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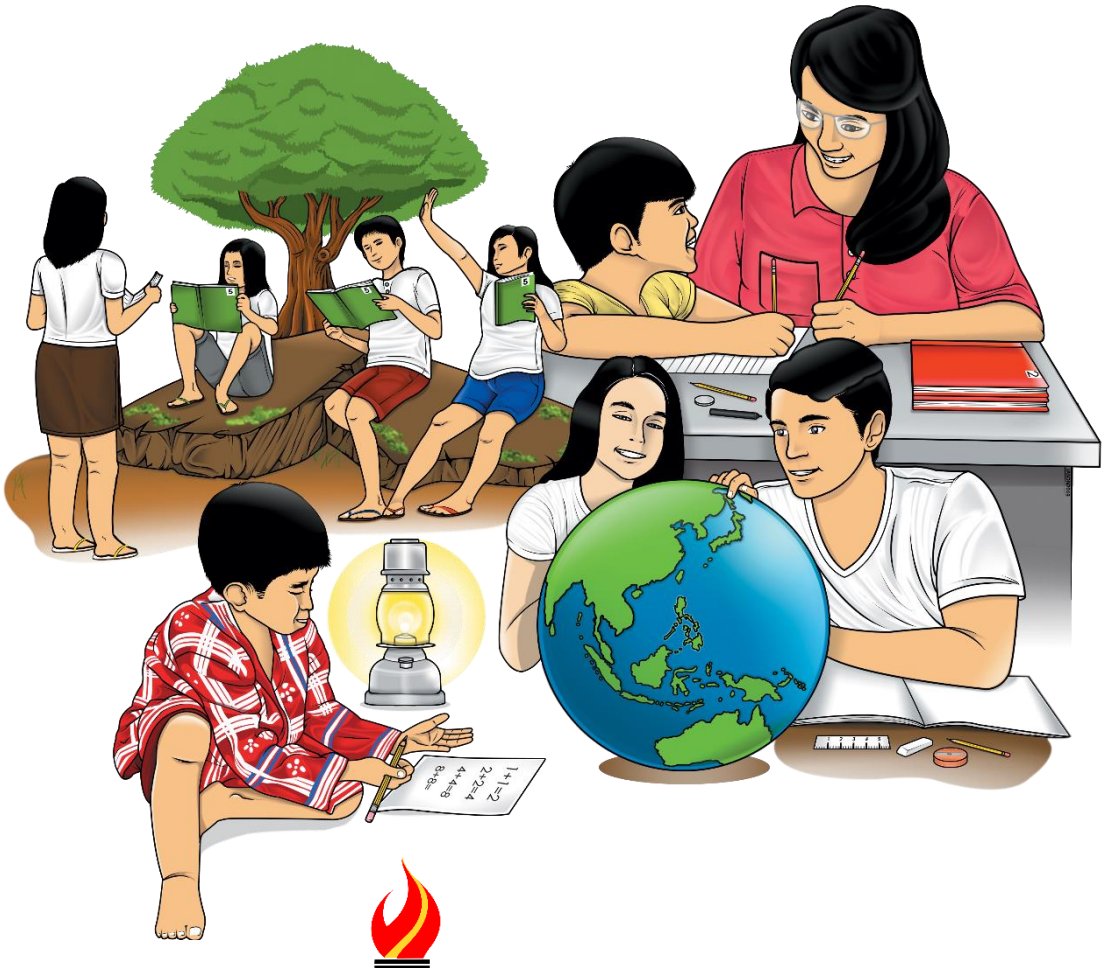
Science

Quarter 2 – Module 4:
Uses of Mirrors and Lenses



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Science

Quarter 2 – Module 4:
Uses of Mirrors and Lenses

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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.

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

Pre-tests are 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 post-test 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

Figure 1. A mirror image

Before leaving your house, you find yourself in the mirror most of the time and see how you look, what's missing or what's too much. A mirror in real life is not just like that of a fairy-tale, which is used just to determine the fairest being alive on the planet. Mirror's use is not only for checking one's physical appearance. A mirror in fact saves lives of many. Side mirrors in cars, buses and other vehicles allow drivers to see vehicles behind. With careful driving, having side mirrors can prevent road accidents. Rushing ambulance which may have a passenger on a critical condition, are easily identified with its inverted print.

