

Radiation From Space

(p. 628 - 633)

Time Dilation

A moving clock advances slower than a stationary clock

EX: Back to The Future

I. Electromagnetic Waves

1. What two properties are present in electromagnetic waves?

1. Electric 2. magnetic

2. Through what two mediums can electromagnetic waves carry energy?

1. Space 2. Matter

3. Sound waves can travel through space.

Circle One : True False

4. Define the term electromagnetic spectrum.

Electromagnetic Spectrum - Arrangement of electromagnetic waves according to their Wavelengths

5. List the types of radiation in the electromagnetic spectrum from long wavelength to short wavelength and give an example of each type of radiation.

Examples

Longest Wavelength

Radio Waves	Radio, t.v, cell phone
Microwaves	oven, radar, satellite
Infrared waves	restaurant lights, Remote control
Visible Light	Sunlight, lasers
Ultraviolet Rays	Fluorecent Black lights ^{greenhouse lights}
X-Rays	X-rays (chiro, airport)
Shortest Wavelength	Gamma Rays
	Brain pictures, atomic Bombs

Visible Spectrum:

R = Red
O = Orange
Y = Yellow
G = Green
B = Blue
I = Indigo
V = Violet

6. How fast do all electromagnetic waves travel? 186,000 miles/sec

7. This speed is also known as the Speed of light.

Parsec = 3.26 ly

II. Optical Telescopes

Largest:
Yerkes Observatory
(Chicago)
63 ft. long

1. What do light telescopes collect and focus?

Electromagnetic Radiation


2. Define the term refracting telescope.


Refracting Telescope - Optical telescope that uses a double Convex lens to bend light and form an image at the focal point.

3. Define the term reflecting telescope.

Reflecting Telescope - Optical telescope that uses a concave mirror to focus light and form an image at the focal point.

4. What is the difference between the shape of a convex lens and a concave mirror?

 Convex Lens - Converging lenses (movie projectors, cameras, light houses - human eye)

 Concave Mirror - Curved inward (head lights, flashlights, street lights, microscopes, dentist tools)

5. Define the term observatories.

Observatories - Building that can house an optical telescope, often has a dome-shaped roof that can be opened for viewing.

6. Why have astronomers placed telescopes in space?

To detect radiation blocked by the atmosphere (otherwise, twinkling occurs!)

7. Why can the Hubble Space Telescope make very detailed images in visible light?

It is large and located above the Earth's atmosphere (1990)

8. Where is the largest optical telescope located? Chile (European Southern Observatory) 8.2m. reflector

III. Radio Telescopes

1. Define the term radio telescope.

Radio Telescope - Collects and records radio waves traveling through space (can be used day or night under most weather conditions)

2. How is a radio telescope different from optical telescopes?

Detects electromagnetic radiation not visible by humans

IV. NASA Great Observatories

1. List the names of the NASA Great Observatories. (Not in the book.)

Infrared Telescope = Spitzer Space Telescope (2003)
 Optical Telescope = James Webb Telescope (2013)
 X-Ray Telescope = Chandra X-Ray Observatory (1999)
 Gamma Ray Telescope = Compton Gamma Ray Observatory (1991)