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PHYSICS · JEE MAIN

Ray Optics

Chapter-wise previous year questions, with answer key

90	2020–2025	7
PYQS	PAPERS	TOPICS

Refraction and Snell's Law · Refraction at Spherical Surface · Lenses · Prism and Dispersion · Optical Instruments · Total Internal Reflection · Reflection and Mirrors

1. Attempt each question on paper first — they're grouped by topic, newest papers first.
2. Check yourself against the answer key at the end.
3. Got one wrong? Tap “Step-by-step solution” under it for the full working.

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Refraction and Snell's Law · 15 PYQs

Q1 JEE Main 2025 · 7 Apr · Shift 2

Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A): Refractive index of glass is higher than that of air.

Reason (R): Optical density of a medium is directly proportionate to its mass density which results in a proportionate refractive index.

In the light of the above statements, choose the **most appropriate answer** from the options given below:

(A) Both (A) and (R) are correct and (R) is the correct explanation of (A)

(B) (A) is correct but (R) is not correct

(C) (A) is not correct but (R) is correct

(D) Both (A) and (R) are correct but (R) is **not** the correct explanation of (A)

Step-by-step solution ▸ prepwiser.in/questions/SBsOd8xYEH

Q2 JEE Main 2025 · 3 Apr · Shift 2

A monochromatic light of frequency $5 \times 10^{14} \mathrm{Hz}$ travelling through air, is incident on a medium of refractive index ' 2 '. Wavelength of the refracted light will be :

(A) 400 nm

(B) 300 nm

(C) 600 nm

(D) 500 nm

Step-by-step solution ▸ prepwiser.in/questions/TjAH1OVTGu

Q3 JEE Main 2025 · 23 Jan · Shift 1

What is the lateral shift of a ray refracted through a parallel-sided glass slab of thickness ' h ' in terms of the angle of incidence ' i ' and angle of refraction ' r ', if the glass slab is placed in air medium?

(A) h

(B) $\frac{h \cos(i-r)}{\sin r}$

(C) $\frac{\mathrm{h} \tan(\mathrm{i}-\mathrm{r})}{\tan \mathrm{r}}$

(D) $\frac{h \sin(i-r)}{\cos r}$

Step-by-step solution ▸ prepwiser.in/questions/XirPrY3jg5

Q4 JEE Main 2024 · 4 Apr · Shift 2

A light ray is incident on a glass slab of thickness $4\sqrt{3} \mathrm{cm}$ and refractive index $\sqrt{2}$ The angle of incidence is equal to the critical angle for the glass slab with air. The lateral displacement of ray after passing through glass slab is _____ cm.

(Given $\sin 15^{\circ} = 0.25$)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/xUutlQ0rP3

Q5 JEE Main 2023 · 13 Apr · Shift 1

A vessel of depth 'd' is half filled with oil of refractive index n_1 and the other half is filled with water of refractive index n_2. The apparent depth of this vessel when viewed from above will be-

(A) $\frac{2d(n_1+n_2)}{n_1n_2}$

(B) $\frac{d(n_1+n_2)}{2n_1n_2}$

(C) $\frac{dn_1n_2}{2(n_1+n_2)}$

(D) $\frac{dn_1n_2}{(n_1+n_2)}$

Step-by-step solution ▸ prepwiser.in/questions/dOZHXF2dLc

Q6 JEE Main 2023 · 13 Apr · Shift 1

A fish rising vertically upward with a uniform velocity of 8ms^{-1}, observes that a bird is diving vertically downward towards the fish with the velocity of 12ms^{-1}. If the refractive index of water is $\frac{4}{3}$, then the actual velocity of the diving bird to pick the fish, will be _____ ms^{-1}.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/aVUt-hN2si

Q7 JEE Main 2023 · 12 Apr · Shift 1

An ice cube has a bubble inside. When viewed from one side the apparent distance of the bubble is 12cm. When viewed from the opposite side, the apparent distance of the bubble is observed as 4cm. If the side of the ice cube is 24cm, the refractive index of the ice cube is

(A) $\frac{3}{2}$

(B) $\frac{4}{3}$

(C) $\frac{2}{3}$

(D) $\frac{6}{5}$

Step-by-step solution ▸ prepwiser.in/questions/XxSXkQbfEV

Q8 JEE Main 2023 · 6 Apr · Shift 1

A monochromatic light wave with wavelength λ_1 and frequency v_1 in air enters another medium. If the angle of incidence and angle of refraction at the interface are 45° and 30° respectively, then the wavelength λ_2 and frequency v_2 of the refracted wave are:

(A) $\lambda_2 = \lambda_1, v_2 = \frac{1}{\sqrt{2}}v_1$

(B) $\lambda_2 = \lambda_1, v_2 = \sqrt{2}v_1$

(C) $\lambda_2 = \sqrt{2}\lambda_1, v_2 = v_1$

(D) $\lambda_2 = \frac{1}{\sqrt{2}}\lambda_1, v_2 = v_1$

Step-by-step solution ▸ prepwiser.in/questions/6yKqoRUCJJ

Q9 JEE Main 2023 · 6 Apr · Shift 1

A pole is vertically submerged in swimming pool, such that it gives a length of shadow 2.15m within water when sunlight is incident at angle of 30° with the surface of water. If swimming pool is filled to a height of 1.5m, then the height of the pole above the water surface in centimeters is $(n_w = 4/3)$ _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/GLqHGuOlff

