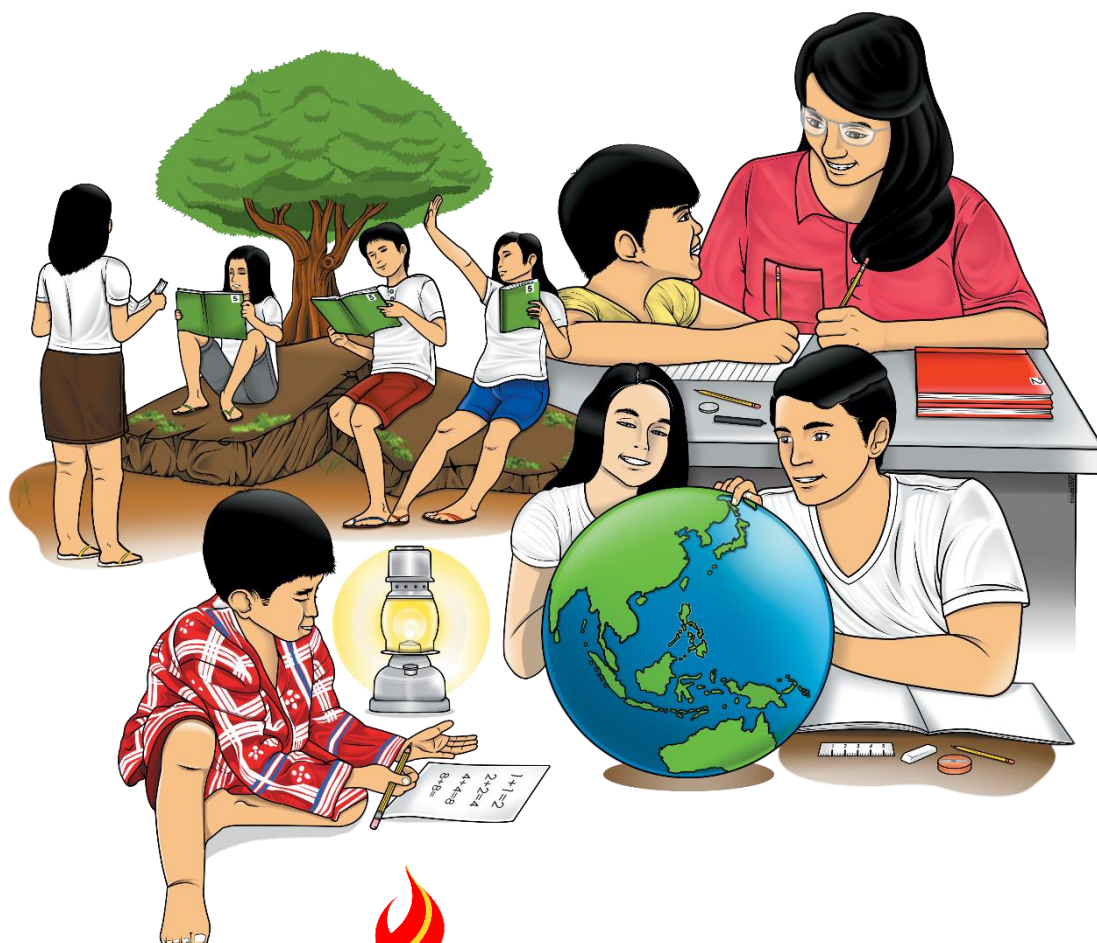


# Science

## Quarter 2 – Module 2: Practical Applications and Effects of Electromagnetic Waves



**Science – Grade 10**  
**Alternative Delivery Mode**  
**Quarter 2 – Module 2: Practical Applications and Effects of Electromagnetic Waves**  
**First Edition, 2020**

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Published by the Department of Education  
Secretary: Leonor Magtolis Briones  
Undersecretary: Diosdado M. San Antonio

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**Printed in the Philippines by** \_\_\_\_\_

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# Science

## **Quarter 2 – Module 2: Practical Applications and Effects of Electromagnetic Waves**

## **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***

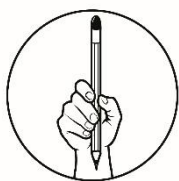
Are you not wondering how you are able to communicate with your loved ones from far places? How were you able to listen to music from your radio? Or how your television remote control works?

Most of the things we use nowadays are applications of our knowledge about Electromagnetic (EM) waves. We may not see these EM waves, but we encounter their different forms in our daily life. You know more of these waves than you may think.

This module contains various activities and tasks to be accomplished which will give you more understanding on the significance and effects of electromagnetic waves.

At the end of this module you will be able to:

1. cite examples of practical applications of the different regions of EM waves, such as the use of radio waves in telecommunication **(S10FE-IIc-d-48)**;
2. explain the effects of electromagnetic radiation on living things and the environment **(S10FE-IIe-f-49)**.



