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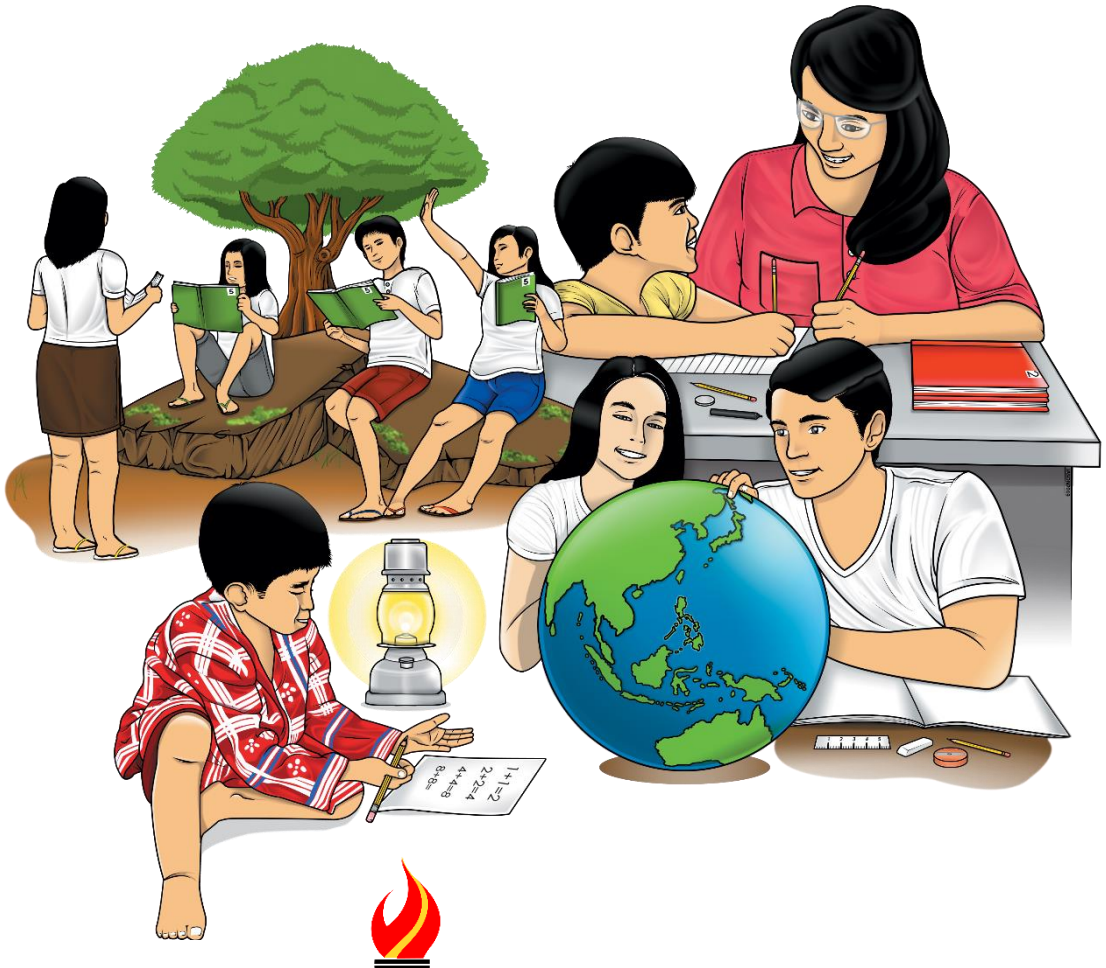
Science

Quarter 2 – Module 3: Qualitative Characteristics of Images



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Science

Quarter 2 – Module 3: Qualitative Characteristics of Images

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

The SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pretest is provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the posttest to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

When you look in the mirror, have you noticed something interesting about you and your image in the mirror? You will also learn how mirrors form images. How are light rays reflected from different types of mirrors: plane, spherical concave, and spherical convex mirrors? Did you know that a mirror could create different types of images?

In this module you will get acquainted with the qualitative characteristics of the image that is formed in Plane, Concave and Convex Mirrors. As you go through the pages of this module, you will be able to use the laws of reflection in order to describe and explain how mirrors and lenses form images.

In this module, the learners should be able to:
1. predict the qualitative characteristics (orientation, type, and magnification) of images formed by plane and curved mirrors and lenses **(S10FE-IIg-50)**; and
2. apply ray diagramming techniques in describing the characteristics and position of images formed by mirrors and lenses.

This module allows you to learn in your own space and pace so have fun in reading and learning from this module!

To get the most out of this module, here are few reminders:
1. Take your time to read and understand the module very well. Follow the instruction carefully.

2. Use a separate sheet or Science notebook for your answers in the activities and assessment. Be sure to label your work by the activity number and title.

