Physical Optics Test Review (B & A)

This is a preview of the draft version of the quiz

Started: Jan 28 at 10:36am

Quiz Instructions

Question 1 — 1 pts

The bending of light around obstacles is called

a. refraction

b. reflection

c. diffraction

d. interference

e. polarization

- ◯ d
- ◯ e
- ◯ c
- ◯ b
- ◯ a

Question 2 — 1 pts

If linear wave fronts are incident on a barrier has a very small opening, the waves moving through the opening will

a. become polarized

b. converge on a single point

c. continue moving as linear wave fronts

d. form circular wave fronts

e. destructively interfere and cancel each other completely

- ◯ b
- ◯ c
- ◯ a
- ◯ d
- ◯ e

Question 3

1 pts

Young's double-slit experiment provided evidence that light

a. refracts

b. reflects

c. transmits

d. acts like a particle

e. acts like a wave

- ◯ e
- ◯ b
- ◯ c
- ◯ a
- ◯ d

Question 4

1 pts

Light incident on two slits is used to project an interference pattern onto a screen. The distance between the bright maximums observed on the screen can be increased by

a. moving the slits closer together

b. moving the slits farther apart

c. making the slit openings narrower

d. making the slit openings wider

e. increasing the intensity of the light source

- ◯ d
- ◯ e
- ◯ a
- ◯ b
- ◯ c

Question 5

1 pts

A prism disperses different colors of light because as each color of light moves through the prism, each color has a different

a. amplitude

b. energy

c. wavelength

d. critical angle

e. oscillation

- ◯ e
- ◯ a
- ◯ d
- ◯ b
- ◯ c

Question 6

1 pts

Light striking the surface of an object can be

a. reflected

b. scattered

c. polarized

d. absorbed

e. All of these are possible to some

- ◯ d
- ◯ b
- ◯ a
- ◯ e
- ◯ c

Question 7

1 pts

Which of the following statements is NOT true regarding electromagnetic waves?

a. They all travel at the same speed in a vacuum

b. They can be polarized

c. Frequency is directly proportional to wavelength

d. They are formed from oscillating electric and magnetic fields

- ◯ c
- ◯ d
- ◯ b
- ◯ a

Question 8

1 pts

Which of the following correctly ranks radiations from lowest frequency to highest frequency?

a. Red, green, infrared, gamma

b. Infrared, blue, ultraviolet, X-ray

c. Yellow, red, infrared, radio

d. Ultraviolet, green, red, infrared

e. Infrared, Red, Green, Gamma

- ◯ b
- ◯ d
- ◯ e
- ◯ c
- ◯ a

Question 9

1 pts

Which of the following wavelength ranges falls within the range of ultraviolet light?

(A) 530 - 600 nm

(B) 250 - 300 nm

(C) 450 - 550 nm

(D) 600 - 700 nm

- ◯ b
- ◯ a
- ◯ c
- ◯ d

Question 10

1 pts

Which of the following waves cannot be polarized?

a. visible light passing through a vacuum

b. radio waves passing through air

c. gamma rays passing through a vacuum

d. sound waves passing through in air

- ◯ c
- ◯ a
- ◯ b
- ◯ d

Question 11

1 pts

Which of the following statements is true regarding polarization of light?

a. The intensity of polarized light is not changed when it passes through a polarizer

b. The amount that the intensity of unpolarized light is reduced depends on the incident angle as it reaches the polarizer

c. The intensity of polarized light is reduced by half when it passes through a polarizer

c. The intensity of polarized light is not affected by the incident angle as it reaches a polarizer

- [ ] d
- [ ] b
- [ ] a
- [ ] c

Question 12

1 pts

Which of the following statements best describes polarization of light by reflection?

a. Light reflected from metallic surfaces is usually polarized.by reflection

b. Light reflected from a horizontal surface is generally polarized in the vertical direction

c. Reflected light is completely polarized when the reflected beam is perpendicular to the refracted beam

d. Polarization is most complete when the light is incident to the surface along the normal

- ◯ d
- ◯ a
- ◯ c
- ◯ b

Question 13

1 pts

What is red shift of distant objects in the universe?

a. an observed increase in frequency of light emitted by objects moving away from Earth

b. an observed decrease in frequency light emitted by objects moving away from Earth

c. an observed increase in frequency of light emitted by objects moving toward Earth

d. an observed decrease in frequency of light emitted by objects moving toward earth

- ◯ a
- ◯ b
- ◯ d
- ◯ c

Question 14

1 pts

Interference of light as it passes through a double slit produces a pattern of light and dark bands. Interference is evidence of what property of light?

a. Light has a particle nature, such that the momentum of photons causes them to cancel their motions when they collide

b. Light is attenuated, or absorbed, by the region around the double slits, leaving only certain beams of light and producing a pattern of light and dark

c. Light has a wave nature, so that it cannot pass efficiently through the double slits, leaving only certain rays of light to produce a pattern on a screen

d. Light has a wave nature, so that the wave patterns produced by the two slits interfere constructively and destructively to produce a pattern