## ***What I Know***

**Directions:** Read each question carefully. Choose the letter of the correct answer.

1. What EM wave make cellular telephones transmit and receive signals?  
A. radio waves  
B. microwaves  
C. visible light  
D. gamma rays
2. All of the following are uses of visible light. Which one is **not**?  
A. it enables us to see things  
B. gives light to the screen of our devices  
C. for thermal imaging  
D. used in optical fibers
3. Which kind of wave is use in night vision goggles?  
A. microwave  
B. infrared  
C. gamma ray  
D. visible light
4. Which of the following EM wave makes use of artificial lighting?  
A. visible spectrum  
B. x-ray  
C. gamma rays  
D. infrared

5. Which of the following is a use of ultraviolet radiation?
 

A. diagnosing bone fracture	C. night vision goggle
B. identifying original from fake banknotes	D. optical fiber
  
6. Which type of X-ray can penetrate even through metals?
 

A. regular X-ray	C. short wavelength X-ray
B. long wavelength X-ray	D. dental X-ray
  
7. What type of electromagnetic waves is used in RADAR?
 

A. infrared rays	C. radio waves
B. microwaves	D. ultraviolet rays
  
8. What imaging technique uses powerful magnets, computer and radio waves to make detailed pictures inside your body?
 

A. thermal imaging	C. Magnetic Resonance Imaging (MRI)
B. infrared imaging	D. X-ray image
  
9. In an infrared camera, what color indicates warmer temperature?
 

A. blue	C. violet
B. green	D. yellow
  
10. Which of the EM waves below are emitted by stars and some radioactive substances?
 

A. gamma rays	C. microwave
B. radio waves	D. X-ray
  
11. Which kind of wave causes the fluorescent chemicals to glow in sunlight?
 

A. microwave	C. gamma ray
B. ultraviolet	D. visible light
  
12. How many of the EM waves are visible?
 

A. none out of seven EM waves	C. all of the EM waves
B. most of it	D. only one out of seven EM waves
  
13. Among the following forms of the EM spectrum, which waves do **not** have enough energies to damage the body cells?
 

A. gamma ray and infrared	C. gamma ray and ultraviolet
B. radio wave and visible light	D. X-ray and ultraviolet
  
14. What kind of wave is very dangerous, but have been used to kill cancer cells?
 

A. gamma rays	C. radio waves
B. infrared	D. visible light
  
15. Which of the following sets of EM radiation can harm your body cells?
 

A. gamma ray, ultraviolet ray, X-ray	C. infrared, microwaves, ultraviolet
B. light, ultraviolet, X-ray	D. gamma ray, microwaves, infrared

## Lesson

# 1

# Practical Applications and Effects of Electromagnetic Waves



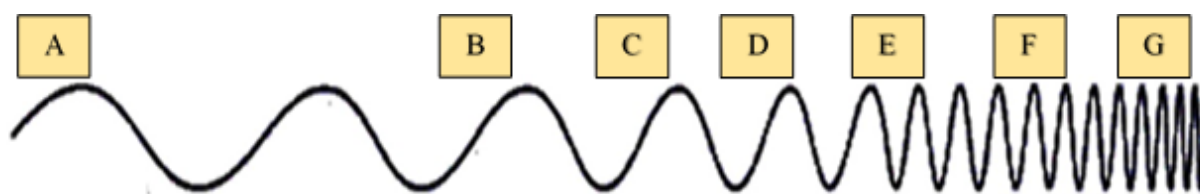
## What's In

Can you still remember the different forms of Electromagnetic waves you have learned from the previous module? While all these EM waves move through space at the same speed of about three hundred (300) million meters per second, their wavelengths, frequencies, and energies differ. This is the reason why they are arranged accordingly in a scheme called Electromagnetic Spectrum.

Let me remind you that wavelength has an inverse relation with frequency and energy. So, if wavelength increases, what will happen to the frequency of the wave? If the wavelength of an EM wave decreases, what will be the effect in its energy?

Let's compare the relative wavelengths, frequencies, and energies of the different regions of the Electromagnetic spectrum.

**Directions:** On a separate sheet, answer the following activity. Look at the picture below, write the name of the correct Electromagnetic wave corresponding to the letters on the picture. You may refer your answer for numbers 1-7 from the box.



1. **A** \_\_\_\_\_
2. **B** \_\_\_\_\_
3. **C** \_\_\_\_\_
4. **D** \_\_\_\_\_
5. **E** \_\_\_\_\_
6. **F** \_\_\_\_\_
7. **G** \_\_\_\_\_

x-ray		radio wave	
gamma ray		microwave	
ultraviolet	infrared	visible light	

8. What letter shows the lowest frequency? \_\_\_\_\_
9. What letter shows the shortest wavelength? \_\_\_\_\_
10. What letter shows the EM wave with the highest energy? \_\_\_\_\_



### Notes to the Teacher

The students should have mastery of the properties of electromagnetic waves for them to relate the forms to the uses.



### What's New

**Directions:** Look for the name of devices hidden in the puzzle below. The words may be placed vertically, horizontally, diagonally, or even backwards. Write ten (10) terms you found in the word box below.

M	I	C	R	O	W	A	V	E	O	V	E	N	Q	Z
U	J	N	Z	I	Z	O	W	M	X	J	Z	C	D	T
A	Q	L	D	T	M	Y	R	K	R	E	D	A	O	N
S	M	O	N	H	D	P	B	I	A	N	U	F	X	A
T	H	R	W	G	U	C	A	V	Y	S	A	M	R	E
P	Z	T	N	I	O	I	R	P	D	O	D	Z	N	G
I	V	N	O	L	M	V	E	W	I	Q	L	O	F	T
Q	H	O	I	H	N	C	M	D	H	N	H	R	I	S
T	W	C	S	S	J	T	A	E	B	P	Y	M	V	P
X	A	E	I	A	M	R	C	G	L	U	F	H	W	A
U	V	T	V	L	C	A	M	L	A	R	L	T	M	K
L	N	O	E	F	R	I	E	Y	F	U	A	B	F	J
U	B	M	L	P	B	C	H	Z	B	W	R	D	C	M
W	O	E	E	S	A	T	E	L	L	I	T	E	A	Q
J	M	R	T	O	P	H	O	H	A	P	A	D	Y	R

Generated from Free Word Search Puzzle Maker

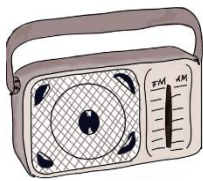
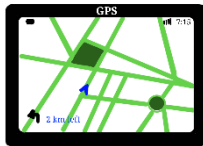
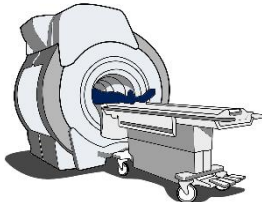
What do you think are these devices for? What form of EM waves make them work?