Q10 JEE Main 2023 · 31 Jan · Shift 2

A microscope is focused on an object at the bottom of a bucket. If liquid with refractive index $\frac{5}{3}$ is poured inside the bucket, then the microscope has to be raised by 30cm to focus the object again. The height of the liquid in the bucket is :

(A) 50cm

(B) 18cm

(C) 75cm

(D) 12cm

Step-by-step solution ▸ prepwiser.in/questions/aFrYpk266N

Q11 JEE Main 2022 · 25 Jul · Shift 1

Time taken by light to travel in two different materials A and B of refractive indices μ_A and μ_B of same thickness is t_1 and t_2 respectively. If $t_2 - t_1 = 5 \times 10^{-10}$ s and the ratio of μ_A to μ_B is $1:2$. Then, the thickness of material, in meter is: (Given v_A and v_B are velocities of light in A and B materials respectively.)

(A) $5 \times 10^{-10}\, v_\text{A}\,\text{m}$

(B) $5 \times 10^{-10}\text{m}$

(C) $1.5 \times 10^{-10}\text{m}$

(D) $5 \times 10^{-10}\, v_\text{B}\,\text{m}$

Step-by-step solution ▸ prepwiser.in/questions/mlq3_3DD2O

Q12 JEE Main 2022 · 27 Jun · Shift 2

If a wave gets refracted into a denser medium, then which of the following is true?

(A) wavelength, speed and frequency decreases.

(B) wavelength increases, sped decreases and frequency remains constant.

(C) wavelength and speed decreases but frequency remains constant.

(D) wavelength, speed and frequency increases.

Step-by-step solution ▸ prepwiser.in/questions/2jpG3GqKov

Q13 JEE Main 2022 · 27 Jun · Shift 1

Consider a light ray travelling in air is incident into a medium of refractive index $\sqrt{2n}$. The incident angle is twice that of refracting angle. Then, the angle of incidence will be :

(A) $\sin^{-1}\left(\sqrt{n}\right)$

(B) $\cos^{-1}\left(\sqrt{\frac{n}{2}}\right)$

(C) $\sin^{-1}\left(\sqrt{2n}\right)$

(D) $2\cos^{-1}\left(\sqrt{\frac{n}{2}}\right)$

Step-by-step solution ▸ prepwiser.in/questions/uB3u3ttVBU

Q14 JEE Main 2022 · 25 Jun · Shift 1

The difference of speed of light in the two media A and B ($v_A - v_B$) is 2.6×10^7 m/s. If the refractive index of medium B is 1.47, then the ratio of refractive index of medium B to medium A is : (Given : speed of light in vacuum c = 3×10^8 ms^{-1})

(A) 1.303

(B) 1.318

(C) 1.13

(D) 0.12

Step-by-step solution ▸ prepwiser.in/questions/RR6fo5REFC

Q15 JEE Main 2021 · 25 Jul · Shift 1

A ray of laser of a wavelength 630 nm is incident at an angle of 30° at the diamond-air interface. It is going from diamond to air. The refractive index of diamond is 2.42 and that of air is 1. Choose the correct option.

(A) angle of refraction is 24.41°

(B) angle of refraction is 30°

(C) refraction is not possible

(D) angle of refraction is 53.4°

Step-by-step solution ▸ prepwiser.in/questions/DPVT-cyziO

Refraction at Spherical Surface · 4 PYQs

Q16 JEE Main 2025 · 23 Jan · Shift 1

A spherical surface of radius of curvature R, separates air from glass (refractive index $= 1.5$). The centre of curvature is in the glass medium. A point object ' O ' placed in air on the optic axis of the surface, so that its real image is formed at 'I' inside glass. The line OI intersects the spherical surface at P and $PO = PI$. The distance PO equals to

(A) 5R

(B) 2R

(C) 1.5R

(D) 3R

Step-by-step solution ▸ prepwiser.in/questions/iFuk081p92

Q17 JEE Main 2024 · 31 Jan · Shift 2

Light from a point source in air falls on a convex curved surface of radius 20cm and refractive index 1.5. If the source is located at 100cm from the convex surface, the image will be formed at _____ cm from the object.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/MxBOZYiPN-

Q18 JEE Main 2023 · 8 Apr · Shift 2

Two transparent media having refractive indices 1.0 and 1.5 are separated by a spherical refracting surface of radius of curvature 30cm. The centre of curvature of surface is towards denser medium and a point object is placed on the principle axis in rarer medium at a distance of 15cm from the pole of the surface. The distance of image from the pole of the surface is _____ cm.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/7qjf0H2Hxk

Q19 JEE Main 2021 · 17 Mar · Shift 2

The image of an object placed in air formed by a convex refracting surface is at a distance of 10 m behind the surface. The image is real and is at $\frac{2^{rd}}{3}$ of the distance of the object from the surface. The wavelength of light inside the surface is $\frac{2}{3}$ times the wavelength in air. The radius of the curved surface is $\frac{x}{13}$ m. The value of 'x' is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/xYoQnDMjOZ

Lenses · 29 PYQs

Q20 JEE Main 2025 · 8 Apr · Shift 2

A convex lens of focal length 30 cm is placed in contact with a concave lens of focal length 20 cm. An object is placed at 20 cm to the left of this lens system. The distance of the image from the lens in cm is _____.

