OPTICS REVIEW

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A. Fill in the blanks (use the following list) [/20]

angle of incidence	convex mirror	image	normal	refracted ray
angle of reflection	critical angle	incandescence	objective lens	refraction
angle of refraction	dispersion	incident ray	partial reflection & refraction	retina
apparent depth	diverging lens	index of refraction	phosphorescence	shimmering
astigmatism	eyepiece	lens	presbyopia	spherical aberration
bioluminescence	fluorescence	luminescence	principle axis	total internal reflection
chemiluminesence	focal length	magnification	ray	triboluminesence
chromatic aberration	focal point	medium	real image	vertex
concave mirror	plane mirror	mirage	reflected ray	virtual
converging lens	hyperopia	myopia	reflection	wavelength

1. is light produced by living organisms.
2. According to the laws of , the is equal to the .
3. A mirror whose reflecting surface curves inward is a .
4. The is the point on the through which reflected rays pass.
5. A mirror whose reflecting surface curves outward is a .
6. The angle of incidence for which the is 90° is called the .
7. When you think that you are seeing an object but it is not really there, you are seeing a image.
8. occurs when rays at the edges of curved mirrors do not pass through the focal point.
9. A is an optical effect caused by the bending of light rays passing through layers of varying temperatures.
10. The ratio of the speed of light in a vacuum to the speed of light in a is the .
11. A is thinner in the centre than it is around the edges.
12. The light-sensitive part of the eye is the .
13. When someone's eyes cannot focus on nearby objects, the person has .
14. A brings parallel light rays toward a common point.
15. A is a transparent object with at least one curved side that causes light to refract.

B. True or False (If the statement is false, rewrite the statement to make it true) [/10]

16. The characteristics of an image produced by a concave mirror are always the same.

17. Magnification of an image formed by a convex mirror will be ≥ 1.0

18. A ray traveling towards any curved mirror, parallel to the PA will reflect back through F.

19. Concave and convex mirrors can both experience spherical aberration.

20. Concave mirrors are used for security mirrors and convex mirrors are used for radar antennas.

C. Similarities/Differences (describe similarities/differences between each pair) [/8]

21. luminous / nonluminous

22. reflection / refraction

23. mirror / lens

24. principle axis / normal

D. Multiple choice (Choose the best answer) [/8]

25. How is light transmitted?
    a) in the form of electromagnetic waves
    b) in straight lines
    c) as energy
    d) all of the above

26. What type of image is produced by a plane mirror?
    a) always a virtual image
    b) sometimes produces a real image
    c) always a real image
    d) sometimes produces a virtual image

27. The line perpendicular to a reflecting surface is called
    a) incident ray
    b) reflected ray
    c) normal
    d) principle axis

28. A material has an index of refraction of 1.54. Calculate the speed of light through this material.
    a) 4.38×10^8 m/s
    b) 1.95×10^8 m/s
    c) 2.34×10^8 m/s
    d) 4.46×10^8 m/s

29. What is the phenomenon of apparent movement of objects seen through hot air over objects and surfaces called?
    a) refraction
    b) shimmering
    c) reflection
    d) dispersion

30. A ray of light passes from glass to air. Which of the following can occur?
    a) total internal reflection
    b) total refraction
    c) partial reflection and partial refraction
    d) both A and C

31. Which factor can affect the focal length of a lens?
    a) curvature
    b) colour of light
    c) index of refraction
    d) both A and C

32. A person with a condition who is unable to see objects far away?
    a) myopia
    b) hyperopia
    c) presbyopia
    d) astigmatism

E. Diagrams [/30]

33. Draw the image produced from the following object and then complete a LOST table. (6)

34. Draw the image produced from the following object and then complete a LOST table. (8)

35. Draw the image produced from the following object and then complete a LOST table. (8)

36. Draw the image produced from the following object and then complete a LOST table. (8)

F. Calculations [/28]

37. A concave mirror has a focal length of 6.0 cm. An object with a height of 0.60 cm is placed 10.0 cm in front of the mirror.
    a) Calculate the image distance, d_i. (4)
    b) Calculate the image height, h_i. (4)

38. A convex surveillance mirror in a convenience store has a focal length of -0.40 m. A customer, who is 1.7 m tall, is standing 4.5 m in front of the mirror.
    a) Calculate the image distance, d_i. (4)
    b) Calculate the image height, h_i. (4)

39. Calculate the speed of light in fused quartz, given the index of refraction for fused quartz is n = 1.46 and the speed of light in a vacuum is $c = 3.00 \times 10^8$ m/s. (4)

40. An object 8.5 cm high is placed 28 cm from a converging lens. The object forms 21 cm from the lens.
    a) Calculate the focal length of the lens, f. (4)
    b) Calculate the image height, h_i. (4)