PHYSICS

BOOKS - NAVNEET PUBLICATION

REFRACTION OF LIGHT

Solved

1. What is the meant by reflection of light?

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2. What are the laws of reflection.

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3. Will light travel through glass slab with the same velocity as it travels in air?

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4. Will the velocity of light be same in all media?

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Exercise

1. Fill in the blanks:

The phenomenon of change in the___ of light when it passes obliquely from one transparent medium to another is called refration?

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2. Fill in the blanks:

The refractive index depends upon the___ of propogation of light in different media?

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3. Choose the correct alternative and write it along with its allotted alphabet:

The process of separation of light into its component colours while it is passing through a medium is called___

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4. Fill in the blanks:

When a light ray travels oliquely from air to water, it bends___the normal at the point of incidence.

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5. Fill in the blanks:

When a light ray travels oliquely from benzene

to air, it bends___the normal at the point of incidence.

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6. Fill in the blanks:

In glass the speed of a red ray is ____ violet ray.

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7. Fill in the blanks:

The speed of light in glass is _____ in water.

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8. Fill in the blanks:

The speed of light in water is _____ in Benzene.

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9. Fill in the blanks:

Rainbow occurs due to refraction, dispersion, ____ and again refraction of sunlight by water droplets.

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10. Fill in the blanks:

In dispersion of sunlight by a glass prism,____ ray is deviated the least.

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11. Fill in the blanks and explian the complete statements:

Refractive index depends on the ___of light.

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12. Fill in the blanks and explian the complete statements:

The change in _____ of light rays while going from one medium to another is called refration.

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13. Choose the correct alternative and write it along with its allotted alphabet:

The change in the direction of propogation of light when it passes abliquely from one transparent medium to another is called ____

A. Dispersion

B. scattering

C. refraction

D. reflection

Answer: C

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14. When a ray of light travels from air to glass and strikes the surface of separation at 90° ,then it

A. bends towards the normal

B. bends away from the normal

C. passes unbent

D. passes in zigzag way

Answer: C

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15. Choose the correct alternative and write it along with its allotted alphabet:

If a ray of light passes from a denser medium to a rarer medium in a straight line, the angle of incidence must be

A. 0°

B. 30°

C. 60°

D. 90°

Answer: A

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16. Choose the correct alternative and write it along with its allotted alphabet:

If a ray of light strikes a glass slab at an angle of 50° with the normal to the surface of the slab. What is the angle of incidence?

A. 50°

B. 25°

C. 40°

D. 100°

Answer: A

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17. Choose the correct alternative and write it along with its allotted alphabet:

If a ray of light propogating in air strikes a glass slab at an angle 60° with the surface of the slab, the angle of refraction is.

A. more than 30°

B. less than 30°

C. 60°

D. 30°

Answer: B

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18. Choose the correct alternative and write it along with its allotted alphabet:

A ray of light gets deviated when it passes

obliquely from one medium to another medium because

A. the colour of light changes

B. the frequency of light changes

C. the speed of light changes

D. the intensity of light changes

Answer: C

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19. Choose the correct alternative and write it along with its allotted alphabet:

The speed of light in turpentine oil is $2 \times 10^8 \frac{m}{s}$. The absolute refractive index of turpentine oil is about _____

A. 1.5

B. 2

C. 1.3

D. 0.67

Answer: A

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20. Choose the correct alternative and write it along with its allotted alphabet:Out of the following___ has the highest absolute refractive index.

A. Fused Quarts

B. Diamond

C. Crown Glass

D. Ruby

Answer: B

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21. Choose the correct alternative and write it along with its allotted alphabet:

The absolute refrative index ____

A. is expressed in dioptre

B. is expressed in m/s

C. of air is about $\frac{4}{3}$

D. has not unit

Answer: D

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22. Choose the correct alternative and write it along with its allotted alphabet:

The speed of the light in a medium of refractive index n _____ , where c is the speed of light in vaccum.

