Using the Electromagnetic Spectrum to Explore the Universe

Introduction:

Celestial objects emit various forms of radiation depending upon their characteristics, and through the analysis of this radiation we gain an understanding of the universe. But how do we gather this information? The most common "tool" is the telescope which is used to gather visible light, but as you know the visible portion of the spectrum is only a small portion of the spectrum. To gather energy from other portions of the spectrum, we must developed more sophisticated tools sensitive to those particular frequencies. We know that our eyes are not sensitive to gamma rays, x-rays, ultraviolet, infrared, and radio waves, and so how are going to create tools that to collect something we cannot see? The ingenuity of astronomers has given us tools with gamma ray eyes, x-ray eyes, ultraviolet eyes, etc. A small complication of creating these tools is the decision about where to place these tools. Optical telescopes gathering visible light can be ground-based or space-based, with the best locations being in remote locations above the light and moisture in the atmosphere. For the balance of the spectrum we need to consider the characteristics of our atmosphere along with the characteristics of the frequency of energy.

Task Description:

A new celestial object has been discovered and you and your research team have been asked to explore and provide as much information as possible about this object. You and your team have expertise in all areas of electromagnetic radiation and so your exploration will incorporate all the information you can find be using your knowledge of the electromagnetic spectrum. Once you find out the name of your object, you are to create a PowerPoint presentation or poster of the information you discovered about this object. Your presentation must include:

1. Images of your object in each form of electromagnetic radiation with the name and description of where the images came from.
2. The type of object it is and the distinguishing features of your object as revealed by each form of electromagnetic radiation. Discuss what these features are and how they were created
3. Explanations of why it is important to study this object using all areas of the spectrum while providing examples from your findings
4. An explanation of why it is important to study all areas of the spectrum.
5. An explanation of why astronomers use different types of tools and why some of these tools are ground-based and some are space-based.

Procedure:

Go to the Multiwavelength page of Cool Cosmos at:
http://coolcosmos.ipac.caltech.edu/cosmic_classroom/multiwavelength_astronomy/multiwavelength_astronomy/index.html

Search this website to complete the **Table 1** and **Table 2** below.

Table 1

Type of Radiation	Objects Emitting This Type of Radiation
Gamma Rays	
X-rays	
Ultraviolet	
Visible	
Infrared	
Radio	

Table 2

Type of Radiation	**Tool Description – describe the tool that's used to observe this portion of the spectrum. Where is it located? What does it look like? How does it work?**	**Object Description – select one galaxy from the Multiwavelength Gallery which has images for each type of radiation. How does the object look using each tool?**
Gamma and X-rays		
Ultraviolet		
Visible Light		
Infrared		
Radio		