These are reasons why you see mirrors not only in your house, but also in cars, in hospitals, and even in dental clinics.

Aside from mirror, this module will also focus on the use and importance of lenses to man's life. Like mirror, a lens is also a fundamental object that opens the gateway to man's discovery of the previously unknown world of microorganisms and the universe afar. Lenses also enable us to see the world we are living in and to know what surround us. Through lenses, we are capable of enjoying the beauty of nature and some other creations.

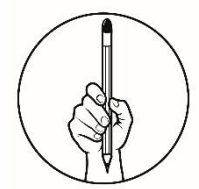
These are just some of the examples of the uses and importance of mirrors and lenses. These objects, though simple and plain have become part of man's daily life, and plays an essential part of his everyday existence.

In this module, you will further discover the Science behind mirrors and lenses. How they work and what their uses are.

At the end of this module, you are expected to:

- identify ways in which the properties of mirrors and lenses determine their use in optical instruments (e.g., cameras and binoculars); **S10FE-IIh52**
- determine how the location of the object from the lenses/mirrors affect the image formed.

Before you go through this module, let's check how much do you know about the application of Mirrors and Lenses.



What I Know

Directions: Choose the letter of the correct answer and write it on your Science Activity Notebook.

1. You see the reflection of the analog type of clock without numbers in your plane mirror. The image formed by the hands of the clock shows the time of 8:30. What is the real time?
   a. 3: 30
   b. 8: 30
   c. 9:30
   d. 12:30

2. What kind of lens curves inward toward its center?
   a. convex
   b. concave
   c. mirror
   d. glasses

3. Which of the following uses concave lens?
   a. Magnifying glasses
   b. Dentist's mouth mirror
   c. Telescopes
   d. Car's headlight

4. Which mirror concept explains why the word AMBULANCE is written in reverse in an ambulance car?
   a. Lateral inversion
   b. Multiple image
   c. Virtual image and real image
   d. All of the above

5. What kind of mirror is used in the side mirrors of automobiles and trucks to give the driver a wider area and smaller image of traffic behind him?
   a. Plane mirror
   b. Convex mirror
   c. Concave mirror
   d. None of the above

6. A car's headlight uses _____.
   a. Plane mirror
   b. Convex mirror
   c. Concave mirror
   d. None of the above

7. Concave mirror _____.
   a. gives wider view field
   b. produces smaller image.
   c. can produce real and virtual image
   d. gives wider view field and gives enlarged image.

8. The sun's rays are observed to focus at a point behind a lens. What kind of lens was used?
   a. converging lens
   b. diverging lens
   c. focusing lens
   d. none of the above

9. What kind of image is formed by concave lenses?
   a. always real
   b. always virtual
   c. could be real or virtual; depends on the distance of the object from the focal point
   d. could be real or virtual; but always real when the object is placed at the focal point.

10. Which of the following is an application of multiple image reflection?
   a. kaleidoscope
   b. car's side mirrors
   c. magnifying glass
   d. binoculars

11. What type of lens is used in a magnifying glass?
   a. Converging lens
   b. Diverging lens
   c. Focusing lens
   d. None of the above.

12. What type of image is formed by the concave side of the spoon when the object is closer to it?
   a. Upright and bigger
   b. Upside down and bigger
   c. Upright and smaller
   d. Upside down and smaller

13. How will the letter **e** appear in the mirror***?***
   a. ɐ
   b. **e**
   c. ə
   d. ɔ

14. What part of the camera corresponds to the retina of our eyes?
   a. aperture
   b. shutter
   c. iris diaphragm
   d. photographic film

15. Convex lenses are used in _____.
   a. magnifying smaller objects
   b. camera
   c. microscopes
   d. all of the above

Lesson 1

Uses of Mirrors

What's In

As mentioned in the first part of this module, mirrors have become part of our daily routine. At home, we normally use plane mirror, a type of mirror that can be found in almost every household. We use this to check on what's needed to be fixed on the way we look.

Figure 2. Images inside a kaleidoscope

When these plane mirrors are placed next to each other at an angle, it gives our eyes not only one image, not even two but more than that. This is called *multiple images.* The mechanism of multiple images is used in the fun and colorful kaleidoscope.

In a barbershop and in a salon or even in malls' fitting rooms you will find a lot of mirrors arranged parallel to each other, one in front of you and another one at your back; it can also be one on your left and another on your right. Were you able to notice the images that your eyes can see?