A. $\frac{c}{a}$

B. mc

C. $\frac{c}{n}$

D. $\sqrt[\frac{c}{n}]{}$

Answer: A

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23. Choose the correct alternative and write it along with its allotted alphabet:

The speed of light in a transparent medium having absolute refractibe index 1.25 is ____[speed of light in vaccum = $3 \times 10^8 \frac{m}{s}$

A. 1.25 times 10^8 m/s`

B. $2.4 \times 10^8 \frac{m}{s}$

C. $3.0 \times 10^8 \frac{m}{s}$

D. $1.5 \times 10^8 \frac{m}{s}$

Answer: B

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24. Choose the correct alternative and write it along with its allotted alphabet:

___light is deviated the maximum in the

spectrum of white light obtained with a glass prims

A. red

B. Yellow

C. Violet

D. Blue

Answer: C

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25. Choose the correct alternative and write it along with its allotted alphabet:

_____ Light is deviated the least in the spectrum of white light obtained with a glass prism.

A. Red

B. Yellow

C. Violet

D. Blue

Answer: A

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26. Choose the correct alternative and write it along with its allotted alphabet:

A ray of light makes an angle of 50° with the surface S_1 of the glass slab. Its angle of incidence will be _____

A. 50°

B. 40°

C. 140°

D. 0°

Answer: B

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27. A glass-slab is placed in the path of convergent light. The point of convergence of light____

A. Moves away from the slab

B. moves towards towards the slab

C. remains at the same point

D. undergoes a lateral shift

Answer: A

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28. Choose the correct alternative and write it along with its allotted alphabet:

In the refraction of light through a glass slab, the directions of the incident ray and the refracted ray are___

A. perpendicular to each other

B. non-parallel to each other

C. parallel to each other

D. intersecting each other.

Answer: C

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29. Choose the correct alternative and write it along with its allotted alphabet:

The process of separation of light into its

component colours while it is passing through a medium is called___

A. reflection

B. refraction

C. dispersion

D. internal reflection

Answer: C

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30. What is the reason for the twinkling of star:?

A. Explosion occuring in stars from time to time

B. Absorbtion of light in the earth's atmosphere

C. Motion of stars

D. Changing refractive index of the atmospheric gases

Answer: D

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31. We can see the sun even when it is little below the horizon because of ....

A. reflection of light

B. Refraction of light

C. Dispersion of light

D. Absorption of light

Answer: B

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32. If the refractive index of glass with respect to air is $\frac{3}{2}$ then the refractive index of air with respect to glass___.

A. $\frac{1}{2}$

B. 3

C. $\frac{1}{3}$

D. $\frac{2}{3}$

Answer: D

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33. State whether the following statements are True or False : The incident ray and refracted ray of light are on the opposite sides of the normal at the point of incidence

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34. State whether the following statements are True or False : < br> the refrective index of a medium (such as glass) does not depend on the wavelength of light.

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35. State whether the following statements are True or False : When a light ray travels obliquely from an optically rarer medium to an

optically denser medium, it bends away from the normal.

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36. State whether the following statements are True or False : When a light ray travels obliquely from glass to air, it bends towards the normal

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37. True/false: If angle of incidence is zero,then the angle of refraction is 90°

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38. State whether the following statements are True or False : < br> In dispersion of white light by a glass prism, yellow color is deviated the least.

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39. State whether the following statements are True or False : < br> In vaccum, the speed of light does not depend upon the frequency of light.

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40. State whether the following statements are True or False : < br> In glass, the speed of violet ray is less than that of red ray.

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41. State whether the following statements are True or False : < br> In a materiial medium, the speed of light depends on the frequency of light.

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42. State whether the following statements are True or False : The velocity of light is different in different media.

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43. State whether the following statements are True or False : < br> The wavelength of red light is close to 700nm.

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44. State whether the following statements are True or False : < br> The wavelength of orange light is greater than that of blue light.

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45. State whether the following statements are True or False :

The refractive index depends upon the velocity of light in the medium.

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46. Find the odd one out and give the reason:

Reflection, Neutralization , Refraction , Dispersion

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47. Wavelength of red light is :

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48. What is refraction of light?

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49. Answer the following questions

Why is there a change in the direction of

propagation of light in the direction of propogation of light when it passes obliquely from one transparent medium to another?

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50. Answer the following questions

In the case of refraction og light through a glass slab, the emergent ray is parallel to the incident ray , but it is displaced sideways. Why does this happen?

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51. Answer the following questions

Define angle of incidence and angle of refraction.

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52. Answer the following questions

Repeat the activity " Refraction of light passing through a glass slab" by replacing the glass slab by a transparent plastic slab.< br> What Similarity do you observe?