(A) $\frac{60}{7}$

(B) 15

(C) 45

(D) 30

Step-by-step solution ▸ prepwiser.in/questions/wWkgX7ordJ

Q21 JEE Main 2025 · 7 Apr · Shift 1

Two thin convex lenses of focal lengths 30 cm and 10 cm are placed coaxially, 10 cm apart. The power of this combination is:

(A) 5 D

(B) 1 D

(C) 20 D

(D) 10 D

Step-by-step solution ▸ prepwiser.in/questions/0n8UjNqpx6

Q22 JEE Main 2025 · 7 Apr · Shift 1

A lens having refractive index 1.6 has focal length of 12 cm , when it is in air. Find the focal length of the lens when it is placed in water. (Take refractive index of water as 1.28)

(A) 355 mm

(B) 655 mm

(C) 288 mm

(D) 555 mm

Step-by-step solution ▸ prepwiser.in/questions/eDtFqRCB06

Q23 JEE Main 2025 · 3 Apr · Shift 1

The radii of curvature for a thin convex lens are 10 cm and 15 cm respectively. The focal length of the lens is 12 cm . The refractive index of the lens material is

(A) 1.4

(B) 1.8

(C) 1.5

(D) 1.2

Step-by-step solution ▸ prepwiser.in/questions/fu9PmkRjDP

Q24 JEE Main 2025 · 2 Apr · Shift 2

A bi-convex lens has radius of curvature of both the surfaces same as $1/6\mathrm{cm}$. If this lens is required to be replaced by another convex lens having different radii of curvatures on both sides $(R_1 \neq R_2)$, without any change in lens power then possible combination of R_1 and R_2 is :

(A) $\frac{1}{3}\mathrm{cm}$ and $\frac{1}{7}\mathrm{cm}$

(B) $\frac{1}{5}\mathrm{cm}$ and $\frac{1}{7}\mathrm{cm}$

(C) $\frac{1}{3}\mathrm{cm}$ and $\frac{1}{3}\mathrm{cm}$

(D) $\frac{1}{6}\mathrm{cm}$ and $\frac{1}{9}\mathrm{cm}$

Step-by-step solution ▸ prepwiser.in/questions/juYC4Dih7O

Q25 JEE Main 2025 · 29 Jan · Shift 2

A convex lens made of glass (refractive index = 1.5) has focal length 24 cm in air. When it is totally immersed in water (refractive index = 1.33), its focal length changes to

(A) 96 cm

(B) 72 cm

(C) 24 cm

(D) 48 cm

Step-by-step solution ▸ prepwiser.in/questions/JAokwXj0Yn

Q26 JEE Main 2025 · 24 Jan · Shift 1

A thin plano convex lens made of glass of refractive index 1.5 is immersed in a liquid of refractive index 1.2. When the plane side of the lens is silver coated for complete reflection, the lens immersed in the liquid behaves like a concave mirror of focal length 0.2 m . The radius of curvature of the curved surface of the lens is

(A) 0.15 m

(B) 0.10 m

(C) 0.25 m

(D) 0.20 m

Step-by-step solution ▸ prepwiser.in/questions/V2fkG1Uu5O

Q27 JEE Main 2025 · 24 Jan · Shift 1

A plano-convex lens having radius of curvature of first surface 2 cm exhibits focal length of f_1 in air. Another plano-convex lens with first surface radius of curvature 3 cm has focal length of f_2 when it is immersed in a liquid of refractive index 1.2. If both the lenses are made of same glass of refractive index 1.5 , the ratio of f_1 and f_2 will be

(A) $2:3$

(B) $1:3$

(C) $1:2$

(D) $3:5$

Step-by-step solution ▸ prepwiser.in/questions/jEuBheC0Ca

Q28 JEE Main 2025 · 24 Jan · Shift 1

What is the relative decrease in focal length of a lens for an increase in optical power by 0.1 D from 2.5D ? ['D' stands for dioptre]

(A) 0.04

(B) 0.1

(C) 0.40

(D) 0.01

Step-by-step solution ▸ prepwiser.in/questions/MkfM0Bk0VY

Q29 JEE Main 2024 · 9 Apr · Shift 1

Given below are two statements :

Statement (I) : When an object is placed at the centre of curvature of a concave lens, image is formed at the centre of curvature of the lens on the other side.

Statement (II) : Concave lens always forms a virtual and erect image.

In the light of the above statements, choose the correct answer from the options given below :

(A) Statement I is false but Statement II is true

(B) Both Statement I and Statement II are false

(C) Both Statement I and Statement II are true

(D) Statement I is true but Statement II is false

Step-by-step solution ▸ prepwiser.in/questions/XH6j5ezyWe

Q30 JEE Main 2024 · 6 Apr · Shift 2

For the thin convex lens, the radii of curvature are at 15cm and 30cm respectively. The focal length the lens is 20cm. The refractive index of the material is :

(A) 1.2

(B) 1.5

(C) 1.4

(D) 1.8

Step-by-step solution ▸ prepwiser.in/questions/lIFWp7Lujh

Q31 JEE Main 2024 · 4 Apr · Shift 1

An effective power of a combination of 5 identical convex lenses which are kept in contact along the principal axis is 25D. Focal length of each of the convex lens is:

