



PHYSICS

BOOKS - SELINA PHYSICS (ENGLISH)

REFRACTION OF LIGHT

Examples

1. A ray of light bends while passing from one transparent medium to another medium having a different refractive index.

(a) Name the phenomenon. Give reason for it.

(b) How do the following quantities change:

speed. Wavelength, frequency and amplitude
is second medium is denser than the first
medium.

(c) State whether the ray of light will bend or
not, if both media have the same refractive
index.



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2. A ray of light falls normally on a glass slab. Draw a diagram showing the path of the ray till it emerges out of the slab. What is the angle of incidence and angle of refraction at each surface of slab ?



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3. The refractive index of water is $\frac{4}{3}$. Explain the meaning of this statement.



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4. Refractive index of water is $\frac{4}{3}$. calculate the speed of light in water. Speed of light in vacuum is $3 \times 10^8 \text{ms}^{-1}$.



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5. The refractive index of water is $\frac{4}{3}$ and glass is $\frac{3}{2}$. What is the refractive index of glass with respect to water ?



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6. Orange light of wavelength 6600 \AA travelling in air gets refracted in water. If the speed of light in air is $3 \times 10^8 \text{ ms}^{-1}$ and refractive index of water is $4/3$, find : (i) the frequency of light in air, (ii) the speed of light in water, and (iii) the wavelength of light in water.



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7. A ray of light strikes a glass slab 5 cm thick, making an angle of incidence equal to 30° .

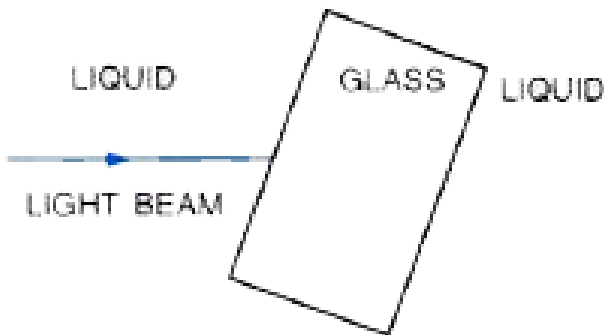
(a) Draw a ray diagram showing the emergent ray and the refracted ray through the glass block. The refractive index of glass is 1.5 .

(b) Measure the lateral displacement of the ray. The $\sin 19.5^\circ = 1/3$.



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8. The diagram below shows a glass block suspended in a liquid. A beam of light of single colour is incident from liquid on one side of the block.



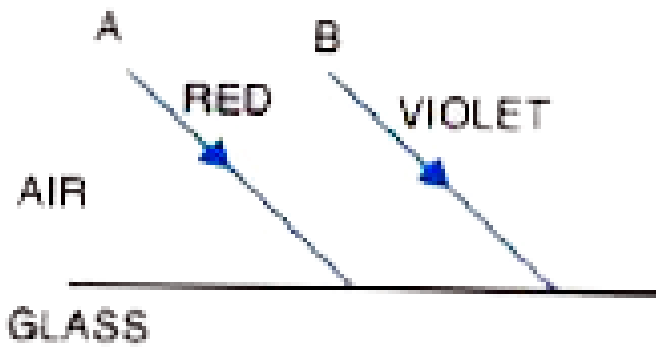
(a) Draw diagrams to show how does the light bend when it travels from liquid to glass and then to liquid if (i) the light slows down in glass, and (ii) the light speeds up in glass.

(b) State two conditions under which the light ray passing from liquid to glass travels straight without bending. will the glass be visible then ?



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9. The diagram below shows two parallel rays A and B of red and violet light respectively incident from air on air-glass boundary. Complete the diagram showing the refracted rays for them in the glass.



(i) How do the speeds of the rays differ in glass ?

(ii) are the two refracted rays in glass parallel ?

Give a reason for your answer.

(iii) How does the refractive index of glass differ for the two rays ?



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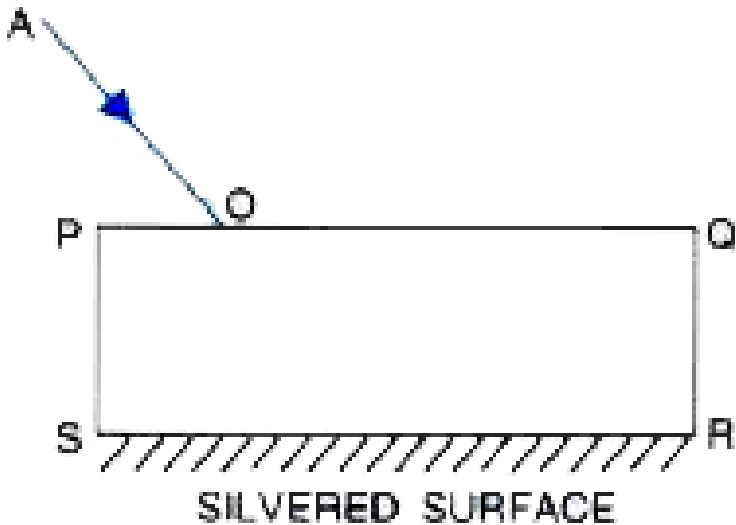
10. Figure shows a ray of light AO incident on a rectangular glass block PQRS, which is silvered at the surface RS. The ray is partly reflected and partly refracted.

(a) Draw the path of the reflected and refracted rays.

(b) Show at least two rays emerging from the surface PQ after reflection from the surface RS.

(c) How many images are formed in the above

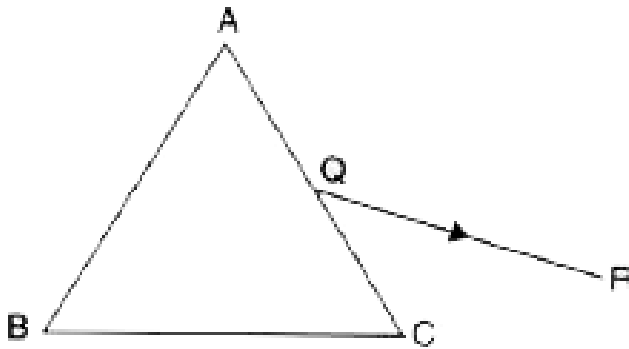
case ? Which image is the brightest ?



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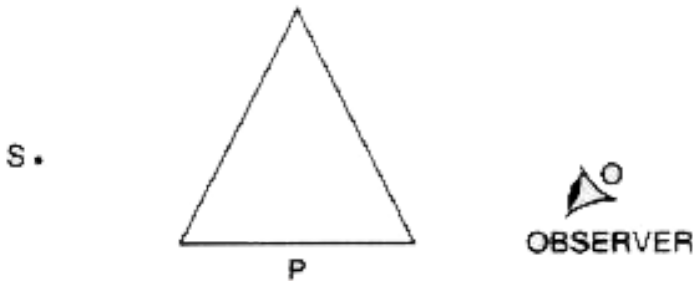
11. Figure alongside shows an equilateral prism ABC and the ray QR emerging out from the prism after suffering minimum deviation.

Complete the diagram to show the refracted ray PQ inside the prism and the incident ray OP on the prism. State in words how have you completed the diagram to show the refracted ray PQ inside the prism and the incident ray OP on the prism. state in words how have you completed the diagram.



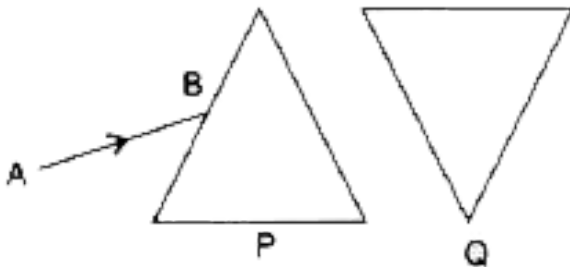
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12. In Figure, a monochromatic point source of light S is viewed by an observer O through a prism P. complete the diagram to show the image formed by the prism and as seen by the observer O. label the image by the letter I.