## What is It


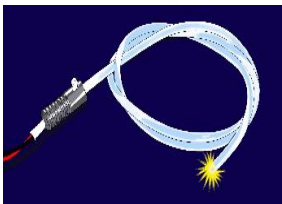
Study the tables below. Electromagnetic waves have practical applications which depend greatly on their wavelength, frequency, and energy. Continue reading and you will know more about them.



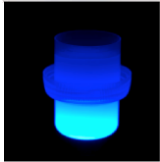
Electromagnetic Waves	Practical Applications
<p><b><u>Radio Waves</u></b></p>   	<ul style="list-style-type: none"> <li>• <b>Radio/Television signals</b> Radio and television signals are radio waves that are produced by making electrons vibrate. It has a long wavelength capable of transmitting sound and picture information over long distances.</li> <li>• <b>Global Positioning System (GPS)</b> is a space-based navigation system that provides geographical position and time information anywhere on or near the earth. It communicates with stations on the ground using radio waves.</li> <li>• <b>Magnetic Resonance Imaging (MRI)</b> It is a medical imaging technique that uses powerful magnets, computer and radio waves to make detailed pictures inside your body.</li> </ul>



Electromagnetic Waves	Practical Applications
<p><b><u>Microwaves</u></b></p>   	<ul style="list-style-type: none"> <li>• <b>Satellite communication</b> Microwaves are used in satellite communications because it can penetrate the earth's atmosphere. Microwave's signals are transmitted by an antenna to a satellite which amplifies and retransmits the signal to an antenna in other parts of the world. This is how we communicate even from afar.</li> <li>• <b>Terrestrial communication</b> A cell phone is a radio transmitter and receiver that uses microwaves. Cellular phones depend on overlapping network of cells. Each cell has its tower that receives and sends microwave signals.</li> <li>• <b>Cooking</b> The microwaves in a microwave oven penetrate and agitate the water molecules within the food. Thus, they create molecular friction which produces heat that will cook the food.</li> </ul>

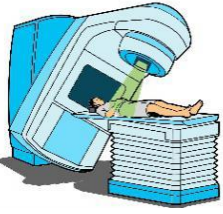
	<ul style="list-style-type: none"> <li>• <b>RADAR (Radio Detection and Ranging)</b> is a detection system used to determine the range, angle or velocity of objects. It can be used to detect aircraft, ships, and the like.</li> </ul>
-----------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Electromagnetic Waves	Practical Applications
<p><u><b>Infrared (IR)</b></u></p>  	<ul style="list-style-type: none"> <li>• <b>Remote control (IR remote)</b> uses LED lights to transmit signals to control devices. It emits pulses of invisible infrared light.</li> <li>• <b>Thermal imaging through infrared scanners</b> Infrared scanner such as thermal imaging and thermal scanner are used to show the temperature variation of the body. Our body radiates infrared and under infrared cameras, our images appear in a variety of colors. The differences in color determine the differences in temperature. For example, shades of blue and green indicate regions of colder temperature; and red and yellow indicate warmer temperature.</li> <li>• <b>Night vision goggles</b> use thermal imaging technology to capture the infrared light being emitted as heat by objects in the field of view.</li> </ul>

Electromagnetic Waves	Practical Applications
<p><u><b>Visible Light</b></u></p>  	<ul style="list-style-type: none"> <li>• Enables us to see things around us. It also gives light to the <b>screen</b> of most <b>electronic devices</b>.</li> <li>• <b>Artificial Lights like flashlight, lamp etc.</b> are any light source that produce light instead of natural lights produced by the sun.</li> <li>• <b>Optical fibers</b> One use of optical fibers in medicine is endoscope, a flexible tube with tiny camera that is used to observe the internal parts of the body.</li> </ul>

Electromagnetic Waves	Practical Applications
<p><b><u>Ultraviolet (UV)</u></b></p>   	<ul style="list-style-type: none"> <li>• Ultraviolet B (UVB) radiation in sunlight interact with a protein (7-DHC) in the skin, converting it into vitamin D3, the active form of vitamin D, which is essential for maintaining healthy bones and teeth.</li> <li>• <b>Security markings</b> Sensitive documents such as credit cards, banknotes, and passports include a UV watermark that is only seen under UV emitting light.</li> <li>• <b>Sterilization of water in drinking fountains</b> Ultraviolet light disinfection is one water treatment system that can be used to remove most forms of microbiological contamination from water.</li> <li>• <b>Fluorescence</b></li> <li>• Some washing powder contains fluorescent chemicals which glow in sunlight. This makes your shirt look whiter than white in daylight.</li> </ul>

Electromagnetic Waves	Practical Applications
<p><b><u>X-ray</u></b></p>  	<ul style="list-style-type: none"> <li>• <b>Diagnosing bone fractures</b> X-rays are produced using an X-ray tube. They are emitted when fast moving electrons hit a metal target. Long wavelength X-rays can penetrate the flesh but not the bones that's why it is used in diagnosing bone fractures.</li> <li>• <b>Airport security scanner</b> The short wavelength X-rays can penetrate through metals which can be used in <b>airport security scanner</b>.</li> </ul>

Electromagnetic Waves	Practical Applications
<p><b><u>Gamma Ray</u></b></p> 	<ul style="list-style-type: none"> <li>• <b>Treat tumors and cancer through the process called radiotherapy.</b> The high-energy rays of gamma destroys cancer cells in the area where it is given.</li> <li>Gamma rays <b>sterilize surgical instruments</b> because they easily penetrate through materials and the energy they release kills bacteria and other microorganisms.</li> </ul>

### Effects of Electromagnetic (EM) radiation on living things and the environment

From the practical applications of EM waves discussed above, we can conclude that these waves are significant to us. But, even essential forms of radiation can be harmful in excessive amount.

