Electromagnetic Spectrum

You will be using the following website (<http://science.hq.nasa.gov/kids/imagers/ems/ems.html>) to answer all of the questions below. Make sure you answer **ALL** questions in **COMPLETE SENTENCES** to receive **FULL CREDIT**. The questions are in order. Every person is expected to complete the basic information below, before moving on to your specific group project. Upon completion of the first part of this assignment you will be considered a generalist. A generalist is a person who knows a little about a lot. In the second part of the assignment your group will become a specialist in one section of the spectrum. A specialist is a person who knows a lot about a little.

**Section 1:**

Overview: Click on<http://school.discoveryeducation.com/lessonplans/interact/electromagneticspectrum.html>. This information contains a basic overview of the entire spectrum. It includes a section for “Cosmic” rays. For the purposes of this assignment Cosmic rays are included with Gamma rays.

Click on **“**[**What are waves**](http://imagers.gsfc.nasa.gov/ems/waves.html)**?” (**[**http://missionscience.nasa.gov/ems/02\_anatomy.html**](http://missionscience.nasa.gov/ems/02_anatomy.html)**)** for the answers to the following questions.

Question 1: How do sound waves travel? What do sound waves NEED in order to travel?

Question 2: Do electromagnetic waves need molecules to travel?

Question 3: How are sound waves and electromagnetic waves different?

Question 4: Can sound travel through space? WHY?

Read **“**[**What are electromagnetic waves?”** for the following questions.](http://imagers.gsfc.nasa.gov/ems/waves2.html)

Question 5: Define the word static.

Question 6: How did James Maxwell discover electromagnetic waves?

Questions 7: Who is Heinrich Hertz and what is he famous for?

Section 4: Click on [“Intro to EMS"](http://imagers.gsfc.nasa.gov/ems/waves3.html) (<http://missionscience.nasa.gov/ems/01_intro.html>)for the following questions.

Question 8: How are electromagnetic waves different form one another?

Read “Describing Electromagnetic Energy” on the Anatomy of an Electromagnetic Wave page for question 9 and question 10 below.

Question 9: In scientific notation, how big is one “nano”? How big is one “micro” in scientific notation?

Question 10: In scientific notation, how big is one “giga”?

Question 11: List the electromagnetic waves in increasing wavelength.

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| --- | --- | --- |
| Wave Type | Starting Wavelength | Ending Wavelength |
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Click on [RADIO WAVES](http://imagers.gsfc.nasa.gov/ems/radio.html) for the following questions.

Question 12: Which type of wave has a larger wavelength FM radio or AM radio?

Question 13: How do radio telescopes work?

Click on [MICROWAVES](http://imagers.gsfc.nasa.gov/ems/micro.html) for the following questions.

Question 14: Why are microwaves good at transmitting information?

Question 15: What is RADAR used for?

Click on [INFRARED](http://imagers.gsfc.nasa.gov/ems/infrared.html) for the following questions.

Question 16: How big (or small) are infrared waves?

Question 17: Give three examples of far infrared waves.

Click on [Visible](http://imagers.gsfc.nasa.gov/ems/visible.html) for the following questions.

Question 18: What is unique about visible waves compared to other types of waves in the electromagnetic spectrum?

Question 19: What color of visible light has the longest wavelength? Shortest wavelength?

Question 20: When all the colors of the rainbow are seen together, what color do you see?

Question 21: What is Earth’s natural form of visible light?

Click on [Ultraviolet](http://imagers.gsfc.nasa.gov/ems/uv.html) for the following questions.

Question 22: Ultraviolet radiation has too small of a wavelength for humans to see. However, name one animal that can see ultraviolet radiation.

Question 23: What causes sunburns?

Question 24: What important layer in Earth’s atmosphere is responsible for blocking ultraviolet radiation?

Click on [X-Rays](http://imagers.gsfc.nasa.gov/ems/xrays.html) for the following questions.

Question 25: What is the relationship between wavelength and amount of energy?

Question 26: Can X-rays penetrate through the Earth’s atmosphere? Why?

Question 27: Where do X-ray telescopes have to be placed in order to view objects in space?

Click on [Gamma Rays](http://imagers.gsfc.nasa.gov/ems/gamma.html) to answer the questions below.

Question 28: How are gamma rays generated?

Question 29: Compare Gamma Rays wavelength and energy to other forms of electromagnetic radiation.

Question 30: What astronomical objects do gamma rays show us?

**Section 2:**

As part of the Electromagnetic Spectrum unit, you will do group research into the various parts of the spectrum. Each group will be assigned a certain part of the electromagnetic spectrum to research (gamma ray, x-ray, ultraviolet, visible light, infrared, microwave, or radio wave). Your group will research your assigned section of the spectrum, write a summary, and create a poster (or other visual presentation) for your classmates.

Your group (2-3 members) has been assigned the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ray portion of the electromagnetic spectrum. Your group task is to further research you specific section of the electromagnetic spectrum and present your findings to the class.

Your group will conducts research on your assigned section of the electromagnetic spectrum. You will create a summary to include each of the bulleted topics below. The group creates a visual presentation (iMovie, piktochart, poster or Prezi)

* Wavelength and its relation to other wavelengths in the electromagnetic spectrum
* Interesting facts
* Discoverer and date discovered
* Device used to detect it
* Benefits - the good that it does
* Negatives - the bad that it does

Group Roles

Each group consists of 2-3 students. The entire group works together to create the visual presentation. To assist in creating the visual presentation, each student must choose one or more roles from the following choices:

1. Researcher - finds resources for group to use (resources can include books, web sites, magazines) \
2. Visual Designer - creates the visual product that will be used in the presentation (iMovie, piktochart, poster or Prezi). Each group is required to present their portion of the spectrum on a chart. The chart can be no more than one 8 ½ x 14 sheet of paper in landscape. Your chart should blend with the section before and after your part of the spectrum. Significant events and section must be highlighted on the chart.
3. Resource Keeper - creates group bibliography that includes all resources used by the team.