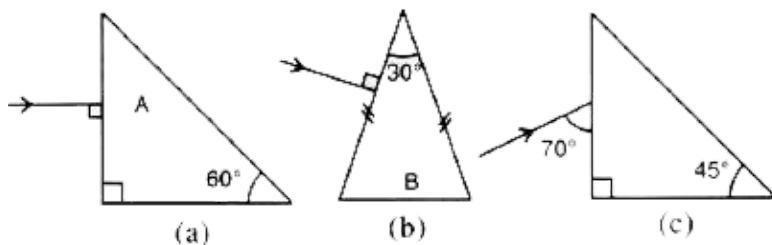
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13. Figure shows two identical prisms P and Q placed with their faces parallel to each other. A light ray AB of yellow colour is incident at the face of the prism P. Complete the diagram to show the path of the ray till it emerges out of the prism Q.



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14. Figure below shows a light ray of green colour incident on the prisms A,B and C. in each case, draw the path of the ray of light as it enters and emergest out of the prism. Mark the angle wherever necessary.



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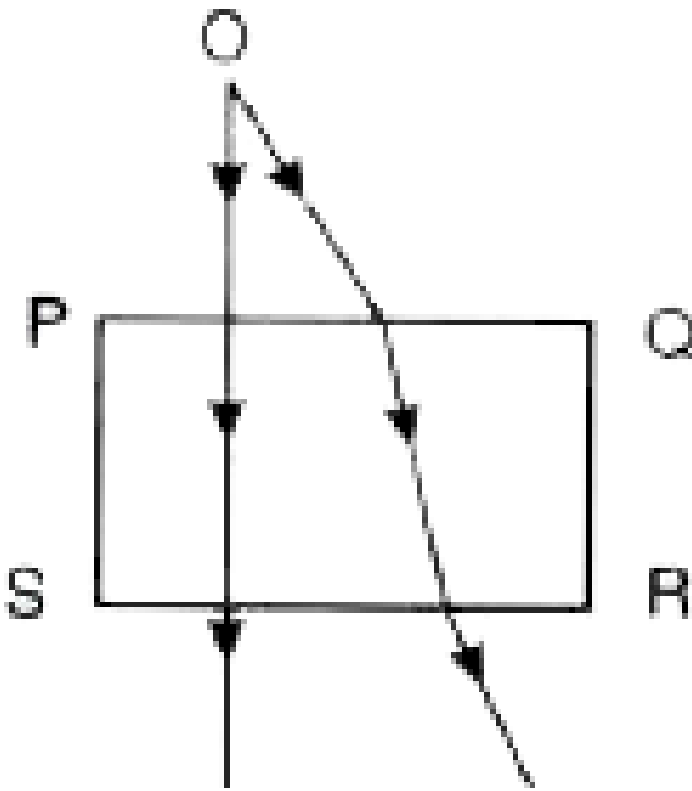
15. The apparent depth of a liquid in a vessel is 15 cm, when its real depth is 20 cm. find the

refractive index of the liquid.



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16. A point source of light O of single colour is seen through a rectangular glass slab $PQRS$. The paths of two rays, in and outside the slab, are shown in figure.



In the diagram, label the position I of the source O where it will appear when seen through the surface RS.

(ii) Does the source O appear to be nearer or farther with respect to the surface PQ ?

(iii) How does the shift depend on the thickness PS or QR of the slab?

(iv) Justify your answer in (iii) with the help of an appropriate ray diagram.

(v) For the same rectangular glass slab, which colour from the visible spectra (violet to red) will produce the maximum shift ?



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17. A glass slab is placed over a piece of paper on which VIBGYOR is printed with each letter

into its corresponding colour.

(i) Will the image of all the letters be in the same place?

(ii) The letter of which colour will appear to be raised (a) maximum, and (b) minimum ?

Explain your answer.



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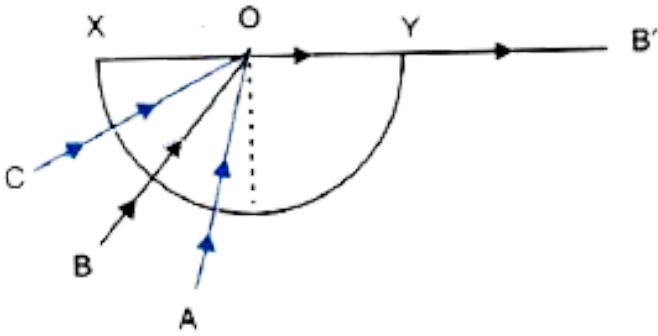
18. A coin kept inside water ($\mu = 4/3$) when viewed from air in a vertical direction, appears

to be raised by 2.0mm . Find the depth of the coin in water.



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19. Figure shows the section of a semi-circular glass slab having its centre at O. three rays of light A,B and C of the same colour are incident on the slab and strike on the edge XY at the point O. the light ray B suffers refraction along OB'.



- (a) On the diagram, mark the critical angle by C.
- (b) The rays enter the slab undeviated. give reason.
- (c) Draw the path of rays A and C after they strike the edge XY.
- (d) Name the phenomenon which the rays A and C exhibit.



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20. Show with the aid of a ray diagram, how a right angled isosceles prism can be used to invert the rays. (a) How should the rays fall on the prism ?

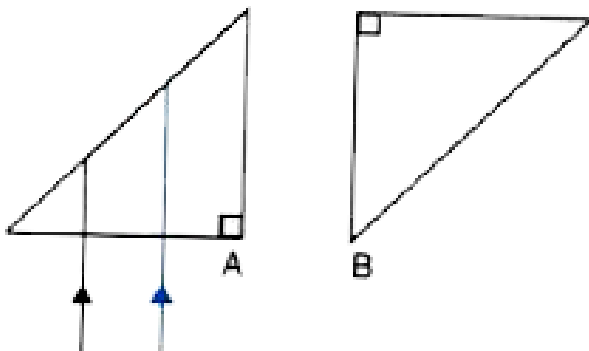
(b) Which phenomenon is responsible for this action of prism? (c) What is the nature of the image in relation to the object ?



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21. (a) Figure shows two isosceles right angled prisms A and B and the light rays incident on the prism A. complete the diagram to show the rays emerging out of the prism B.

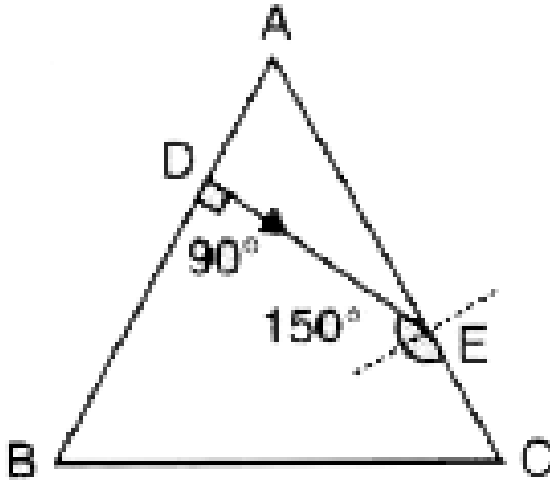
(b) State the principle used for completing the ray diagram in part (a) above.



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22. The critical angle for material of which the equiangular prism ABC shown in figure is made, is 60° . A ray of light incident on the side AB of the prism is refracted along DE such that the angle it makes with the side AC is 150° and $\angle EDB = 90^\circ$. draw the path of the incident ray on the side AB (which travels along DE) and also the path along which the

ray DE travels from the point E onwards.



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Exercise 4 A

1. What do you understand by the term 'refraction of light'?



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2. Draw diagrams to show the refraction of light from (i) air to glass, and (ii) glass to air. In each diagram, label the incident ray, refracted ray, the angle of incidence (i) and the angle of refraction (r).



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3. A ray of light is incident normally on a plane glass slab. What will be (i) the angle of refraction, and (ii) the angle of deviation for the ray ?



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4. An obliquely incident light ray bends at the surface due to change in speed, when passing from one medium to another. The ray does not

bend when it is incident normally. Will the ray have different speed in the other medium ?



