

The Nature Of Light (p. 552 - 558)

I. Waves & Particles

1. Light behaves sometimes like a wave and sometimes like a stream of particles.

Circle One : True False

p. 552

2. What happens when a beam of light passes through two narrow openings?

- Produced a striped pattern of light

3. What produced the striped pattern in Thomas Young experiment?

- Wave Interference

4. What type of waves are light waves?

Circle One : Electromagnetic Longitudinal

5. Define the term photons.

Photons - unit or quantum of light (particles without mass) (Beam of light = Stream of photons)

Light Bulb DEMO

6. Describe the photoelectric effect. (i.e., electrons knocked off metal by light particles)

- Dim, blue light can knock electrons off a metal plate white bright red light cannot (Red = More Energy, Blue = Less Energy) (Contradicts the wave theory)

p. 553

7. Depending on the situation, light can be viewed as a wave or a particle.

Circle One : True False

(Interference) (Intensity)

8. Light energy is proportional to the frequency of light.

Radio Waves vs. Gamma Rays

9. Nothing is faster than the speed of light.

Circle One : True False

What do you think?

10. Rate the speed of light in the following substances. [1 = Fastest; 3 = Slowest]

1. 1 - Gases 2. 2 - Liquids 3. 3 - Solids

186,000 miles/sec.

p. 555

11. Define the term light intensity.

Light Intensity - quantity that measures the amount of light illuminating a surface

12. Intensity of light decreases as distance from the light source decreases.

Circle One : True False

increases

p. 555 Bottom

Ex. Spray Can

II. The Electromagnetic Spectrum

1. Fill in the types of electromagnetic waves according to frequency.
[1 = lowest frequency; 7 = highest frequency]

- | | | |
|----|-------------------------|---|
| 1. | <u>Radio Waves</u> | (longer than 1mm) |
| 2. | <u>Microwaves</u> | (1mm - 1m) |
| 3. | <u>Infrared Waves</u> | (1mm - 750 billionths of a meter) |
| 4. | <u>Visible Light</u> | (750 - 450 billionths of a meter) |
| 5. | <u>Ultraviolet Rays</u> | (400 - 10 billionths of a meter) |
| 6. | <u>X-Rays</u> | (10 billionths - 10 trillionths of a meter) |
| 7. | <u>Gamma Rays</u> | (less than 10 trillionths of a meter) |

p. 556-557

2. Circle the letter of each way that radio waves are used.

- a. Holograms
 b. Radar
 c. Radio Technology
 d. Television Technology - (Radio waves that carry picture + sound info.)

Longest wave lengths;
Lowest frequencies

3. What are two uses of microwaves?

1. Ovens (vibrations cause friction) 2. Cell Phones

TV Satellites

4. Circle the letter of each way that infrared waves are used.

- a. Heat Lamps (Restaurant / Reptiles)
 b. Long-range remote sensors
 c. Thermograms (heat images) → Electric current problems, Search + rescue
 d. Computer Mouse

5. What are the colors present in the visible light spectrum?

R. ed O. range Y. ellow G. reen B. lue I. ndigo V. iolet

6. Which statement is false concerning ultraviolet rays? (Not in the book.)

- a. Ultraviolet light helps your skin produce Vitamin ~~B~~ ^D.
 b. Microorganisms on food and medical supplies are killed using ultraviolet radiation.
 c. Certain materials will fluoresce under ultraviolet lighting. (Black light)
 d. Only a fool would intentionally get sunburned.

Fluorescent Light
- Reptile Terrariums
- Greenhouses
- S.A.D.

7. List three ways in which x-rays are useful. (Not in the book.)

1. Medicine (Chiropractic) 2. Industry (seals on containers) 3. Transportation (air ports)

8. How are x-rays and gamma rays used in radiation therapy?

- Rays are focused in on diseased areas

Limits healthy cell loss

9. What are three other uses of gamma rays? (Not in the book.)

1. Brain Imaging 2. Inspection Tool (Pipes) 3. Universe Mapping