(A) 50 cm

(B) 20 cm

(C) 25 cm

(D) 500 cm

Step-by-step solution ▸ prepwiser.in/questions/VlXvOhGHBU

Q32 JEE Main 2024 · 30 Jan · Shift 1

The distance between object and its two times magnified real image as produced by a convex lens is 45cm. The focal length of the lens used is _____ cm.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/oP1cfRqOKO

Q33 JEE Main 2024 · 29 Jan · Shift 1

A biconvex lens of refractive index 1.5 has a focal length of 20cm in air. Its focal length when immersed in a liquid of refractive index 1.6 will be:

(A) -16 cm

(B) +16 cm

(C) +160 cm

(D) -160 cm

Step-by-step solution ▸ prepwiser.in/questions/KLy49sNhej

Q34 JEE Main 2024 · 27 Jan · Shift 1

A convex lens of focal length $40\mathrm{cm}$ forms an image of an extended source of light on a photoelectric cell. A current I is produced. The lens is replaced by another convex lens having the same diameter but focal length $20\mathrm{cm}$. The photoelectric current now is :

(A) $\frac{\mathrm{I}}{2}$ **(B)** $4\,\mathrm{I}$

(C) $2\,\mathrm{I}$ **(D)** I

Step-by-step solution ▸ prepwiser.in/questions/jNZg2vOcbB

Q35 JEE Main 2023 · 13 Apr · Shift 2

A bi convex lens of focal length $10\mathrm{cm}$ is cut in two identical parts along a plane perpendicular to the principal axis. The power of each lens after cut is _____ D.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/foarKEv6u9

Q36 JEE Main 2023 · 11 Apr · Shift 1

The radius of curvature of each surface of a convex lens having refractive index 1.8 is $20\mathrm{cm}$. The lens is now immersed in a liquid of refractive index 1.5 . The ratio of power of lens in air to its power in the liquid will be $x:1$. The value of x is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/hhbJioSbGs

Q37 JEE Main 2023 · 24 Jan · Shift 2

When a beam of white light is allowed to pass through convex lens parallel to principal axis, the different colours of light converge at different point on the principle axis after refraction. This is called :

(A) Spherical aberration **(B)** Scattering

(C) Polarisation **(D)** Chromatic aberration

Step-by-step solution ▸ prepwiser.in/questions/9-CuQqjkzO

Q38 JEE Main 2023 · 24 Jan · Shift 2

A convex lens of refractive index 1.5 and focal length 18cm in air is immersed in water. The change in focal length of the lens will be _____ cm.

(Given refractive index of water $= \frac{4}{3}$)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/ziH0mEUpUr

Q39 JEE Main 2022 · 28 Jul · Shift 2

In an experiment with a convex lens, The plot of the image distance (v') against the object distance (μ') measured from the focus gives a curve $v'\mu' = 225$. If all the distances are measured in cm. The magnitude of the focal length of the lens is _____ cm.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/XuY6niqR_h

Q40 JEE Main 2022 · 28 Jul · Shift 2

The power of a lens (biconvex) is $1.25\mathrm{m}^{-1}$ in particular medium. Refractive index of the lens is 1.5 and radii of curvature are $20\mathrm{cm}$ and $40\mathrm{cm}$ respectively. The refractive index of surrounding medium:

(A) 1.0
(B) $\frac{9}{7}$
(C) $\frac{3}{2}$
(D) $\frac{4}{3}$

Step-by-step solution ▸ prepwiser.in/questions/h8-73EX5_k

Q41 JEE Main 2022 · 25 Jul · Shift 2

For an object placed at a distance 2.4 m from a lens, a sharp focused image is observed on a screen placed at a distance 12 cm from the lens. A glass plate of refractive index 1.5 and thickness 1 cm is introduced between lens and screen such that the glass plate plane faces parallel to the screen. By what distance should the object be shifted so that a sharp focused image is observed again on the screen?

(A) 0.8 m
(B) 3.2 m
(C) 1.2 m
(D) 5.6 m

Step-by-step solution ▸ prepwiser.in/questions/36zBFOtMDe

Q42 JEE Main 2022 · 24 Jun · Shift 1

Two identical thin biconvex lens of focal length 15 cm and refractive index 1.5 are in contact with each other. The space between the lenses is filled with a liquid of refractive index 1.25. The focal length of the combination is _____ cm.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/Ok9njMnCzj

Q43 JEE Main 2021 · 16 Mar · Shift 2

The refractive index of a converging lens is 1.4. What will be the focal length of this lens if it is placed in a medium of same refractive index? Assume the radii of curvature of the faces of lens are R_1 and R_2 respectively.