If the answer in the above's question is no, try to observe again the images in the mirrors that surround you, when you happen to go to one of the said places and count the number of images that you can see.

Surely, this arrangement of mirrors will make it hard for you to count the number of images that you see, because it will give you infinite number of images; which means a number that can't be counted.

What's New

Have you checked yourself in the mirror today? Try to do this activity to reveal a message that is specially sent for you.

You've Got a Message in a Mirror!

What you need: Pen, Science Activity Notebook and Mirror

What you have to do:

1. Read the flipped words below by facing the text box in front of a mirror.

YOU ARE GOD'S CREATION AND YOU ARE BEAUTIFUL!

2. Write the message you deciphered on your notebook
3. Now, look at the mirror and read it loud and with confidence.

What is It

Did the activity brighten up your day? In the previous modules you learned about the nature of images formed by different types of mirrors and lenses. One of the properties of images formed by a mirror that you learned in the preceding module is called the *lateral inversion,* wherein your right becomes your left and your left becomes your right. What you did in the activity is a demonstration of this property of the image formed in a plane mirror.

Figure 3. The word AMBULANCE written in reverse.

Maybe along the way to school, you happened to see an ambulance rushing its way to the hospital, have you noticed that the word AMBULANCE is written in reverse? Why do you think is this so?

Let's have a little recall of what a mirror is. Technically, a *mirror* is a reflective surface, made of glass coated with metals, which bounces off light that strikes its surface and form a visual representation or projection of an object called *image*.

Questions like: *How do images form in a mirror? How is one able to see his or her image in the mirror? What makes up a mirror?* These were the queries you asked before going through the modules about Mirrors and Lenses, but surely these learnings were all made clear in the prior modules about the said topics.

In the previous modules about mirrors, you found out that mirrors produce different types of images depending on their shapes. Plane and convex mirrors form images called *virtual images*, upright and erect. Other type of image formed by a mirror is called *real image;* inverted upside down and larger than the original image. Concave mirrors can produce both virtual and real images.

Applications of Concave and Convex Mirrors

A mirror is not just flat and plane, a mirror can be curved; convex and concave mirrors. These mirrors are collectively called *spherical mirrors*.

Concave mirror

Concave mirror, also known as a *converging mirror* has reflecting surface which collects light inward and focus them to one focal point, this type of mirror is what the dentist used in magnifying the area behind your teeth to check on cavities and tooth decay.

Figure 4. A mouth mirror used by a dentist

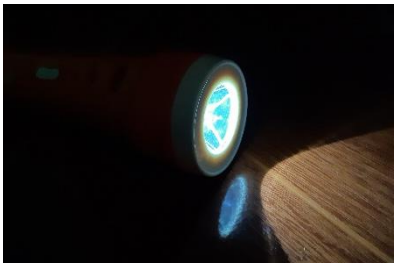


Figure 5. Concave mirror in a flashlight

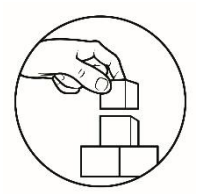
For illuminating purposes, you can see concave mirrors used in headlamps, flashlights and spotlights. In these devices, the light rays that gathered from a small source of the mirror are collected and directed outward in a beam. Small light source bounded by a concave mirror flashes a brighter beam.

Convex mirror, also known as *diverging mirror,* is another type of spherical mirror which has the outer bulging surface that reflects light instead of the inner one. It has a wider view field compared to a concave mirror. This makes bigger objects appear to be smaller than their original form.

Figure 6. Side mirrors of Cars are convex mirrors.

A car's side mirrors enable the driver and its passenger to see the vehicles behind. Also, while in mall supermarkets and in some convenience stores, you may notice mirrors hanging on corners from which you can see your reflection and those of other people. These are just some of the applications of convex mirrors.

Can you think of other uses of convex and concave mirrors?



