane mirror. How does the image appear?
A. Real, inverted, and the same size as the object.
B. Virtual, upright, and the same size as the object.
C. Real, upright, and magnified.
D. Virtual and smaller than the object.

2. What type of image is always formed by a concave lens?
A. Real, inverted, and magnified.
B. Virtual, upright, and reduced.
C. Real, upright, and reduced.
D. Virtual, inverted, and magnified.

3. When an object is placed beyond twice the focal length of a convex lens, what is the nature of the image?
A. Real, inverted, and smaller than the object.
B. Virtual, upright, and larger than the object.
C. Real, upright, and the same size as the object.
D. Virtual and inverted.

4. If an object is moved closer to a convex lens from beyond twice the focal length to between the focal point and twice the focal length, how does the image change?
A. The image becomes virtual, upright, and magnified.
B. The image becomes real, inverted, and magnified.
C. The image becomes smaller and inverted.
D. The image disappears.

5. A concave lens is used to view an object placed at a distance greater than its focal length. What type of image is formed?
A. Real, upright, and reduced.
B. Virtual, inverted, and magnified.
C. Virtual, upright, and reduced.
D. Real, inverted, and magnified.

6. What happens to the image in a plane mirror when you step farther away from it?
A. The image becomes smaller and inverted.
B. The image moves farther from you.
C. The image becomes larger.
D. The image disappears.

7. Which of the following best demonstrates the use of a convex mirror?
A. Security mirrors in stores.
B. Microscope lenses.
C. Projectors.
D. Binoculars.

8. A concave lens is used to form an image of an object. Which of the following describes the image?
A. Real, inverted, and magnified.
B. Virtual, upright, and reduced.
C. Real, upright, and magnified.
D. Virtual, inverted, and smaller.

9. If an object is positioned very close to a convex lens, between the lens and its focal point, what will be the nature of the image?
A. Real, inverted, and magnified.
B. Virtual, upright, and magnified.
C. Real, upright, and smaller.
D. Virtual, inverted, and smaller.

10. How does moving an object closer to a convex lens affect its image size?
A. The closer the object is to the focal point, the larger the image becomes.
B. The farther the object is from the focal point, the larger the image becomes.
C. Image size remains the same no matter where the object is placed.
D. The image size is always smaller than the object.

Compare your answers with the pre-test to see how much you've learned and retained.

1. Consider the image of a person standing in front of a plane mirror. Which statement correctly describes the image?

A. The image is real and inverted.
B. The image is virtual, upright,
and the same size as the object.
C. The image is real and magnified.
D. The image is virtual and smaller than the object.

2. A concave lens is used to view an object. Which type of image will be produced?
A. Real, inverted, and magnified.
B. Virtual, upright, and reduced.
C. Real, upright, and reduced.
D. Virtual, inverted, and magnified.

3. What happens when an object is placed far from a convex lens?
A. The image is real, inverted, and smaller than the object.
B. The image is virtual, upright, and larger than the object.
C. The image is real, upright, and the same size as the object.
D. The image is virtual and inverted.

4. If the object is moved closer to a convex lens, how does the image change?
A. The image becomes virtual, upright, and magnified.
B. The image becomes real, inverted, and magnified.
C. The image becomes smaller and inverted.
D. The image disappears.

5. What type of image does a concave lens form when the object is placed beyond the focal point?
A. Real, upright, and reduced.
B. Virtual, inverted, and magnified.
C. Virtual, upright, and reduced.
D. Real, inverted, and magnified.