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5. What is the cause of refraction of light when it passes from one medium to another ?



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6. A light ray suffers reflection and refraction at the boundary in passing from air to water.

Draw a neat labelled ray diagram to show it.



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7. A ray of light passes from medium 1 to medium 2. which of the following quantities of the refracted ray will differ from that of the incident ray speed, intensity, frequency, and wavelength ?



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8. State the Snell's laws of refraction of light.



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9. Define the term refractive index of a medium. Can it be less than 1 ?



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10. (a) Compare the speed of light of wavelength 4000 \AA (i.e., violet light) and 8000

Å (i.e. red light) in vacuum.

(b) How is the refractive index of a medium related to the speed of light in it and in vacuum or air ?



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11. A light ray passes from water to (i) air, and (ii) glass. In each case, state how does the speed of light change.



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12. A light ray in passing from water to a medium (a) speeds up, (b) slows down. In each case, (i) give one example of the medium, (ii) state whether the refractive index of medium is equal to, less than or greater than the refractive index of water.



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13. What do you understand by the statement the refractive index of glass is 1.5 for white light' ?



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14. A monochromatic ray of light passes from air to glass. The wavelength of light in air is λ , the speed of light in air is c and in glass is v . If the refractive index of glass is 1.5 , write down (a) the relationship between c and v , (b) the wavelength of light in glass.



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15. A boy uses blue colour of light to find the refractive index of glass. He then repeats the experiment using red colour of light. Will the refractive index be the same or different in the two cases? Give a reason to support your answer.



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16. (a) For which colour of white light, is the refractive index of a transparent medium (i)

the least, (ii) the most ?

(b) Which colour of light travels fastest in any medium except air ?



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17. Name two factors on which the refractive index of a medium depends ? State how does it depend on the factors stated by you.



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18. How does the refractive index of a medium depend on the wavelength of light used ?



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19. How does the refractive index of a medium depend on its temperature ?



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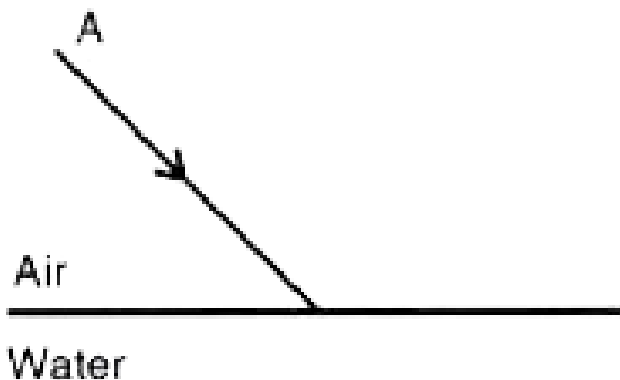
20. Light of a single colour is passed through a liquid having a piece of glass suspended in it. On changing the temperature of liquid, at a particular temperature the glass piece is not seen.

(i) When is the glass piece not seen ?

(ii) why is the light of a single colour used ?



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21.

In Figure, a ray of light A incident from air suffers partial reflection and refraction at the boundary of water.

(a) Complete the diagram showing (i) the reflected ray B and (ii) the refracted ray C.

(b) How are the angles of incidence i and refraction r related ?

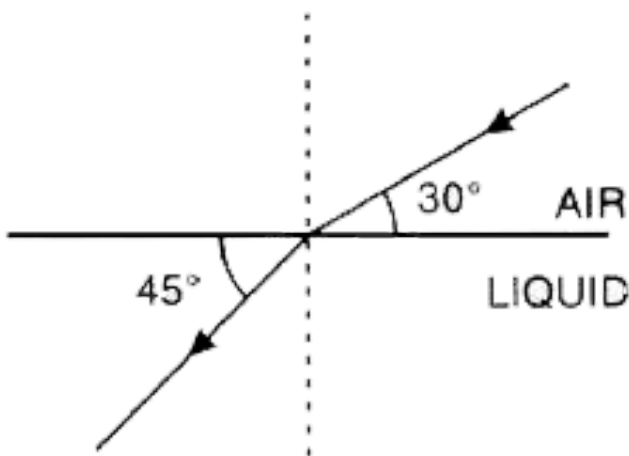


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22. The diagram alongside shows the refraction of a ray of light from air to a liquid.

(a) Write the values of (i) angle of incidence, and (ii) angle of refraction.

(b) Use snell's law to find the refractive index of liquid with respect to air.





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23. The refractive index of water with respect to air is ${}_a\mu_w$ and of glass with respect to air is ${}_a\mu_g$. Express the refractive index of glass with respect to water.



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24. What is lateral displacement ? Draw a ray diagram showing the lateral displacement of a

ray of light when it passes through a parallel sides glass slab.

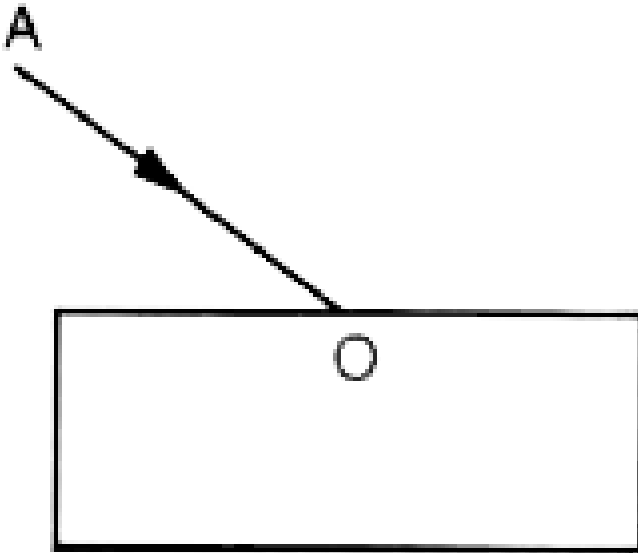


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25. A ray of light strikes the surface of a rectangular glass slab such that the angle of incidence in air is (i) 0° , (ii) 45° . In each case, draw a diagram to show the path taken by the ray as it passes through the glass slab and emerges from it.



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26.

In the adjacent diagram, AO is a ray of light incident on a rectangular glass slab.

(a) Complete the path of the ray till it emerges out of the slab.

(b) In the diagram, mark the angle of incidence

(i) and the angle of refraction (r) at the first

interface. how is the refractive index of glass related to the angles i and r ?

(c) Mark angle of emergence by the letter e .

how are the angles i and e related ?

(d) Which two rays are parallel to each other ?

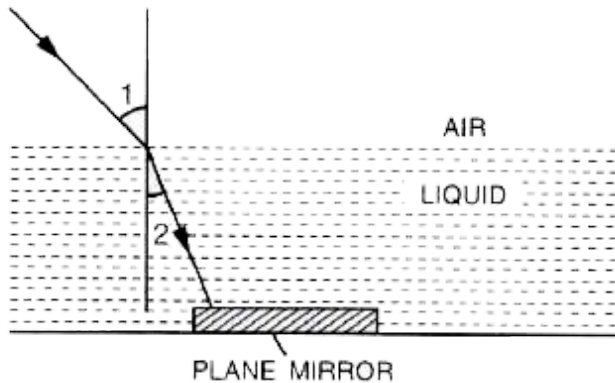
Name them

(e) Indicate in the diagram the lateral displacement between the emergent ray and the incident ray. state one factor that affects the lateral displacement.



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27. A ray of green light enters a liquid from air, as shown in figure. Angle 1 is 45° and angle 2 is 30° .



- Find the refractive index of the liquid
- Show in the diagram the path of the ray after it strikes the mirror and re-enters in air. mark in the diagram the angles wherever necessary.
- Redraw the diagram if plane mirror

becomes normal to the refracted ray inside the liquid.

state the principle used.



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28. When an illuminated object is held in front of a thick plane glass mirror, several images are seen, out of which the second image is brightest. Give reason.