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53. Answer the following questions

Repeat the activity " Refraction of light passing through a glass slab" by replacing the glass slab by a transparent plastic slab.< br> What difference do you notice?

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54. State the Laws of Refraction.

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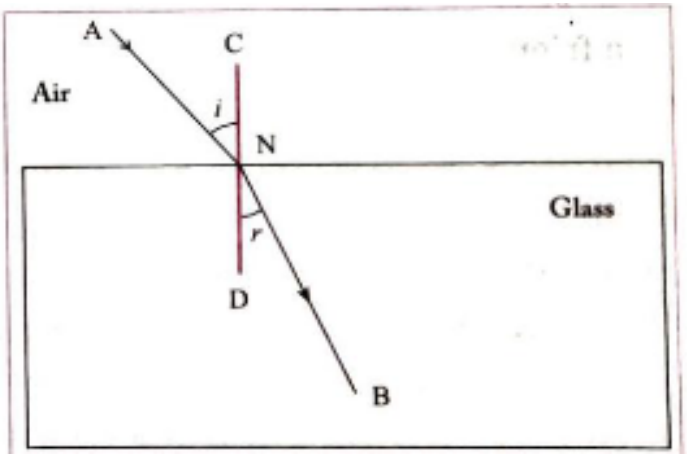
55. Answer the following questions

Observe the given figure and answer the following questions.



Name the process represented by the figure.

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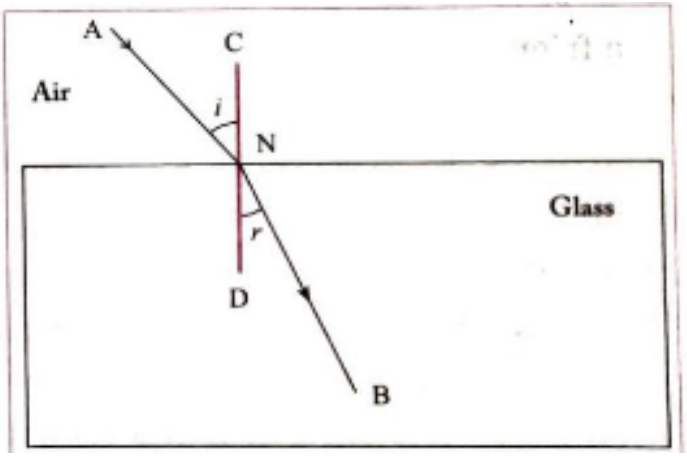
56. Answer the following questions

Observe the given figure and answer the following questions.



State the two laws related to the process.

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57. Answer the following questions

How is refraction of light related to refractive index ?

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58. Answer the following questions

Define the refractive index of the second medium, with respect to the first medium .

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59. Answer the following questions

What is meant by refractive index?

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60. Answer the following questions

State the formula for the refractive index of the second medium with respect to the first medium.

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61. Answer the following questions

Define absolute refractive index.

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62. Answer the following questions

Obtain the relation between the refractive index of the second medium with respect to the first medium and the refractive index of the first medium with respect to the second medium.

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63. Answer the following questions

If the refractive index of a certain material with respect to air is 1.5, what is the refractive index of air with respect to that material ?

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64. If the angle of incidence and angle of emergence of a light ray falling on a glass slab are i and e respectively, then prove that i=e.

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65. Answer the following questions

Explain the terms optically rarer medium and optically denser medium with examples.

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66. Answer the following questions

A ray of light is incident obliquely at a boundary separating two media . What is its behaviour if

the refractive index of the second medium is greater than that of the first medium.

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67. Answer the following questions

A ray of light is incident thobliquely at a boundary separating two media . What is its behaviour if

the refractive index of the first medium is greater than that of the second medium ?

Draw the corresponding neat and labelled diagrams.

