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Science

Quarter 3 – Module 3:
Interaction of Light on Different Materials

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Science

Quarter 3 – Module 3:
Interaction of Light on Different Materials

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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

This module was designed and written with you in mind. It is here to help you describe how light interacts with different materials. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

Specifically, this module will help you describe the ability of the material to block, absorb or transmit light to its use.

The module is divided into two lessons, namely:

- Lesson 1 – How Light Interacts with Different Materials
- Lesson 2 – Transparent, Translucent and Opaque Materials

After going through this module, you are expected to:

1. describe how materials block (reflect), absorb and transmit (refract) light;
2. cite examples of materials that can block, absorb, and transmit light;
3. describe the uses of materials that can block, absorb, and transmit light;
4. differentiate characteristics of transparent, translucent and opaque materials; and
5. identify examples of materials that are transparent, translucent, and opaque.

What I Know

Directions: Choose the letter of the best answer. Write your answer on a separate sheet of paper.

1. Which of the following is true about visible light?
   A. Visible light is not real.
   B. Visible light can never harm you.
   C. Visible light can't be seen.
   D. Visible light is radioactive and causes skin cancer.

2. When is a shadow formed?
   A. when light passed an object
   B. when light is absorbed
   C. when light is blocked
   D. when there is no light

3. When does reflection happen?
   A. When light curves in a circular path
   B. When light bounces off a shiny, smooth surface
   C. When light spreads out as it passes through a gap
   D. When light bends as it moves through different materials

4. What happens when light strikes a transparent surface, such as window glass or plastic wrap?
   A. The light will bend
   B. The light will bounce back
   C. The light will be absorbed and heated
   D. The light can pass through or be transmitted

5. In which of the following materials can light NOT pass through?
   A. wooden door
   B. clear cellophane
   C. glass with water
   D. clear glass jalousie window

6. Which of the following materials will allow light to pass through?
   A. wax paper
   B. cardboard
   C. black art paper
   D. plastic cover

7. What happens to light when it strikes translucent materials?
    A. The light is blocked.
    B. The light is absorbed.
    C. The light passes through.
    D. The light is both transmitted and absorbed.

8. What happens when opaque materials absorb light?
    A. The material heats up.
    B. The material bounces off the light.
    C. The material scatters the light.
    D. The material transmits light.

9. A cardboard does not allow light to pass through. What kind of material is it?
    A. paper material
    B. transparent material
    C. translucent material
    D. opaque material

10. What material are used in the tinted glass of cars?
    A. absorbent
    B. opaque
    C. translucent
    D. transparent

Lesson 1 How Light Interacts with Different Materials

Can you imagine living in a world without light where you can't see anything, and you can only sense most objects by sound, touch, and smell? How do you think you would feel?

What's In

Activity: "Movement of Light"

What you need: pencil, 2 pieces of cardboard, flashlight

What to do:

1. Use a pencil point to punch a hole into the two cardboards carefully.
2. Hold the cards upright on a flat surface so that the holes are lined up.
3. Place a flashlight directly behind the last card. Turn it on and aim the light to the hole of the cardboard.
4. Bend your body so that you are at eye level with the first card. Observe the hole of the first card.

Guide Questions:

Directions: Answer the following questions. Write your answers in your science notebook.

1. Can you see the flashlight's beam when the two holes are lined up?
2. What will happen if you move one of the cards? Will you still be able to see the light?
3. Draw/ illustrate how light travels.