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29. Fill in the blanks to complete the following sentence:

Q: When light travels from a rarer to a denser medium, its speed _____



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30. Fill the blanks to complete the following sentence:

Q: When light travels from a denser to a rarer medium, its speed _____



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31. Fill in the blanks to complete the following sentence:

Q: The refractive index of glass with respect to air is $\frac{3}{2}$. the refractive index of air with respect to glass will be _____



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Exercise 4 A Multiple Choice Type

1. When a ray of light from air enters a denser medium, it :

A. bends away from the normal

B. bends towards the normal

C. goes undeviated

D. is reflected back

Answer: B



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2. A light ray does not bend at the boundary in passing from one medium to the other medium if the angle of incidence is :

A. 0°

B. 45°

C. 60°

D. 90°

Answer: A



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3. The highest refractive index is of :

A. glass

B. water

C. diamond

D. ruby

Answer: C



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1. The speed of light in air is $3 \times 10^8 \text{ m s}^{-1}$.

Calculate the speed of light in glass. The refractive index of glass is 1.5.



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2. The speed of light in diamond is $125,000 \text{ km s}^{-1}$ what is its refractive index? (Speed of light in air = $3 \times 10^8 \text{ m s}^{-1}$).



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3. The refractive index of water with respect to air is $\frac{4}{3}$. What is the refractive index of air with respect to water ?



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4. A ray of light of wavelength 5400 \AA suffers refractive from air to glass. Taking ${}_a\mu_g = \frac{3}{2}$, find the wavelength of light in glass.



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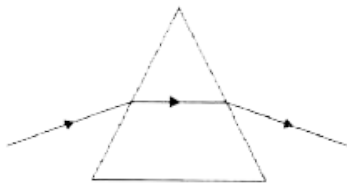
Exercise 4 B

1. What is prism? With the help of a diagram of the principal section of a prism, indicate its refracting surface, refracting edge and base.

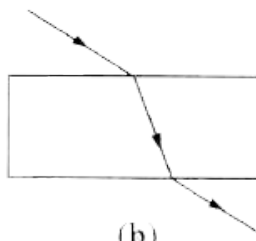


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2. Diagram (a) and (b) in figure below show the refraction of a ray of light of single colour through a prism and a parallel sided glass slab respectively.



(a)



(b)

(i) In each diagram, label the incident, refracted, emergent rays and the angle of deviation.

(ii) In what way the direction of the emergent ray in the two cases differ with respect to the incident ray? explain your answer.



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3. Define the term angle of deviation.



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4. Complete the following sentence :

Angle of deviation is the angle which the ___ ray makes with the direction of ___ ray.



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5. What do you understand by the deviation produced by a prism? Why is it caused ? State

three factors on which the angle of deviation depends.



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6. (a) How does the angle of deviation produced by a prism change with increase in the angle of incidence. Draw a curve showing the variation in the angle of deviation with the angle of incidence at a prism surface.

(b) Using the curve in part (a) above, how do you infer that for a given prism, the angle of

minimum deviation δ_{\min} is unique for a given light.



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7. State whether the following statement is 'true' or 'false'.

The deviation produced by a prism is independent of the angle of incidence and is same for all colours of light.



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8. How does the deviation produced by a prism depend on (i) the refractive index of its material, and (ii) the wavelength of incident light.



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9. How does the angle of minimum deviation produced by a prism change with increase in (i) the wavelength of incident light, and (ii) the refracting angle of prism ?



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10. Write a relation for the angle of deviation (δ) for a ray of light passing through an equilateral prism in terms of the angle of incidence (i_1), angle of emergence (i_2) and angle of prism (A).



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11. A ray of light incident at an angle of incidence i_1 passes through an equilateral

glass prism such that the refracted ray inside the prism is parallel to its base and emerges at an angle of emergence i_2 .

(i) How is the angle of emergence ' i_1 ' related to the angle of incidence ' i_1 ' ?

(ii) What can you say about the angle of deviation in such a situation ?



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12. Draw a ray diagram to show the refraction of a monochromatic ray through a prism when

it suffers minimum deviation. How is the angle of emergence related to the angle of incidence in the position.



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13. A light ray of yellow colour is incident on an equilateral glass prism at an angle of incidence equal to 48° and suffers minimum deviation by an angle of 36° . (i) What will be the angle of emergence ?

(ii) If the angle of incidence is changed to (a)

30°

(b) 60° , state in each case whether the angle of deviation will be equal to, less than or more than 36° .?



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14. Name the colour of white light which is deviated (i) the most, and (ii) the least, on passing through a prism.



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15. Which of the two prisms, A made of crown glass and B made of flint glass, deviates a ray of light more ?



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16. How does the angle of deviation depend on the refracting angle of the prism?



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17. An object is viewed through a glass prism with its vertex pointing upwards. Draw a ray diagram to show the formation of its image as seen by the observer.



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18. A ray of light is normally incident on one face of an equilateral glass prism. Answer the following :

(a) What is the angle of incidence on the first

face of the prism?

(b) What is the angle of refraction from the first face of the prism ?

(c) What will be the angle of incidence at the second face of the prism ?

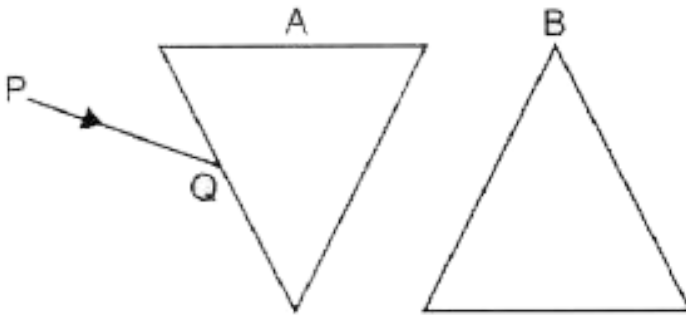
(d) Will the light ray suffer minimum deviation by the prism ?



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19. Figure below shows two identical prisms A and B placed with their faces parallel to each

other. A ray of light of single colour PQ is incident at the face of the prism A. complete the diagram to show the path of the ray till it emerges out of the prism B.



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Exercise 4 B Multiple Choice Type

1. In refraction of light through a prism the light ray:

A. suffers refraction only at one face of the prism

B. emergest out from the prism in a direction parallel to the incident ray

C. bends at both the surface of the prism towards its base

D. bends at both the surfaces of the prism
opposite to its base.

Answer: C



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2. A ray of light suffers refraction through an equilateral prism. The deviation produced by the prism does not depend on the:

A. angle of incidence

B. colour of light

C. material of prism

D. size of prism

Answer: D



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Exercise 4 B Numericals

1. A ray of light incident at an angle of incidence 48° on a prism of refracting angle

60° suffers minimum deviation. Calculate the angle of minimum deviation.



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2. What should be the angle of incidence for a ray of light which suffers minimum deviation of 36° through an equilateral prism ?



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Exercise 4 C

1. How is the refractive index of a medium related to the real and apparent depths of an object in that medium ?



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2. Prove that

$$\text{Refractive index} = \frac{\text{real depth}}{\text{apparent depth}}$$



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3. A tank of water is viewed normally from above.

(a) State how does the depth of the tank appear to change.

(b) Draw a labelled ray diagram to explain your answer.



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4. Water in a pond appears to be only three-quarter of its actual depth. (a) what property

of light is responsible for this observation ?

Illustrate your answer with the help of a ray diagram. (b) how is the refractive index of water calculated from its real and apparent depths ?



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5. Draw a ray diagram to show the appearance of a stick partially immersed in water. Explain your answer.



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6. A fish is looking at a 1.0m high plant at the edge of a pond. Will the plant appear to the fish shorter or taller than its actual height ?

Draw a ray diagram to support your answer.



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7. A student puts his pencil into an empty trough and observes the pencil from the position as indicated in Figure.



(i) What change will be observed in the appearance of the pencil when water is poured into the trough?

(ii) Name the phenomenon which accounts for the above stated observation.

(iii) Complete the diagram showing how the student's eye sees the pencil through water.