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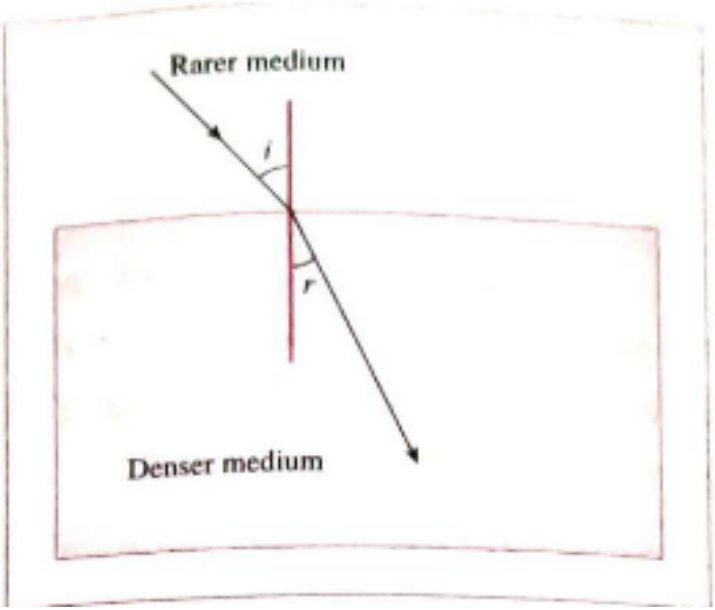
68. Answer the following questions

Observe the following figure and write accurate conclusion regarding refraction of

light.



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69. Answer the following questions

What happens when a ray of light is incident normal to the interface between two media ?

Draw the corresponding neat and labelled diagram.

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70. Answer the following questions

Draw a neat and labelled diagram to show the path of a ray of light in air and glass when the ray is incident obliquely on a glass slab. Show the

Incident ray.

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71. Answer the following questions

Draw a neat and labelled diagram to show the path of a ray of light in air and glass when the ray is incident obliquely on a glass slab. Show the

Refracted ray

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72. Answer the following questions

Draw a neat and labelled diagram to show the

path of a ray of light in air and glass when the ray is incident obliquely on a glass slab. Show the

Emergent ray

Watch Video Solution

73. Answer the following questions

Draw a neat and labelled diagram to show the path of a ray of light in air and glass when the ray is incident obliquely on a glass slab. Show

the

Angle of incidence

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74. Answer the following questions

Draw a neat and labelled diagram to show the path of a ray of light in air and glass when the ray is incident obliquely on a glass slab. Show the

Angle of refraction

Watch Video Solution

75. Answer the following questions

Draw a neat and labelled diagram to show the path of a ray of light in air and glass when the ray is incident obliquely on a glass slab. Show the

Angle of emergence

Watch Video Solution

76. Answer the following questions

Draw a neat and labelled diagram to show

refraction of light through a glass slab.

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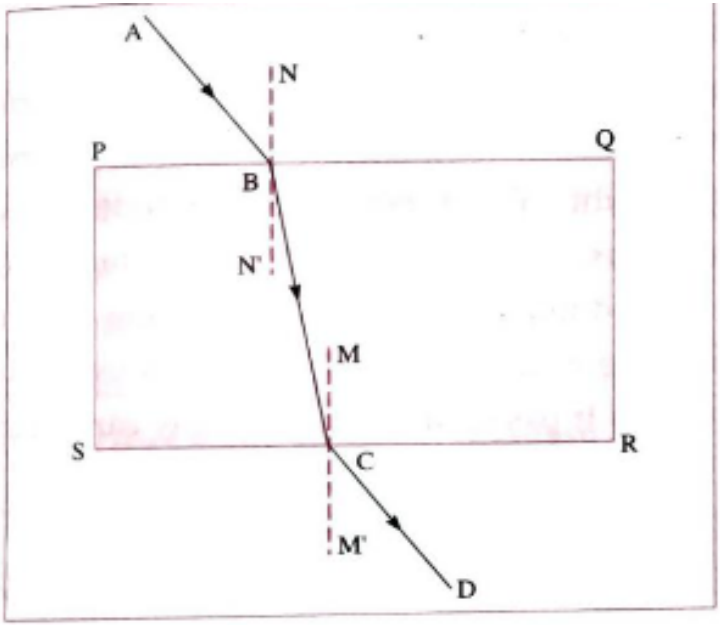
77. Answer the following questions