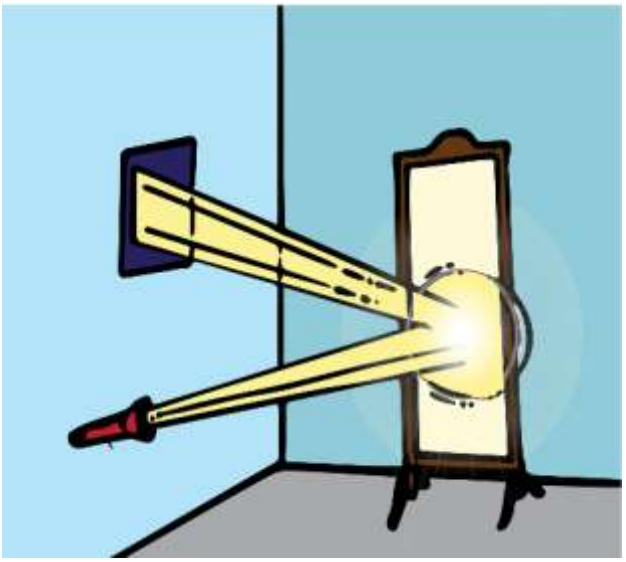
What's New

Activity: "Bouncing Back"

What you need: mirror and flashlight

What to do:

1. Stand in front of the mirror. Turn the flashlight ON and direct it to the mirror.
2. Observe what happens to the flashlight's beam.
3. Pick a spot. Make the light bounce off the mirror and shine on that spot (ex. a wall or any surface) like in the illustration below.



Illustrated by Kristina C. Aguirre and Jose Marie E. Baculi

Guide Questions:

Directions: Answer the following questions. Write your answers in your science notebook.

1. How were you able to light up the spot? Do you have to move the mirror, the flashlight, or both?
2. What happened to the beam of light when it hit the mirror?
3. What did you observe when you moved the mirror?

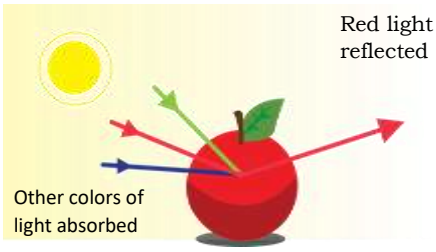
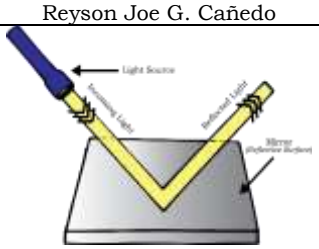
What is It

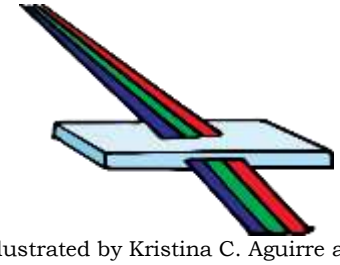
The light that your eyes react to is named ***visible*** or ***white light***. It is a kind of energy that will be seen once reflected off the surface of an object and is responsible for the sense of sight. It travels in straight lines. The primary source of visible light is the sun.

However, the visible or white light is not simply made of one color only; it includes all the wavelengths of light that the human eye can detect. White light consists of colors called the light spectrum or commonly called the rainbow colors. It is referred to as visible light because it permits us to see completely different colors.

But how will it happen? To understand the process, we should study light more and the way it interacts with different objects. This branch of science is ***Optics***. Optics is a branch of physics that deals with the behavior and properties of light, the interaction between light and matter, and instruments that detect light. It includes the study of absorption, transmission, reflection, and refraction of light.

Table 1. Ways on How Light Interacts with Different Materials

Light Interaction	**Definition**	**Sample Illustration**
Blocking	An object blocks the light from a source forming a shadow.	 Illustrated by Kristina C. Aguirre and Jose Marie E. Baculi
Absorption	When light is blocked, the material takes in light, changing it into energy that heats the matter.	 Illustrated by Elpidio S. Palacio and Reyson Joe G. Cañedo
Reflection	When an object blocks light, some parts of it bounce back from the object.	 Illustrated by Kristina C. Aguirre and Jose Marie E. Baculi

Light Interaction	Definition	Sample Illustration
Transmission	Light passes through some materials.	 Illustrated by Kristina C. Aguirre and Jose Marie E. Baculi
Refraction	Light bends as it passes through different materials.	 Illustrated by Kristina C. Aguirre and Jose Marie E. Baculi

Almost everything that can be seen depends on the light in many ways. For example, we see most plants as green because leaves absorb all colors of visible light except green. Regardless of the colors of the objects we see, it is precisely the colors that those objects bounce back.