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8. An object placed in one medium when seen from the other medium, appears to be vertically shifted. Name two factors on which the magnitude of the shift depends and state how does it depend on them.



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Exercise 4 C Multiple Choice Type

1. A small air bubble in a glass block when seen from above appears to be raised because of :

A. refraction of light

B. reflection of light

C. reflection and refraction of light

D. none of the above

Answer: A



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2. An object in a denser medium when viewed from a rarer medium appears to be raised. The shift is maximum for :

A. red light

B. violet light

C. yellow light

D. green light

Answer: B



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Exercise 4 C Numericals

1. A water pond appears to be $2.7m$ dep. If the refractive index of water is $4/3$, find the actual depth of the pond.



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2. A coin is placed at the bottom of a beaker containing water (refractive index= $4/3$) at a depth of $12cm$. By what height the coin

appears to be raised when seen from vertical above ?



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3. A postage stamp kept below a rectangular glass slab of refractive index 1.5 when viewed from vertically above it, appears to be raised by 7.0 mm . Calculate the thickness of the glass slab.



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Exercise 4 D

1. Explain the term critical angle with the aid of a labelled diagram.



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2. How is the critical angle related to the refractive index of a medium ?



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3. State the approximate value of the critical angle for (a) glass-air surface
(b) water-air surface.



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4. What is meant by the statement 'the critical angle of diamond is 24° '?



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5. A light ray is incident from a denser medium on the boundary separating it from a rarer medium at an angle of incidence equal to the critical angle. What is the angle of refraction for the ray ?



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6. Name two factors which affect the critical angle for a given pair of media. State how do the factors affect it.





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7. The critical angle for glass-air is 45° for the light of yellow colour. State whether it will be less than, equal to, or more than 45° for (i) red light, and (ii) blue light ?



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8. Which colour of light has a higher critical angle? Red light or Green light.



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9. (a) What is total internal reflection ?

(b) State two conditions necessary for total internal reflection to occur.

(c) draw diagrams to illustrate total internal reflection.



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10. Fill in the blanks:

Q: Total internal reflection occurs only when a

ray of light passes from a ____ medium to a ____ medium.



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11. Fill in the blanks:

Q: Critical angle is the angle of ____ in denser medium for which the angle of ____ in rarer medium is ____ -



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12. State whether the following statement is true or false ? If the angle of incidence is greater than the critical angle, light is not refracted at all, when it falls on the surface from a denser medium to a rarer medium.



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13. The refractive index of air with respect to glass is expressed as ${}_g\mu_a = \frac{\sin i}{\sin r}$.

(a) Write down a similar expression for ${}_a\mu_g$ in

terms of the angles i and r .

(b) if angle $r = 90^\circ$, what is the corresponding angle i called ?

(c) What is the physical significance of the angle i in part (b) ?



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14. Figure alongside shows two rays A and B travelling from water to air. If the critical angle for water-air surface is 48° , complete the ray

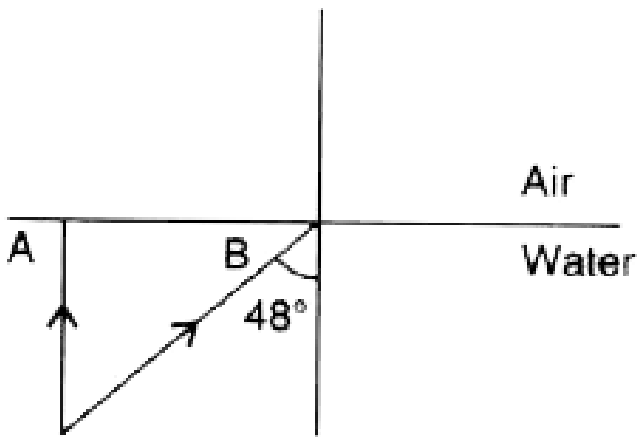


diagram showing the refracted for each. State conditions when the ray will suffer total internal reflection.

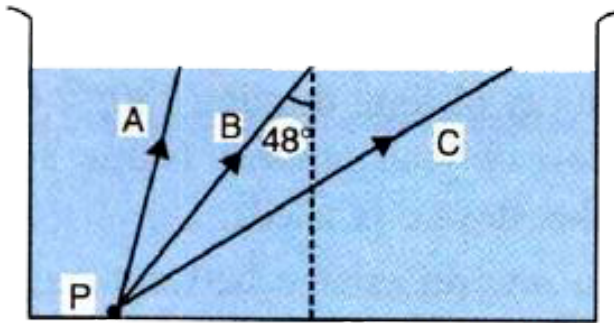


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15. Figure shows a point source P inside a water container. Three rays A,B and C starting

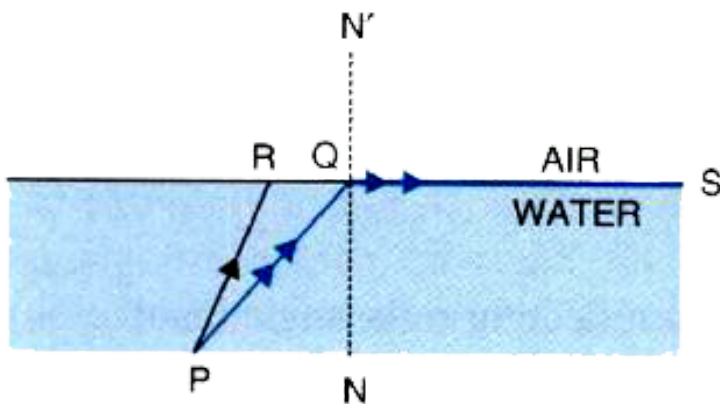
from the source P are shown up to the water surface.

(a) show in the diagram the path of these rays after striking the water surface. The critical angle for water-air surface is 48° . (b) Name the phenomenon which the rays A, B and C exhibit.



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16. In figure, PQ and PR are the two light rays emerging from an object P. the ray PQ is refracted as QS.



(a) state the special name given to the angle of incidence $\angle PQN$ for the ray PQ.

(b) What is the angle of refraction for the refracted ray QS?

(c) Name the phenomenon that occurs if the

angle of incidence $\angle PQN$ is increased.

(d) The ray PR suffers partial reflection and refraction on the water-air surface. give reason.

(e) Draw in the diagram the refracted ray for the incident ray PR and hence show the position of the image of the object P by the letter P' when seen vertically from above.



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17. The refractive index of glass is 1.5 from a point P inside a glass slab, draw rays PQ , PB and PC incident on the glass-air surface at an angle of incidence 30° , 42° and 60° respectively.

(a) In the diagram show the approximate direction

of these rays as they emerge out of the slab.

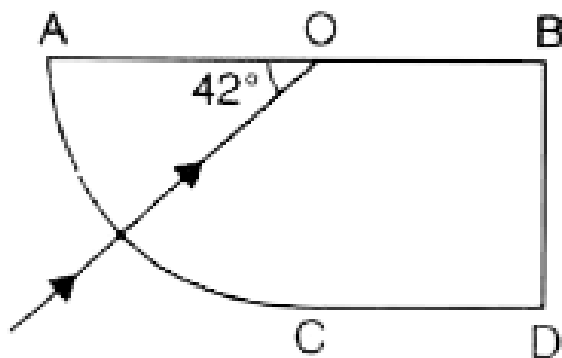
(b) What is the angle of refraction for the ray

PB

(Take $\sin 42^\circ = \frac{2}{3}$)



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18.

A ray of light enters a glass slab ABCD as shown in figure and strikes at the centre O of the circular part AC of the slab. The critical angle of glass is 42° . Complete the path of the ray till it emerges out from the slab. mark the angles in the diagram wherever necessary.



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19. What is a total reflecting prism ? State three actions that it can produce. Draw a diagram to show one such action of the total reflecting prism.