What's More

Enrichment Activity 1: "Light Reflectors"

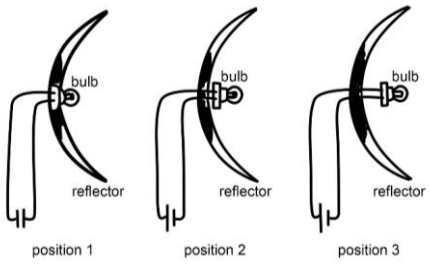
(Adapted from: Science and Technology Textbook for Fourth Year, Reprint Edition)

Materials: Flashlight (the one that can be dismantled), pen and Science Activity Notebook

Procedure:

1. Get a flashlight and switch it on. What do you observe about the beam it emits?

2. Examine the part where the bulb is positioned.
   Q1. What do you notice?
   _____
3. Remove the reflector from the flashlight's body. Describe the reflector.
   Note: The reflector is the silver-colored material that surrounds the bulb of the flashlight
4. Remove the bulb and connect it to a source such that it can be moved or adjusted within the concave reflector. See figure below:



5. Put the bulb in a position 1. Connect to the source and switch it on.
   Q2. What do you observe about the beam it emits?
   _____

6. Repeat step 5 with the bulb at position 2 then 3.
   Q3. What are the differences of the beam intensities?
   _____
7. Summarize your observations by writing: *brightest*, *brighter*, and *bright* for the beam intensities in the table provided below.

Position of Bulb in the Reflector	Beam Intensities
Position 1	
Position 2	
Position 3	

8. Reassemble the flashlight that you dismantled after use.

The activity on Light Reflectors allows you to understand how a concave mirror illuminates light beam from a small source. As you can observe, when the bulb is removed from the concave reflector, the light it emitted is not as bright as when it is positioned in the center of the reflector.

Enrichment Activity 2: Mirror Self-Check!

Directions: Write your answers to this activity on your Science Activity notebook.

Materials: Double-sided make up mirror, side mirror (of a motorcycle or of a car)

Science Activity Notebook

Procedure:

1. Hold a make-up mirror close in front of you. Describe the image that you see. Write your observations in your Science activity notebook.

   Q1. _____

2. Have someone hold the mirror for you, slowly move at least 3 m away from the it. Observe your image as you move away from the mirror. Are there any changes in the image formed? Write your observations.

   Q2. _____

3. Holding the same mirror, turn the other side close in front of you. What do you observe about the image that you see? How do you compare your image on this side of the mirror to the image formed in the opposite side of it?

   Q3. _____

4. Again, have someone hold the mirror for you, slowly move at least 3 m away from the mirror. How do you compare your image when you were observing it closer in front of you and when you were 3m away from the mirror?

   Q4 _____

5. Now this time, sit close in front of a side mirror. How do you describe the image that you see? Write your observations.

   Q5. _____

6. Slowly move at least 3 m away from the side mirror. Observe your image as you move away from the mirror. Write your observations.

   Q6. _____

7. Compare the images formed in different mirrors. You may draw illustrations to support your answer.

   Q7. _____

The activity above helped you understand the different images formed by the three different mirrors; plane mirror, concave mirror and convex mirror. A plane mirror produces upright, left-right reversed and virtual image. Concave mirror produces a magnified image and virtual image, but as you move away from it, image is projected upside down, called *real image*. Convex mirror on the other hand gives us the smaller version of the image, thus allowing us to see wider view field.

Assessment 1

Directions: Identify what is defined in the following statement, you can use the jumbled letters in each item as a hint. Write your answers on your Science Activity Notebook.

1. A plane mirror is a flat surface mirror, the image formed by a plane mirror is called **(TULARIV)** image.
2. Mirrors arranged parallel to each other can form **(ENITFNII)** image, a number you can't count.

3. A **(PEOCSOKAEILD)** is a colorful optical instrument in which the mechanism of multiple image is used.

4. A convex mirror is used in car's side mirror because it gives **(RDWIE)** view field than concave mirrors.

5. To secure the store from shoplifters, aside from CCTV camera, store owners hang (**RORMIR XNCOEV)** on the corner.

Lesson 2

Uses of Lenses

What's In

In your lessons about the behavior of light in Grade 8, you learned that light is not reflected when it hits a surface. Light can also bend or refract when travelling from one medium to another. In this part of the module, let us talk about another object which plays a vital role in the study of the behavior of light, *lenses*. Like the mirror, the lens is usually made of glass. The only thing that makes it different is that the lens can also be made of other transparent materials like plastics that allow light to pass through, instead of bouncing the light rays off. Lenses come also in two types, namely: convex (*converging)* and concave (*diverging) lenses.* When these lenses

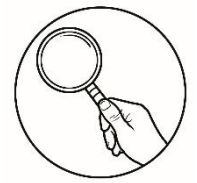
are combined, the produced lens is called **meniscus lens**. This type has one concave and one convex lens on opposite sides.