(A) Zero
(B) Infinite
(C) 1
(D) $\frac{R_1R_2}{R_1-R_2}$

Step-by-step solution ▸ prepwiser.in/questions/p19yBXtGyt

Q44 JEE Main 2021 · 25 Feb · Shift 1

The same size images are formed by a convex lens when the object is placed at 20 cm or at 10 cm from the lens. The focal length of convex lens is _____ cm.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/inKrqqwJwX

Q45 JEE Main 2020 · 6 Sep · Shift 2

A double convex lens has power P and same radii of curvature R of both the surfaces. The radius of curvature of a surface of a plano-convex lens made of the same material with power 1.5 P is :

(A) $\frac{R}{3}$
(B) $\frac{3R}{2}$
(C) $\frac{R}{2}$
(D) 2R

Step-by-step solution ▸ prepwiser.in/questions/9Ys5-p4cVj

Q46 JEE Main 2020 · 4 Sep · Shift 2

The distance between an object and a screen is 100 cm. A lens can produce real image of the object on the screen for two different positions between the screen and the object. The distance between these two positions is 40 cm. If the power of the lens is close to $\left(\frac{N}{100}\right) D$ where N is an integer, the value of N is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/EkO3CDCntO

Q47 JEE Main 2020 · 8 Jan · Shift 1

A point object in air is in front of the curved surface of a plano-convex lens. The radius of curvature of the curved surface is 30 cm and the refractive index of the lens material is 1.5, then the focal length of the lens (in cm) is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/4SYNuuP8UR

Q48 JEE Main 2020 · 7 Jan · Shift 2

A thin lens made of glass (refractive index = 1.5) of focal length f = 16 cm is immersed in a liquid of refractive index 1.42. If its focal length in liquid is f_1 , then the ratio $\frac{f_1}{f}$ is closest to the integer :

(A) 17 **(B)** 1

(C) 9 **(D)** 5

Step-by-step solution ▸ prepwiser.in/questions/OG0kBEzqsu

Prism and Dispersion · 16 PYQs

Q49 JEE Main 2025 · 3 Apr · Shift 1

Consider following statements for refraction of light through prism, when angle of deviation is minimum.

A. The refracted ray inside prism becomes parallel to the base.

B. Larger angle prisms provide smaller angle of minimum deviation.

C. Angle of incidence and angle of emergence becomes equal.

D. There are always two sets of angle of incidence for which deviation will be same except at minimum deviation setting.

E. Angle of refraction becomes double of prism angle.

Choose the correct answer from the options given below :

(A) A, B and E Only **(B)** B, C and D Only

(C) B, D and E Only **(D)** A, C and D Only

Step-by-step solution ▸ prepwiser.in/questions/7ezHXfWTJl

Q50 JEE Main 2025 · 2 Apr · Shift 2

A ray of light suffers minimum deviation when incident on a prism having angle of the prism equal to 60° . The refractive index of the prism material is $\sqrt{2}$. The angle of incidence (in degrees) is_____

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/oXrhHFiw3E

Q51 JEE Main 2025 · 28 Jan · Shift 1

A thin prism P_1 with angle 4° made of glass having refractive index 1.54 , is combined with another thin prism P_2 made of glass having refractive index 1.72 to get dispersion without deviation. The angle of the prism P_2 in degrees is

(A) 1.5
(B) 16/3
(C) 3
(D) 4

Step-by-step solution ▸ prepwiser.in/questions/N_joG6ePOQ

Q52 JEE Main 2025 · 23 Jan · Shift 2

The refractive index of the material of a glass prism is $\sqrt{3}$. The angle of minimum deviation is equal to the angle of the prism. What is the angle of the prism?

(A) 60°
(B) 50°
(C) 58°
(D) 48°

Step-by-step solution ▸ prepwiser.in/questions/2uqxGrPHOB

Q53 JEE Main 2024 · 6 Apr · Shift 1

The refractive index of prism is $\mu = \sqrt{3}$ and the ratio of the angle of minimum deviation to the angle of prism is one. The value of angle of prism is _____$^\circ$.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/IeELowcDWt

Q54 JEE Main 2024 · 5 Apr · Shift 2

Given below are two statements :

Statement I : When the white light passed through a prism, the red light bends lesser than yellow and violet.

Statement II : The refractive indices are different for different wavelengths in dispersive medium. In the light of the above statements, chose the correct answer from the options given below :

(A) Both Statement I and Statement II are true
(B) Statement I is true but Statement II is false
(C) Statement I is false but Statement II is true
(D) Both Statement I and Statement II are false

Step-by-step solution ▸ prepwiser.in/questions/b5thvo2Oon

Q55 JEE Main 2024 · 31 Jan · Shift 1

The refractive index of a prism with apex angle A is $\cot A/2$. The angle of minimum deviation is :

(A) $\delta_m = 180^\circ - 3\mathrm{A}$
(B) $\delta_m = 180^\circ - 4A$
(C) $\delta_m = 180^\circ - 2A$
(D) $\delta_m = 180^\circ - A$

Step-by-step solution ▸ prepwiser.in/questions/wHu1pK7KtW

Q56 JEE Main 2024 · 27 Jan · Shift 1

If the refractive index of the material of a prism is $\cot\left(\frac{A}{2}\right)$, where A is the angle of prism then the angle of minimum deviation will be

(A) $\pi - 2\mathrm{A}$

(B) $\frac{\pi}{2} - 2\mathrm{A}$

(C) $\pi - \mathrm{A}$

(D) $\frac{\pi}{2} - \mathrm{A}$

Step-by-step solution ▸ prepwiser.in/questions/dNS2SVopEa

Q57 JEE Main 2023 · 15 Apr · Shift 1

The refractive index of a transparent liquid filled in an equilateral hollow prism is $\sqrt{2}$. The angle of minimum deviation for the liquid will be _____ °.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/QS77egvcNp