It even needs light to see everything on the screen of televisions, video games, and computers. Without light, we would not see how beautiful the world is like rainbow colors, sunset, sunrise, or full moon in the night sky!

What's More

Activity 1. "Going Through"

What you need:

- a glass of water (3/4 full)
- crayons
- white bond paper
- pencil

What to do:

1. Take the glass of water and white bond paper to a part of the room with enough sunlight (near a window is good).
2. Hold the glass of water above the paper and let sunlight pass through it, bend, and form a rainbow of colors on the bond paper.

3. Try holding the glass of water at different heights and angles to see if it has a different effect.
4. Draw your observation on the paper and put colors based on what you see.

Guide Questions:

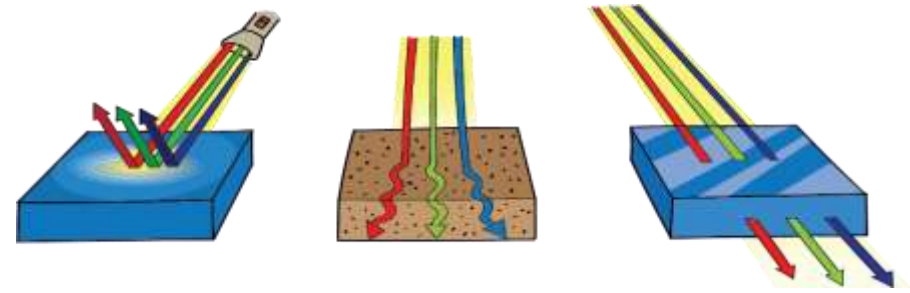
Directions: Based on the result of the activity conducted, answer the questions below. Write your answers on a separate sheet of paper.

1. What did you see on the paper when sunlight passed through the glass of water?
2. What do you think caused the sunlight to refract or bend?
3. What was the effect when the glass was held at different heights and angles?
4. The activity showed refraction of light. In your own words, what is the refraction of light?

Activity 2. "Closely Related"

What to do:

Study the diagrams below.



Reflection **Absorption** **Transmission**

Illustrated by Elpidio S. Palacio and Reyson Joe G. Cañedo

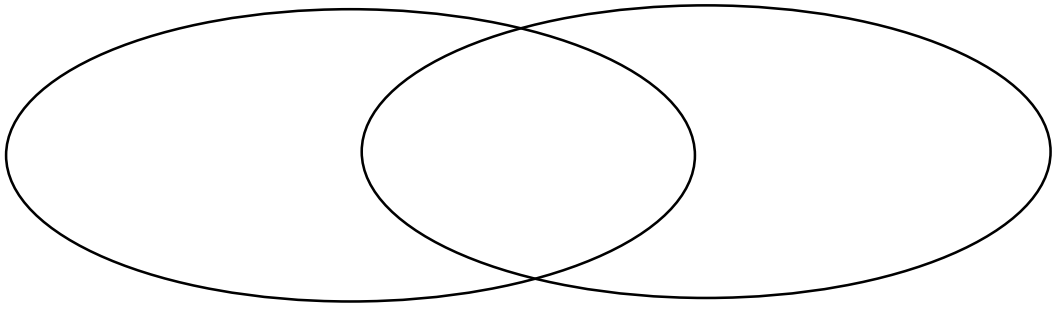
Guide Questions:

Directions: Using the Venn diagrams below, compare and contrast the following interactions. Choose the correct terms from the box for your answer for each item. Copy and complete the diagrams on a separate paper.