3. Don't hesitate to approach or contact your teacher or any knowledgeable person, whenever there's something you don't understand. There is also list of references to look into at the last part of this module.

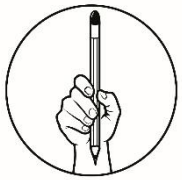
4. Before working on the activities, answer the Pretest first. It is a simple multiple-choice test provided at the start to determine how much you know about the content of this module.

5. You will find activities to work on. After each activity go over the Assessment that follows as this will help you to have a better understanding of the topic. Pay attention to the items you missed.

6. Take the posttest at the end of the module so that you will know how much you have learned.

7. Check your answers to each pretest, activities, self-assessment and posttest against the answer key. This will give you an idea how well you understand the lesson. Review the lesson if necessary, until you have achieved a sufficient level of proficiency.

Let's find out how much you know about the module. After taking pretest, you will find out your score. An answer key is provided at the end of the module.



What I Know

Directions: Read carefully each item. Choose the letter that you think best answers the question. Write the answer in your notebook or sheet of paper.

1. Regular reflection is the _____ reflection of light on a(n) _____ surface.

A. even, smooth
B. even or uneven, rough
C. semi-smooth, rough
D. uneven, rough

2. The image you see on a plane mirror is placed in _____ direction(s) of real image.

A. five
B. multiple directions
C. the opposite
D. the same

3. A plane mirror has a/an _____ reflecting surface.

A. angled B. concave C. convex D. flat

4. Diffuse Reflection is a(n) _____ reflection of light rays on a _____ surface.

A. even, smooth
B. even or uneven, semi rough
C. semi-smooth, rough
D. uneven, rough

5. Scattering of light occurs when light waves travelling in _____ direction(s) is/are made to travel in _____ direction(s).

A. one, many B. one, ten C. many, one D. several, one

6. With Regular/Diffuse Reflection, the _____ of the object will determine the SHARPNESS of reflection.

A. angle B. color C. surface D. a and b

7. As per the Law of Reflection measured through the normal line, the angle of incidence is _____ to the angle of reflection.

A. equal
B. greater than
C. less than
D. both a and b

8. A concave mirror may form an image which is _____. Which one of the following is incorrect?

A. real, erect and magnified
B. real, inverted and diminished
C. real, inverted and magnified
D. real, inverted and same size

9. The image in a convex mirror is always _____.

A. real, erect and diminished
B. real, erect and magnified
C. virtual, erect and diminished
D. virtual, inverted and diminished

10. The image formed in a plane mirror is _____ .

A. at the same distance in front of the mirror as the object is in front of the mirror.
B. at a shorter distance in front of the mirror than the distance that the object is in front of the mirror.
C. at the same distance behind the mirror as the object is in front of the mirror.
D. at a shorter distance behind the mirror than the distance the object is in front of the mirror.

11. A typical mirror you look in at a home or in a restroom is a _____ mirror.

A. concave B. convex C. parabolic D. plane

12. What type of lens produces smaller and upright images?

A. concave lens
B. converging lens
C. convex lens
D. cannot be determined

13. What type of lens is thicker at the center as compared to its edges?

A. concave B. convex C. parabolic D. plane

14. The size of the image is always smaller than the object in _____ .

A. concave mirror B. convex mirror C. plane mirror D. silver mirror

15. What type of lens is use to correct nearsightedness?

A. concave B. convex C. parabolic D. plane

Key to answers on page 27

How was your performance in the pre-assessment? Were you able to answer all the problems?

If you got a perfect score, you can skip this module or still continue to further enrich your understanding. But if your score is 14 and below, you must proceed with the module.

Have fun in learning from this module!

Lesson 1 Qualitative Characteristics of Images

Light is form of energy that you can see! Every day, light waves reflect on objects and into your eyes, which allows you to see the objects. Light also helps you identify objects both near and far.

What's In

In Grade 7, 8, and in the previous modules, you learned about electromagnetic spectrum. One of the most common among these electromagnetic waves is the visible light. Let us start our study of this module by reviewing first the properties and behavior of light when it comes in contact with something.

Directions: Fill in the blanks in the sentence below. Below each paragraph are words corresponding on the properties and behavior of light that you will encounter in this module. Write your answer on a clean sheet of paper.

Light is a natural agent that stimulates sight and make things possible. It is a type of energy known as 1. _____. It is given out by luminous objects such as the sun, light bulbs and laser. It is made up of little packets of energy called 2._____. Light travels as waves. But unlike sound waves, it does not need any material to carry its energy along. This means that light can travel through a 3. _____ - a completely airless space. Light waves travel out from their source in a straight lines called 4. _____.

electromagnetic radiation	photons	rays	vacuum

Light behaves in a variety of ways when it comes in contact with water, air, and other matters. When light strikes matter, a part of light is 7. "_____" into the matter and is transformed into heat energy. If the matter that the light strikes is a transparent material, the light component that was not absorbed within the material is 8. "_____" through and exits to the outer side of the material. If the surface of the material is smooth (a mirror for example), 9."_____" occurs, but if the surface is irregular having pits and protrusions, the light 10. "_____".

