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12. "GEOMETRICAL OPTICS"

Sr.	Statements	A	B	C	D
1	Which of the following quantity is not changed during refraction of light?	direction	speed	frequency	wavelength
2	Incident ray of light makes an angle of 30° with plane mirror. What is the angle of reflection of light ray? (Note: refractive index of glass is 1.5)	60°	45°	90°	35.26°
3	Incident ray of light makes an angle of 30° with plane mirror. What is the angle of refraction of light ray? (Note: refractive index of glass is 1.5)	60°	45°	90°	35.26°
4	A converging mirror with a radius of 20 cm creates a real image 30 cm from the mirror. What is the object distance?	- 5.0 cm	- 7.5 cm	- 15 cm	- 20 cm
5	An object is 14 cm in front of a convex mirror. The image is 5.8 cm behind the mirror. What is the focal length of the mirror?	- 4.1 cm	- 8.2 cm	- 9.9 cm	- 20 cm
6	The index of refraction depends on the:	focal length	speed of light	image distance	object distance
7	A virtual, erect, and smaller than object, image is always formed by:	concave mirror	convex lens	plane mirror	convex mirror
8	Which type of image is formed by a convex lens on a screen?	inverted and real	inverted and virtual	upright and real	upright and virtual
9	Which type of image is produced is produced by the converging lens of human eye if it view a distant object?	real, erect, same size	real, inverted, diminished	virtual, erect, diminished	virtual, inverted, magnified
10	Image formed by a camera is:	virtual, upright, diminished	real, inverted, diminished	virtual, upright diminished	real, inverted, magnified
11	If a ray of light in glass on an air surface at an angle greater than the critical angle, the ray will:	refract only	reflect only	partially refract	diffract only
12	The critical angle for a beam of light passing from water into air is 48.8°. This means that all light rays with an angle of incidence greater than this angle will be:	absorbed	totally reflected	partially reflected and partially transmitted	totally transmitted
13	Radius of curvature of convex mirror is 20 cm, its focal length is:	40 cm	10 cm	-10 cm	-20 cm
14	The focal length of spherical mirror is equal to:	R/2	R/4	4 R	2 R
15	The principal focus of a concave mirror is:	virtual	real	both A & B	none
16	Focal length of concave lens is:	positive	negative	infinity	zero
17	Which type of image is formed in plane mirror?	real	virtual	both A & B	none
18	Which mirror is used in malls for security purposes?	convex	concave	both A & B	none
19	$\frac{\sin i}{\sin r}$=n , is called:	Boyle's law	Charles's law	Snell's law	Newton's law
20	A denser medium has refractive index of 1.5, then critical angle for it is:	41.8°	39.5°	30°	15.5°
21	Concave lens forms virtual, erect and enlarge image if object is placed:	between F and 2F	before 2F	at F	between F and C
22	Rainbow is formed due to:	reflection	refraction	dispersion	diffraction
23	The speed of light in glass (having n=1.5) is:	2×10^{8} ms^{-1}	3×10^{8} $m^{-1}s$	3×10^{-8} ms^{-1}	3×10^{8} ms^{-1}

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24	The refractive index of medium is:	$\frac{\sin i}{\sin r} = n$	$n = \frac{c}{v}$	$n = \frac{1}{\sin C}$	all of these
25	A concave lens has focal length of 5 cm. Find its power?	20 D	0.2 D	-5 D	-20 D
26	Optical fibers work on the principle of:	reflection	refraction	total internal reflection	diffraction
27	Endoscope which is used to diagnose bladder is:	gastroscope	cytoscope	bronchoscope	microscope
28	Formula for power of lens is:	P= 1/R	P= f	P= 1/f	none
29	SI unit of power of lens is:	watt	dioptre	decibel	volt
30	For finding a virtual and erect image by a converging lens, object should be placed:	between pole and F	at F	between F and 2F	beyond 2F
31	Focal length of a concave lens is:	positive	negative	double	none
32	If the image is virtual then its distance from lens is:	positive	negative	double	none
33	The change in the focal length of the eye lens is:	modification	induction	accommodation	none
34	To correct farsightedness, which lens is used?	converging	diverging	both	none
35	A magnifying glass has focal length of 5 cm then its magnifying power is:	5	6	6.2	7
36	Near point of a person lies at 40 cm from him. He is suffering from:	farsightedness	near sightedness	presbyopia	no disease
37	Accommodation in eye is done by:	pupil	retina	ciliary muscle	cornea
38	An object is placed 7 cm from a concave mirror whose radius of curvature is 10 cm, the image formed will be:	real and upright	virtual and upright	real and inverted	virtual and inverted
39	Which one of the following materials will refract more?	water	glass	air	diamond
40	If the distance from your eye's lens to the retina is shorter than for a normal eye, you will struggle to see objects that are:	nearby	colorful	far away	moving fast
41	Who benefits more from using a magnifying glass, a person whose near point is located at a distance away from the eyes	75 cm	50 cm	35 cm	25 cm
42	The human eye forms the image of an object at its:	iris	retina	pupil	cornea

