Exam 4-PHYS 151--S14--Chapter 6, Optics

Multiple Choice
*Identify the choice that best completes the statement or answers the question.*

1. Consider this diagram of the eye and answer the following questions.

   ![Diagram of the eye](image)

   Which is the part that changes the focal length of the lens?
   a. (1)  d. (4)
   b. (2)  e. (5)
   c. (3)

2. At this part of the eye, most of the refraction of light occurs.
   a. (2)
   b. (3)
   c. (4)
   d. (6)

3. This part carries electrical signals to the brain.
   a. (4)
   b. (5)
   c. (6)
   d. (7)

4. This part is called the fovea.
   a. (4)
   b. (5)
   c. (6)
   d. (7)

5. This changes the focal length of the lens.
   a. (2)
   b. (4)
   c. (3)
   d. (1)

6. There are no rods or cones at this part of the eye. It is a “blind spot.”
   a. (5)
   b. (6)
   c. (7)

7. This small opening prevents spherical aberrations.
   a. (2)
   b. (4)
   c. (5)
   d. (6)
   e. (7)
8. When light travels from a vacuum to a medium, necessarily, does which of these?
   a. speeds up
   b. slows down
   c. bends
   d. travels straight

9. A light bulb emits light in all directions. If I think about the light traveling outward in concentric circles, as in this figure, what is the method of considering this light?
   a. parallel waves
   b. rays
   c. circular path
   d. wave fronts

10. Light can be described as which of these?
    a. A magnetic wave
    b. An electric wave
    c. A longitudinal wave
    d. Both A & B
    e. A, B, & C

11. What is the proper order of these types of radiation, in order from smallest to biggest energy?
    gamma rays
    infrared
    microwaves
    ultraviolet
    a. microwaves, infrared, ultraviolet, gamma rays
    b. infrared, microwaves, ultraviolet, gamma rays
    c. infrared, ultraviolet, microwaves, gamma rays
    d. gamma rays, infrared, microwaves, ultraviolet

12. Visible light is caused by which of these?
    a. Moving magnetic fields
    b. Excessive heating of the atom
    c. Electrons moving in and out of energy states of an atom
    d. Visible light is always in existence; it is not “caused” by anything

13. Light moves from glass to water as in this figure. The light ______.
    a. bends towards the normal
    b. bends away from the normal
    c. travels straight
    d. reflects off of the water

14. Light moves through a slab of glass. Which is the path it would take?
    a. a
    b. b
    c. c

15. The focal length is equal to____.
    I. ½ the center of curvature
    II. The point where parallel rays focus
    III. The center of curvature
    a. I & II
    b. III
    c. I
    d. II & III
    e. II

16. For the eye, when you change the object distance, you must change the ____ to focus the image.
    a. focal length
    b. image distance
    c. magnification
    d. index of refraction
17. To see an object closer to the eye, the lens must become _____.
   a. thinner in the middle
   b. thicker in the middle
   c. completely flat
   d. completely spherical

18. An astigmatism causes_____.
   a. The light to focus in front of the retina
   b. The dispersion of light
   c. The light to focus behind the retina
   d. multiple focal points of light
   e. Light to be dimmer than usual

19. A negative image distance means the image is _____.
    a. inverted
    b. real
    c. virtual
    d. imaginary
    e. smaller than the object

20. A negative magnification means the image is _____.
    a. inverted
    b. real
    c. virtual
    d. imaginary
    e. smaller than the object

21. Hyperopia or far-sightedness is usually caused by the _______.
    a. eyeball being too short
    b. the retina not functioning properly
    c. eyeball being too long
    d. the lens having multiple focal points

22. A near-sighted person can see _____.
    a. nearby things
    b. far away things
    c. nothing without glasses
    d. very bright lights

23. The near point of a typical person is which of these?
    a. 20 cm
    b. 200 cm
    c. 0.2 cm
    d. 2000 cm

24. As you age, your nearpoint _____.
    a. decreases
    b. increases
    c. goes away

25. This figure shows a convex lens with 3 rays that originate from the object on the left. One of the rays is incorrectly drawn. Which one?
   ![Diagram of convex lens with rays](image)
   a. (a)
   b. (b)
   c. (c)
   d. They are all correct.

26. The lens of your eye forms what type of image on the retina?
   I. Real
   II. Virtual
   III. Upright
   IV. Inverted
   a. I & IV
   b. II & IV
   c. I & III
   d. II & III

27. The focal length of the lens in your eye is equal to the diameter of the eyeball when the object is _______.
   a. real
   b. virtual
   c. nearby
   d. far away

28. Light entering the eye refracts the most at which point?
    a. the fovea
    b. the lens
    c. the cornea
    d. the aqueous humor

29. This liquid in your eye is the same as when you were born. It is not replenished nor does it drain.
    a. CSF
    b. fovea
    c. vitreous humor
    d. aqueous humor
30. What is the primary purpose of the aqueous humor?
   a. to limit the amount of light entering the eye
   b. to provide nutrients to the eye
   c. to refract light
   d. to help maintain the spherical shape of the eyeball

31. To correct your vision, the optometrist prescribes convex lenses with a strength of 2 diopters. At what point do these lenses focus light?
   a. 0.25 m
   b. 1.5 m
   c. 0.5 m
   d. 2 m

32. Concave lenses cause light rays to _____.
   a. create a real image
   b. travel faster
   c. diverge
   d. converge

33. What type of lens is this?
   a. convex
   b. plano-convex
   c. concave
   d. plano-concave

34. The energy of light is directly proportional to which of these?
   I. Frequency
   II. Wavelength
   III. Amplitude
   a. II
   b. I & III
   c. I
   d. II & III

35. Light can be described by which of these quantities?
   I. Frequency
   II. Wavelength
   III. Amplitude
   a. II
   b. II & III
   c. I & III
   d. I & II
   e. All of these
MULTIPLE CHOICE

1. ANS: A  PTS: 1
2. ANS: B  PTS: 1
3. ANS: B  PTS: 1
4. ANS: D  PTS: 1
5. ANS: D  PTS: 1
6. ANS: B  PTS: 1
7. ANS: A  PTS: 1
8. ANS: B  PTS: 1
9. ANS: D  PTS: 1
10. ANS: D  PTS: 1
11. ANS: A  PTS: 1
12. ANS: C  PTS: 1
13. ANS: B  PTS: 1
14. ANS: A  PTS: 1
15. ANS: A  PTS: 1
16. ANS: A  PTS: 1
17. ANS: B  PTS: 1
18. ANS: D  PTS: 1
19. ANS: C  PTS: 1
20. ANS: A  PTS: 1
21. ANS: A  PTS: 1
22. ANS: A  PTS: 1
23. ANS: A  PTS: 1
24. ANS: B  PTS: 1
25. ANS: B  PTS: 1
26. ANS: A  PTS: 1
27. ANS: D  PTS: 1
28. ANS: C  PTS: 1
29. ANS: C  PTS: 1
30. ANS: B  PTS: 1
31. ANS: C  PTS: 1
32. ANS: C  PTS: 1
33. ANS: B  PTS: 1
34. ANS: C  PTS: 1
35. ANS: E  PTS: 1