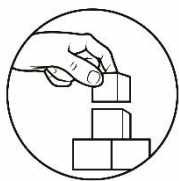
The effect of EM radiation on organisms and the environment depends on how much energy it carries. Radiation can be non-ionizing and ionizing. Non-ionizing radiation does not have enough energy to remove electrons from atoms and molecules.

Radio waves, microwaves, infrared, visible light and ultraviolet are non-ionizing radiation. We are exposed to low levels of non-ionizing radiation every day. When the exposure is intense and direct, it may result in damage to tissue due to heat. Right amount of non-ionizing radiation like UV rays maintain the proper mechanism of ecosystem.

High-energy EM waves like x-rays and gamma rays are considered as ionizing radiation. We are also exposed to low levels of ionizing radiation that comes from the atmosphere. This means that the usual amount of ionizing radiation from natural sources absorbed by our bodies is small.

Our main exposure to ionizing radiation comes from manmade sources through the use of diagnostic medical exams. Excessive exposure to these radiations can alter molecules within the cells and may cause eventual harm such as skin or tissue damage, cancer and death.

When handled improperly, radioactive pollution may occur, where the air, soil and water will be contaminated. This pollution may eventually makes its way up to the food chain where all forms of life may be affected.



## What's More

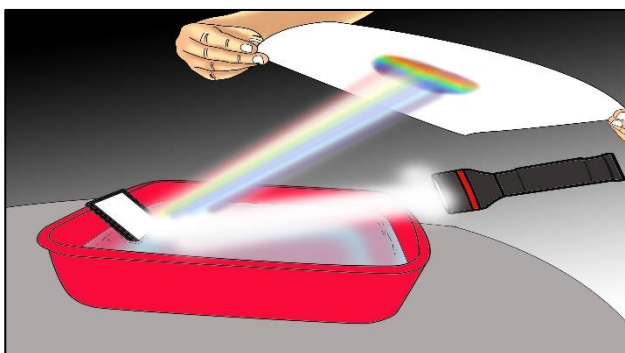
Here are some activities which will give you hands-on experience on some of the common EM waves mentioned above. Each activity needs simple materials that are readily available at your home or school.

### Activity 1: “Behind the White Light”

Adapted from <https://www.physicscentral.com/experiment/physicsathome/rainbow.cfm>

#### What you need:

- water
- sunlight or flashlight
- shallow pan
- small mirror
- piece of paper or white surface



#### What to do:

1. Before doing this activity, read the guide questions below.
2. Fill the shallow pan with water of about half full.
3. Put the mirror into the water inside the pan at an angle.
4. Position the pan so that sunlight/flashlight shines directly where the mirror is under water. You may have to shift the mirror to find the right angle.
5. Hold the white paper above the mirror. It would be easier to see if the room is dark.
6. Adjust the angle of the mirror until you see a rainbow. Observe.

**Guide Questions:** Answer the following activity questions on a separate sheet.

- A. Prism is a triangular piece of glass that is used to separate white light. From the activity above, which materials served as a prism?  
\_\_\_\_\_
- B. Explain why white light splits up into different colors when it goes through a prism?  
\_\_\_\_\_
- C. Write down the color spectrum you observed in proper order from top to bottom.  
\_\_\_\_\_
- D. What color bends the least?  
\_\_\_\_\_

E. What color bends the most?

\_\_\_\_\_

### Assessment 1

**Directions:** Unscramble the letters to form the correct words and write the appropriate word to complete the statements below on a separate sheet.

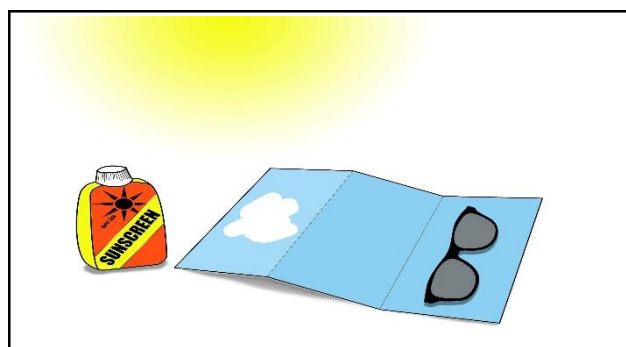
1. EM wave that can be seen by human eye is the \_\_\_\_\_. **ISVIELB HGLIT**
2. \_\_\_\_\_ is the only source of natural white light. **UNS**
3. Rainbow is formed when light \_\_\_\_\_ at different angles. **FRRETACS**
4. \_\_\_\_\_ is one of the artificial lights we use at night. **LBUB**
5. In a rainbow, the color that bends the most is \_\_\_\_\_. **IVLTOE**

### Activity 2: “Block it!”

**Adapted from** <https://homeschoolgameschool.com/the-great-sunscreen-experiment/>

#### What you Need:

- bright-colored construction paper
- sunblock lotion
- sunglass



#### What to Do:

1. Before doing this activity, read the guide questions below.
2. Divide the construction paper by folding it into three.
3. Apply sunblock lotion on one side of the paper, place the sunglass on the other side. Leave the center of the construction paper uncovered.
4. Place the paper in a sunny spot and leave it there for three hours.
5. Observe the paper.