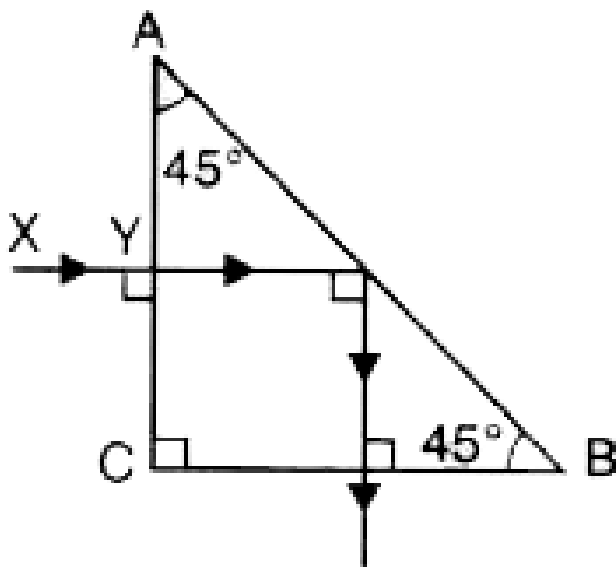
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20. Show with the help of a diagram how a total reflecting prism can be used to turn a ray

of light through 90° . Name one instrument in which such a prism is used.



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21.

A ray of light XY passes through a right angled isosceles prism as shown alongside Figure.

(a) What is the angle through which the incident ray deviates and emerges out of the prism?

9b) Name the instrument where this action of prism is put into use.

(c) Which prism surface will behave as a mirror ?



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22. Draw a diagram of a right angled isosceles prism which is used to make an inverted image

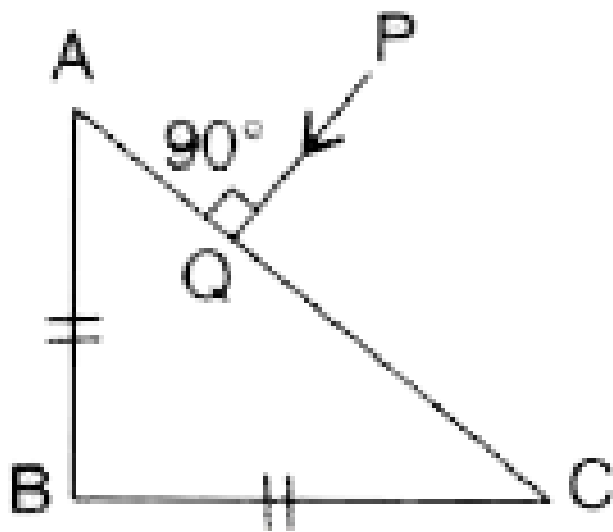
erect.



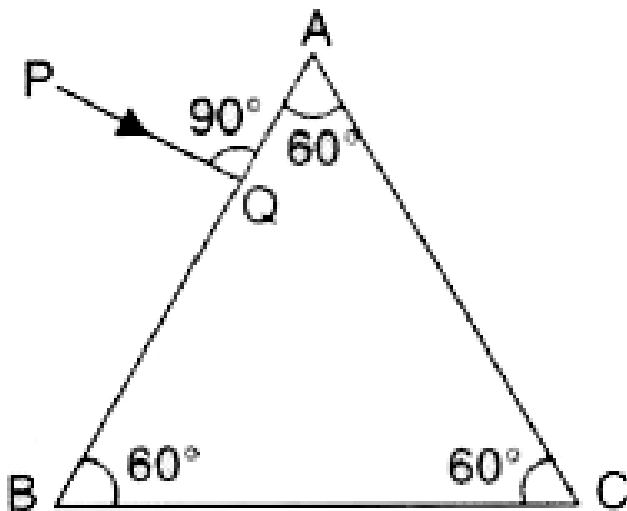
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23. In figure, a ray of light PQ is incident normally on the hypotenuse of an isosceles right angled prism ABC. (a) complete the path of the ray PQ till it emerges from the prism. Mark in the diagram the angle wherever necessary. (b) what is the angle of deviation of the ray PQ ?

(c) Name a device in which this action is used.



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24.

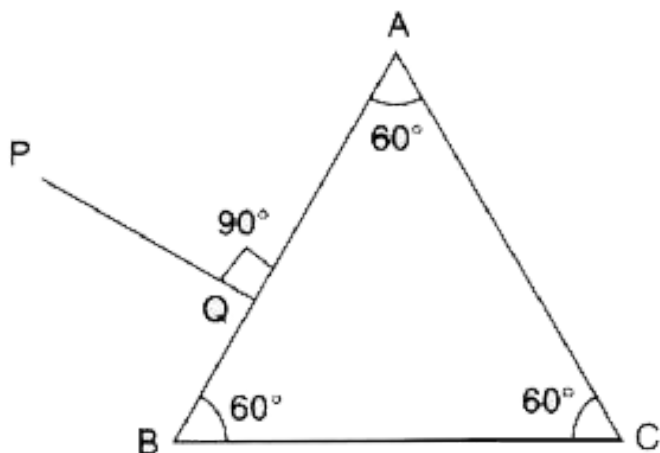
In figure, a ray of light PQ is incident normally on the face AB of an equilateral glass prism. Complete the ray diagram showing its emergence into air after passing through the prism. Take critical angle for glass = 42° .

(a) Write the angles of incidence at the faces AB and AC of the prism.

(b) Name the phenomenon which the ray of light suffers at the face AB, AC and BC of the prism.



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25.

Copy the diagram given below and complete the path of the light ray till it emerges out of

the prism. The critical angle of glass is 42° . In your diagram mark the angles wherever necessary.



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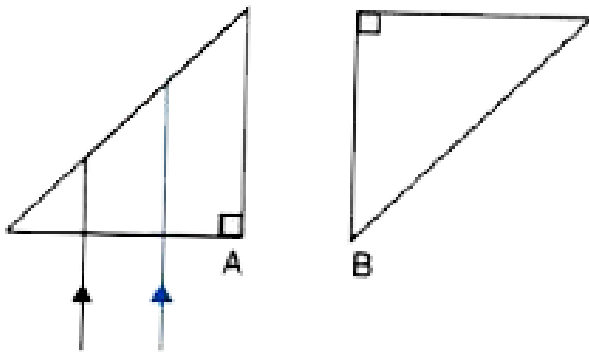
26. Draw a neat labelled ray diagram to show total internal reflection of a ray of light incident normally on one face of a 30° , 90° , 60° prism.



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27. (a) Figure shows two isosceles right angled prisms A and B and the light rays incident on the prism A. complete the diagram to show the rays emerging out of the prism B.

(b) State the principle used for completing the ray diagram in part (a) above.



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28. What device other than a plane mirror can be used to turn a ray of light through 180° ? Draw a diagram in support of your answer. Name an instrument in which this device is used.



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29. Mention one difference between reflection of light from a plane mirror and total internal reflection of light from a prism.



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30. State one advantage of using a total reflecting prism as a reflector in place of a plane mirror.



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Exercise 4 D Multiple Choice Type

1. The critical angle for glass-air interface is :

A. 24°

B. 48°

C. 42°

D. 45°

Answer: C



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2. A total reflecting right angled isosceles prism can be used to deviate a ray of light through :

A. 30°

B. 60°

C. 75°

D. 90°

Answer: D



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3. A total reflecting equilateral prism can be used to deviate a ray of light through :

A. 30°

B. 60°

C. 75°

D. 90°

Answer: B



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Theory Based Mcq

1. Refraction of light is the phenomenon of.

A. movement of light

B. bending of light

C. distribution of light

D. scattering of light

Answer: B



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2. Light when travels from one medium to another refracts because of

A. difference in refractive index

B. difference in velocities

C. difference in wavelengths

D. all of the above

Answer: D



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3. A ray of light bends the normal when it travels from optically rarer medium to an optically denser medium .