"Short Questions"

1. What do you understand by reflection of light? State laws of reflection.
2. When you look at the front side of the polished spoon, your image is inverted and from back of the spoon, your image is erect. Explain why?
3. Write four differences between concave and convex mirror.
4. Which is used by girls for make up and why?
5. A man raises his left hand in a plane mirror, the image facing his is raising right hand. Why?
6. If a concave mirror produces a real image, is the image necessarily inverted? Explain.
7. Why are large convex mirrors fixed at blind turns of mountains?
8. Why is the driver's side mirror in many cars convex rather than plane or concave?
9. Which mirrors are used for rear view of vehicles and why?
10. Define pole, centre of curvature and radius of curvature.
11. Define refraction of light. State laws of refraction.
12. What is meant by refractive index of a material?
13. Find the angle of refraction r, whose i=30° and n=1.52.
14. A magician during a show makes a glass lens with n=1.47 disappear in a trough of liquid. What is the refractive index of the liquid? Could the liquid be water?

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15. If a person is walking in pool, why do his legs appear shorter in water? Do they really become short?
16. Why a fish under water appears to be at a different depth below the surface than it actually is?
17. What is critical angle? Derive a relationship between critical angle and refractive index.
18. What is meant by total internal reflection? State conditions for it.
19. Can we achieve total internal reflection from optically rare medium to optically dense medium?
20. Why diamonds sparkle brightly?
21. When white light passes through a prism, it disperses into its seven colours. Why does this happens?
22. What are optical fibers? Describe how total internal reflection is used in light propagation through it.
23. Describe the terms applied to a lens: principal axis, optical centre, focal length.
24. What is meant by the principal focus of convex lens and concave lens. Illustrate with diagram.
25. Suppose that you were handed a lens and a ruler and told to determine the focal length of the lens. How would you proceed?
26. Write four differences between convex lens and concave lens.
27. With the help of a ray diagram, how you can show the use of thin converging lens as magnifying glass.
28. When you use a simple magnifying glass, does it matter whether you hold the object to be examined closer to the lens that its focal length or farther away? Explain.
29. Which type of lens would you use to start fire from sunlight, concave or convex? At what distance from the lens should the paper be held for best results?
30. Magnifying glass can burn the paper. How is it possible?
31. Under what condition, is a convex lens nearly act as diverging lens?
32. A coin is placed at a focal point of a converging lens. Is an image formed? What is its nature?
33. What are differences between real and virtual images?
34. Define power of lens and its units.
35. Describe passage of light through a glass prism and measure the angle of deviation.
36. Define the terms resolving power and magnification.
37. Draw ray diagrams and write magnification formula of simple microscope, compound microscope and telescope.
38. What is meant by nearsightedness and farsightedness? How can these defects be corrected?
39. Will a nearsighted person who wears corrective lenses in her glasses be able to see clearly underwater when wearing those glasses?
40. How does thickness of lens affect its focal length?
41. When converging lens form a virtual image?
42. Under what conditions will a converging lens form a real image that is same size as the object?
43. Why do we use refracting telescope with a large objective lens of large focal length?

"Important Long Questions"

A. What is spherical mirror? Derive spherical mirror formula with neat ray diagram.
B. What is optical fibre? How does light travel through it? Explain.
C. What is lens? Define the basic terminologies used in lenses. Derive lens formula.
D. What is compound microscope? Describe its construction and working. What is its magnifying power?
E. What is astronomical telescope? Describe its construction and working. What is its magnifying power? Under what conditions, astronomical telescope acts in normal adjustment?
F. What are defects of vision? What are causes of each defect? How can we remove these defects of vision? Show by diagram.

Problems: All examples and exercise numericals of PTB (Old Book) and NBF (New Book). The numericals of this chapter are very important w.r.t examination point of view.