1.

bend through	bounce back	light
need materials	pass through	see colors

Reflection *Similarities* **Refraction**

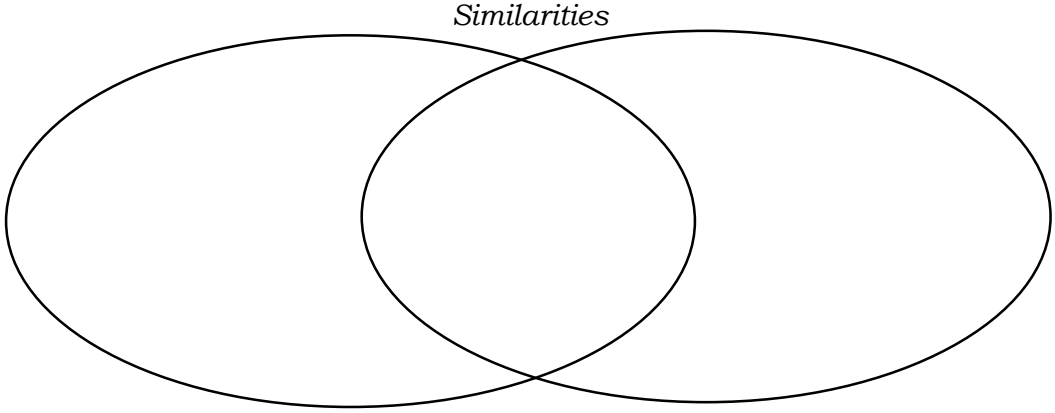


2.

take in	light	need materials	pass through

Absorption **Transmission**

Similarities



Lesson 2 Transparent, Translucent, and Opaque Materials

You have learned in the previous lesson how light interacts with different materials. In this lesson, you will learn that light behaves differently as it strikes other materials.

What's In

Directions: Choose the correct word inside the parentheses to complete each sentence. Write your answers in your science notebook.

1. Rainbow is made up of _____ colors. (*five, seven, eight*)
2. A cabinet made of _____ reflect light. *(rock, wood, glass)*
3. A mirror will show your _____. *(reflection, shadow, energy)*
4. A shadow is formed when light is _____. *(reflected, transmitted, blocked)*
5. To protect travelers' eyes from too much light from the sun, they wear _____. (*sunglasses, goggles, mask*)

What's New

Directions: Copy the table below, then give the possible use/s of the given materials. Write your answers in your science notebook.

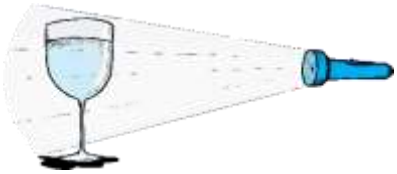
Table 2. Possible uses of the materials

Materials	Use/s
Sunglasses	
Frosted glass	
Glass bottles	
Umbrella	
Curtains	
Concrete wall	

What is It

When the light hits different materials, the light behaves differently. It depends on whether the material is transparent, translucent, or opaque. It serves as the foundation for how materials are used in our daily lives.

Table 3. Types, descriptions, and uses of materials based on how they interact with light

Kinds of Materials	Description	Illustration	Uses
Transparent	- The material transmits light easily because of its smooth and clear surface. - It allows all light to pass through them. - Transmission and refraction happen in these materials.	 Illustrated by Kristina C. Aguirre and Jose Marie E. Baculi	Able to see things behind the materials clearly.
Translucent	- The material only allows some light to pass through them. - It scatters the light from its source. - Some of the light is transmitted, while others are absorbed and reflected by the material. - Translucent materials can transmit, absorb, and reflect light.	 Illustrated by Elpidio S. Palacio and Reyson Joe G. Cañedo	Still able to look at things at the back of the materials, but they are not clearly visible.
Opaque	- These materials do not allow light to pass through them because they block light and cast shadows. - A shadow is a dark space where light is blocked. - Some amount of the light is reflected while these kinds of material absorb some.	 Illustrated by Kristina C. Aguirre and Jose Marie E. Baculi	Cannot see the things behind the material, produce shadows, know the color of things, form images (ex. a figure like an object as seen on the mirror)

