NCERT solution for Lights

Question 1

Suppose you are in a dark room. Can you see objects in the room? Can you see objects outside the room? Explain.

Answer

It is not possible to see the objects in the darkroom. But we can see objects outside the room

We can see any object, when light reflected by that object reaches our eyes. But in the dark room, no light is reflected by the object. Hence, we are unable to see the objects in dark room. But if there is light outside the room, we can see the objects lying there

Question 2

Differentiate between regular and diffused reflection. Does diffused reflection mean the failure of the laws of reflection?

Answer

S.No.	Regular reflection	Diffused reflection
1.	It takes place from a smooth or regular surface.	It takes place from a rough surface.
2.	All reflected rays are parallel to each other.	The reflected rays are not parallel to each other. This happens because of irregular microscopic surface but each ray obeys the laws of reflection So law of reflection is violated
3.	Reflected rays go in one direction.	Reflected rays are scattered in different directions. Again this happen to the reason given above
4.	It is caused by smooth surfaces such	It is caused by the irregularities in the reflecting surface, like that of a cardboard.

	as mirror.	

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Question 3

Mention against each of the following whether regular or diffused reflection will take place when a beam of light strikes. Justify your answer in each case.

(a) Polished wooden table

(b) Chalk powder

(c) Cardboard surface

(d) Marble floor with water spread over it

(e) Mirror

(f) Piece of paper

Answer

S.No	Question	Reflection type	Explanation
a)	Polished wooden table	regular reflection	A polished wooden table is an example of smooth surface
b)	Chalk powder	diffused reflection	Chalk powder has irregular surface.
c)	Cardboard	diffused reflection	A cardboard has irregular surface.
d)	Marble floor with water spread over it	regular reflection	Smooth surface
e)	Mirror	regular reflection	A mirror has a smooth surface
f)	piece of paper	diffused reflection	A piece of paper may appear smooth but it has many minor irregularities.

Question 4

State the laws of reflection.

Answer

The angle of incidence is equal to the angle of reflection.

$\angle i = \angle r$

The incident ray, the reflected ray and the normal to the surface at the point of incidence lie in the same plane.

Question 5

Describe an activity to show that the incident ray, the reflected ray and the normal at the point of incidence lie in the same plane

Answer

NCERT book has the activity associated with it. check it out

Question 6

Fill in the blanks in the following:

a) A person 1 m in front of a plane mirror seems to be _____ m from his image.

b) If you touch your ___ ear with right hand in front of a plane mirror it will be seen in the mirror that your right ear is touched with ___.

c) The size of the pupil becomes _____ when you see in dim light.

d) Night birds have ___ cones than rods in their eyes.

Answer

(a) 2m

As Distance of the object and its image from the plane mirror is same. When the person is standing 1m away from the mirror, its image is also 1 m away. So, the distance between the person and its image appears to be 2 m.)

(b) left, left hand

Reason is laterally inversion

(c) large

(d)less

Question 7

Angle of incidence is equal to the angle of reflection

(a) Always

(b) Sometimes
(c) Under special conditions
(d) Never

Answer
(a)

Question 8
Image formed by a plane mirror is
(a) virtual, behind the mirror and enlarged
(b) virtual, behind the mirror and of the same size as the object
(c) real at the surface of the mirror and enlarged
(d) real, behind the mirror and of the same size as the object.

Answer
(b)

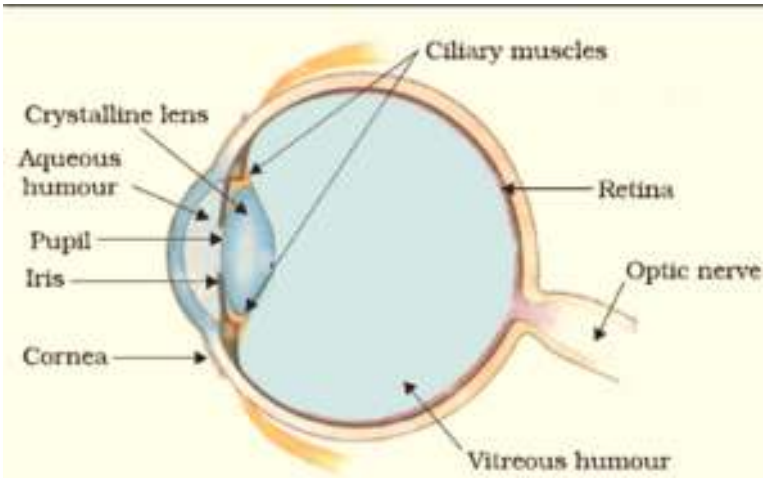
Question 9
Describe the construction of a kaleidoscope.