A. away

B. towards

C. far away

D. very close

Answer: B



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4. A ray of light when travels from
medium it bends away from the normal

A. rarer to rarer

B. denser to denser

C. rarer to denser

D. denser to rarer

Answer: D



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5. A ray of light travels undeviated on passing through the optical boundary

A. if both mediums are same

B. both have the same refractive index

C. the ray makes an angle of 0° with the normal

D. all the above

Answer: D



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6. A ray travelling parallel to the optical boundary along its surface

A. will undergo no refraction

B. will partially refract and partially travel undeviated

C. will suffer total internal reflection

D. none of the above

Answer: B



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7. Two light rays incident parallel to each other on an optical boundary will undergo the same refraction.

A. True

B. False

C. data is not given

D. none of the above

Answer: A



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8. Can two refracted rays be parallel to each other even if incident rays are not?

A. Yes

B. No

C. data insufficient

D. none of these

Answer: C



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9. Is Snell's law applicable when a ray of light is incident normal to the optical boundary?

A. No

B. Yes

C. incomplete data

D. none of these

Answer: C



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10. Is Snell's law applicable when a ray of light is incident perpendicular to the normal at the point of incidence?

A. Yes

B. No

C. data is not given

D. It is an exception for the validity of the law.

Answer: D



11. Lateral displacement is

A. perpendicular shift between emergent ray and incident ray

B. perpendicular shift between incident ray and emergent ray

C. parallel shift between incident ray and emergent ray

D. parallel shift between emergent ray and incident ray

Answer: B



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12. Lateral displacement occurs in case of

A. Cuboidal glass block

B. rectangular glass block

- C. two equiangular prisms held near each other with faces parallel to one another
- D. all of the above

Answer: D

 [View Text Solution](#)

13. Angular deviation in case of lateral displacement is

A. 0°

B. 180°

C. 360°

D. both (a) and (c)

Answer: D



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14. Lateral displacement with increase in angle of incidence.

A. increases

B. decreases

C. remains same

D. keeps changing

Answer: A



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15. Lateral displacement decreases with in wavelength.

A. decrease

B. increase

C. no change

D. none of these.

Answer: B



View Text Solution

16. Greater the optical density is lateral displacement .

A. greater

B. less

C. equal

D. none of these

Answer: A



View Text Solution

17. Slimmer the glass slab the lateral displacement.

A. more

B. less

C. equal

D. none of these

Answer: B



View Text Solution

18. Fill in the blanks:

Q: Critical angle is the angle of ___ in denser medium for which the angle of ___ in rarer medium is ___ -

A. refraction

B. incidence

C. reflection

D. emergence

Answer: B



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19. The refractive index is related to critical angle as

A. reciprocal of angle of incidence

B. reciprocal of angle of emergence

C. $[\text{critical angle}]^2$

D. $[\sin C]^{-1}$

Answer: A



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20. Velocity of light is more in than

A. air, water

B. water, air

C. sea water, mineral water

D. brown glass, transparent glass

Answer: A



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21. Velocity of light is to refractive index

A. directly proportional

B. inversely proportional

C. independent

D. none of the above

Answer: B



View Text Solution

22. Greater the refractive index the apparent depth.

A. more

B. same

C. less

D. none of these

Answer: C



View Text Solution

23. Thicker the glass slab is the object appearing to be raised.

A. more

B. less

C. uniform

D. all of these

Answer: A



View Text Solution

24. Greater the angle of refraction the lateral displacement

A. same

B. uniform

C. less

D. proportionate

Answer: C



View Text Solution

25. An equiangular prism is a

A. total reflecting prism

B. refracting prism

C. dispersing prism

D. all of the above

Answer: D



View Text Solution

26. The deviation produced in case of an equiangular prism is called

A. equal deviation

B. angular deviation

C. lateral deviation

D. none of the above

Answer: B



View Text Solution

27. The measure of angular deviation in case of a prism is called

A. refrangibility of light

B. refractibility of light

C. reflectivity of light

D. reversibility of light

Answer: A



View Text Solution

28. For minimum deviation the angle of incidence..... angle of refraction.

A. less than

B. greater than

C. equal to

D. directly proportional to

Answer: B



View Text Solution

29. The emergent ray and incident ray should be equally inclined to the refracting surfaces of a prism in

A. no deviation condition

B. minimum deviation condition

C. maximum deviation position

D. equal deviation position

Answer: B



View Text Solution

30. The refracted ray is to the base of the prism in minimum deviation position.

A. parallel

B. perpendicular

C. collinear

D. inclined

Answer: A



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31. Is it correct to say that angle of incidence is equal to angle of emergence?

A. Yes

B. No

C. both (a) and (b)

D. none of these

Answer: D



View Text Solution

32. Is minimum angular deviation applicable for isosceles right-angled prism?

A. Yes

B. No

C. not defined

D. none of these

Answer: A



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Application Based Mcq

1. A ray of light from the light house reaches the submarine which is under water. The sailor

places a plane mirror such that angle between the light ray and the mirror is 0° . Where would he see the light house?

- A. he won't see the light source at all
- B. at the same position as no refraction occurs
- C. at the same position as light reverses along the same path
- D. it is pitch dark to relocate the light from the submarine.

Answer: C



View Text Solution

2. A fish while on the surface of water has its angle of view as α while it is in water the angle of vision becomes β . Compare the two angles of view.

A. $\alpha = \beta$

B. $\alpha > \beta$

C. $\alpha < \beta$

D. can't say.

Answer: B



View Text Solution

3. A fisherman points towards the While harpoon hunting

A. tail

B. eye

C. head

D. body

Answer: A



View Text Solution

4. A coconut tree appears to be when viewed by a sea diver from below the water surface.

A. taller

B. shorter

C. same size

D. distorted

Answer: A



View Text Solution

5. Stars appear to twinkle while planets don't because

A. they are luminous as compared to planets

B. they are at far off distances

C. stars undergo T.I.R while planets refract

D. both (a) and (b).

Answer: D



View Text Solution

6. Face of a person sitting near a camp fire appears to shimmer because of.

A. total internal reflection

B. refraction of light

C. scattering of light

D. dispersion of light

Answer: B



View Text Solution

7. Diamond sparkles only in the dark. Is this statement true?

A. yes

B. incomplete data

C. No

D. none of these

Answer: C



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8. If light is not incident on diamond the diamond would never sparkle.

A. True

B. False

C. insufficient data

D. none of these

Answer: A



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9. Diamond sparkle because of

A. T.I.R followed by entrapping of light
inside it

B. Refraction followed by T.I.R

C. T.I.R followed by refraction

D. none of the above

Answer: A



View Text Solution

10. Water being completely transparent can appear shiny like a mirror due to.

A. Total internal reflection

B. dispersion

C. refraction of light

D. absorption of light.

Answer: A



View Text Solution

11. A lightning strikes a window pane and produces a crack in it. This crack appears silvery because of

- A. Total internal reflection
- B. Fineness of the crack
- C. Light being entrapped in the crack
- D. Diffraction

Answer: A



View Text Solution

12. Formation of mirage is because of the thirst felt by the nomadic traveller?

A. True

B. False

C. data incomplete

D. none of these

Answer: B



View Text Solution

13. Mirage is a consequence of TIR followed by successive refraction.

A. Yes

B. No

C. data insufficient

D. none of these

Answer: A



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14. High speed internet is provided by the use
of

A. Jio network

B. 5G plan

C. Airtel network

D. Optical fiber

Answer: D



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15. Optical fibre works on the principle of..... .

A. satellite signals

B. total internal reflection

C. Optical transmission

D. internet mobile towers

Answer: B



View Text Solution

16. Can a black body which absorbs 100% light appear to be silvery?

A. Yes

B. No

C. data insufficient

D. none of these

Answer: C



View Text Solution

17. Is black a colour of light?

A. Yes

B. No

C. insufficient data

D. none of the above

Answer: A



View Text Solution

Numerical Based Mcq

1. The refractive index of glass is 1.5 when the ray of light travels from air to glass. Calculate

the refractive index when light travels from glass to air.

A. 0.67

B. 0.33

C. 0.5

D. 1.5

Answer: A



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2. The ratio of sine of angle of incidence and sine of angle of refraction is 0.75 while traveling from air to water. Its refractive index of water with respect to air is..