What's More

Activity 1. "Light and Shadow"

What you need: source of light and paper doll (object)

What to do:

1. Lit or turn on the source of light.
2. Aim the light towards a wall or surface.
3. Put the paper doll between the light source and the wall/ surface.
4. Adjust the paper doll where it can block the light.
5. Hold the paper doll closer to the light.
6. Then move it farther from the light.
7. Let light hit the side of the paper doll. Take note of your observations.

Guide Questions:

Directions: Based on the activity conducted, answer the following questions below. Write your answers in your science notebook.

1. What is formed on the wall? Describe it.
2. How does the shadow look when the object is closer to the light?
3. How does the shadow look when the object is farther from the light?
4. When light hits the side of the object, how does shadow look like?
5. How does a shadow form?

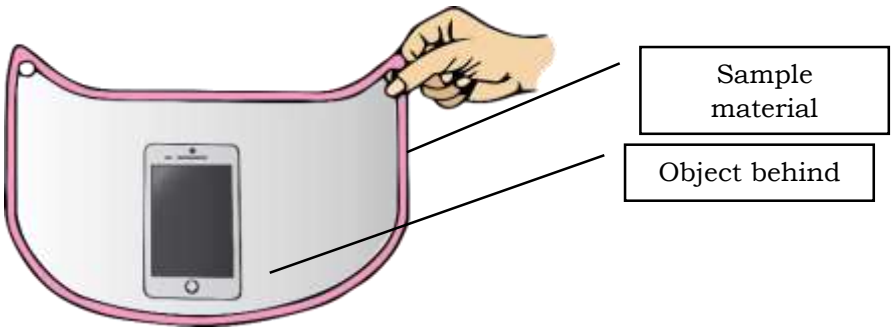
Activity 2. "Opaque, Translucent and Transparent Materials"

What you Need:

Leather (rubber if not available), bond paper, colored cellophane, book, mirror, plastic cup, eyeglasses, cloth, cement/ wooden wall, clear glass

What to Do:

1. Expose the sample materials to a light source, one at a time.
2. Put an object behind each sample material. See sample set up below.



Illustrated by Elpidio S. Palacio and Reyson Joe G. Cañedo

3. Observe the interactions of light with the materials. Did the light pass through the material? Can you see the object at the back of the material?
4. Based on the interaction of light with the material (*ex. bond paper*), identify whether it is opaque, translucent, or transparent.

Guide Questions:

Directions: Read and analyze the table below. Put a check (✓) mark on the appropriate column whether the material is transparent, translucent, or opaque. Copy the table and write your answers in your science notebook.

Table 4. Kinds of materials as to how they interact with light

Material	Transparent	Translucent	Opaque
Leather/ rubber			
Bond paper			
Colored Cellophane			
Book			
Mirror			
Plastic cup			
Eyeglasses			
Cloth			
Cement wall			
Clear glass			

What I Have Learned

A. Directions: Read, understand, and complete the sentences below. Choose your answer for each item from the words inside the box. Write your answers in your science notebook.

Sunlight	Visible light	Refraction
Reflection	Absorption	Transmission

1. _____ is the bending of light as it passes through different materials.
2. _____ is the bouncing back of light when it hits an object.
3. _____is the transfer of light energy to materials rather than being reflected or transmitted.
4. _____ happens when light passes through the materials.
5. _____ allows us to see objects around us and their colors.

B. Directions: Arrange the following jumbled letters to show the correct words of the given definition. Write your answers in your science notebook.