- ◯ d
- ◯ b
- ◯ a
- ◯ c

Question 15

1 pts

An interference pattern is produced by light from a monochromatic source passing through a double slit, The amplitude of the pattern at the very center is a maximum because the path length difference from each slit to the center of the screen is

a. zero

b. maximum

c. one wavelength

d. one half wavelength

- ◯ a
- ◯ c
- ◯ b
- ◯ d

Question 16

1 pts

A thin film with an index of refraction of 1.3 is layered on top of glass, so that there is air above the film and glass below the film. In order for green light to be reflected from the film so that the film appears green in full sunlight, the minimum thickness of the film must be

a. one half the wavelength of green light in air

b. one fourth the wavelength of green light in the film

c. one half the wavelength of green light in the film

d. one fourth the wavelength of green light in air

- ◯ b
- ◯ d
- ◯ c
- ◯ a

Question 17

1 pts

When a large soap bubble is viewed in white light, it produces many colors. Which of the following statements but explains this phenomenon?

a. Different thicknesses in the bubble reflect different colors

b. The bubble acts as a prism and separates the light into a spectrum of colors

c. White light is made up of all the colors of the rainbow

d. You can view it from any angle, so you see all the colors

- ◯ c
- ◯ a

- ◯ b
- ◯ d

Question 18

1 pts

As a wave passes through an opening that is approximately equal to its wavelength, the wave will build or change direction, leading to interference of waves from each side of the opening. This is a demonstration of

a. diffraction

b. reflection

c. refraction

d. dispersion

- ◯ c
- ◯ b
- ◯ d
- ◯ a

Question 19

1 pts

As the wavelength of light shining through a single-slit aperture increases,

what happens to the interference pattern formed?

a. Nothing changes

b. The pattern becomes more spread out

c. The pattern moves closer together

d. Single slits don't produce interference

- ◯ c
- ◯ a
- ◯ d
- ◯ b

Question 20

1 pts

In a classroom demonstration, a red laser is shone through a diffraction grating, producing a pattern of bright spots on the wall. Maintaining all other conditions, the red laser is replaced with a green laser. The pattern of bright spots will

a. move closer together

b. move farther apart

c. remain the same, but the central maximum will be much wider

d. remain the same, but the entire pattern will shift to either the right or left

- ◯ c
- ◯ d
- ◯ b
- ◯ a

Question 21

1 pts

If a light ray in a substance strikes its surface from inside at an angle of incidence of 40°, and retracts into air at 50°, what is the approximate index of refraction of the substance?

Question 22

1 pts

When light moves from a medium with a low index of refraction to a medium with a higher index of refraction, the light:

a. slows down and bends toward the normal

b. remains at the same constant velocity and bends toward the normal

c. speeds up and bends toward the normal

d. speeds up and bends away from the normal

- ◯ d
- ◯ b
- ◯ c
- ◯ a

Question 23

1 pts

In order for total internal reflection to occur at the interface between two substances:

a. the index of refraction of the interfacing substances must be the same

b. the index of refraction of the substance which the light is trying to leave must be less than the index of refraction of the substance which it is trying to enter

c. the index of refraction of the substance which the light is trying to leave must be greater than the index of refraction of the substance which it is trying to enter

d. one of the substances must be air

- ◯ b
- ◯ d
- ◯ a
- ◯ c

Question 24

1 pts

Visible light of which color bends the most when entering glass from air?

a. yellow

b. green

c. violet

d. red

- ◯ a
- ◯ c
- ◯ d
- ◯ b

Question 25

1 pts

What is the frequency in Hz of a radio wave with a wavelength of 5.2 m?

Question 26

1 pts

A ray of light is incident from a layer of glass (n = 1.62) upon a layer of water (n = 1.33). The critical angle of incidence for this situation is equal to_____ degrees.

Question 27

1 pts

What is the velocity of light (m/s) in a substance with n =1.16?

Question 28

1 pts

If the intensity of a monochromatic ray of light is increased while the ray is incident on a pair of narrow slits, the spacing between maxima in the diffraction pattern will be _____.

- ◯ the same
- ◯ increased or decreased, depending upon the frequency
- ◯ increased
- ◯ decreased

Question 29

1 pts

In a single-slit experiment, increasing the width of the slit results in

- narrowing the diffraction pattern moving the secondary bands closer a narrower central band
- increasing the width of the central band while decreasing the width of the secondary bands
- no change in the central band while moving wider secondary bands farther away from the central band
- widening the diffraction pattern moving the secondary bands farther from a wider central band

Question 30

1 pts

Visible light of which color bends the most when changing mediums?

- violet
- red
- yellow
- green

Question 31

1 pts

Which of the following is true of light striking a glass-air interface from the air side?

- Total internal reflection may occur.
- The intensity of the reflected light will always be greater than the intensity of the refracted

light.

- ◯ The intensity of the reflected light will always be less than the intensity of the refracted light.
- ◯ The frequency of the refracted light will be the same as the frequency of the reflected light.

Question 32

1 pts

Which of the following is true when light strikes a glass-air interface from the glass side?

- ◯ The wavelength of the refracted light will increase.
- ◯ The frequency of the refracted light will decrease.
- ◯ The wavelength of the refracted light will decrease.
- ◯ The frequency of the refracted light will increase.

Question 33

1 pts

A prism bends different wavelengths of light to different degrees, in a phenomenon called chromatic:

- ◯ diffraction
- ◯ dispersion
- ◯ interference
- ◯ refraction

Question 34

1 pts

You are more likely going to see questions about double slit experiments and thin films as compared to diffraction gratings and single slit experiments.

- ◯ True
- ◯ False

Question 35

1 pts

The equation for double slit experiments on the AP Physics 2 equation sheet is the same for single slit experiments and diffraction gratings.

- ◯ True
- ◯ False

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