Observe the given figure and name the following rays:



ray AB

rayBC

ray CD

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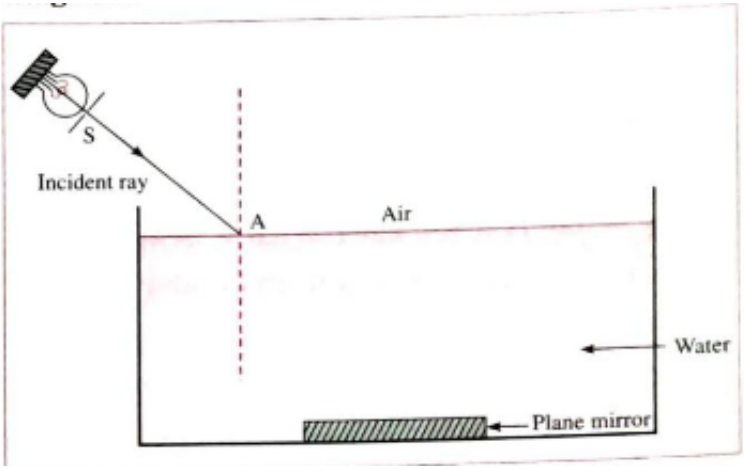
78. Answer the following questions

A plane mirror is kept at the bottom of a trough with water in it as show in the following figure . The ray of light emerging from a source at the point S outside the trough, reaches the point A on the surface of

water. Draw a neat ray diagram to show the subsequent path of light and complete the ray diagram.



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79. Answer the following questions

Give two examples of the effect of

atmospheric refraction on a small scale in local environment.

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80. Answer the following questions

What is mirage ? With a neat labelled diagram, explain the conditions under which it is seen.

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81. Answer the following questions

Explain in brief the flickering of an object seen through a turbulent stream of hot air rising above the holi fire.

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82. Answer the following questions

With a neat labelled diagram, explain twinkling of a star . Also explain why a planet does not twinkle.

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83. Answer the following questions

What is the correct reason for blinking/ flickering of stars? Explain it.

A. The blasts in the stars.

B. bsorption of star light by the atmosphere

C. Motion of the stars

D. Changing refractive index of gasses in the atmosphere.

Answer:

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84. Answer the following questions

With a neat labelled diagram , explain advanced sunrise and delayed sunset.

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85. Answer the following questions

Water in a swimming pool or water tank appears shallower than its depth . Why ?

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86. Answer the following questions

Place a coin at the bottom of a glass jar containing water. Now tilt the jar suitably. When viewed at a suitable angle, the coin appears to be floating. Why ?

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87. Answer the following questions

State the wavelength range of electromagnetic radiation to which our eyes are sensitive.

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88. Answer the following questions

What do you mean by dispersion of light? What is a spectrum of light ? Name the

different colours of light in the proper sequence in the spectrum of white light.

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89. Answer the following questions

What do you mean by dispersion ? Name the different colours of light in the proper sequence in the spectrum of white light.

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90. Answer the following questions

What is a prism?

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91. Answer the following questions

Witha neat labelled diagram describe the experiment to demonstrate dispersion of sunlight (white light)by a prism).

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92. Answer the following questions

Draw a neat labelled diagram of dispersion of white light through a glass prism.

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93. Answer the following questions

Which coloured ray is the least deviated ?

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94. Answer the following questions

Which coloured ray is the most deviated ?

Watch Video Solution

95. Answer the following questions

How does the dispersion of white light take place when it passes through a glass prism ?

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96. Answer the following questions

What is a spectrum ? why do we get a spectrum of seven colours when while light is dispersed by a prism ?

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97. Answer the following questions

Explain how a spectrum is formed.

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98. What is partial reflection?

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99. Answer the following questions

Explain the terms total internal reflection and critical angle.

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100. Answer the following questions

The observation made by swarali while doing the experiment are given below . Based on these write answers to the following questions: Swarali found that the light ray trvelling from the denser medium to a rarer medium goes away from the normal. If the angle of incidence (i) is raised by Swarali, the angle of refraction (r) went on increasing

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101. Answer the following questions

The observations made by swarali while doing the experiment are given below. Based on these write answers to the questions: Swarali found that the light ray trvelling from the denser medium to a rarer medium goes away from the normal. If the angle of incidence (i) is raised by Swarali, the angle of refraction (r) went on increasing . However after certain value of the angle of incidence. the light ray is seen to return back into the denser medium

What is the specific value of angle i called ?

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102. Answer the following questions

The observations made by swarali while doing the experiment are given below. Based on these write answers to the questions: Swarali found that the light ray trvelling from the denser medium to a rarer medium goes away from the normal. If the angle of incidence (i) is raised by Swarali, the angle of refraction (r) went on increasing . However after certain value of the angle of incidence. the light ray is

seen to return back into the denser medium

What is the process of reflection of incident ray into a denser medium called ?

