Geometric Optics Test Review (C & D)

This is a preview of the draft version of the quiz

Started: Jan 28 at 10:40am

Quiz Instructions

Question 1 — 1 pts

Which material will produce a converging lens with the longest focal length?

- Lucite, n = 1.5
- Flint glass, n = 1.66
- Quartz, n = 1.45
- Crown glass, n = 1.52

Question 2 — 1 pts

An object is placed in front of a converging lens in such a way that the image produced is inverted and If the lens were replaced by one with a smaller index of refraction, the size of the image would

- increase
- increase or decrease, depending on the degree of change
- decrease
- remain the same

Question 3

1 pts

You wish to make an enlarged reproduction of a document using a copying machine.

When you push the enlargement button, the lens inside the machine moves to a point:

- ◯ between f and 2f
- ◯ equal to 2f
- ◯ equal to f
- ◯ beyond 2f

Question 4

1 pts

A negative image distance means that the image formed by a concave mirror will be

- ◯ smaller
- ◯ inverted
- ◯ erect
- ◯ real

Question 5

1 pts

Real images can be produced by

- ◯ plane mirrors
- ◯ concave lenses (aka diverging)

- ◯ convex mirrors
- ◯ convex lenses (aka converging)

Question 6

1 pts

The focal length of a concave mirror with a radius of curvature of 100 cm is ___ cm.

Question 7

1 pts

An object is located 18 cm in front of a converging lens. An image twice as large as the object appears on the other side of the lens. The image distance must be _____ cm.

Take the absolute value of your answer before typing it in the text box.

Question 8

1 pts

A 2-meter-tall person stands 3.5 m in front of a vertical plane mirror. The height of his image is _____ m.

Question 9

1 pts

If an optical medium has an average index of refraction of 2 for white light, it can be concluded that a ray of white light traveling into the medium _____.

- ◯ has 5 times the wavelength it would have in a vacuum
- ◯ must change its direction
- ◯ has 50% the frequency it would have in a vacuum
- ◯ has 50% the speed it would have in a vacuum

Question 10

1 pts

The focal length is _____ the radius of curvature for a spherical mirror.

- ◯ 1/4
- ◯ 1/9
- ◯ 1/2
- ◯ 1/3

Question 11

1 pts

When white light travels from air into a glass prism and is dispersed into colors,

- ◯ blue light refracts over a smaller angle that red
- ◯ green light changes wavelength more than blue
- ◯ blue light has a lower speed than red

- ◯ all frequencies of light travel at the same speed

Question 12

1 pts

As a ray of light moves from a medium with a lower index of refraction into a medium with a higher index of refraction,

- ◯ speed and frequency decrease, while wavelength remains the some
- ◯ speed and wavelength decrease, while frequency remains the some
- ◯ speed and wavelength increase, while frequency remains the same
- ◯ speed decreases, while frequency and wavelength remain the same

Question 13

1 pts

Which of the following are possible?

- ☐ a concave lens produces a real image
- ☐ a plane mirror produces a, virtual image
- ☐ a concave mirror produces a real image
- ☐ a convex mirror produces a virtual image

Question 14

1 pts

An object placed a distance d in front of a convex mirror with a focal length -f produces an image that is one half the size of the original object. Which of the following correctly expresses the focal length?

- ◯ -1/4 d
- ◯ -1/3 d
- ◯ -2 d
- ◯ -1/2 d

Question 15

1 pts

White light entering a glass prism may be separated into its component color, a phenomenon called dispersion, because

- ◯ each color has a different index of refraction in the glass
- ◯ longer wavelengths are refracted more than shorter wavelengths, separating the colors
- ◯ each color undergoes a different frequency change as the light goes from the prism back into air
- ◯ the red end of the spectrum retracts at a larger angle than the violet

Question 16

1 pts

Light travels from a medium with an index of refraction N1 to a medium with an index of refraction N2 which is greater than N1. Which of the following must the true for total internal reflection to occur at this interface?

- ◯ Total internal reflection is not possible in this situation.
- ◯ The incident angle must he greater than arcsin N2/N1.
- ◯ The incident angle must be less than 45°.
- ◯ The incident angle must be greater than 45°.

Question 17

1 pts

An object is placed at the focal point of a thin convex lens. Which of the following statements best describes the image that forms?

- ◯ The image is real, forming at the focal length on the side of the lens opposite the object.
- ◯ The image is virtual, forming at twice the focal length on the same side of the lens as the object.
- ◯ No image will form.
- ◯ The image is real, forming at twice the focal length on the side of lens opposite the object.

Question 18

1 pts

Which of the following statements provides the cause of and a possible solution for spherical lens aberration?

- ◯ Spherical aberration is produced when a lens bends different wavelengths of light by different amounts, causing multiple focal points. Making the lens more spherical will cause red light to bend more, reducing the effect.
- ◯ Spherical aberration is produced when a lens is not perfectly spherical, causing light to focus at multiple points. Both sides of the lens should be ground so that it is perfectly spherical.
- ◯ Spherical aberration is produced when the lens is ground so the focal length is greater than R/2, where R is the radius of curvature. Grinding the lens so that it is spherical but has less curvature will improve focus.
- ◯ Spherical aberration is produced when a spherical lens bends light from the edges to a closer focal point than light passing through closer to the center. Making the lens non-spherical will improve focus.

Question 19

1 pts

Which of the following statements describes the eye of a myopic (nearsighted) person and a possible solution?