Absorbed	reflection	scatters	transmitted

These exercises you have answered help you understand the nature of light. In this module, you will do varied activities which will help you comprehend the qualitative characteristics of image formed in Plane Mirror, Concave Mirror, and Convex Mirror.

What's New

"Light as Rays"

What you need:

Plane Mirror Laser pointers Protractor

What you have to do:

a. Put your mirror carefully on the line labelled "mirror.

b. Point your laser along incident ray line.

c. Mark the reflected ray line that represent where the light ray goes after hitting the mirror.

d. Measure the angles between the normal line and incident ray. (Normal line is an imaginary line that is perpendicular to the surface.) Record this in the table. Then measure the angle between the reflected ray and the normal line. Put this result in the table too.

e. Repeat the procedure with all the other incident ray lines.

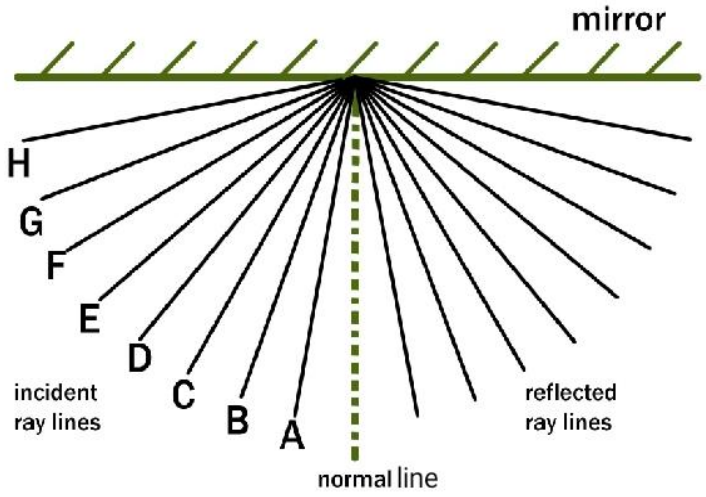


Figure 1. Paper Protractor

1. Using protractor complete the table by writing in the measurement of angle of incidence and angle of reflection. Do this in your activity notebook or a separate sheet of paper.

Ray	Angle of Incidence	Angle of Reflection
A		
B		
C		
D		
E		
F		
G		
H		

2. Fill in the box in the sentences below. Choose the letter that you think best completes the statement. Do this in your activity notebook or a separate sheet of paper.

(i) Light is a form of energy which travels at a speed ☐ .
a. 3×10^8 m/s b. 8×10^6 m/s

(ii) Reflection occurs when light ☐ off an object.
a. bounces b. transmitted

(iii) A mirror with a flat reflective surface is called ☐.
a. concave mirror b. plane mirror

(iv) The angle of incidence (i) is equal to the angle of _____ (r), and the incident ray, the _____ and the reflected ray are all in the same plane.

a. normal, incident b. reflection, normal

(v) An image formed by the actual intersection of light rays is called _____.

a. real b. virtual

(vi) An image formed by the apparent intersection of rays is called _____.

a. real b. virtual

What is It

Reflection of Light in Mirrors

The **laws of reflection** state that:

1. the incident ray, the reflected ray, and the normal line to the reflecting surface all lie in the same plane; and
2. the angle of incidence is equal to the angle of reflection.