#### Guide Questions:

Answer the following activity questions on a separate sheet.

- A. Did the paper's color change or stay the same? \_\_\_\_\_
  - B. How is the side of the construction paper with sunblock lotion different from the side without sunblock lotion?
- \_\_\_\_\_
- \_\_\_\_\_

C. How is the side of the construction paper with sunglass different from the side without sunglass?

---

D. Describe how sunscreen and sunglass protect us from UV radiation.

---

## Assessment 2

**Directions:** Write **ULTRA** if the statement is correct, and **VIOLET** if not. If the statement is incorrect, state reason or appropriately correct the statement.

\_\_\_\_\_ 1. Too much exposure to UV rays may increase the risk for skin cancer and cataracts.

\_\_\_\_\_ 2. Sunscreens protect our skin so we can stay under the sun all day.

\_\_\_\_\_ 3. The higher the Sun Protection Factor (SPF) in a sunscreen, the higher the protection.

\_\_\_\_\_ 4. Sunglasses have UV coating that help block harmful rays from the sun.

\_\_\_\_\_ 5. It is good to avoid the sun entirely.

## Activity 3: Post the Risk

**Directions:** Using a letter-size bond paper, make a poster on the risks of long exposure to the different forms of Electromagnetic waves in living things. The rubric below will be used to grade your work.

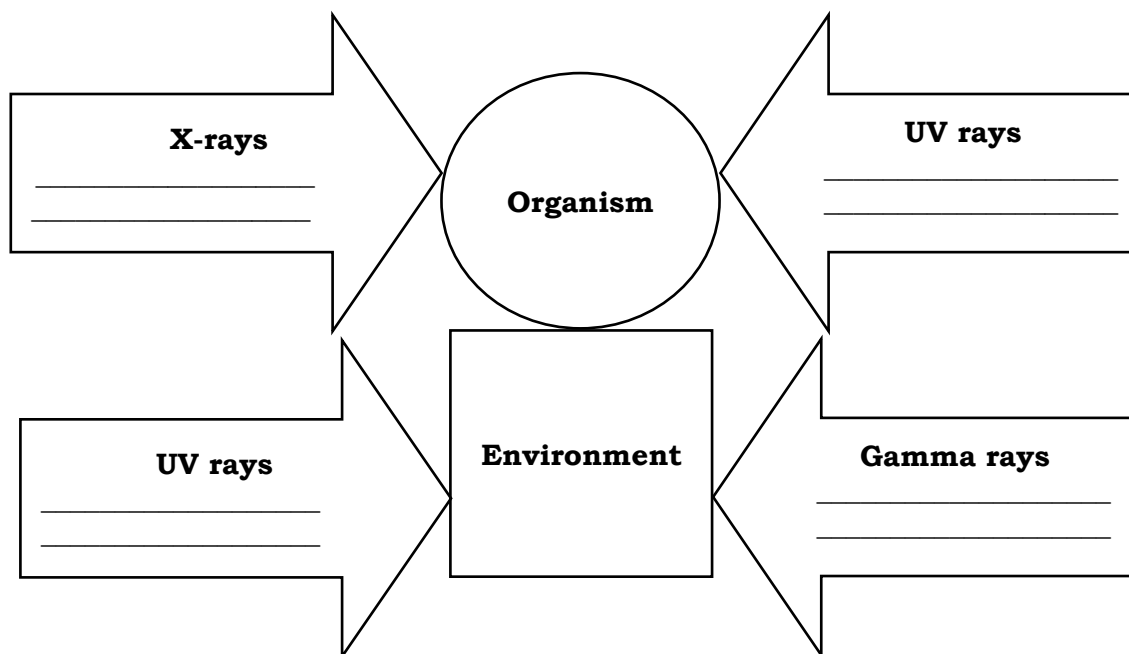
### RUBRIC

1 - Weak	2 - Moderately Weak	3 - Average
4 - Moderately Strong	5 - Strong	
1. The poster contains appropriate items and information.		
2. The poster is clean and neat, and the information on it is well organized.		
3. The poster is colorful and creative.		
4. Any artwork on the poster is appropriate and carefully executed.		
5. The poster shows an understanding of the topic and related concepts.		
<b>Total:</b>		



### Assessment 3

**Directions:** Write the effect of the given EM waves on living things and environment when exposed in large amount. Do it on a separate sheet of paper.

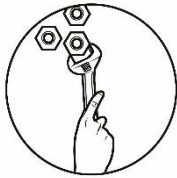


### ***What I Have Learned***

Let's sum up what you have learned. Choose the correct term from the enclosed choices that should go into the blank spaces.

Radio/television signals, GPS and MRI are practical applications of (1) \_\_\_\_\_ (radio wave/microwave). Satellite communication, cooking, terrestrial communication, and RADAR make use of (2) \_\_\_\_\_ (infrared/microwave). Remote controls, thermal imaging and night vision goggles are practical applications of (3) \_\_\_\_\_ (infrared/ultraviolet). You can see things around you because of (4) \_\_\_\_\_ (gamma rays/visible light) which is also used in optical fibers, artificial lights and screens of electronic devices. Vitamin D is produced from (5) \_\_\_\_\_ (ultraviolet /microwave), which is also used for security markings and sterilization of water in drinking fountains. In diagnosing bone fractures, we use (6) \_\_\_\_\_ (gamma rays/X-rays). (7) \_\_\_\_\_ (long wavelength X-ray)/short wavelength X-ray)) is a type of x-ray that can penetrate the flesh while (8) \_\_\_\_\_ (long wavelength X-ray)/short wavelength X-ray)) can penetrate through metals. Treating tumors and cancer through the process called radiotherapy and sterilizing medical equipment are practical applications of (9) \_\_\_\_\_ (gamma rays/ultraviolet). The effect of Electromagnetic waves on organisms and environment depends on how much (10) \_\_\_\_\_ (wavelength, energy) it carries.





