



PHYSICS

NCERT - NCERT PHYSICS(TELUGU)

REFRACTION OF LIGHT AT CURVED SURFACES

Example

1. A bird is flying down vertically towards the surface of water in a pond with constant

speed. There is a fish inside the water. If that fish is exactly vertically below the bird, then the bird will appear to the fish to be :

Which of the four options are true? How can you prove it?

A. farther away than its actual distance.

B. closer than its actual distance

C. moving faster than its actual speed

D. moving slower than its actual speed.

Answer: A::C



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2. A transparent sphere of radius R and refractive index n is kept in air. At what distance from the surface of the sphere should a point object be placed on the principal axis so as to form a real image at the same distance from the second surface of the sphere?



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3. A transparent (glass) sphere has a small, opaque dot at its centre. Does the apparent position of the dot appear to be the same as its actual position when observed from outside?



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4. Draw a ray diagram to locate the position of image when a point source (S) is placed on optical axis MN of a convex lens, in such a way that it is beyond focal point (F_2).



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5. Complete the ray diagram to show the paths of the rays after refraction through the lenses shown in the figures?



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6. An electric lamp and a screen are placed on the table, in a line at a distance of 1m. In what

positions of convex lens of focal length of $f = 21\text{ cm}$ will the image of lamp be sharp?



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7. What is the focal length of double concave lens kept in air with two spherical surfaces of radii $R_1 = 30\text{ cm}$ and $R_2 = 60\text{ cm}$. Take refractive index of lens as $n = 1.5$.



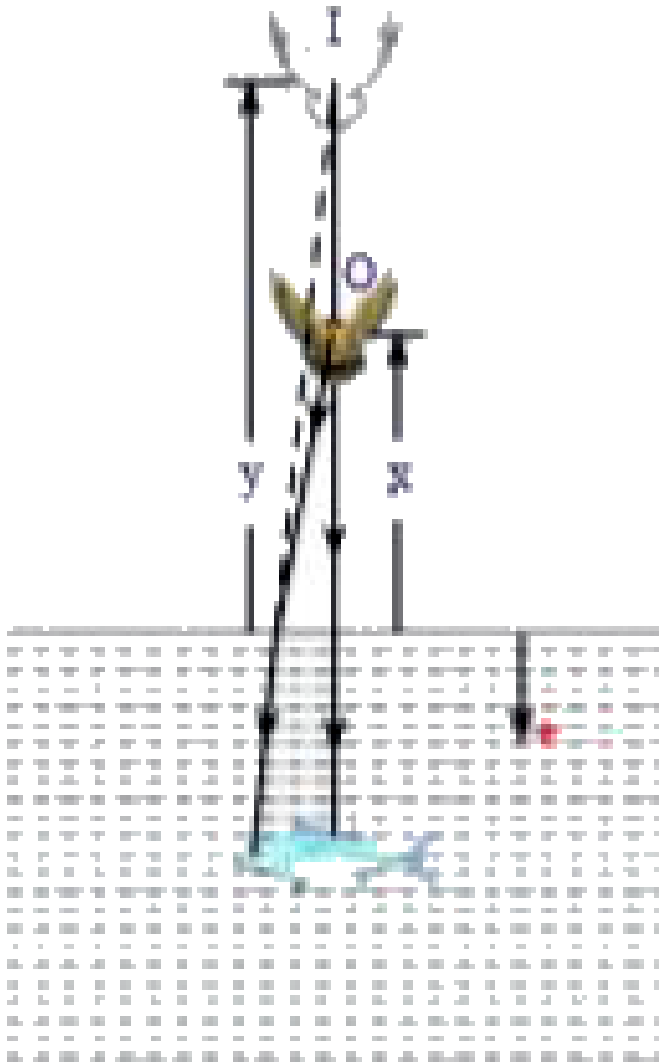
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8. A bird is flying down vertically towards the surface of water in a pond with constant speed. There is a fish inside the water. If that fish is exactly vertically below the bird, then the bird will appear to the fish to be:

- a. farther away than its actual distance.
- b. closer than its actual distance.
- c. moving faster than its actual speed.
- d. moving slower than its actual speed.

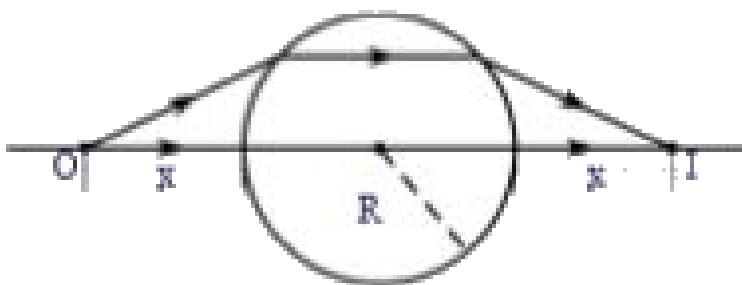
Which of the four options are true? How can

you prove it?



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9. A transparent sphere of radius R and refractive index n is kept in air. At what distance from the surface of the sphere should a point object be placed on the principal axis so as to form a real image at the same distance from the second surface of the sphere?



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10. A transparent (glass) sphere has a small, opaque dot at its centre. Does the apparent position of the dot appear to be the same as its actual position when observed from outside?



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11. Draw a ray diagram to locate the position of image when a point source (S) is placed on

optical axis MN of a convex lens, in such a way that it is beyond focal point (F). See figure E(4).

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12. Complete the ray diagram to show the paths of the rays after refraction through the lenses shown in the figures E5(a) and E5(b)?



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13. An electric lamp and a screen are placed on the table, in a line at a distance of 1m. In what positions of convex lens of focal length of $f = 21$ cm will the image of lamp be sharp?



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14. What is the focal length of double concave lens kept in air with two spherical surfaces of radii $R_1 = 30\text{cm}$ and $R_2 = 60\text{cm}$. Take refractive index of lens as $n = 1.5$.



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Improve Your Learning Application Of Concepts

1. The focal length of a converging lens is 20cm. 2 cm. height object is 60cm from the lens. Where will the image be formed and what kind of image is it? And also find the height of the image (AS_1)



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2. Find the refractive index of the glass which is a symmetrical convergent lens if its focal length is equal to the radius of curvature of its surface.



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3. Find the radii of curvature of a convexo – concave convergent lens made of glass with refractive index $n=1.5$ having focal length of

24cm. One of the radii of curvature is double the other.



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Improve Your Learning

1. The focal length of a converging lens is 20cm. An object is 60cm from the lens. Where will the image be formed and what kind of image is it? (AS1)



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2. Find the refractive index of the glass which is a symmetrical convergent lens if its focal length is equal to the radius of curvature of its surface. (AS7)



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3. Find the radii of curvature of a convexo – concave convergent lens made of glass with refractive index $n=1.5$ having focal length of

24cm. One of the radii of curvature is double the other.



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