

1 – ENGAGE (5 Minutes)

The EM Spectrum

After watching the following NASA video (<http://www.youtube.com/watch?v=lwfJPc-rSXw>), circle the correct answer:

1. Electromagnetic radiation is:
 - a. Odorless
 - b. Tasteless
 - c. Use it and depend on it every hour of every day
 - d. All of the above

2. EM waves are produced by the vibration of charged particles and have:
 - a. Electrical Properties
 - b. Magnetic Properties
 - c. Just A
 - d. Both A & B

3. EM waves travel through the vacuum of space at different speeds of light.
 - a. True
 - b. False

4. Long EM waves, such as _____ waves, have the _____ frequency and carry _____ energy.
 - a. gamma, lowest, more
 - b. gamma, highest, less
 - c. radio, highest, more
 - d. radio, lowest, less

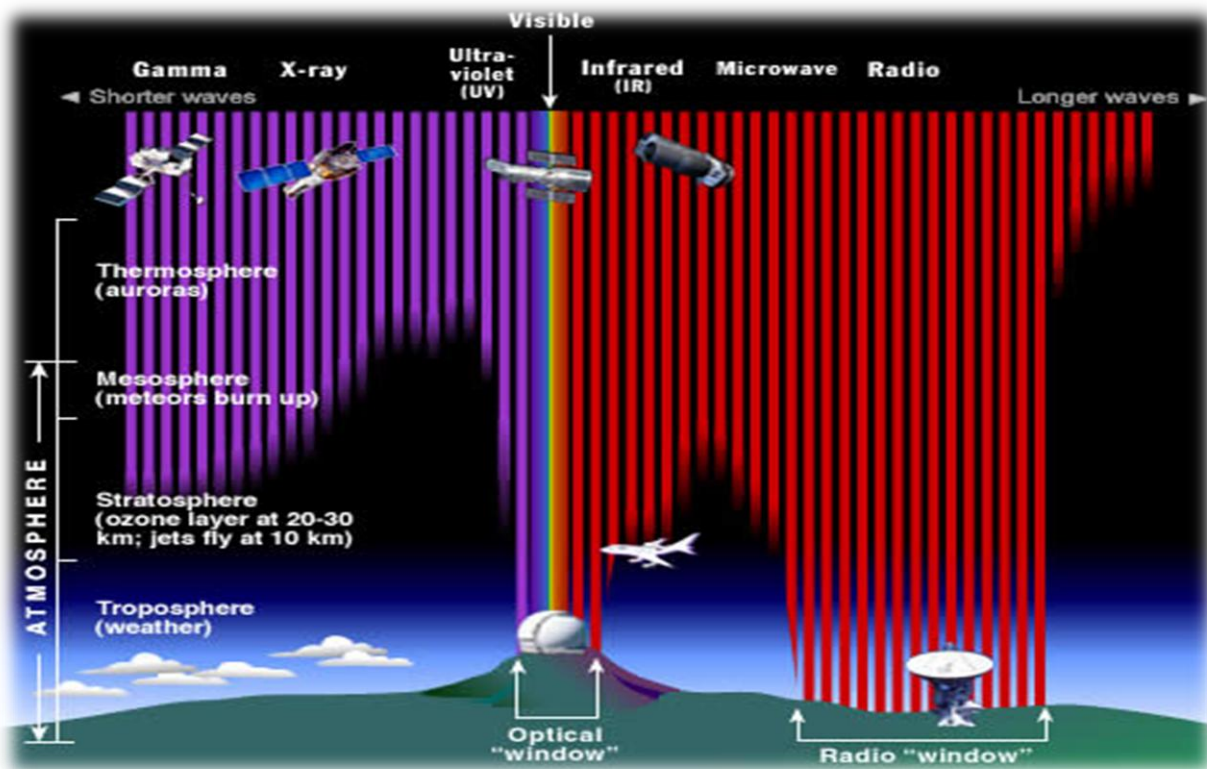
5. _____ waves have the highest energy waves in the EM spectrum.
 - a. Gamma
 - b. Radio
 - c. Visible
 - d. Infrared

6. The range of visible light falls into:
 - a. 100-400 nm
 - b. 400-700 nm
 - c. 700-1000 nm
 - d. 1000-1300 nm

7. Everything around us emits, reflects and absorbs EM radiation differently based on its composition.
 - a. True
 - b. False

2 – EXPLORE (10 Minutes)
Seeing Earth in Different Ways

By looking at Earth through various parts of the EM spectrum, different information is revealed. In the space below, describe which parts of the EM spectrum you think are best to view the Earth in, and why.



