Connecting Models to Reality

Let's Review



Answer the following question on your paper:

- How is our flashlight model like the sun and other objects in space?



Be prepared to share your answer with the class.

Vocabulary

- **Apparent Brightness:** How bright an object looks from Earth.
- **Actual Brightness:** How much light an object (like a star) actually gives off.
- **Distance:** The space between Earth and a celestial object.





Las Cumbres Observatory

Magnitude

Brightness and distance





Actual Brightness versus Apparent Brightness

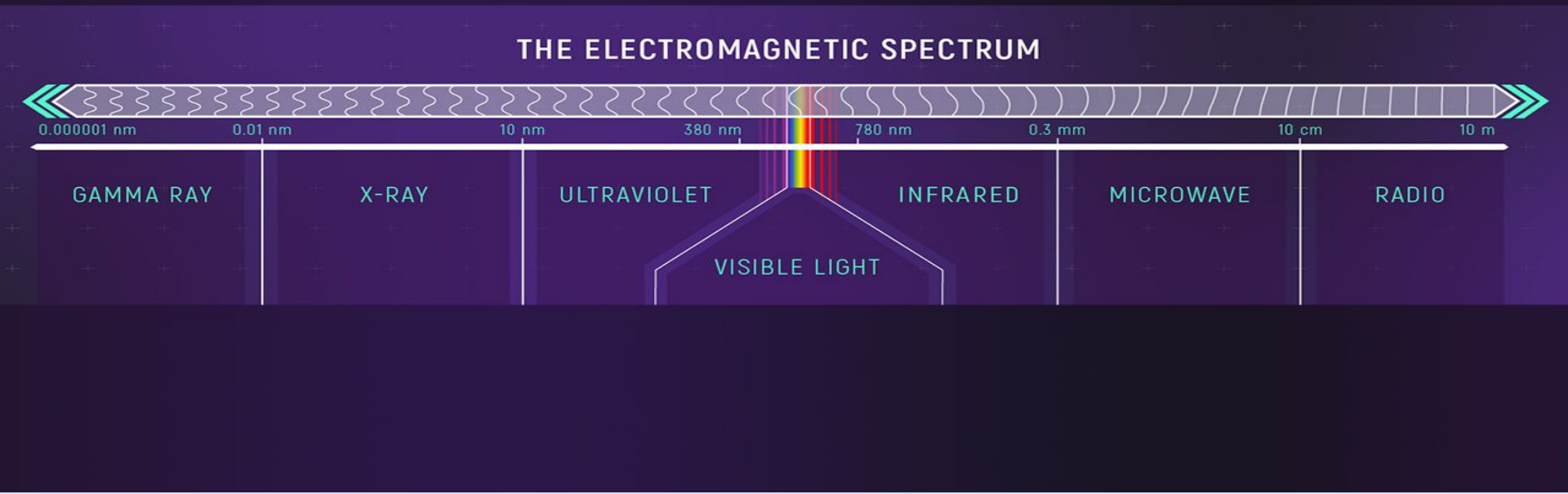
Reading Passage



- With your group, take turns reading aloud sections of the passage, and answer the questions.
- We will discuss the passage at the end of the timer.
- Be ready to share.

Reading Questions

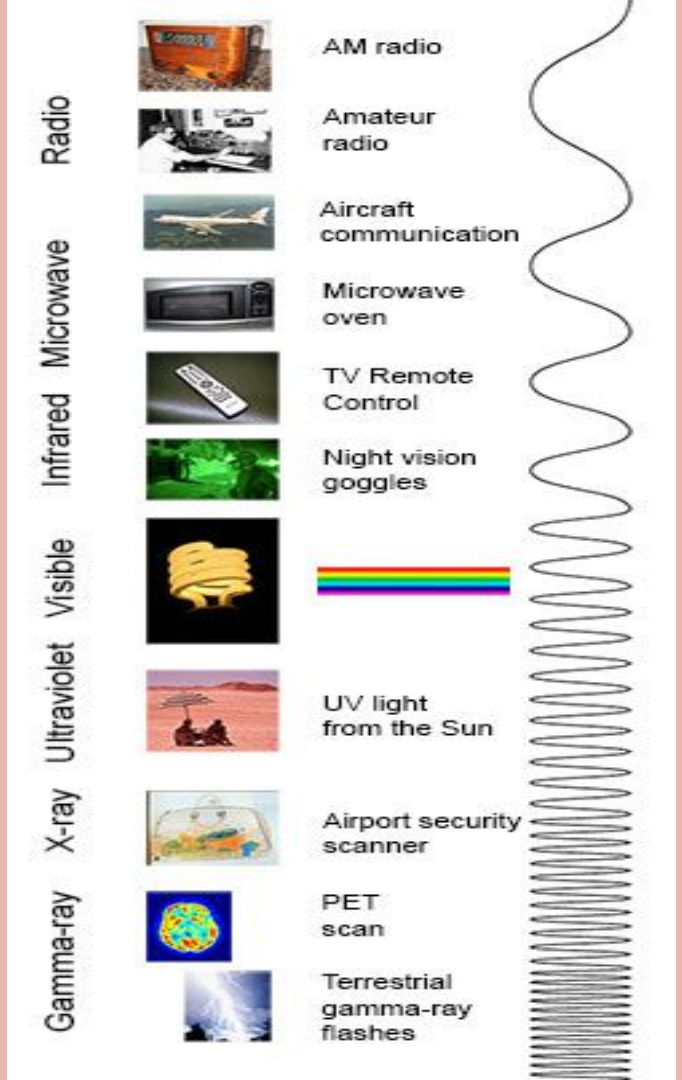
1. How bright does the Sun appear compared to other objects in the sky?
2. How far away is the Sun from Earth?
3. Do all stars appear equally bright? Why or why not?
4. What factors impact the brightness of stars seen from Earth?
5. How close is Proxima Centauri to Earth? Is it closer or farther away than the Sun? Does it look as bright as our Sun does?