What's New

On Lenses

The discovery of the uses of lenses has opened a lot of doors for many other discoveries in the field of Science. It has allowed scientists to explore what's beyond the Earth and importantly; through our eyes, which has built-in natural lenses, we are able to enjoy all of these wonderful things and creations. The prior modules about mirrors and lenses explained the principles behind how lenses work.

In this part of the module, let us unravel more of it as we talk about some of the fundamental applications of lenses.



What is It

Uses of Convex Lenses

Sometimes called a positive lens, a *convex lens* is characterized by its bulging surfaces that is directed outward making it thicker at the center than on its edges. It is also known as converging lens because as light passes through it, its rays bend inward and converge at a spot located beyond the lens known as the *focal point*

causing the object behind the lens to magnify or to appear bigger than its actual size. Image produced by convex lenses can be a *virtual* or *real image*.

If both sides of the lens are curved inward, then that type of convex lens is called *biconvex* typically seen in magnifying glasses. If only one side of the lens is curved inward and the other has a flat surface, it is called as *plano-convex.*

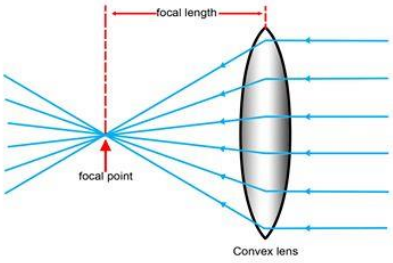


Figure 7a. biconvex

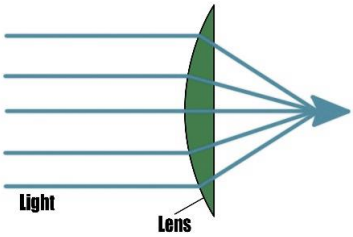


Figure 7b. plano-convex

Microscopes

Among the applications in which convex lenses are used is found in compound microscopes. A *microscope* is an instrument that is used in viewing small objects and microorganisms that are impossible for our unaided eyes to see. It uses lenses that can magnify objects100x or even more than a thousand times.

Have you tried to view objects using a microscope? What object did you view under it?

There are many types of microscopes, among this is the most commonly used in school laboratories; *light microscope.* This type of microscope uses at least two convex lenses, one on the eyepiece near the observer's eye and the other one is the objective lens located near the object being observed.

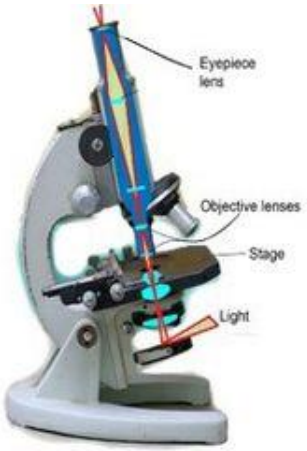


Figure 8. Convex lenses in Light microscope

CAMERA LENSES

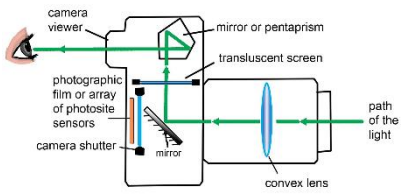


Figure 9.1. A view inside a DSLR Camera

Figure 9.2. DSLR Camera

As illustrated in Figure 9.1, DSLR camera uses convex lenses where light rays pass through. These light rays are directed towards the slanted mirror located near the camera shutter, and then reflected from a translucent screen projected to another mirror until it reaches the viewer's eye. Through this, the photographer will be able to see what he is capturing.

The image formed by the passing of light rays, from the object through the lens directing to the film of the camera, is affected by the angle of the light entry. The

closer the lens to the object, the farther the beams converge. The farther the object from the lens, the shorter the distance the light beams converge. That is how the camera works. Though it seems complicated, the entire process is just seconds-long.

The Human Eye is a Natural Camera

Our eyes are our natural cameras. Some of the basic and fundamental parts of a camera functions just like how the different parts of our eyes work. Among these are the lens, the aperture, iris diaphragm, shutter, and photographic film.