## What I Can Do

A. On another sheet, copy the table below and for a day, list down your exposure to the different forms of electromagnetic waves. Write the time duration of exposure and your activity. Then identify the form of EM wave involved and the source of that wave. An example was given as your guide.

Time Duration	Activity	Form of EM wave	Source
<b>Example:</b> 9:00 AM – 10: 00 AM	I watch my favorite TV show.	Radio wave	Television

B. Write a self-reflection related to your answer on the table above. Use the following questions as guide.

What activity has the most radiation exposure over a long period of time? What could be the possible negative effects of this exposure to you? How are you going to minimize such effects?



## Assessment

**Directions:** Read each question carefully. Choose the letter of the correct answer.

- Which pair of EM waves is commonly used for communication?
  - X-rays and infrared
  - radio waves and microwaves
  - radio waves and gamma rays
  - infrared and microwaves
- Radio wave is useful in which of the following applications?
  - watching television
  - treating cancers
  - sterilizing medical equipment
  - sunbathing
- All of the following made use of gamma rays **except** one. Which is it?
  - treating tumors
  - treating cancer through the process called radiotherapy
  - sterilization of water in drinking fountains
  - sterilization of medical equipment
- Infrared waves is useful in which of the following applications?
  - remote control
  - television signal
  - screen of electronic devices
  - night vision goggles

5. Microwave is useful in which of the following applications?
  - A. remote control
  - B. cellphone communication
  - C. artificial lighting
  - D. sterilization
  
1. In visible light, which color has the longest wavelength?
  - A. red
  - B. violet
  - C. yellow
  - D. green
  
7. What form of wave makes your skin tan when exposed for a long period of time?
  - A. infrared rays
  - B. microwaves
  - C. radio waves
  - D. ultraviolet rays
  
8. Which of the following is **not** an application of visible light?
  - A. bulb
  - B. security markings
  - C. cell phone screen
  - D. flashlight
  
9. Which of the following is the correct meaning of the acronym GPS?
  - A. Guided Position Symbol
  - B. Global Positioning System
  - C. Guided Positioning System
  - D. Global Perimeter Scale
  
10. Colors in the infrared image depend on \_\_\_\_\_.
  - A. wavelength
  - B. frequency
  - C. amplitude
  - D. temperature
  
11. Which of the devices below can be used to detect aircrafts and ships?
  - A. RADAR
  - B. MRI
  - C. GPS
  - D. communication tower
  
12. What device uses thermal imaging technology to capture the light being emitted as heat by objects in the field of view?
  - A. infrared camera
  - B. remote control
  - C. fluorescent
  - D. night vision goggles
  
13. Which of the EM waves below is used to remove most forms of microbiological contamination from water?
  - A. infrared rays
  - B. microwaves
  - C. radio waves
  - D. ultraviolet rays
  
14. All of the following are dangerous waves when taken by the body in large amounts **except** one. Which is it?
  - A. radio waves
  - B. gamma rays
  - C. ultraviolet
  - D. x-rays
  
15. How does the energy level changes from gamma ray to radio wave?
  - A. increases
  - B. decreases
  - C. cannot be determined
  - D. energy level does not change



## Additional Activities

**A. Directions:** The following are electromagnetic waves with their applications. On another sheet, write the name of the device which **does not** belong to the group.

**1. Radio Waves**

GPS

MRI

RADAR

**2. Microwaves**

Night vision goggles

Satellite

Cooking

**3. Visible spectrum**

Artificial lights

Diagnosing bone fracture

Optical Fibers

**4. Ultraviolet (UV)**

Fluorescence

Cellphone signal

Sterilization of water in drinking fountain

**5. Gamma rays**

Radiotherapy

Sterilization of medical tools

Radio

**B. Directions:** Complete the table below by choosing what matches to the types of radiation with its use and its effect on living things. Use another sheet for this activity.

**Used for**

Communication  
MRI, GPS

Creating images of the inside of the body

Seeing  
Optical fibers  
Artificial lightings

Remote controls and thermal imaging

**Effects on living things**

Activates sensitive cells in the retina.

High doses can kill living cells.

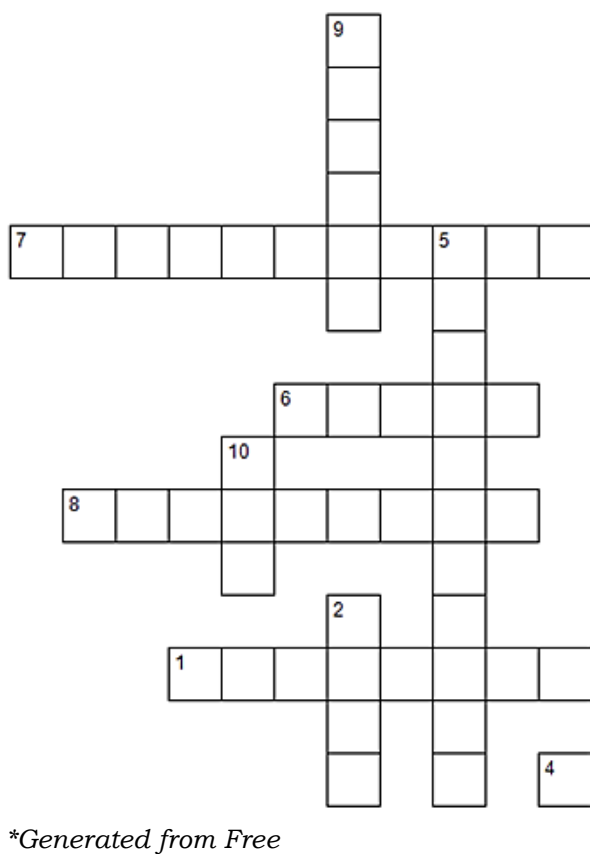
High doses can kill living cells.