- In nearsightedness, light passing through the eye's lens is focused in front of the retina, that is the focal length of the lens is less than the distance from the lens to the retina. A concave lens will increase the focal length to correct it.
- In nearsightedness, light passing through the eye's lens is focused in front of the retina, that is, the focal length of the lens is less than the distance from the lens to the retina. A convex lens will increase the focal length to correct it.
- In nearsightedness, light passing through the eye's lens is focused behind the retina, that is, the focal length of the lens is more than the distance from the lens to the retina. A convex lens will increase the focal length to correct it.
- In nearsightedness, light passing through the eye's lens is focused behind the retina, that is, the focal length of the lens is more than the distance from the lens to the retina. A concave lens will decrease the focal length to correct it.

Question 20

1 pts

For total internal reflection to occur at the interface between two different materials, all of the following conditions must be be met except

- the incident angle must be less than the critical angle
- the critical angle must be equal to arcsin N1/N2, where N1 is the indicent medium
- the incident angle must be the critical angle when the refracted angle is 90 degrees
- the incident path of the light must be from a medium with a higher index of refraction to a medium with a lower index of refraction

Question 21

1 pts

The image in a plane mirror of a person standing at a distance d in front of the mirror appears to the person to be

- ◯ vertically inverted, real, and a distance 2d from the person
- ◯ upright, real, and a distance d away
- ◯ vertically inverted, virtual, and a distance 2d from the mirror
- ◯ upright, virtual, and a distance 2d away

Question 22

1 pts

An object is 2 meters in front of a plane mirror. The image is

- ◯ virtual, inverted, and 2 m behind the mirror
- ◯ virtual, inverted, and 2 m in front of the mirror
- ◯ real, upright, and 2 m behind the mirror
- ◯ virtual, upright, and 2 m behind the mirror
- ◯ none of these

Question 23

1 pts

Which of the following is true when light enters a denser medium?

- ◯ v increases, wavelength decreases, and n increases
- ◯ v decreases, wavelength increases, and n increases
- ◯ v decreases, wavelength decreases, and n increases
- ◯ v increases, wavelength decreases, and n decreases

- ◯ v decreases, wavelength decreases, and n decreases

Question 24

1 pts

At and beyond the critical angle, all the light striking the boundary between two substances is

- ◯ dispersed
- ◯ absorbed
- ◯ transmitted
- ◯ reflected
- ◯ refracted

Question 25

1 pts

The image formed by a pinhole camera is

- ◯ upright, virtual, and larger than the object
- ◯ inverted, real, and smaller than the object
- ◯ inverted, real, and larger than the object
- ◯ inverted, virtual, and smaller than the object
- ◯ upright, real, and larger than the object

Question 26

1 pts

The type of lens that refracts parallel light rays to the far focal point is a

- converging, convex lens
- diverging, concave lens
- diverging, convex lens
- All spherical lenses retract parallel rays to the far
- converging, concave lens

Question 27

1 pts

An image appearing on a screen is

- real and upright
- virtual and inverted
- virtual and upright
- none of these
- real and inverted

Question 28

1 pts

An image formed by a convex mirror is

- real and inverted
- real and upright
- no image is formed by this
- virtual and upright
- virtual and inverted

Question 29

1 pts

Which of the following has the shortest wavelength?

- ◯ Radio waves
- ◯ Red light
- ◯ Blue light
- ◯ Gamma rays
- ◯ X rays

Question 30

1 pts

A person's image appears on the far side of an optical instrument, upside down. What is the optical instrument?

- ◯ Concave lens
- ◯ Convex lens
- ◯ Convex mirror
- ◯ Concave mirror
- ◯ Plane mirror

Question 31

1 pts

Which of the following refraction indexes will produce a convex lens that has the longest focal length?

- ◯ 1.2

- ◯ 1.4
- ◯ 1.3
- ◯ 1.5

Question 32

1 pts

When light is incident on a surface, all the electromagnetic radiation is

- ◯ reflected, transmitted, and absorbed at a surface
- ◯ either rejected from the surface or transmitted
- ◯ either reflected from the surface or absorbed at the surface
- ◯ either reflected from the surface or absorbed

Question 33

1 pts

Light incident on the interface between air (n = 1) and water (n = 1.33) along the normal to the interface

- ◯ slows and is bent away from the normal
- ◯ slows and is bent toward the normal
- ◯ continues into the water at constant speed, but is bent toward the normal
- ◯ slows but is not bent since it travels along the normal

Question 34

1 pts

A ray of light in air strikes the interface between air and water at some angle with the normal. In water, the ray has a

- ◯ smaller wavelength
- ◯ larger wavelength
- ◯ smaller frequency
- ◯ larger frequency

Question 35

1 pts

A layer of water (n = 1.33) covers a block of substance with an index of refraction of n = 1.41. Total internal reflection at the interface between the two media

- ◯ may occur when the ray of light goes from the glass to the water because the speed of light increases in the water
- ◯ may occur when the ray of light goes from the water to the glass because the speed of light increases in the glass
- ◯ occurs whenever the ray of light goes from the glass to the water because the speed of light increases in the water
- ◯ occurs whenever the ray of light goes from the water to the glass because the speed of light increases in the glass

Question 36

1 pts

A real image twice as large as an object is produced when the object is placed 30.00 cm away from a converging lens. What is the focal length of the lens in cm?

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