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103. Answer the following questions

The observations made by swarali while doing the experiment are given below. Based on these write answers to the questions: Swarali found that the light ray trvelling from the denser medium to a rarer medium goes away

from the normal. If the angle of incidence (i) is raised by Swarali, the angle of refraction (r) went on increasing . However after certain value of the angle of incidence. the light ray is seen to return back into the denser medium Draw the diagram of three observations made by swarali.

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104. Answer the following questions

Define total internal reflection of light.

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105. Answer the following questions

Define critical angle.

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106. Answer the following questions

If the refractive index of a rarer medium with respect to a denser medium is 0.5 what is the critical angle ?

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107. Answer the following questions

Name the devices in which total internal reflection of light is used .

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108. Answer the following questions

Explain why an empty test tube held obliquely in water appears shiny to an observer looking down.

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109. Answer the following questions

Prove the following statement : A rainbow is the combined effect (an exhibition) of the refraction , dispersion and total internal reflection of light (taken together)

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110. With a neat labelled diagram explain rainbow formation

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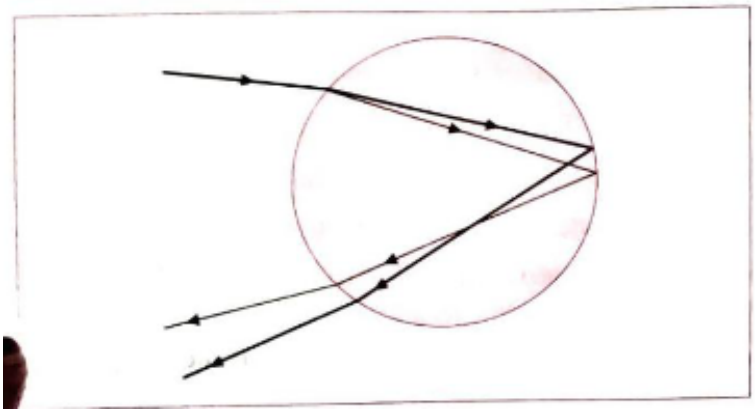
111. Answer the following questions

Observe the given figure and answer the following questions.



Identify and write the natural process shown in the figure.

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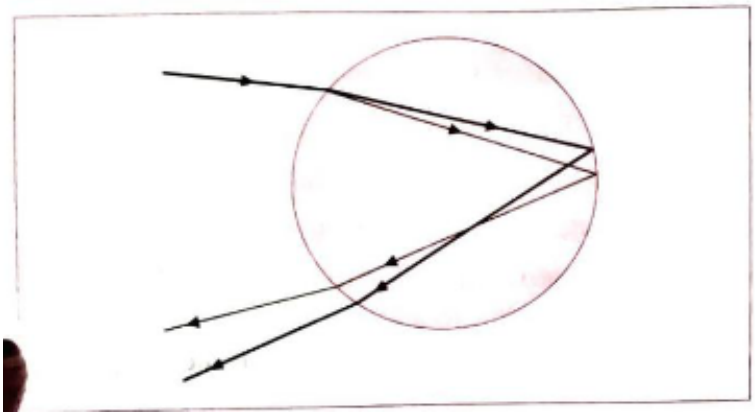
112. Answer the following questions

Observe the given figure and answer the following questions.



List the phenomena which are observed in this process.

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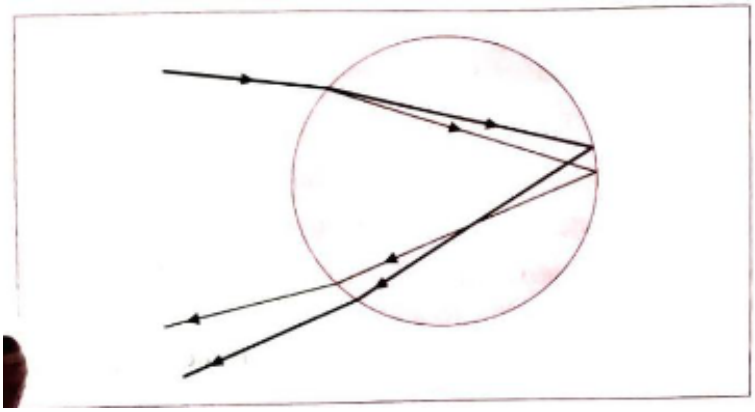
113. Answer the following questions

Observe the given figure and answer the following questions.