Causes burning of tissues.

Probably None

Forms of EM Wave	Used for	Effects on living things
Gamma	Treating tumors Sterilizing medical tools	High doses can kill living cells. Lower doses can cause cancer in cells
X-ray		
UV	Vitamin D Security marking	
Visible light		
Infrared		
Microwave	Satellite communication. Cooking, RADAR	Heating of water in tissues can cause burning
Radio		

**C. Directions:** Using the given clues, fill in the crossword puzzle with the correct words. Write your answer in a separate sheet of paper.



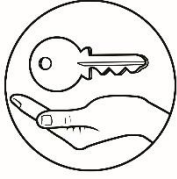
**Across:**

1. treating medical tools with gamma rays
4. disease that treated with radiography
6. wavelength that penetrate metals
7. shows as color in an infrared scanners
8. used for mobile phone communication

**Down:**

2. use to show images of the bone
3. used to detect aircraft and ships
5. used for security markings
9. G in the GPS
10. uses radiowave for body imaging

*\*Generated from Free  
Crossword Puzzle Maker*



## Answer Key

<p><b>What I know</b></p> <ol style="list-style-type: none"> <li>1. B</li> <li>2. C</li> <li>3. B</li> <li>4. A</li> <li>5. B</li> <li>6. A</li> <li>7. D</li> <li>8. B</li> <li>9. B</li> <li>10. D</li> <li>11. C</li> <li>12. A</li> <li>13. D</li> <li>14. A</li> <li>15. B</li> </ol> <p><b>Additional Activities</b></p> <p><b>A.</b></p> <ol style="list-style-type: none"> <li>1. RADAR</li> <li>2. night vision goggles</li> <li>3. diagnosing bone fracture</li> <li>4. cellphone signal</li> <li>5. radio</li> </ol> <p><b>B.</b></p> <p><b>X-ray</b> - Creating images of the inside of the body - High doses can kill living cells. Lower doses can cause cancer.</p> <p><b>UV</b> - High doses can kill living cells. Lower doses can cause cancer.</p> <p><b>Visible light</b> - Seeing, optical fibers &amp; artificial lightings - activates sensitive cells in the retina</p> <p><b>Infrared</b> - Remote controls and thermal imaging - causes burning of tissues</p> <p><b>Radio</b> - communication MRI, GPS, probable none</p> <p><b>C.</b></p> <p><b>Across</b></p> <ol style="list-style-type: none"> <li>1. sterilization</li> <li>4. cancer</li> <li>6. short</li> <li>7. temperature</li> <li>8. microwave</li> </ol> <p><b>Down</b></p> <ol style="list-style-type: none"> <li>2. xray</li> <li>3. radar</li> <li>5. ultraviolet</li> <li>9. global</li> <li>10. MRI</li> </ol>	<p><b>What I know</b></p> <ol style="list-style-type: none"> <li>1. B</li> <li>2. C</li> <li>3. B</li> <li>4. A</li> <li>5. B</li> <li>6. A</li> <li>7. D</li> <li>8. B</li> <li>9. B</li> <li>10. D</li> <li>11. C</li> <li>12. A</li> <li>13. D</li> <li>14. A</li> <li>15. B</li> </ol> <p><b>Additional Activities</b></p> <p><b>A.</b></p> <ol style="list-style-type: none"> <li>1. RADAR</li> <li>2. night vision goggles</li> <li>3. diagnosing bone fracture</li> <li>4. cellphone signal</li> <li>5. radio</li> </ol> <p><b>B.</b></p> <p><b>X-ray</b> - Creating images of the inside of the body - High doses can kill living cells. Lower doses can cause cancer.</p> <p><b>UV</b> - High doses can kill living cells. Lower doses can cause cancer.</p> <p><b>Visible light</b> - Seeing, optical fibers &amp; artificial lightings - activates sensitive cells in the retina</p> <p><b>Infrared</b> - Remote controls and thermal imaging - causes burning of tissues</p> <p><b>Radio</b> - communication MRI, GPS, probable none</p> <p><b>C.</b></p> <p><b>Across</b></p> <ol style="list-style-type: none"> <li>1. sterilization</li> <li>4. cancer</li> <li>6. short</li> <li>7. temperature</li> <li>8. microwave</li> </ol> <p><b>Down</b></p> <ol style="list-style-type: none"> <li>2. xray</li> <li>3. radar</li> <li>5. ultraviolet</li> <li>9. global</li> <li>10. MRI</li> </ol>	<p><b>What I know</b></p> <ol style="list-style-type: none"> <li>1. B</li> <li>2. C</li> <li>3. B</li> <li>4. A</li> <li>5. B</li> <li>6. C</li> <li>7. B</li> <li>8. C</li> <li>9. D</li> <li>10. A</li> <li>11. B</li> <li>12. D</li> <li>13. B</li> <li>14. A</li> <li>15. A</li> </ol> <p><b>What's in</b></p> <ol style="list-style-type: none"> <li>1. Radio wave</li> <li>2. Microwave</li> <li>3. Infrared</li> <li>4. Visible Light</li> <li>5. Ultraviolet</li> <li>6. X-ray</li> <li>7. Gamma rays</li> <li>8. A</li> <li>9. G</li> <li>10. G</li> </ol> <p><b>What's New</b></p> <ul style="list-style-type: none"> <li>• cellphone</li> <li>• radio</li> <li>• television</li> <li>• RADAR</li> <li>• microwave oven</li> <li>• remote control</li> <li>• camera</li> <li>• X-ray</li> <li>• bulb</li> <li>• flashlight</li> <li>• satellite</li> </ul> <p><b>What's New</b></p> <p><b>Activity 1</b></p> <p>A. Water</p> <p>B. As white light passes through prism, its components bend(refract) into different angles causing the light to separate.</p>