The lens, just like the cornea of our eyes gathers and bends light rays inwardly to the camera. The iris diaphragm controls the size of the aperture (*opening*) to regulate the light that enters. This duo resembles the iris and the pupil of our eyes. The shutter opens and shuts the aperture to avoid too much light exposure thus helping the photographic film capture a beautiful image similar to the work done by the eyelids and the retina.

Concave Lens

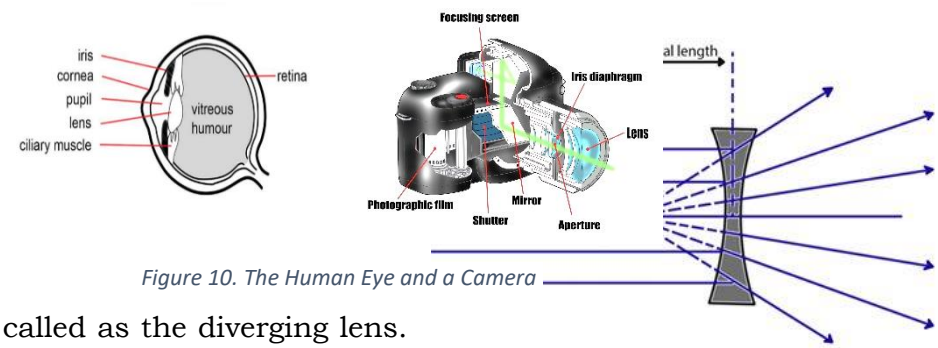


Figure 10. The Human Eye and a Camera

Contrary to concave lens, convex lens has thicker edges curving towards the center, causing light to diverge, hence it is called as the diverging lens. It spreads out light, producing virtual image, making object to appear smaller and farther than the way it actually is.

Figure 11. Concave lens

Although convex lenses can magnify object, it still cannot transfer light accurately that's why an object would appear blurry, so makers of binoculars and telescopes add concave lens to these instruments in order to focus objects that are too far for our eyes to see.

Concave Lenses and Myopia (nearsightedness) Correction

Concave lenses, such as eyeglasses and contact lenses are used in correcting myopia (nearsightedness*). Myopia* is a condition in which light rays focus in front of

the eye's retina instead of, on the retina. The result of this condition is a makes distant object to appear blurry, while near objects appear normal.

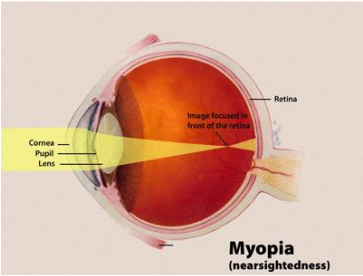


Figure 12.1. Light rays converge in front of the retina image retrieved from: http://www.nei.nih.gov/healthyeyes/eye_images/Myopia.gif

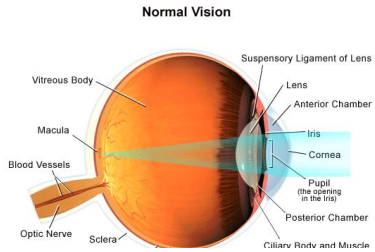


Figure 12.2. Light rays converge in the retina. Image retrieved from: https://www.stanfordchildrens.org/

Meniscus Lenses and Hyperopia (farsightedness) Correction

Hyperopia is the eye condition that enables someone to see distant object clearly but makes nearby object seem blurry. This condition is due to the inability one's eyes to focus on objects closer to the eyes. A person with hyperopia has a shortened eyeball, in which the retina lies closer than usual to the cornea and lens. This disorder leads to the formation of the image nearby object to form beyond retina.

Hyperopia is the opposite of myopia, another vision problem that needs correction.

To correct hyperopia, converging meniscus converging lens is used. The converging meniscus lens converge light before it enters the eye eventually reducing the image distance.

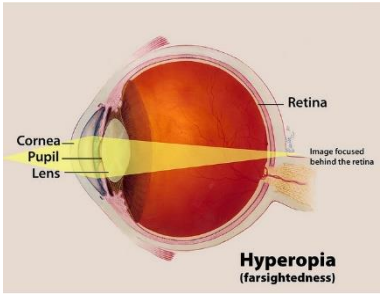
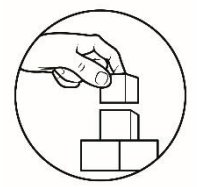


Figure12.3. Light rays converge at the back of the retina. Image retrieved from: http://www.hertzogfamilyeyecare.com/far-sighted.html



What's More

Enrichment Activity 3: "Investigating Convex and Concave Lenses"

Directions: Write your answers on your Science Activity Notebook

Materials: convex lens, concave lens and Science Activity Notebook

Procedure:

Part A (convex lens)

1. Hold a convex lens close to some prints of your Science book.
   Q1. What do you see? Is the image enlarged and upright? You may draw an illustration that supports your answer.