A. 1.25

B. 1.5

C. 1.33

D. 2.4

Answer: C



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3. The refractive index of a material is 1.20. If the velocity of light in vacuum is $3 \times 10^8 \text{ms}^{-1}$. Find the velocity of light in the material.

A. $2.5 \times 10^8 \text{ms}^{-1}$

B. $2 \times 10^8 \text{ms}^{-1}$

C. $4 \times 10^8 \text{ms}^{-1}$

D. none of these.

Answer: A





4. A glass block 3cm thick is placed over a newspaper. Calculate the height through which the image of the newspaper is raised if refractive index of the glass slab is 1.5.

A. 4cm

B. 2cm

C. 3cm

D. 1cm

Answer: D



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5. The floor of a water tank appears at a depth of 2.5m. If refractive index of water is 1.33, find the actual depth of water?

A. 3.325m

B. 3.5m

C. 4m

D. 4.5cm

Answer: A



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6. A stone is placed at the bottom of a water tank appears to be raised by 80cm. If refractive index of water is $\frac{4}{3}$, find the actual depth of stone from the free water surface.

A. 200cm

B. 320 cm

C. 400cm

D. 360 cm

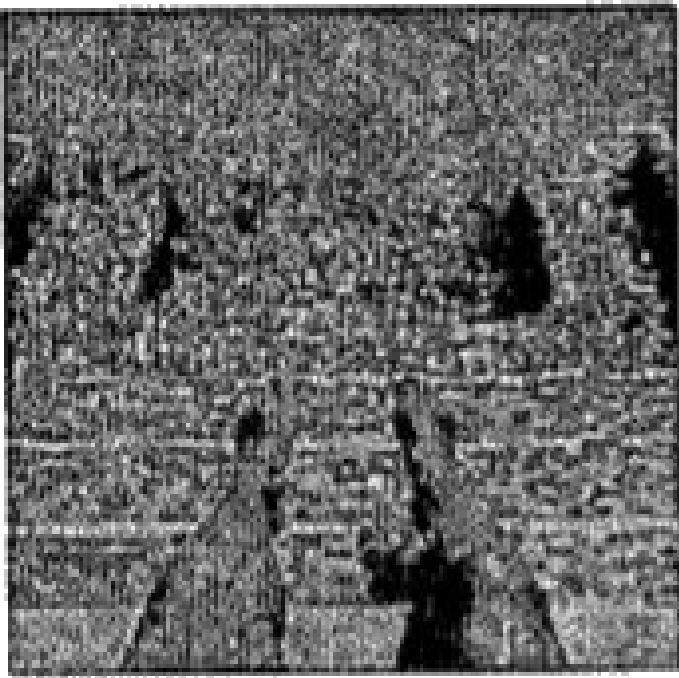
Answer: B



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Diagram Based Mcq

1. Name the phenomenon occurring in the following figure:



A. reflection

B. refraction

C. distortion

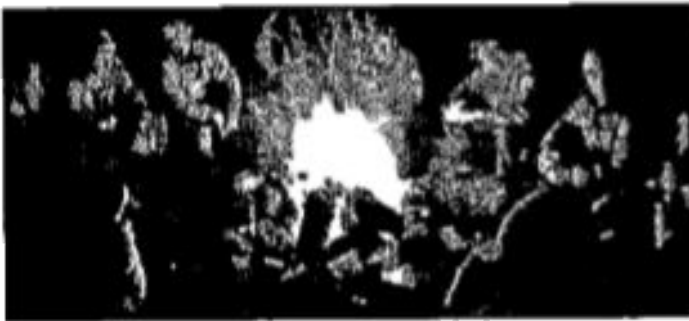
D. none of these

Answer: B



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2. Distorted image of a face of a person sitting in front of a camp fire is because of the phenomenon of.



A. refraction

B. diffusion

C. total internal reflection

D. winds blowing

Answer: A



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3. A watery image is seen on the road during hot summer days as seen in the figure. What is

this occurrence called?



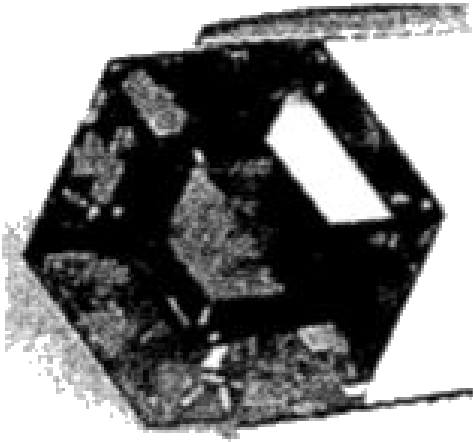
- A. reflection
- B. inverted image
- C. Mirage
- D. looming

Answer: C



View Text Solution

4. Why does this stone sparkle ?



A. light being entrapped inside it due to

low critical angle

B. refraction of light

C. reflection of light

D. bending of light

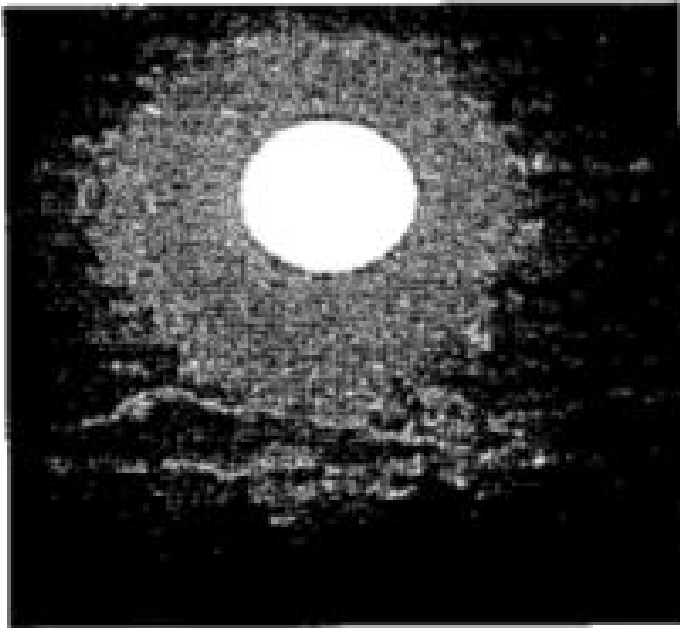
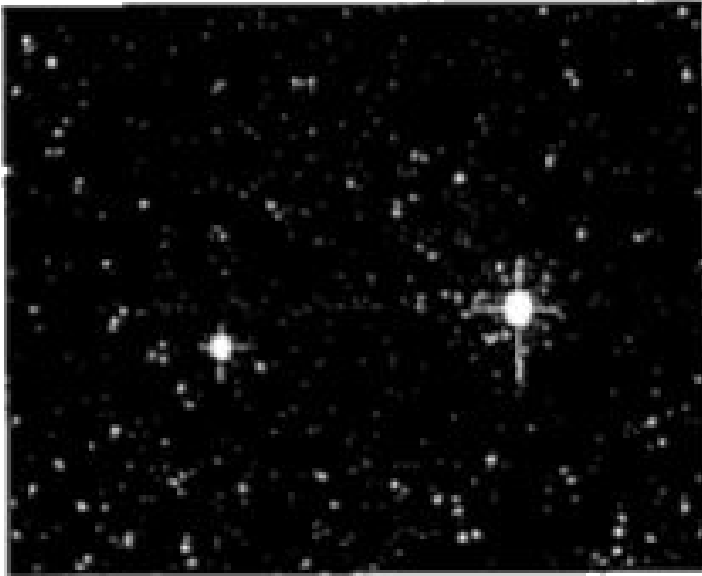
Answer: A



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5. It is said that stars twinkle but sun also being a star doesn't twinkle as is seen. Why is

it that sum doesn't twinkle ?



A. Sun is made of fire

B. Sun is made of plasma

C. Sun is formed by the fusion reaction of
hydrogen isotopes

D. Sun is the nearest star

Answer: D



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