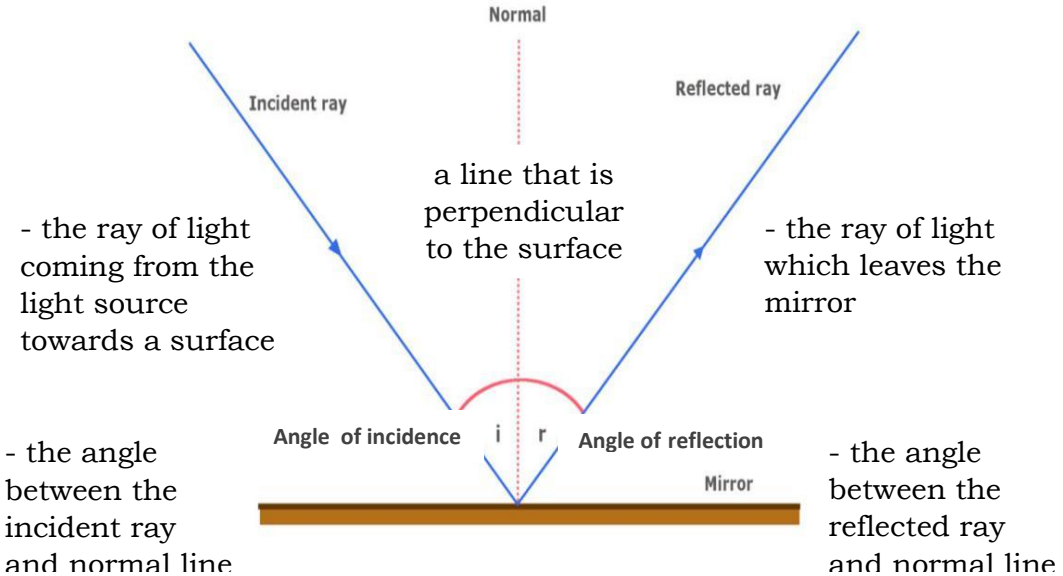


Figure 2. Reflection of a Light ray on a Plane

Reflection in Plane Mirror

When light hits an object, every part of that object reflects light in all direction. Some of the reflected light reaches our eyes. Thus, we can see an object.

Characteristics of images formed by a plane mirror:

1. Image is virtual;
2. Same size as the object;
3. Same orientation as the object; and
4. Same distance from the mirror as the object.

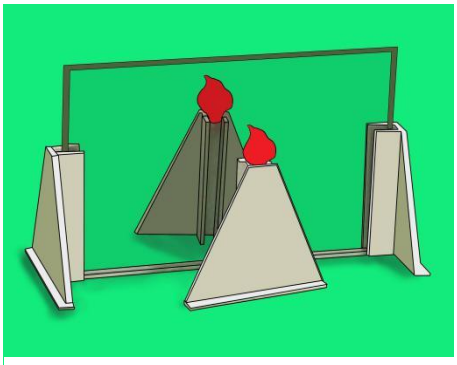
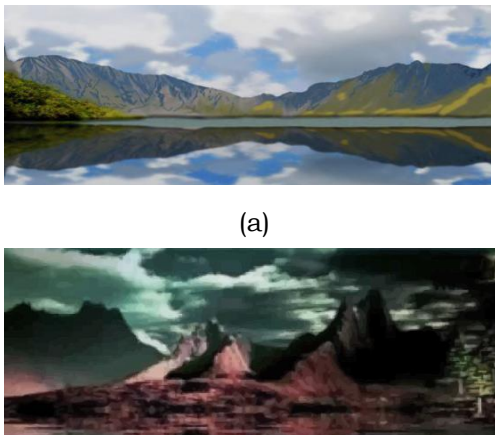


Figure 3. Reflection in a plane Mirror

Types of Reflection of Light

a. Specular/Regular reflection. It is defined as light reflected from a smooth surface at a definite angle.

b. Diffused/Irregular Reflection. It is produced by rough surfaces that tend to reflect light in all directions.



(a)

(b)

Figure 4. (a) Mountains and its reflection on calm water (b) Mountains and its reflection on wavy water

The phenomenon by which a ray of light changes the direction of propagation when it strikes a boundary between different media through which it cannot pass is described as the reflection of light.

If the bundle of light rays is incident upon a smooth surface, then the light rays reflect and remain concentrated in a bundle upon leaving the surface. On the other hand, if the surface is microscopically rough, the light rays will reflect and diffuse in many different directions.

Specular Reflection
(smooth surface)
(a)

Diffuse Reflection
(rough surface)
(b)

Figure 5. (a) Parallel light rays reflect in one direction. (b) Parallel light rays reflect in different directions.

Mirror Left-Right Reversal

If you view an image of yourself in a plane mirror (perhaps a bathroom mirror), you will quickly notice that there is an apparent left-right reversal of the image. That is, if you raise your left hand, you will notice that the image raises what would seem to be its right hand. If you raise your right hand, the image raises what would seem to be its left hand. This is often termed **left-right reversal**.

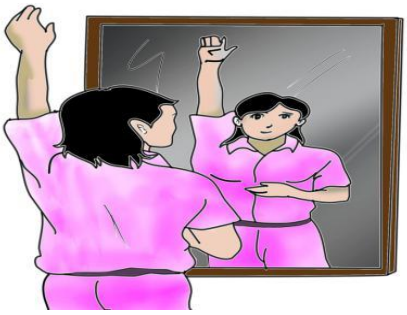


Figure 6. Mirror Left-Right Reversal

The letters in front of the ambulance are written laterally. This is because when seen in rear view mirror by another vehicle, the image of the word would get inverted, letting the driver read the word properly so that he can provide way to the ambulance.

Figure 7. Mirror Left-Right Reversal

Reflection on Spherical Mirrors

Most curved mirrors are called spherical mirrors because their shape follows the surface of a sphere.

Two Kinds of Spherical Mirrors:

1. **The Concave Mirror**
   - It reflects light inward to one focal point. It is used to focus light.
   - Also known as **converging mirror** has a reflecting surface that is recessed inward (away from the incident light).