1. It refers to the bending of light as it passes through different materials. **(FRACTIREON)**
2. It is the bouncing of light when it hits an object. **(TIONFLECRE)**
3. It is the taking in of light and not reflecting it. **(SORPABTION)**
4. It is the passing of light through some materials. **(SIONMISTRANS)**
5. It allows us to see color that is not absorbed by the objects. **(GHTLI BLESIVI)**

C. Directions: Identify the term being described using the words inside the box. Write your answers in your science notebook.

Transparent	Translucent	Opaque	Shadow

1. Smooth and clear materials that transmit light easily.
2. Allow all light to pass through them.
3. Materials that can transmit, absorb and block the light.
4. Scatter the light from its source.
5. Permit some light to pass through them.
6. Do not let light pass through them.
7. Formed when some light is blocked.
8. Water is an example of this material.
9. Some light is absorbed, and some are reflected.
10. Things behind this object cannot be seen.

What I Can Do

A. Directions: Read and carefully analyze the situation and answer each question or problem following the rubrics below. Write your answers on a separate sheet of paper.

1. You have a clear glass window in your room. As the sun rises, the sunlight enters your room, disturbing your sleep and making your room warmer. You do not want to make your room dark either. What will you do?
2. Your family wants to set up a flower garden. You have various orchids that need to be continuously exposed to a little amount of sunlight to grow and produce flowers. What will you suggest to your parents?
3. You heard over the radio that the solar eclipse would be happening at 10:00 AM. People were advised not to look directly at the sun. What are the safest ways to view a solar eclipse?

RUBRICS

Criteria	1	2	3	4
Quality of Writing	Very poorly organized and no idea at all	Give some new information but poorly organized	Somewhat informative and organized	Very informative and organized
Grammar, Usage, and Mechanics	Many spelling and grammatical errors	A number of spelling, punctuations, or grammatical errors	Few spelling and punctuation errors, minor grammatical errors	No spelling, punctuation, or grammatical errors

B. Directions: Classify the materials found in the box below under the appropriate column. Copy the table on a separate sheet of paper. Complete or fill it in with your chosen answers that correspond with the proper heading.

glass window	wax paper	concrete wall
wooden door	plastic cup	glass window
fishbowl	frosted glass	metal spoon
mirror	tissue paper	eyeglasses
plastic container	umbrella	clear water bottle

Transparent	**Translucent**	**Opaque**

Assessment

Directions: Match the descriptions in Column A with the concepts in column B. Write the letter of the correct answer on a separate sheet of paper.

Column A	**Column B**
1. The major source of light	A. absorption
2. Formed when some light is blocked	B. fluorescent
3. The light that the human eye can see	C. opaque
4. It is the passing of light through certain materials	D. reflection
5. Materials that do not allow light to pass through	E. refraction
6. Materials that allow all light to pass through them	F. shadow
7. When light hits an object, it bounces back.	G. sun
8. Materials that allow only some light to pass through them	H. translucent
9. The light is bent as it passes through different transmission materials	I. transmission
10. The taking in of light and not reflecting it by some materials	J. transparent
	K. visible light

Additional Activities

Directions: Read and answer the following. Write your answers on a separate sheet of paper.

A. List down at least three objects found in school, at home, or around you that are transparent, translucent, or opaque materials.

B. Illustrate/draw or paste pictures of materials that can do each of the following concepts to light. Do this on separate sheets of paper.
   1. absorption
   2. transmission
   3. reflection; and
   4. refraction

Answer Key

What I Know

1.D 2. C 3.B 4.A 5.A 6.D 7.D 8.A 9.D 10.C

Lesson 1. How Light Interacts with Different Materials

What's In

Movement of Light

Guide Questions: (Possible answers)

1. Yes. I can see the flashlight's beam when the two holes are lined up.
2. I will not see the light.
3.

Illustrated by Elpidio S. Palacio

What's New

Bouncing Back

Guide Questions (possible answers):

1. I may move the mirror or the flashlight or both of them to light the spot.
2. The light bounces back when it hit the mirror.
3. The light still bounces back from the mirror but the lighted spot changes.