Redraw the diagram and show the above phenomena in it.

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114. Write short notes on the following :

Refraction observed in the atmosphere.

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115. Write short notes on the following :

Dispersion of light

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116. Give scientific reasons

A coin kept in a bowl is not visible when seen from one side. But, when water is poured in the bowl , the coin becomes visible.

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117. Give scientific reasons

Apencil dipped in water obliquely appears bent at the surface of water.

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118. Give scientific reasons

When a pencil is partly immersed in water and held in a slanting position, it appears to be bent at the boundary separating water and air.

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119. Give scientific reasons

The shadow of the edge of an empty vessel is formed due to the slanting rays of the sun .

When water is poured in the vessel , the shadow is shifted.

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120. Give scientific reasons

The bottom of a pond appears raised.

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121. Give scientific reasons

While shooting a fish in a lake, the gun is

aimed below the apparent position of the fish.

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122. Give scientific reasons

Stars twinkle but we do not see the twinkling of planets.

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123. Give scientific reasons

Stars appear to be twinkling at night.

Watch Video Solution

124. Give scientific reasons

The sun is seen on the horizon a little before sunrise.

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125. Give scientific reasons

The sn is seen on the horizon for sometimes even after sunset.

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126. Distinguish between

Reflection of light and refraction of light :

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127. Solve and fill in the blanks

Sr. No.	Velocity of light in the first medium v_1	Velocity of light in the second medium v_2	Refractive Index $_2n_1$	Refractive Index $_1n_2$
(1)	3×10^8 m/s	1.2×10^8 m/s	_____	_____
(2)	_____	2.25×10^8 m/s	$\frac{4}{3}$	_____
(3)	2×10^8 m/s	_____	_____	1.5

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128. Solve the following examples/ numerical problems:(c=3xx10^8 m/s)

The speed of light in a transparent medium is 2.4 xx10^8 m/s. Calculate the absolute refractive index of the medium.

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129. Solve the following examples/ numerical problems:(c=3xx10^8 m/s)

The velocity of light in a medium is 2xx10^8 m/s. What is the refractive index of the medium with respect to air, if the velocity of light in air is 3xx10^8 m/s ?

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130. If the speed of light in a medium is $1.5 \times 10^8 m/s$, what is the absolute refractive

index of the medium?

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131. The absolute refractive index of water is 1.36. What is the velocity of light in water? (velocity of light in vacuum is $3 \times 10^8 m / s$)

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132. Solve the following examples/ numerical problems:(c=3xx10^8 m/s)

Light travels with a velocity 1.5xx10^8 m/s in a medium. On entering second medium its velocity becomes 1.25xx10^8 m/s. What is the refractive index of the second medium with respect to the first medium ?

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133. The refractive index of water is $\frac{4}{3}$ and speed of light in air is $3 \times 10^8 m/s$. Find the speed of light in water

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134. Solve the following examples/ numerical problems:(c=3xx10^8 m/s)

The speed of light in water and glass is 2.2xx10^8 m/s and 2xx10^8 m/s respectively.What is the refractive indexx of (i) water with respect to glass (ii) glass with respect to water?

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135. If the absolute refractive indices of glass and water are $3/2$ and $4/3$ respectively, what is the refractive index of glass with respect to water?

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136. The speed of light in a transparent medium is 2x10^8 m/s . Find the absolute refractive index of the medium.

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137. The absolute refractive index of a transparent medium 5/3 . Find the speed of light in the medium.

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138. The absolute refractive index of a transparent medium is 2.4 and the speed of light in that medium is 1.25xx10^8 m/s. Find the speed of light in air.

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139. Solve the following examples/ numerical problems:(c=3xx10^8 m/s)

The speed of light in water and glass is 2.2xx10^8 m/s and 2xx10^8 m/s respectively.What is the refractive indexx of (i) water with respect to glass (ii) glass with respect to water?

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140. If the refractive index of a certain glass with respect to water is 1.25, find the refractive index of water with respect to the glass.

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141. If the absolute refractive index of glass is 1.5 and that of water is 4/3, find the refractive index of water with respect to glass.

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