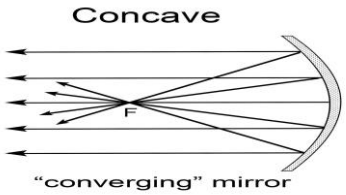


Figure 9. Parallel rays converge after reflection on a concave mirror

2. **The Convex Mirror**
   - Also known **diverging mirror** is a curved mirror in which the reflective surface bulges towards the light source.
   - Convex mirrors reflect light outwards; therefore they are not used to focus light.

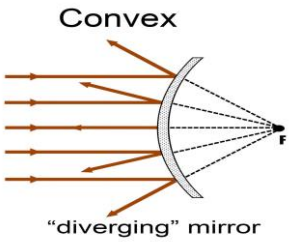


Figure 10. Parallel rays diverge after reflection on a convex mirror

There are two types of images formed by reflecting surfaces.

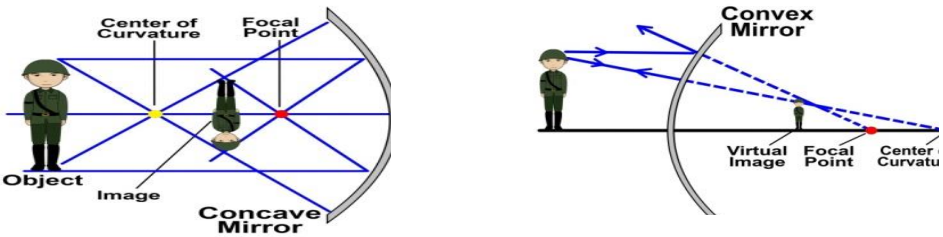


Figure 11. Reflection from Concave and Convex Mirror

Real Image	Virtual Image
1. A real image is formed when light rays **actually meet** after reflection. 2. A real image **can** be **formed on a screen.** 3. A real image is **inverted** with respect to the object. e.g. The image of a distance object formed by a concave mirror.	1. A virtual image is formed when light rays **do not actually intersect** after reflection, but they appear to diverge from the mirror. 2. A virtual image **cannot** be **formed on a screen.** 3. A virtual image is **erect** with respect to the object. e.g. The image of an object formed by a convex mirror.

Ray Diagram and Image Formation by Plane Mirror

A plane mirror makes an image of objects in front of the mirror; the image appears to be behind the plane in which the mirror lies. An image is formed by reflection when two or more reflected rays of a point meet at a single point. The image is formed at the point of intersection of the reflected rays.

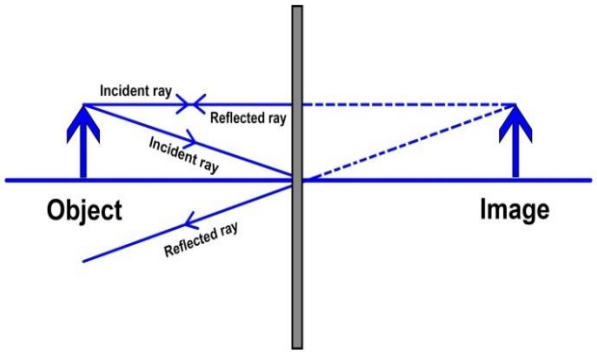


Image Formation by Plane Mirror	
Location	Behind the mirror
Orientation	Upright
Size	Same size as the object
Type	Virtual

Figure 8. Image Formation by Plane Mirror

Images Formed by Curved Mirrors

In locating the image formed in curved mirror graphically, six important points are considered. The following important points are enumerated below.

- Center of Curvature, **C** – the center of the sphere whose surface forms the curved mirror
- Focal Point, **F** – where the light rays meet
- Vertex, **V** – the point where the principal axis meets the mirror
- Principal Axis – the straight line passing through the center of curvature to the mirror
- Focal Length, **f** – the distance from the focal point to the vertex
- Radius of Curvature, **R** – the distance from the vertex to the center of the curvature

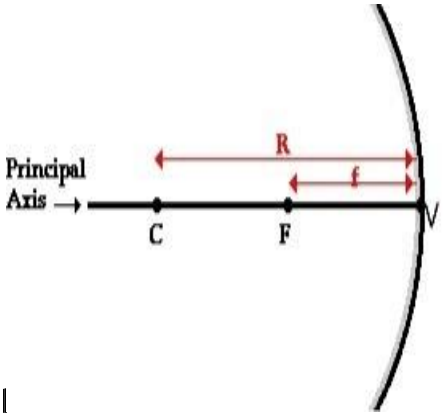
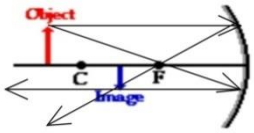
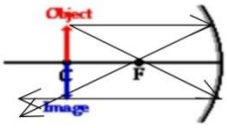
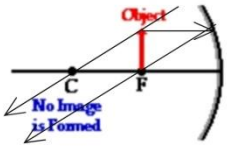