Answer
A **kaleidoscope** operates on the principle of multiple reflection, where several mirrors are placed at an angle to one another. Typically, there are three rectangular mirrors set at 60° to each other so that they form an equilateral triangle, but other angles and configurations are possible.

It is made by taking three plane mirror strips and joining them to form a triangle. A piece of cardboard is wrapped around the mirrors. On one side of the tube so formed, we place pieces of glass of different colors between two transparent sheets. The other side is closed with a plane transparent sheet. When we see through this end, and rotate the kaleidoscope, we see beautiful coloured patterns.

Question 10
Draw a labeled sketch of the human eye.

Answer



Question 11

Gurmeet wanted to perform Activity using a laser torch. Her teacher advised her not to do so. Can you explain the basis of the teachers advise?

Answer

Intensity of laser beam is very high, as it carries large amount of energy. It is harmful for eyes and can cause permanent damage. One should not look laser beam directly or for a longer period.

Question 12

Explain how you can take care of your eyes.

Answer

Eye are very important part of body and we should take care of our eyes with following steps

1) We should wash our eyes two or three times a day.
2)We should never touch our eyes with dirty hands.
3) We should never rub our eyes.
4) Maintain distance from TV
5) We should consult eye specialist in case of any redness or irritation in the eyes.

Question 13

What is the angle of incidence of a ray if the reflected ray is at an angle of 90° to the incident ray?

Answer

According to the laws of reflection,
Angle of incidence = Angle of reflection.
As given, ∠i + ∠r = 90
It implies ∠i = ∠r = 90/2 = 45 degrees.

Angle of incidence = 45 degrees.

Question 14

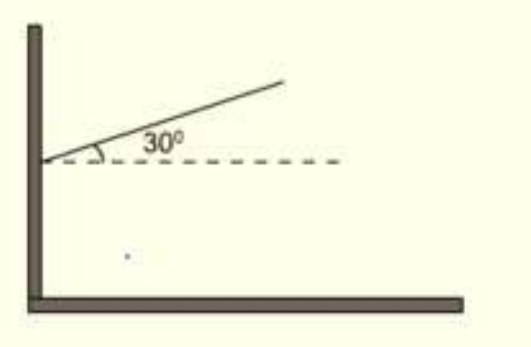
How many images of a candle will be formed if it is placed between two parallel plane mirrors separated by 40 cm?

Answer

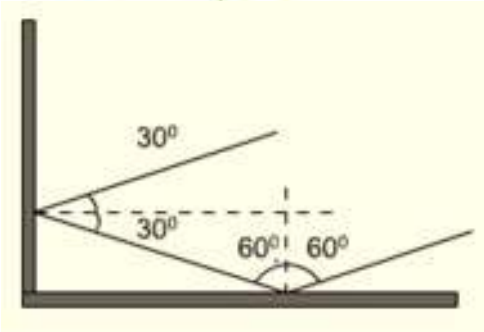
Infinite number of images will be formed if a candle is placed between two parallel plane mirrors.

Question 15

Two mirrors meet at right angles. A ray of light is incident on one at an angle of 30° as shown in below. Draw the reflected ray from the second mirror.

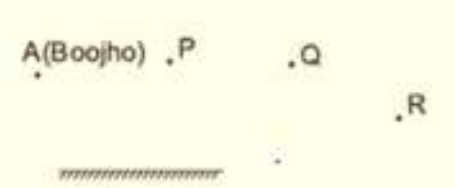


Answer



Question 16

Boojho stands at A just on the side of a plane mirror as shown in below figure. Can he see himself in the mirror? Also can he see the image of objects situated at P, Q and R?

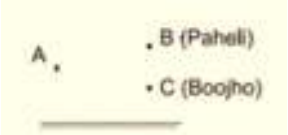


Answer

Boojho himself can't see his image as he is not standing in front of the mirror. However, he is able to see objects at P and Q because the reflected rays from P and Q reach his eyes. If the ray from object R does not reflect and reaches Boojho, he cannot see object R as well.

Question 17

(a) Find out the position of the image of an object situated at A in the plane mirror.
(b) Can Paheli at B see this image?
(c) Can Boojho at C see this image?
(d) When Paheli moves from B to C, where does the image of A move?



Answer

a) The image of the object at position A will be formed behind the mirror. It will be at the same distance away from mirror as the object is.

(b) Yes Paheli at B can see the object because reflected ray from A will reach B.

(c) Boojho can also see the image because his eyes receive the reflected ray from A.

(d). Position of image A remains fixed even if Paheli moves from B to C.