Visible Light Spectrum - just part of the Electromagnetic Spectrum!

Credit: NASA, ESA, L. Hustak (STScI)


TED-Ed
LIGHT WAVES



Electromagnetic Spectrum

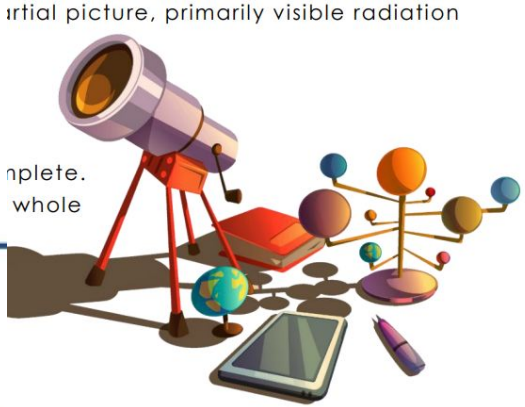
"The electromagnetic spectrum from lowest energy/longest wavelength (at the top) to highest energy/shortest wavelength (at the bottom)."

Which parts can we see with our eyes?

https://imagine.gsfc.nasa.gov/science/toolbox/emspectrum1.html

Grade 5 Reading Comprehension Worksheet

Read the short story. Then answer each question.



Space Based Astronomy

With your group, take turns reading aloud sections of the passage, and answer the questions.

We will discuss the passage at the end of the timer. Be ready to share.



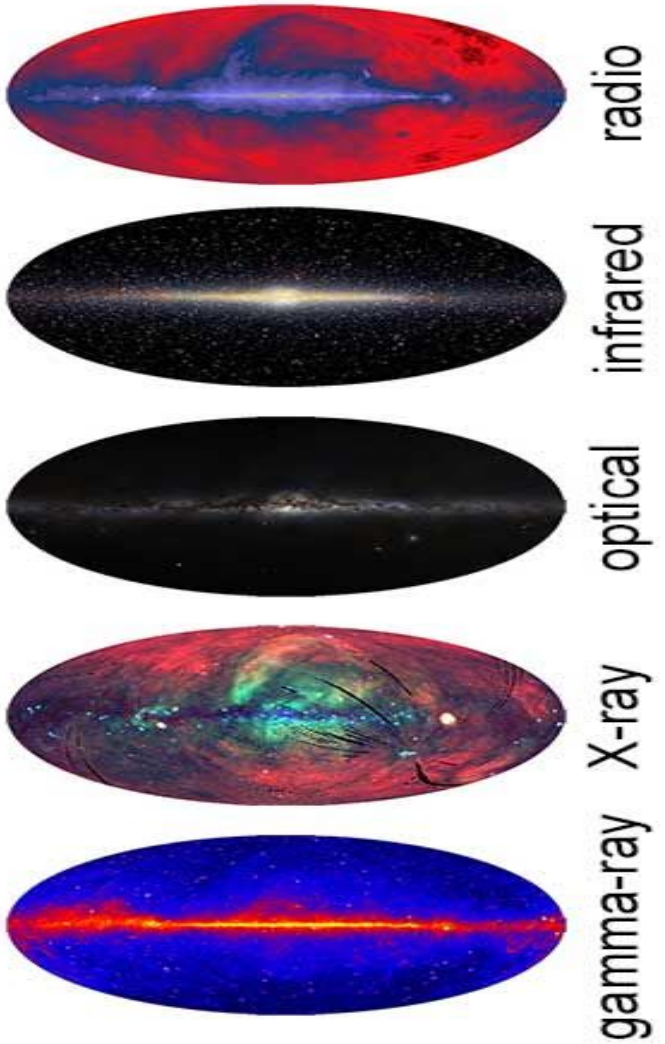
Reading Questions

1. Why do you think city lights would prevent you from seeing stars?
2. What do you need to see hundreds of thousands of stars?
3. What does the Earth's atmosphere do to sustain life on Earth?
4. What do you think the phrase treasure house is synonymous with in this short story?
5. While the short story never directly provides a definition for space based astronomy, what do you think it is?