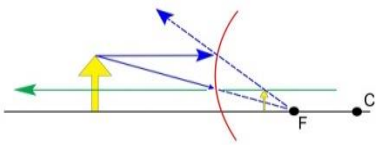
Figure 12. Curved Mirrors

Since the **focal point** is the midpoint of the line segment adjoining the **vertex** and the center of **curvature**, the **focal length** would be one-half the **radius of curvature**

Location, Orientation, Size, and Type of Image Formed in Concave Mirror

Location of Object	**Image**			
	Location	**O**rientation (upright or Inverted)	**S**ized (same, reduced or enlarged)	**T**ype (real or virtual)
A. Beyond Center of Curvature 	Between C and F	Inverted	Reduced	Real
B. At the Center of Curvature 	At C	Inverted	Same	Real
D. At the Focus 	No Image Formed			

Location, Orientation, Size, and Type of Image Formed in Convex Mirror

Location of Object	**Image**			
	Location	**O**rientation (upright or Inverted)	**S**ized (same, reduced or enlarged)	**T**ype (real or virtual)
A. Anywhere you put the object in front of a convex mirror. 	Anywhere you put the object in front of a convex mirror.	Upright	Reduced	Virtual

Difference Between Convex and Concave Lens

BASIS FOR COMPARISON	CONVEX LENS	CONCAVE LENS
Meaning	Convex lens refers to the lens which merges the light rays at a particular point, that travels through it.	Concave lens can be identified as the lens which disperses the light rays around, that hits the lenses.
Figure		
Curve	Outward	Inward
Light	Converges	Diverges
Center and Edges	Thicker at the center, as compared to its edges.	Thinner at the center as compared to its edges.
Focal Length	Positive	Negative
Image	Real and Inverted image. Also produces virtual, erect and enlarged image in a magnifying glass.	Virtual, erect and diminished image.
Objects	Appear closer and larger	Appear smaller and farther.
Used to	Correct hyperopia	Correct myopia.

What's More

Here are some enrichment activities for you to work on to strengthen the basic concepts you have learned from our mini-lesson and to validate your observations in the activity part.

Enrichment Activity 1 "Multiple Reflection"

A mirror reflects everything in front of it including another mirror. If you place two mirrors at an angle, you increase the number of reflected images you can see. Depending on the angle you choose, you can see a number of unbroken reflections and one or more composite or partial reflections. What would you think would happen if an object was reflected by plane mirrors three times? Four times? Five times?

What you need:

- Science notebook or answer sheet
- A pencil or some other object, such as a pen, one peso coin or paper clip
- 2 plane mirrors
- Paper
- Protractor

What you have to do:

1. Take two plane mirrors and place them together with the shiny sides facing one another. Tape them along the side to form a hinged door.

2. Take a piece of paper or cardboard. Using a protractor, measure and mark angles (by drawing a line) of 180°, 120°, 90°, 60°, 45°

3. Place the hinged mirrors at each of these angles and put an object (it could be a coin, a pencil, an eraser, or some other item you may have at your desk) between them as close to the mirrors as possible.

4. Count the number of images you see and record your observations in the observation table.

5. When you are finished, answer the following questions in your worksheet.

Assessment 1

Direction**:** Use a separate sheet for your answers.

1. Observation Table

Angle (degrees)	Number of Images
180^0	
120^0	
90^0	
60^0	
45^0	

2. What happened to the number of images you saw as you changed the angle from 60^0 to 45^0 between the mirrors?

A. as angle decreased, more reflections will occur
B. as angle decreased, fewer reflections will occur

3. What happened to the number of images you saw as you changed the angle from 90° degrees to 120°?

A. as angle decreased, more reflections will occur
B. as angle decreased, fewer reflections will occur

4. Can you now make a statement about how the angles between the mirrors determine the number of images that will be produced?

A. N = (360/angle between the mirror) -1
B. N = (360/angle between the mirror) +1

Enrichment Activity 2 "Mirror Left-Right Reversal"

1. Stand in front of a plane mirror.
2. Raise your left hand.

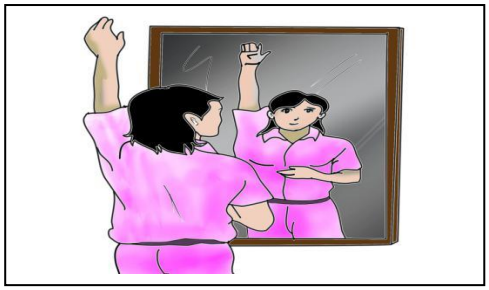


Figure 14. Mirror Left-Right Reversal

Assessment 2

Direction: Answer the following questions on your answer sheet.