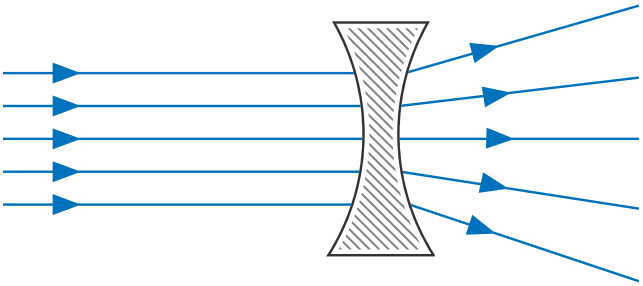
Pre-test

Answer Key

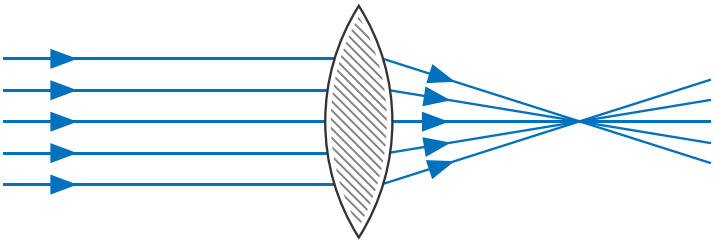
6. What happens to the image in a plane mirror when you move closer to it?
A. The image becomes smaller and inverted.
B. The image moves closer to you.
C. The image becomes larger.
D. The image disappears.

7. Which of the following applications best utilizes a convex mirror?
A. Side-view mirrors in cars.
B. Magnifying glasses.
C. Cameras.
D. Telescopes.

8. Which of the following best describes the image formed by a concave lens in this ray diagram?
A. Real, inverted, and magnified.
B. Virtual, upright, and reduced.
C. Real, upright, and magnified.
D. Virtual, inverted, and reduced.

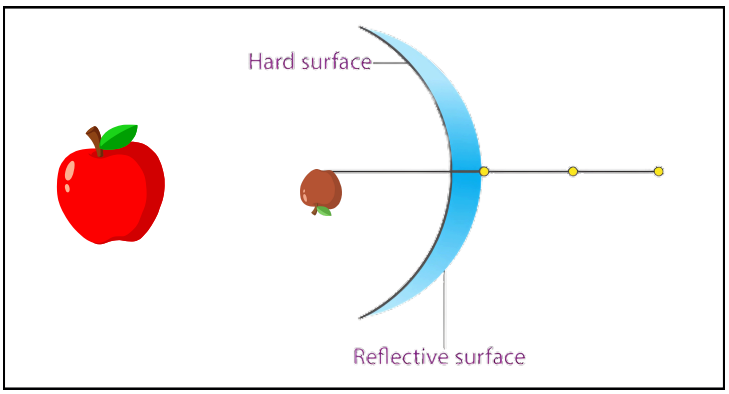


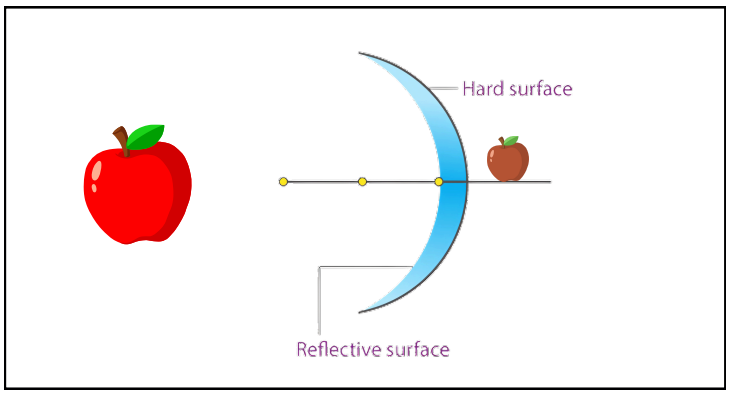
9. If an object is placed between the focal point and a convex lens, what type of image will be produced?
A. Real, inverted, and magnified.
B. Virtual, upright, and magnified.
C. Real, upright, and smaller.
D. Virtual, inverted, and smaller.



10. How does the position of the object affect the magnification of a convex lens?
A. The closer the object is to the focal point, the greater the magnification.
B. The farther the object is from the focal point, the greater the magnification.
C. Magnification is the same regardless of object position.
D. Magnification is always greater than 1.

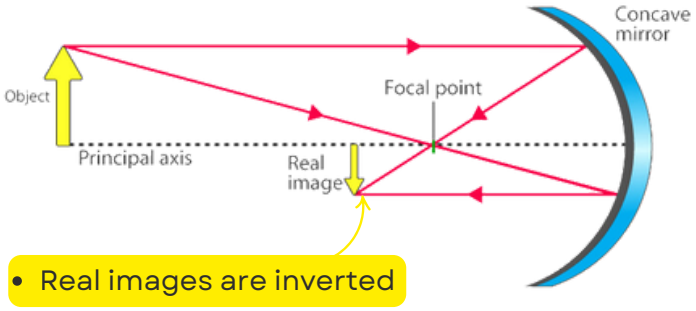
1. Which of the following is the correct characteristics based on the image shown?