Q58 JEE Main 2023 · 30 Jan · Shift 2

A thin prism P_1 with an angle 6° and made of glass of refractive index 1.54 is combined with another prism P_2 made from glass of refractive index 1.72 to produce dispersion without average deviation. The angle of prism P_2 is

(A) 4.5°

(B) 7.8°

(C) 1.3°

(D) 6°

Step-by-step solution ▸ prepwiser.in/questions/hoJ8ID72ed

Q59 JEE Main 2022 · 30 Jun · Shift 1

The refractive index of an equilateral prism is $\sqrt{2}$. The angle of emergence under minimum deviation position of prism, in degree, is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/U8V1QPrtVT

Q60 JEE Main 2022 · 28 Jun · Shift 1

The refracting angle of a prism is A and refractive index of the material of the prism is cot (A/2). Then the angle of minimum deviation will be -

(A) 180 − 2A

(B) 90 − A

(C) 180 + 2A

(D) 180 − 3A

Step-by-step solution ▸ prepwiser.in/questions/k9uv8E9I0N

Q61 JEE Main 2021 · 25 Jul · Shift 2

A prism of refractive index μ and angle of prism A is placed in the position of minimum angle of deviation. If minimum angle of deviation is also A, then in terms of refractive index

(A) $2\cos^{-1}\left(\frac{\mu}{2}\right)$

(B) $\sin^{-1}\left(\frac{\mu}{2}\right)$

(C) $\sin^{-1}\left(\sqrt{\frac{\mu-1}{2}}\right)$

(D) $\cos^{-1}\left(\frac{\mu}{2}\right)$

Step-by-step solution ▸ prepwiser.in/questions/Qetn7Oufst

Q62 JEE Main 2021 · 22 Jul · Shift 2

A ray of light passing through a prism ($\mu = \sqrt{3}$) suffers minimum deviation. It is found that the angle of incidence is double the angle of refraction within the prism. Then, the angle of prism is _____ (in degrees).

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/WNpZl03rVu

Q63 JEE Main 2021 · 16 Mar · Shift 2

A deviation of 2° is produced in the yellow ray when prism of crown and flint glass are achromatically combined. Taking dispersive powers of crown and flint glass as 0.02 and 0.03 respectively and refractive index for yellow light for these glasses are 1.5 and 1.6 respectively. The refracting angles for crown glass prism will be _____$^\circ$ (in degree). (Round off to the Nearest Integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/k5EzoZduty

Q64 JEE Main 2020 · 5 Sep · Shift 2

A prism of angle A = 1^o has a refractive index μ = 1.5. A good estimate for the minimum angle of deviation (in degrees) is close to $\frac{N}{10}$.
Value of N is ____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/bcJJCK5XrD

Optical Instruments · 11 PYQs

Q65 JEE Main 2023 · 8 Apr · Shift 1

In a reflecting telescope, a secondary mirror is used to:

(A) make chromatic aberration zero

(B) remove spherical aberration

(C) reduce the problem of mechanical support

(D) move the eyepiece outside the telescopic tube

Step-by-step solution ▸ prepwiser.in/questions/e_FWHc1Wd0

Q66 JEE Main 2023 · 30 Jan · Shift 1

A person has been using spectacles of power -1.0 dioptre for distant vision and a separate reading glass of power 2.0 dioptres. What is the least distance of distinct vision for this person :

(A) 50 cm

(B) 40 cm

(C) 30 cm

(D) 10 cm

Step-by-step solution ▸ prepwiser.in/questions/XnEjBa7j67

Q67 JEE Main 2023 · 29 Jan · Shift 2

A scientist is observing a bacteria through a compound microscope. For better analysis and to improve its resolving power he should. (Select the best option)

(A) Decrease the focal length of the eye piece.

(B) Increase the wave length of the light

(C) Increase the refractive index of the medium between the object and objective lens

(D) Decrease the diameter of the objective lens

Step-by-step solution ▸ prepwiser.in/questions/dgPislqHY9

Q68 JEE Main 2022 · 28 Jul · Shift 1

In normal adujstment, for a refracting telescope, the distance between objective and eye piece is 30cm. The focal length of the objective, when the angular magnification of the telescope is 2 , will be :

(A) 20 cm

(B) 30 cm

(C) 10 cm

(D) 15 cm

Step-by-step solution ▸ prepwiser.in/questions/jmaWePY2mx

Q69 JEE Main 2022 · 27 Jul · Shift 1

A microscope was initially placed in air (refractive index 1). It is then immersed in oil (refractive index 2). For a light whose wavelength in air is λ, calculate the change of microscope's resolving power due to oil and choose the correct option.

(A) Resolving power will be $\frac{1}{4}$ in the oil than it was in the air.

(B) Resolving power will be twice in the oil than it was in the air.

(C) Resolving power will be four times in the oil than it was in the air.

(D) Resolving power will be $\frac{1}{2}$ in the oil than it was in the air.