1. Is your image exactly the same size as you are?
   A. image is exactly the same B. image is virtual

2. What hand does your image raise?
   A. right hand B. left hand

3. Is your image erect or inverted? Is it real or virtual?
   B. inverted, real B. erect, virtual

Enrichment Activity 3 "Image Formed by Curved Mirrors"

1. Get a spoon. This can serve as your mirror.
2. Look at the concave surface of the spoon. Place the mirror vey near your face.
3. Bring the spoon on arm length distance away from you.
4. Look now at the convex surface of the spoon. Observe your image as you bring the spoon farther form you.

Image from the outer side of a

Image from the inner side of a

Figure 15. Image in Spherical Mirror

Assessment 3

Directions: Answer the following questions. Use a separate sheet.

1. Describe your image as you look at your face on the concave surface of the spoon.
   A. erect, virtual B. inverted, real

2. Describe your image after you bring the spoon on arm length distance away from you using the concave surface of the spoon.
   A. appear as real image B. appear as virtual image

3. Describe your image as you look at your face on the convex surface of the spoon.

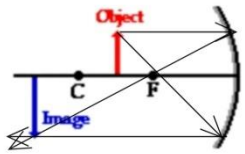
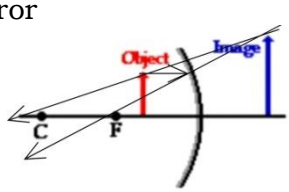
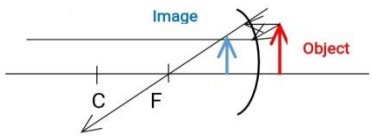
A. erect, virtual B. inverted, real

4. Describe your image after you bring the spoon on arm length distance away from you using the convex surface of the mirror.

A. appear as real B. appear as virtual

Assessment 4 "The L-O-S-T Art of Image Description in Spherical Mirrors"

The following figures below show the ray diagrams for the formation of image by a concave and convex mirror for various positions of the object. Use a Table below to summarize the characteristics and location of the images formed. Use a separate sheet for your answers.

Location of Object	**Image**			
	Location	**O**rientation (upright or Inverted)	**S**ized (same, reduced or enlarged)	**T**ype (real or virtual)
CONCAVE				
a. Between the Center of Curvature and Focus 				
b. Between Focal Point and Mirror 				
CONVEX				
a. Between F and V in front of the Mirror 				

What I Have Learned

Great job! You are almost done with this module. Let's summarize what you have learned from the lesson and activities by answering the following in a separate sheet.

A. Below are the qualitative characteristics of images. Determine whether it is **REAL** or **VIRTUAL** type of images:

1. _____ is upright.
2. _____ is inverted.
3. _____ is behind the mirror.
4. _____ is formed by convex mirror.
5. _____ can be projected onto a screen.
6. _____ is inverted with the respect to the object.
7. _____ is on the same side of the mirror as object.
8. _____ rays of light do not actually pass through the image.
9. _____ can be larger, smaller, or the same size as the object.
10. _____ rays of light actually converge and pass through the image.

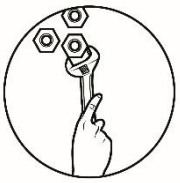
B. Identify whether the following is **PLANE**, **CONCAVE** or a **CONVEX MIRROR**

1. _____ forms images that are either behind the mirror or on the same side as the object.
2. _____ forms images that are always the same distance from the mirror as the object.
3. _____ forms images that are either smaller/same size/larger than the object.
4. _____ forms images that are the same size as the object only.
5. _____ forms images that have left to right reversal.
6. _____ forms images that are either real or virtual.
7. _____ forms images that are upright or inverted.
8. _____ forms images that are behind the mirror.
9. _____ forms images that are always reduced.
10. _____ forms images that are always upright.
11. _____ forms images that are only virtual.
12. _____ forms real or virtual images.
13. _____ forms only virtual images.
14. _____ is flat, smooth mirror.
15. _____ is a curved mirror.

C. Identify whether the following is **CONCAVE** or a **CONVEX LENS**

1. In the _____, the curve faces inward.
2. In the _____, the curve faces outward.
3. _____ is a diverging lens that spreads out the light.
4. _____ is thicker at the center, as compared to its edges.
5. _____ is thinner at the center, as compared to its edges.

6. _____ is use for correction of nearsightedness or myopia.
7. _____ is use for correction of farsightedness or hyperopia.
8. _____ is a converging lens which converges the refracted rays.
9. _____ is called negative lens because of its negative focal length nature.
10. _____ is called positive lens because of its positive focal length nature.



What I Can Do

Think whether the given objects below act as a **CONCAVE** or **CONVEX.**

Number	Object	Types of Mirror
1	Vehicle side view mirror	
2	Water glass surface	
3	Head light of motorcycle	
4	Tube lights	
5	Inner surface of glasses	
6	Lunch plates	
7	Calling bell	
8	Surface of pens	
9	Globe	
10	Surface of steel flask	

Assessment

Posttest

Directions: Read carefully each item. Choose the letter that you think best answers the question. Write the answer in your notebook or sheet of paper.