   _____

2. Bring the lens near your classmate's eyes (at least 5cm -6cm away)
   Q2. What did you notice? Draw an illustration of what you saw.
   _____

Part B (concave lens)

3. Hold a concave lens close to some prints of your Science book.
   Q4. What do you see? Did it bring the same effect as the one you observed in Part A? You may draw an illustration that will explain what you observed.
   _____

4. Now hold the concave lens further away from you *(a hand-stretched forward distance)* and look in something at a distance.
   Q5. What do you see? Describe the object that you are looking at using the concave lens. You may illustrate this observation.
   _____

5. Compare the images you saw with the two different lenses. Summarize your observations using the following descriptions: Larger; smaller; upright and; upside down. Copy and complete the table below.

Position	Image Orientation		Image Size	
	Convex lens	Concave lens	Convex lens	Concave lens
Near				
Far				

The activity above, showed how the two kind of lenses can form different types of images. Their sizes and orientations in one's eyes depend on the two factors: distance and the types of lens.

This also made us understand why certain lenses are used for specific purposes.

Assessment 2

Directions*:* Complete each sentence below by choosing the correct word/words inside the parentheses. Write your answer on your Science activity notebook.

1. Rita, a Medicine student, wanted to examine the differences between animal and plant cell. Her observation will be made better with the use of _____. (*magnifying glass, microscope*).

2. When you hold a convex lens farther from you to see objects afar, the image that you see is (*smaller and upside down, bigger and upright*).

3. Lenses of our eyes are (*convex, concave*).

4. When you hold a concave lens further from you to see objects afar. The image that you see is (*smaller and upright, bigger and upside down*).

5. Meniscus lens is used in correcting (myopia, hyperopia).

What I Have Learned

Read: Now let us summarize what we have discussed in this module, complete the synopsis below, by filling up the blank spaces with the appropriate word/words. You may choose the words from the textbox provided. Word/words can be used more than once, so don't hesitate to use the word/s that you have used already.

Mirror and lenses are the tools used in studying the two main behavior of light:

diverging lens	multiple	images	retina	lateral
inversion		eyes		
plane mirror	convex lenses		concave mirror	eyelids
parallel	converging			
Lenses	convex mirror	iris diaphragm	reflection	refraction
meniscus lenses				

(1) _____ or the bending of light and (2) _____ the bouncing off of light.

Mirrors come in different types. The first one is the (3) _____, a type of mirror with a flat surface, it produces an image flipped vertically, this is known as (4) _____. When mirrors are placed next to each other at a certain angle it can create more than one images, known as (5) _____. When mirrors are placed in (6) _____ position, facing each other, an infinite number of images is produced. The spherical mirrors come in two: (7) _____ or the converging mirror and (8) _____ the diverging mirror.

These mirrors also function differently. A mirror which provides wider view field making distant objects appear smaller is (9) _____. If you want to increase the beam that a certain source of light is radiating, you must enclose it in a (10) _____. Dentists also use this kind of mirror because it can magnify the teeth they are checking on, and this makes easier for them to find the hidden cavity.

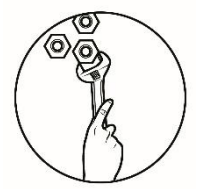
Now let us go to lenses.

Like mirror, lenses also come in either convex lens, known as (11)_____ and concave lens, which is also called (12) _____.

These lenses are also useful to man, like how a mirror is. To see minute or tiny microorganisms, Scientists use (13) _____ which has (14) _____.

To correct a visual problem known as myopia, An eye expert known as Optometrist would prescribe a myopic person to wear eye glasses with (15) _____, while for the person who sees better in a far distance, or the farsighted, a pair of eyeglasses with (16) _____ is used.

In our body, we do also have a natural camera with built in lenses; these are our (17) _____. It enables us to see the world around us because it has an opening that resembles the aperture of a camera. Natural shutters are like our (18) _____, that opens and shuts. The (19) _____controls the light that enters our eyes and the photographic film is like our (20) _____, recording and capturing the beautiful views around us.