Credit: NASA

3 – EXPLAIN (40 Minutes)
Earth Observation Satellites

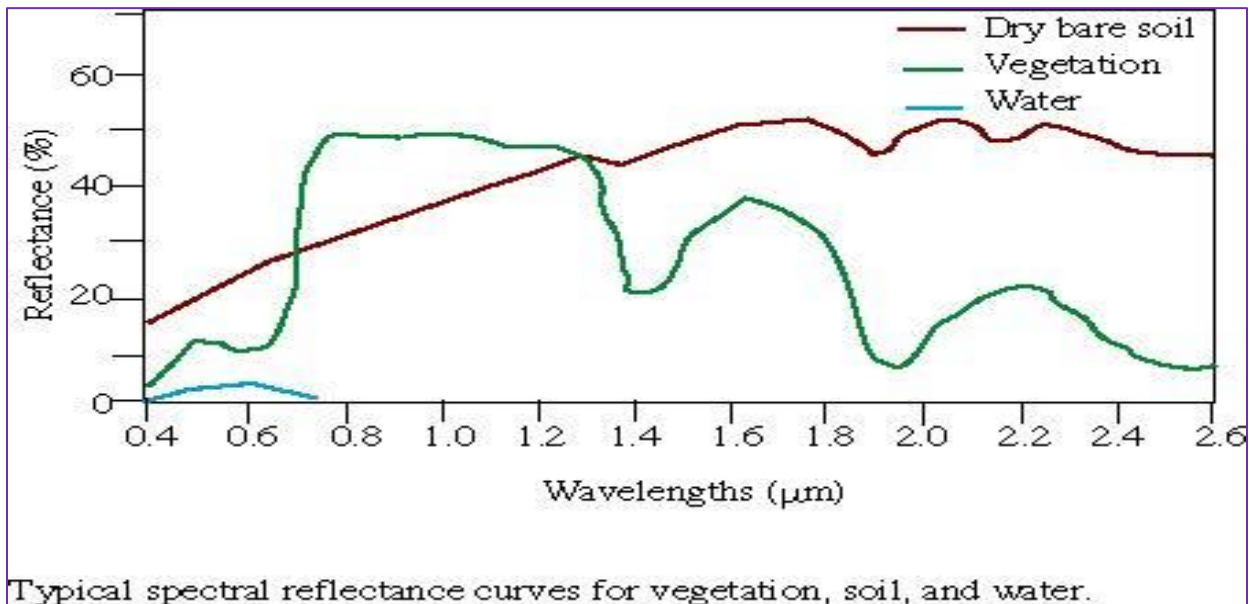
In order to get as much information about the Earth as possible, there are numerous Earth-observing satellites in orbit. All have different sensors that utilize different parts of the EM spectrum to acquire particular kinds of information.

Log on to the following webpage: <http://www.nasa.gov/missions/current/index.html> and use it as a guide for filling out the chart below.

EARTH-OBSERVING SATELLITE	SENSOR(S)	MISSION	RELEVANCE
ATTREX			
Aura			
CloudSat			
Global Precipitation Measurement			
GOES-R			
NOAA-N			
Polar			
Shuttle Radar Topography Mission			

4 – ELABORATE (10 Minutes)
Spectral Reflectance

Objects on the surface of Earth have different features, which impact how light reflects off them. What the object is made of, the physical state of the object’s material, surface roughness and angle of incoming sunlight are some of the factors impacting spectral reflectance. Below each of the following images, explain which would have a high spectral reflectance and which would have a poor spectral reflectance in the 2000 nm range (infrared). Use the chart below to assist.



Credit: University of Calgary



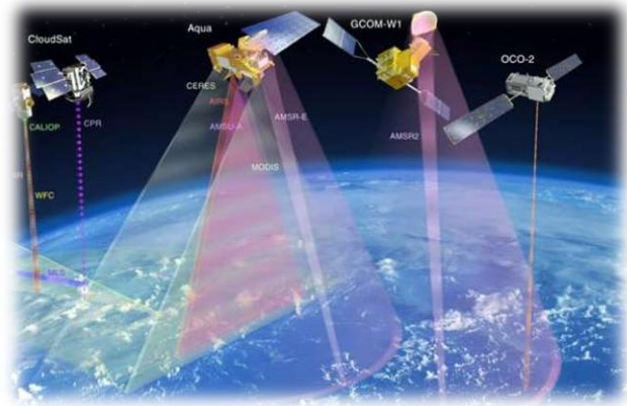
Credit: NASA



Credit: NASA

5 – EVALUATE (10 Minutes)
Putting it all Together

In the space below, answer the following questions: 1) why is it necessary to view Earth in various parts of the EM spectrum (provide at least two examples to justify your answer) and 2) other than visible, what additional part of the EM spectrum would you want to be able to see in and why?



Credit: NASA