1. The reflection by the rough surfaces that tend to reflect light in all directions is called _____ .

a. diffused reflection
b. glossy reflection
c. regular reflection
d. specular reflection

2. The image you see in a plane mirror called a _____ image because it is not a real, physical object.

a. imaginary b. physical c. reflected d. virtual

3. When the image of an object is seen in a plane mirror the image is _____

a. real and inverted
b. real and upright
c. virtual and inverted
d. virtual and upright

4. Diffuse Reflection is produced by _____ surfaces that tend to reflect light

in all directions.

a. rough b. semi rough c. semi smooth d. smooth

5. Out of the following which one is diverging on negative lens?

a. concave lens b. convex lens c. parabolic lens d. plane lens

6. The center of curvature is denoted by letter _____ .

a. c b. C c. o d. O

7. If the angle of incidence between the incident ray and the normal line is 25 degrees, what is the angle of reflection?

a. 65 degrees b. 45 degrees c. 35 degrees d. 25 degrees

8. When the image is seen in the concave mirror, the image will _____.

a. always be real
b. always be virtual
c. be either real or virtual
d. will always be magnified

9. When the image is seen in the convex mirror, the image will _____ .

a. always be real
b. always be virtual
c. be either real or virtual
d. will always be magnified

10. The focal length is equal to the half of the _____.

a. center of curvature
b. principal axis
c. radius of curvature
d. none of the above

11. The focal length is denoted by the letter _____.

a. f b. F c. P d. p

12. A spherical mirror with reflecting surface curved inwards is called _____.

a. concave mirror
b. convex mirror
c. curved mirror
d. none of the above

13. The distance from the focal point to the vertex is called _____.

a. center of curvature
b. focal length
c. focal point
d. vertex

14. Which lens is used to magnify objects and refract light? This type of lens is curved outward.

a. concave lens b. convex lens c. parabolic lens d. plane lens

15. Which describes a concave lens?

a. more transparent in the middle
b. thinner in the middle than on the edges
c. thinner on the edges than in the middle
d. triangular in shape.

Answer Key

What's In

1. electromagnetic radiation
2. photons
3. vacuum
4. rays
5. absorbed
6. transmitted
7. reflection
8. scatters

Assessment

Pretest					Post Test				
1. A	6. C	11. D	1. A	6. B	11. B				
2. C	7. A	12. A	2. D	7. D	12. A				
3. D	8. A	13. B	3. D	8. C	13. B				
4. D	9. A	14. B	4. A	9. B	14. B				
5. A	10. C	15. A	5. A	10. C	15. B				

What's New

1.

Ray	Angle of Incidence	Angle of Reflection
A	80	80
B	70	70
C	60	60
D	50	50
E	40	40
F	30	30
G	20	20
H	10	10

2. (i) a. $3x10^8$ m/s
(ii) a. bounces
(iii) b. plane
(iv) a. reflection, mirror
(v) a. real
(vi) b. virtual
normal

What's More

Assessment 1

Angle (degrees)	Number of Images
180^0	1
120^0	2
90^0	3
60^0	5
45^0	7

2. As angle decreased, more reflections will occur
3. As angle increased, fewer reflections will occur
4. N = (360/angle between the mirror) – 1

Assessment 2

1. Image is exactly the same
2. Right hand
3. Erect, virtual

Assessment 3

1. Inverted, real
2. Appear as real image
3. erect, virtual
4. Appear as virtual

What's More
Assessment 4

Location of Object	Image			
	Location	Orientation (upright or inverted)	Sized (same, reduced or enlarged)	Type (real or virtual)
CONCAVE				
a. Between the Center of Curvature and Focus	Beyond C	Inverted	Enlarged	Real
b. Between Focal Point and Mirror	Behind the Mirror	Upright	Enlarged	Virtual
CONVEX				
c. Between F and V in front of the Mirror	Between F and V	Upright	Reduced	Virtual

What I Have Learned

A.1. Virtual
2. Real
3. Virtual
4. Virtual
5. Real
6. Real, Virtual
7. Real
8. Virtual
9. Real
10. Real

B1. Concave
2. Plane
3. Concave
4. Plane
5. Plane
6. Concave
7. Concave
8. Concave
9. Convex
10.Plane, Convex
11. Plane, Convex
12. Concave
13. Plane, Convex
14. Plane
15. Concave, Convex

C. 1. Concave lens
2. Convex lens
3. Concave lens
4. Convex lens
5. Concave lens
6. Concave lens
7. Convex lens
8. Convex lens
9. Concave lens
10. Convex lens

What I Can Do

1. Convex
2. Convex
3. Concave
4. Convex
5. Concave
6. Concave
7. Convex
8. Convex
9. Convex
10. Convex

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