What I Can Do

Challenge: Make your own Telescope!

This activity will help you apply whatever learnings you have obtained from the above discussion about lenses. Using materials that you can see around you, improvise or build your own telescope. A telescope is an optical instrument used in viewing far objects, it is the instrument that astronomers use in observing the sky, especially at night. Now, imagine yourself as a budding astronomer who lived during the time that technology has not flourished yet.

Young Galileo, please note that your version of telescope will be assessed with the following criteria:

Creativity	30%
Functionality	30%
Application of Scientific Knowledge	40%
Total	100%

Now young Galileo, it's time for you to build your own telescope!

Assessment

Directions: Choose the letter of the correct answer and write it on your Science Activity Notebook.

1. Which of the following tells the difference between lenses and mirrors?
   a. Lenses refract light, mirrors reflect light.
   b. Lenses make object appear larger, while mirrors give exact copy of object.
   c. Lenses reflect light, mirrors refract light.
   d. Lenses produce virtual image; mirrors make real image.

2. Concave mirror _____.
   a. bulges out toward the light source
   b. curves towards the center
   c. diverge light rays
   d. creates smaller image of an object

3. Which of the following uses concave lens?
   a. Magnifying glasses
   b. Person with hyperopia
   c. Nearsighted corrective eyeglasses
   d. All of the above

4. You see the reflection of the analog type of clock without numbers in your plane mirror. The image formed by the hands of the clock shows the time of 10:00. What is the real time?
   a. 2: 00
   b. 1:00
   c. 7:00
   d. Still 10:00

5. Which mirror concept explains why the word AMBULANCE is written in reverse in an ambulance car?
   a. Multiple image
   b. Lateral inversion
   c. Virtual image and real image
   d. All of the above

6. What kind of mirror is used by dentists in examining tooth cavities?
   a. Plane mirror
   b. Concave mirror
   c. Convex mirror
   d. None of the above

7. Vehicle's side mirrors are _____.
   a. plane mirrors
   b. concave mirror
   c. convex mirror
   d. None of the above

8. Which of the following statements is TRUE about virtual image?
   a. virtual image seems to appear behind the mirror and is upside down.
   b. virtual image seems to appear behind the mirror and is seen in an upright position.
   c. virtual image is formed after the light rays are reflected from the mirror.
   d. All of the above.

9. The sun's rays are observed to focus at a point behind a lens. What kind of lens was used?
   a. converging lens
   b. diverging lens
   c. focusing lens
   d. none of the above

10. Looking through a concave lens, arm-length away can make object appear _____.
   a. smaller and upright
   b. smaller and upside down
   c. larger and upright
   d. larger and upside down

11. Images in a kaleidoscope are examples of a
   a. multiple image
   b. convex mirror
   c. concave mirror
   d. lateral inversion

12. To correct nearsightedness, a person is prescribed with what kind of lenses?
   a. Converging lens
   b. Diverging lens
   c. Focusing lens
   d. None of the above.

13. What type of image is formed by the concave side of the spoon when the object is arm-length away from it?
   a. Upright and bigger
   b. Upside down and bigger
   c. Upright and smaller
   d. Upside down and smaller

14. How will the letter **e** appear in the mirror*?*
   a. ɐ
   b. e
   c. ə
   d. ɔ

15. Which of the following parts of the eyes function like the aperture and iris diaphragm of a camera?
   a. eyelid and cornea
   b. pupil and eyelid
   c. retina and cornea
   d. pupil and iris

Answer Key

What I Know/Assessment

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

Assessment 1

1. VIRTUAL
2. INFINITE
3. KALEIDOSCOPE
4. WIDER
5. CONVEX MIRROR

Assessment 2

1. microscope
2. smaller and upside down
3. convex
4. smaller and upright
5. hyperopia

What I Have Learned

1. refraction
2. reflection
3. plane mirror
4. lateral inversion
5. multiple images
6. parallel
7. concave mirror
8. diverging mirror
9. convex mirror
10. concave mirror
11. converging lens/es
12. diverging lens/es
13. microscopes
14. convex lenses
15. concave lenses
16. meniscus lenses
17. eyes
18. eyelids
19. iris diaphragm
20. retina

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