Step-by-step solution ▸ prepwiser.in/questions/90A-v0_8jK

Q70 JEE Main 2022 · 28 Jun · Shift 1

The aperture of the objective is 24.4 cm. The resolving power of this telescope, if a light of wavelength 2440 $\overset{o}{A}$ is used to see th object will be :

(A) 8.1×10^6

(B) 10.0×10^7

(C) 8.2×10^5

(D) 1.0×10^{-8}

Step-by-step solution ▸ prepwiser.in/questions/zQ716rSexP

Q71 JEE Main 2021 · 20 Jul · Shift 1

An object viewed from a near point distance of 25 cm, using a microscopic lens with magnification '6', gives an unresolved image. A resolved image is observed at infinite distance with a total magnification double the earlier using an eyepiece along with the given lens and a tube of length 0.6 m, if the focal length of the eyepiece is equal to _____ cm.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/3wPvaBxbuF

Q72 JEE Main 2021 · 18 Mar · Shift 1

Your friend is having eye sight problem. She is not able to see clearly a distant uniform window mesh and it appears to her as non-uniform and distorted. The doctor diagnosed the problem as :

(A) Astigmatism

(B) Myopia with Astigmatism

(C) Presbyopia with Astigmatism

(D) Myopia and Hypermetropia

Step-by-step solution ▸ prepwiser.in/questions/LBCuya_PDP

Q73 JEE Main 2020 · 4 Sep · Shift 1

In a compound microscope, the magnified virtual image is formed at a distance of 25 cm from the eye-piece. The focal length of its objective lens is 1 cm. If the magnification is 100 and the tube length of the microscope is 20 cm, then the focal length of the eye-piece lens (in cm) is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/wMtnrpJLab

Q74 JEE Main 2020 · 8 Jan · Shift 1

The magnifying power of a telescope with tube 60 cm is 5. What is the focal length of its eye piece ?

(A) 40 cm

(B) 10 cm

(C) 30 cm

(D) 20 cm

Step-by-step solution ▸ prepwiser.in/questions/dpJKNRrGtg

Q75 JEE Main 2020 · 7 Jan · Shift 1

If we need a magnification of 375 from a compound microscope of tube length 150 mm and an objective of focal length 5 mm, the focal length of the eye-piece, should be close to :

(A) 22 mm

(B) 12 mm

(C) 33 mm

(D) 2 mm

Step-by-step solution ▸ prepwiser.in/questions/M7VKN3YVWW

Total Internal Reflection · 6 PYQs

Q76 JEE Main 2024 · 8 Apr · Shift 1

Critical angle of incidence for a pair of optical media is 45°. The refractive indices of first and second media are in the ratio:

(A) $1:2$

(B) $1:\sqrt{2}$

(C) $2:1$

(D) $\sqrt{2}:1$

Step-by-step solution ▸ prepwiser.in/questions/Gp6UDW02kN

Q77 JEE Main 2023 · 11 Apr · Shift 1

The critical angle for a denser-rarer interface is 45°. The speed of light in rarer medium is $3 \times 10^8 \mathrm{m/s}$. The speed of light in the denser medium is:

(A) $2.12 \times 10^8 \mathrm{m/s}$

(B) $5 \times 10^7 \mathrm{m/s}$

(C) $\sqrt{2} \times 10^8 \mathrm{m/s}$

(D) $3.12 \times 10^7 \mathrm{m/s}$

Step-by-step solution ▸ prepwiser.in/questions/JmUMU8tVit

Q78 JEE Main 2022 · 26 Jul · Shift 2

Light travels in two media M_1 and M_2 with speeds $1.5 \times 10^8 \mathrm{ms}^{-1}$ and $2.0 \times 10^8 \mathrm{ms}^{-1}$ respectively. The critical angle between them is :

(A) $\tan^{-1}\left(\frac{3}{\sqrt{7}}\right)$

(B) $\tan^{-1}\left(\frac{2}{3}\right)$

(C) $\cos^{-1}\left(\frac{3}{4}\right)$

(D) $\sin^{-1}\left(\frac{2}{3}\right)$

Step-by-step solution ▸ prepwiser.in/questions/2W7xvlcoRD

Q79 JEE Main 2022 · 29 Jun · Shift 2

The speed of light in media 'A' and 'B' are 2.0×10^{10} cm/s and 1.5×10^{10} cm/s respectively. A ray of light enters from the medium B to A at an incident angle 'θ'. If the ray suffers total internal reflection, then

(A) $\theta = \sin^{-1}\left(\frac{3}{4}\right)$

(B) $\theta > \sin^{-1}\left(\frac{2}{3}\right)$

(C) $\theta < \sin^{-1}\left(\frac{3}{4}\right)$

(D) $\theta > \sin^{-1}\left(\frac{3}{4}\right)$

Step-by-step solution ▸ prepwiser.in/questions/6me-ffRMKK

Q80 JEE Main 2022 · 25 Jun · Shift 1

A light wave travelling linearly in a medium of dielectric constant 4, incidents on the horizontal interface separating medium with air. The angle of incidence for which the total intensity of incident wave will be reflected back into the same medium will be :

(Given : relative permeability of medium μ_r = 1)

(A) 10°

(B) 20°

(C) 30°

(D) 60°

Step-by-step solution ▸ prepwiser.in/questions/diFWIGdtur

Q81 JEE Main 2020 · 8 Jan · Shift 1

The critical angle of a medium for a specific wavelength, if the medium has relative permittivity 3 and relative permeability $\frac{4}{3}$ for this wavelength, will be :

(A) 45°

(B) 15°

(C) 30°

(D) 60°

Step-by-step solution ▸ prepwiser.in/questions/pPx0LDwOXb

Reflection and Mirrors · 9 PYQs

Q82 JEE Main 2025 · 7 Apr · Shift 2

A mirror is used to produce an image with magnification of $\frac{1}{4}$. If the distance between object and its image is 40 cm, then the focal length of the mirror is _____.