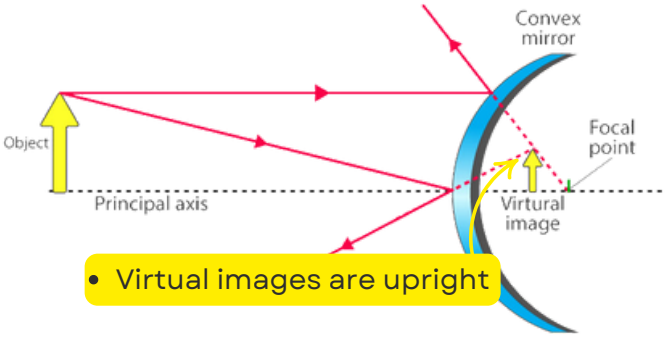


Real image

Virtual image



- Real images are inverted



- Virtual images are upright

2. Which of the following is the correct characteristics based on the image shown?

Upright

Inverted

- Upright = Image is oriented.

Inverted = Image is flipped upside down

Directions: For each of the following diagrams (provided below), predict the image's characteristics by describing the image as real or virtual, upright or inverted, and magnified or reduced by underlining the correct answer.

Mirror Sorting Game

Motivational Activity

Motivational Activity

Mirror Sorting Game

Directions: For each of the following diagrams (provided below), predict the image's characteristics by describing the image as real or virtual, upright or inverted, and magnified or reduced by underlining the correct answer.

- Reduced images are smaller

- Magnified images are larger

Reduced

Magnified

3. Which of the following is the correct characteristics based on the image shown?

1. A person stands in front of a plane mirror. How does the image appear?
A. Real, inverted, and the same size as the object.
B. Virtual, upright, and the same size as the object.
C. Real, upright, and magnified.
D. Virtual and smaller than the object.

2. What type of image is always formed by a concave lens?
A. Real, inverted, and magnified.
B. Virtual, upright, and reduced.
C. Real, upright, and reduced.
D. Virtual, inverted, and magnified.

3. When an object is placed beyond twice the focal length of a convex lens, what is the nature of the image?
A. Real, inverted, and smaller than the object.
B. Virtual, upright, and larger than the object.
C. Real, upright, and the same size as the object.
D. Virtual and inverted.

4. If an object is moved closer to a convex lens from beyond twice the focal length to between the focal point and twice the focal length, how does the image change?
A. The image becomes virtual, upright, and magnified.
B. The image becomes real, inverted, and magnified.
C. The image becomes smaller and inverted.
D. The image disappears.

5. A concave lens is used to view an object placed at a distance greater than its focal length. What type of image is formed?
A. Real, upright, and reduced.
B. Virtual, inverted, and magnified.
C. Virtual, upright, and reduced.
D. Real, inverted, and magnified.

Post-test

Answer key

6. What happens to the image in a plane mirror when you step farther away from it?
A. The image becomes smaller and inverted.
B. The image moves farther from you.
C. The image becomes larger.
D. The image disappears.

7. Which of the following best demonstrates the use of a convex mirror?
A. Security mirrors in stores.
B. Microscope lenses.
C. Projectors.
D. Binoculars.

8. A concave lens is used to form an image of an object. Which of the following describes the image?
A. Real, inverted, and magnified.
B. Virtual, upright, and reduced.
C. Real, upright, and magnified.
D. Virtual, inverted, and smaller.

9. If an object is positioned very close to a convex lens, between the lens and its focal point, what will be the nature of the image?
A. Real, inverted, and magnified.
B. Virtual, upright, and magnified.
C. Real, upright, and smaller.
D. Virtual, inverted, and smaller.

10. How does moving an object closer to a convex lens affect its image size?
A. The closer the object is to the focal point, the larger the image becomes.
B. The farther the object is from the focal point, the larger the image becomes.
C. Image size remains the same no matter where the object is placed.
D. The image size is always smaller than the object.

Compare your answers with the pre-test to see how much you've learned and retained.

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