<p><b>Assessment 1</b></p> <ol style="list-style-type: none"> <li>1. visible light</li> <li>2. sun</li> <li>3. refracts</li> <li>4. bulb</li> <li>5. Violet</li> </ol> <p><b>Activity 2</b></p> <ol style="list-style-type: none"> <li>A. The color changes</li> <li>B. Answers may vary</li> <li>C. Answers may vary</li> <li>D. Answers may vary</li> </ol> <p><b>Assessment 2</b></p> <ol style="list-style-type: none"> <li>1. ULTRA</li> <li>2. VIOLET, We need to reapply sunscreen every 1 and half to 2 hours</li> <li>3. ULTRA</li> <li>4. ULTRA</li> <li>5. VIOLET, Our body needs vitamin D that comes from the sun</li> </ol> <p><b>Assessment 3</b></p> <ol style="list-style-type: none"> <li>UV rays can cause sun burn/damage tissue on organism. Excessive sun rays may cause global warming and drought to the environment.</li> <li>Excessive amount of x-ray can cause cancer.</li> <li>Gamma rays may result to radioactive pollution.</li> </ol> <p><b>What I Have Learned</b></p> <ol style="list-style-type: none"> <li>1. radio wave</li> <li>2. microwave</li> <li>3. infrared</li> <li>4. visible light</li> <li>5. ultraviolet</li> <li>6. X-rays</li> <li>7. long wavelength</li> <li>8. short wavelength</li> <li>9. gamma rays</li> <li>10. energy</li> </ol> <p><b>Assessment</b></p> <ol style="list-style-type: none"> <li>1. A</li> <li>2. A</li> </ol>	<p><b>Assessment 1</b></p> <ol style="list-style-type: none"> <li>1. visible light</li> <li>2. sun</li> <li>3. refracts</li> <li>4. bulb</li> <li>5. Violet</li> </ol> <p><b>Activity 2</b></p> <ol style="list-style-type: none"> <li>A. The color changes</li> <li>B. Answers may vary</li> <li>C. Answers may vary</li> <li>D. Answers may vary</li> </ol> <p><b>Assessment 2</b></p> <ol style="list-style-type: none"> <li>1. ULTRA</li> <li>2. VIOLET, We need to reapply sunscreen every 1 and half to 2 hours</li> <li>3. ULTRA</li> <li>4. ULTRA</li> <li>5. VIOLET, Our body needs vitamin D that comes from the sun</li> </ol> <p><b>Assessment 3</b></p> <ol style="list-style-type: none"> <li>UV rays can cause sun burn/damage tissue on organism. Excessive sun rays may cause global warming and drought to the environment.</li> <li>Excessive amount of x-ray can cause cancer.</li> <li>Gamma rays may result to radioactive pollution.</li> </ol> <p><b>What I Have Learned</b></p> <ol style="list-style-type: none"> <li>1. radio wave</li> <li>2. microwave</li> <li>3. infrared</li> <li>4. visible light</li> <li>5. ultraviolet</li> <li>6. X-rays</li> <li>7. long wavelength</li> <li>8. short wavelength</li> <li>9. gamma rays</li> <li>10. energy</li> </ol> <p><b>Assessment</b></p> <ol style="list-style-type: none"> <li>1. A</li> <li>2. A</li> </ol>	<p><b>Assessment 1</b></p> <ol style="list-style-type: none"> <li>1. visible light</li> <li>2. sun</li> <li>3. refracts</li> <li>4. bulb</li> <li>5. Violet</li> </ol> <p><b>Activity 2</b></p> <ol style="list-style-type: none"> <li>A. The color changes</li> <li>B. Answers may vary</li> <li>C. Answers may vary</li> <li>D. Answers may vary</li> </ol> <p><b>Assessment 2</b></p> <ol style="list-style-type: none"> <li>1. ULTRA</li> <li>2. VIOLET, We need to reapply sunscreen every 1 and half to 2 hours</li> <li>3. ULTRA</li> <li>4. ULTRA</li> <li>5. VIOLET, Our body needs vitamin D that comes from the sun</li> </ol> <p><b>Assessment 3</b></p> <ol style="list-style-type: none"> <li>UV rays can cause sun burn/damage tissue on organism. Excessive sun rays may cause global warming and drought to the environment.</li> <li>Excessive amount of x-ray can cause cancer.</li> <li>Gamma rays may result to radioactive pollution.</li> </ol> <p><b>What I Have Learned</b></p> <ol style="list-style-type: none"> <li>1. radio wave</li> <li>2. microwave</li> <li>3. infrared</li> <li>4. visible light</li> <li>5. ultraviolet</li> <li>6. X-rays</li> <li>7. long wavelength</li> <li>8. short wavelength</li> <li>9. gamma rays</li> <li>10. energy</li> </ol> <p><b>Assessment</b></p> <ol style="list-style-type: none"> <li>1. A</li> <li>2. A</li> </ol>

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