(A) 10 cm

(B) 12.7 cm

(C) 10.7 cm

(D) 15 cm

Step-by-step solution ▸ prepwiser.in/questions/fhCjZI8eVr

Q83 JEE Main 2025 · 4 Apr · Shift 1

When an object is placed 40 cm away from a spherical mirror an image of magnification $\frac{1}{2}$ is produced. To obtain an image with magnification of $\frac{1}{3}$, the object is to be moved :

(A) 20 cm away from the mirror.

(B) 20 cm towards the mirror.

(C) 80 cm away from the mirror.

(D) 40 cm away from the mirror.

Step-by-step solution ▸ prepwiser.in/questions/Vra_BYZ8Lf

Q84 JEE Main 2025 · 23 Jan · Shift 2

A concave mirror of focal length f in air is dipped in a liquid of refractive index μ. Its focal length in the liquid will be:

(A) μf

(B) f

(C) $\frac{f}{\mu}$

(D) $\frac{f}{(\mu-1)}$

Step-by-step solution ▸ prepwiser.in/questions/aPzz4NocZ8

Q85 JEE Main 2023 · 11 Apr · Shift 2

When one light ray is reflected from a plane mirror with 30° angle of reflection, the angle of deviation of the ray after reflection is :

(A) 140°

(B) 130°

(C) 120°

(D) 110°

Step-by-step solution ▸ prepwiser.in/questions/L73fkOejzS

Q86 JEE Main 2023 · 25 Jan · Shift 2

The light rays from an object have been reflected towards an observer from a standard flat mirror, the image observed by the observer are :-

A. Real

B. Erect

C. Smaller in size then object

D. Laterally inverted

Choose the most appropriate answer from the options given below :

(A) B and D only

(B) A, C, and D only

(C) A and D only

(D) B and C only

Step-by-step solution ▸ prepwiser.in/questions/WmQNuR5-6g

Q87 JEE Main 2021 · 27 Aug · Shift 1

An object is placed beyond the centre of curvature C of the given concave mirror. If the distance of the object is d_1 from C and the distance of the image formed is d_2 from C, the radius of curvature of this mirror is :

(A) $\frac{2d_1d_2}{d_1-d_2}$

(B) $\frac{2d_1d_2}{d_1+d_2}$

(C) $\frac{d_1d_2}{d_1+d_2}$

(D) $\frac{d_1d_2}{d_1-d_2}$

Step-by-step solution ▸ prepwiser.in/questions/MnaSXfB_nU

Q88 JEE Main 2021 · 26 Aug · Shift 1

Car B overtakes another car A at a relative speed of 40 ms^{-1}. How fast will the image of car B appear to move in the mirror of focal length 10 cm fitted in car A, when the car B is 1.9 m away from the car A?

(A) 4 ms^{-1}

(B) 0.2 ms^{-1}

(C) 40 ms^{-1}

(D) 0.1 ms^{-1}

Step-by-step solution ▸ prepwiser.in/questions/j01vaEHjgc

Q89 JEE Main 2021 · 24 Feb · Shift 1

The focal length f is related to the radius of curvature r of the spherical convex mirror by :

(A) f = r

(B) f = − r

(C) f = $+\frac{1}{2}$ r

(D) f = −${{1 \over 2}}$ r

Step-by-step solution ▸ prepwiser.in/questions/MfjvVdZics

Q90 JEE Main 2020 · 3 Sep · Shift 2

When an object is kept at a distance of 30 cm from a concave mirror, the image is formed at a distance of 10 cm from the mirror. If the object is moved with a speed of 9 cms^{-1}, the speed (in cms^{-1}) with which image moves at that instant is ___.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/d5pxBGpdSI

Answer key — Ray Optics

Numbers match the question numbers above. For full working, open the solution link under each question.

1	**B**	2	**B**	3	**D**	4	**2**	5	**B**	6	**3**	7	**A**	8	**D**
9	**50**	10	**C**	11	**A**	12	**C**	13	**D**	14	**C**	15	**C**	16	**A**
17	**200**	18	**30**	19	**30**	20	**B**	21	**D**	22	**C**	23	**C**	24	**B**
25	**A**	26	**B**	27	**B**	28	**A**	29	**A**	30	**B**	31	**B**	32	**10**
33	**D**	34	**D**	35	**5**	36	**4**	37	**D**	38	**54**	39	**15**	40	**B**
41	**B**	42	**10**	43	**B**	44	**15**	45	**A**	46	**476**	47	**60**	48	**C**
49	**D**	50	**45**	51	**C**	52	**A**	53	**60**	54	**A**	55	**C**	56	**A**
57	**30**	58	**A**	59	**45**	60	**A**	61	**A**	62	**60**	63	**12**	64	**5**
65	**D**	66	**A**	67	**C**	68	**A**	69	**B**	70	**C**	71	**25**	72	**B**
73	**6**	74	**B**	75	**A**	76	**D**	77	**A**	78	**A**	79	**D**	80	**D**
81	**C**	82	**C**	83	**D**	84	**B**	85	**C**	86	**A**	87	**A**	88	**D**
89	**C**	90	**1**												