What's More

Activity 1. Going Through

1. Different colors of light are seen on the paper.
2. The different kind of material that light passes through (air, glass and water); and also the height and angle of the glass affects the light.
3. The light passes through but is scattered in different angles too.
4. Refraction is the bending of light when it passes through different materials.

Activity 2. Closely Related

1.

2.

What I Have Learned

A. 1. Refraction
2. Reflection
3. Absorption
4. Transmission
5. Visible Light

B.1. REFRACTION
2. REFLECTION
3. ABSORPTION
4. TRANSMISSION
5. VISIBLE LIGHT

Activity 2. Opaque, Translucent, and Transparent Materials (Possible Answers)

Material	Transparent	Translucent	Opaque
Leather/ rubber			✓
Bond paper			✓
Colored Cellophane		✓	
Book			✓
Mirror			✓
Plastic cup		✓	
Eyeglasses	✓		
Cloth			✓
Cement wall			✓
Clear glass	✓		

What's More

Activity 1. Light and Shadow

Assessment (Possible Answers)

1. A shadow is formed on the wall. The shadow takes on the shape of the object.
2. The shadow appears larger when it is closer to the light.
3. The shadow looks smaller when it is farther from the light.
4. When light is slanted, the shadow is longer, when the light comes from above, the shadow is shorter.
5. A shadow is formed when an object blocks the light.

What's New (Possible Answers)

Materials	Use/s
Sunglasses	Protect the eyes from too much light from the sun.
Frosted glass	Allow some light to pass through and used as decorative.
Glass bottles	Used to hold liquid; contents can be seen inside.
Umbrella	Used to shield from sunlight and rain.
Curtains	Used to cover windows and doors so as to block light.
Concrete wall	Used to cover the wall of houses, and do not allow light, heat or cold to pass through.

Lesson 2. Transparent, Translucent and Opaque Materials

What's In

1. seven 2.wood 3.reflection 4.blocked 5.sunglasses

Additional Activities (Possible answers)

A.

Materials	Transparent	Translucent	Opaque
At home	1. glass 2. eyeglasses 3. water	1.plastic cup 2. colored cellophane 3. plastic cabinets	1. shoes 2. mirror 3. table
At school	1.glass window 2. clear bottle water 3. aquarium	1.frosted glass 2. colored plastic envelope 3. light bulb	1.books 2.chairs 3. wooden cabinets

B. Illustration (Possible Answer)

Absorption

Transmission

Illustrated by Elpidio S. Palacio and Jose Marie E. Bacuil

Refraction

Reflection

Illustrated by Elpidio S. Palacio and Jose Marie E. Bacuil

Assessment

1. G 2. F 3. K 4. I 5. C 6. J 7. D 8. H 9. E 10. A

What I Can Do

A. (Possible answers)

1. To make the room cooler without making it darker, put curtains in the window that have light colors.
2. Make a shade house for the orchids.
3. The safest way to view the solar eclipse is to use a solar filter glasses.

B.

Transparent	Translucent	Opaque
Glass window	Wax Paper	Concrete wall
Fishbowl	Plastic cup	Wooden door
Water	Frosted glass	Metal spoon
Eyeglasses	Tissue paper	Mirror
Clear water bottle	Plastic container	Umbrella

What I Have Learned

C. 1. Transparent
2. Transparent
3. Translucent
4. Translucent
5. Translucent
6. Opaque
7. Shadow
8. Transparent
9. Opaque
10. Opaque

References

Online Sources

"Visible Light | Science Mission Directorate". 2010. *Science.Nasa.Gov*. Accessed April 16, 2021.https://science.nasa.gov/ems/09_visiblelight.

"Optics - Optics and Information Theory". 2021. *Encyclopedia Britannica*. Accessed April 25, 2021. https://www.britannica.com/science/optics/Optics-and-information-theory.

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