Our Sky at Different Wavelengths

This is part of the Milky Way Galaxy, as seen from Earth.

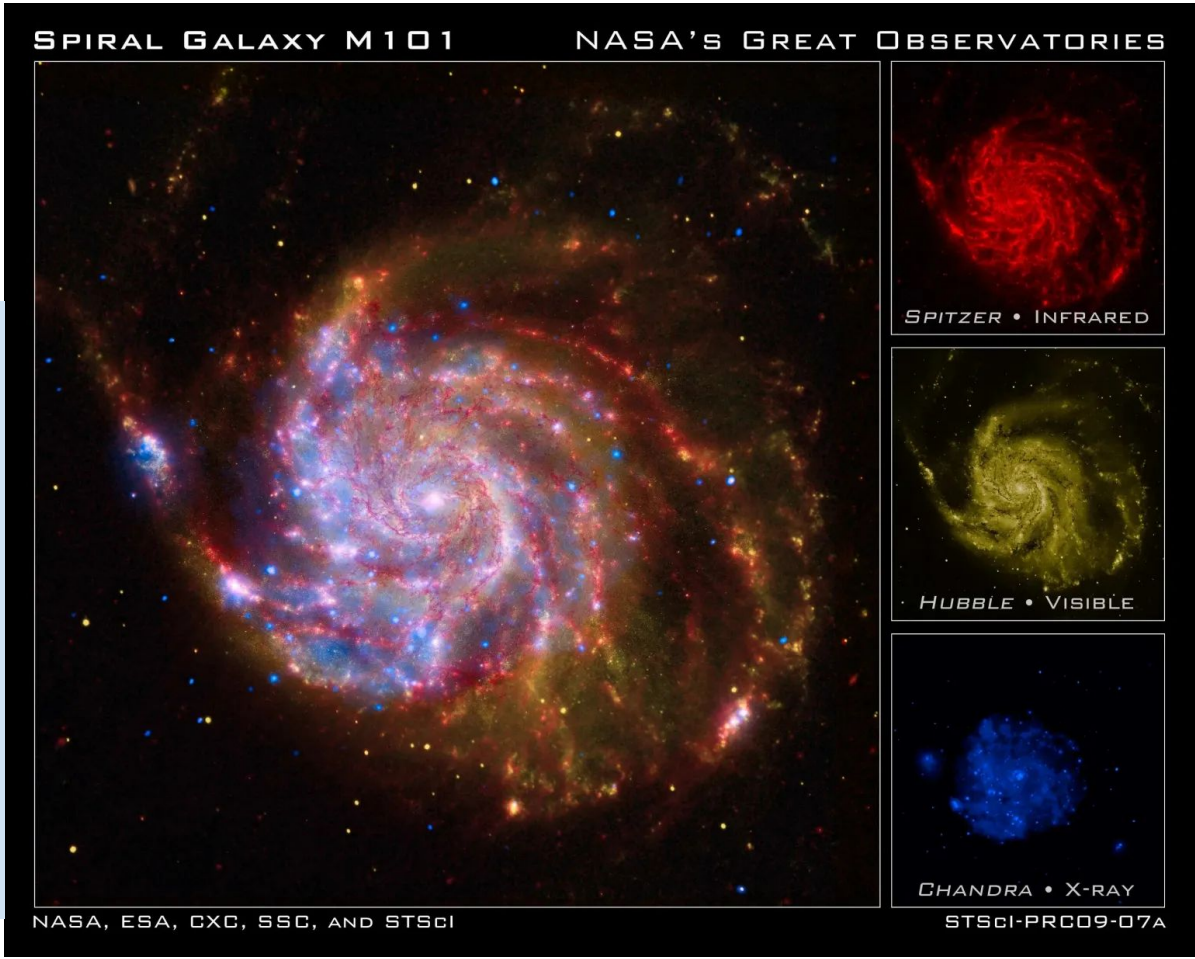
“**Where is the Earth in these pictures?**
The Earth is not in the images because each represents the whole sky as seen *from* Earth. Of course, from any location on the ground at most half of the celestial sphere is visible at any given time - the rest is obscured by the Earth.”



- Credits: radio: Haslam et al. 1982; infrared: NASA; optical: ESO/S. Brunier; X-ray: Max Planck Institute for Extraterrestrial Physics and S. L. Snowden; gamma-ray: NASA/DOE/Fermi LAT Collaboration
- https://asd.gsfc.nasa.gov/archive/mwmw/mmw_allsky.html

Filters and How We See Different Types of Light

- Think back to our color-by-number activity.
- How did we see the full hidden image?
- Are these the actual colors, or ones that scientists chose to represent something?
- How can we relate it to how astronomers see objects deep in space?



Messier 101 galaxy in x-ray, infrared, and visible light. Credit: NASA, ESA, CXC, JPL, Caltech and STScI

Helix Nebula Image Analysis

Answer the following questions in a short paragraph:

- How was the image taken/created?
- What did scientists need to do in order to get it?
- Is this what it looks like to just our normal eyes?
- Are the colors really there?



Image Credit: NASA/JPL-Caltech