

SCIE 3101

Test III

MULTIPLE CHOICE. (3 points each)

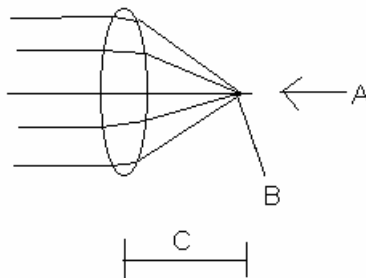
- 1) How many vibrations per second are associated with a 101-MHz radio wave?
A) more than 101,000,00 **B) 101,000,000** C) less than 101,000,000
- 2) The vibrations of a longitudinal wave move in a direction
A) along the direction of wave travel. B) at right angles to the direction of wave travel.
- 3) A standing wave occurs when
A) a wave reflects upon itself.
B) the speed of the wave is zero or near zero.
C) the amplitude of a wave exceeds its wavelength.
D) two waves overlap.
- 4) A bow wave is produced when a wave source moves
A) nearly as fast as the waves it produces. **B) faster than the waves it produces.**
C) as fast as the waves it produces.
- 5) If you double the frequency of a vibrating object, its period
A) doubles. B) is quartered. **C) halves.**
- 6) A sound source of high frequency emits a high
A) amplitude. **B) pitch.**
C) speed. D) all of these
E) none of these
- 7) A sound wave is a
A) shock wave. B) transverse wave.
C) longitudinal wave. D) standing wave.
E) none of these
- 8) The phenomenon of beats results from sound
A) interference. B) refraction.
C) reflection. D) all of these
E) none of these
- 9) Electromagnetic waves consist of
A) high-frequency gravitational waves.
B) compressions and rarefactions of electromagnetic pulses.
C) particles of light energy.
D) vibrating electric and magnetic fields.
- 10) What color light is transmitted by a piece of blue glass?
A) red B) orange **C) blue** D) yellow E) white

- 11) The complementary color of blue is
A) green. B) magenta. C) red. D) cyan. **E) yellow.**
- 12) Different colors of light correspond to different light
A) polarities. B) intensities. C) velocities. **D) frequencies.** E) none of these
- 13) The sky is blue because air molecules in the sky act as tiny
A) resonators that scatter blue light. B) prisms.
C) mirrors that reflect only blue light. D) sources of white light.
E) none of these
- 14) The whiteness of clouds is evidence in the clouds for a variety of
A) particle sizes. B) molecules.
C) light intensities. D) water prisms.
E) "seeds" upon which condensation of cloud material forms.
- 15) A sheet of red paper will look black when illuminated with
A) magenta light. B) yellow light.
C) cyan light. D) red light.
E) none of these
- 16) Colors seen when gasoline forms a thin film on water are a demonstration of
A) reflection. B) refraction.
C) dispersion. D) polarization.
E) interference.
- 17) Diffuse reflection occurs when the size of surface irregularities is
A) small compared to the wavelength of the light used.
B) large compared to the wavelength of the light used.
- 18) Light refracts when traveling from air into glass because light
A) travels slower in glass than in air. B) intensity is greater in glass than in air.
C) frequency is greater in glass than in air. D) frequency is greater in air than in glass.
E) intensity is greater in air than in glass.
- 19) Different colors are dispersed by a prism because different colors in the prism have different
A) speeds. B) energies.
C) directions. D) frequencies.
E) none of these
- 20) The critical angle for a transparent material is the angle at and beyond which all light within the material is
A) reflected. B) dispersed. C) diffused. D) refracted. E) absorbed.
- 21) A person standing waist deep in a swimming pool appears to have short legs because of light
A) refraction. B) reflection.
C) absorption. D) diffraction.
E) interference.

- 22) The photoelectric effect best demonstrates the
A) particle nature of light. B) wave nature of light.
 C) both of these D) none of these
- 23) When light reflects from a surface, there is a change in its
 A) wavelength. B) frequency.
 C) speed. D) all of these
E) none of these
- 24) A mirage is a result of atmospheric
A) refraction. B) aberrations.
 C) scattering. D) dispersion.
 E) reflection.
- 25) A single raindrop illuminated by sunshine disperses
 A) either low, middle, or high frequency colors in most cases.
B) all the colors of the rainbow.
 C) a single color.

Problems (SHOW ALL WORK ON THE ANSWER SHEET):

1. (5 points)) Show the following parts of a lens in the diagram below:



- a) Principle Axis b) Focal Point c) Focal Length

2. (5 points) An oceanic depth-sounding vessel surveys the ocean bottom with ultrasonic sound that travels 1530 m/s in seawater. How deep is the water if the time delay of the echo from the ocean floor is 6 seconds?

Distance sound traveled

$$1530m / s(6s) = 9180m$$

Recall that the sound must travel down to the seabed and then return to the receiver before it is "heard". So, the distance is actually half the value just calculated.

$$9180m / 2 = 4590m$$

3. (5 points) Gusts of wind make a building sway back and forth, completing a cycle every 15.2 seconds. What is the buildings frequency?

$$\begin{aligned}n &= 1/\text{sec} \\ &= 1/15.2 \text{ sec} \\ &= 0.066s^{-1} \text{ or } 0.066\text{hz}\end{aligned}$$

4. (10 points) Complete the following light combinations:

Yellow light + blue light = **white light**

Green light + **magenta light** = White light

Magenta light + yellow light + cyan light = **white** light

Green light + blue light = **cyan** light

White light - yellow light = **blue** light