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Q1.
As ray of light falls normally on mirror, this means that angle of incidence is 0o. From second law of reflection, we know that angle of incidence is equal to angle of reflection. So, angle of reflection will also be zero. Therefore, the light ray will be reflected back along the same path.
Q2.
According to the second law of reflection, angle of incidence is equal to the angle of reflection.
Therefore, angle of reflection=30°
Q3.
Angle to the mirror surface=40°
Therefore, angle of incidence= 90°-40°=50°
According to the second law of reflection, angle of incidence is equal to the angle of reflection.
Therefore, angle of reflection=50°
Q4.
(a) 0°
(b) 0°
Q5.
(a) Virtual image
(b) Real image
Q6.
Plane mirror.
Q7.
Lateral inversion.
Q8.
Lateral inversion.
Q9.
The image is formed behind the mirror at the same distance as the object is kept in front of the mirror.
Given distance between object and mirror = 10cm.
Distance between mirror and image = 10cm.
Therefore, the distance between object and image = 10+10 = 20 cm.
Q10.
Light travels in straight lines.
Q11.
Virtual image.
Q12.
Equal.
Q13.
False.
Q14.
At the back side of mirror.
Q15.
According to the second law of reflection, angle of incidence is equal to the angle of reflection.
Given angle of incidence=30°
Therefore, angle of reflection=30°
Angle made by the reflected ray with mirror surface = 90° - 30° = 60°
Q16.
Real image can be obtained on a screen because light rays actually pass through a real image but virtual image cannot be formed on

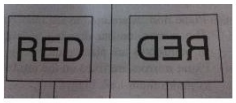
screen because light rays do not actually pass through a virtual image.
Example:
The image formed on a cinema screen is an example of real image.
The image formed by a plane mirror is a virtual image.
Q17.

(a) 

(b) Lateral inversion

Q18.

When an object is placed in front of a plane mirror, then the right side of the object appears to become the left side of the image; and the left side of the object appears to become right side of the image. This change of the sides of an object and its mirror image is called lateral inversion.
Ex. When we hold a placard having the word RED written on it, as given in fig A, in the front of a plane mirror, the image of the word RED will be as given in fig B.



A B

Q19.

AMBULANCE
Because while driving our car, if we see in our rear-view mirror that the hospital van is coming from behind, then we will get the laterally inverted image of AMBULANCE and read it as AMBULANCE and give way for it to pass through.

Q20.
A image of our face in a plane mirror is laterally inverted, so left is right and right is left. However, in a photograph of our face this is not the case.

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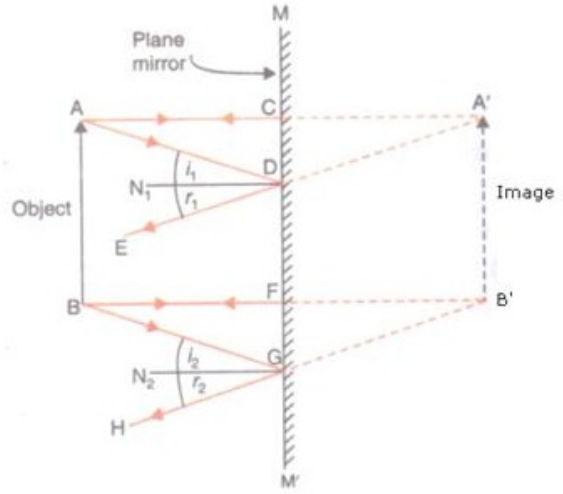
Q21.
(a) A wall has a rough surface, so the reflection by a wall is a diffuse reflection. A parallel beam of light incident on it is reflected in different directions.
A mirror surface is smooth, so the reflection by a mirror is a regular reflection. A parallel beam of light incident on it, gets scattered by making reflected rays in different directions.
(b) Regular reflection
Q22.
In regular reflection, a parallel beam of incident light is reflected as a parallel beam in one direction; while in diffuse reflection, a parallel beam of incident light is reflected in different directions.
(a) Regular reflection
(b) Regular reflection
(c) Diffuse reflection
(d) Regular reflection
Q23.
When we see in a completely dark room, we are not able to see anything because there is no light in the dark room.
(a) We can see bulb due to the light emitted by the bulb.
(b) We can see a piece of white paper because it reflects the light from the bulb falling on it.
Q24.
(a) The image will form 2 m behind the mirror and the width of the image of boy's mouth will be 5 cm.
(b) When the boy walks towards the mirror at a speed of 1 m/s, his image will also appear to move towards the mirror at the same speed of 1 m/s. So, the speed at which his image approach him will be 2 m/s + 2 m/s = 4 m/s.
Q25.

(a)



(b) Uses of Plane mirrors:
(i) Plane mirrors are used to see ourselves. The mirrors on our dressing table and in bathrooms are plane mirrors.
(ii) Plane mirrors are fitted at blind turns of some busy roads so that drivers can see the vehicles coming from the other side and prevent accidents.
(iii) Plane mirrors are used to make periscopes.
(iv) Plane mirrors are fixed on the inside walls of certain shops to make them look bigger.
Q26.
The process of sending back the light rays which fall on the surface of an object is called reflection of light.

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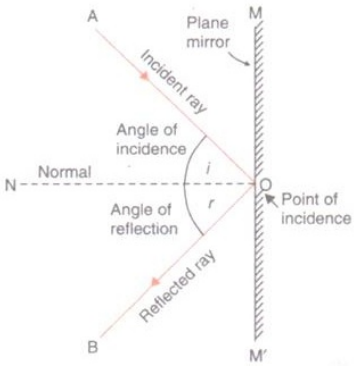

(a) Incident ray: The ray of light that falls on the mirror surface is called the incident ray.
(b) Point of incidence: The point at which the incident ray falls on the mirror is called the point of incidence.
(c) Normal: The normal is a line at right angle to the mirror surface at the point of incidence.
(d) Reflected ray: The ray of light which is sent back by the mirror is called the reflected rays.
(e) Angle of incidence: The angle of incidence is the angle made by the incident ray with the normal at the point of incidence.
(f) Angle of reflection: The angle of reflection is the angle made by the reflected ray with the normal at the point of incidence.
Q27.
Laws of reflection of light:

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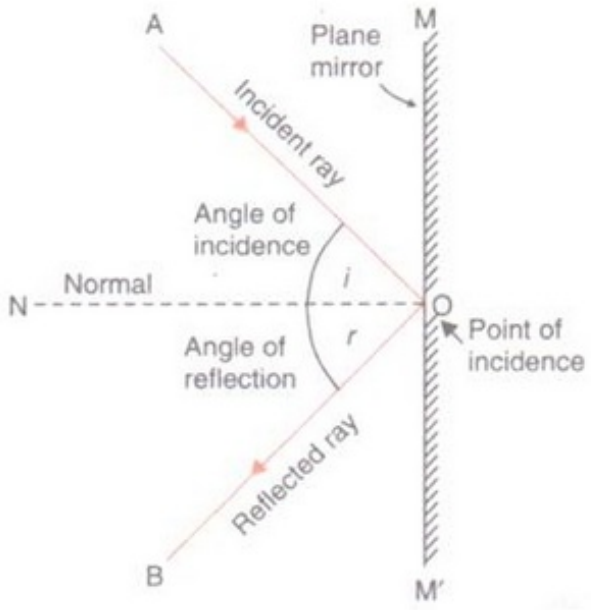
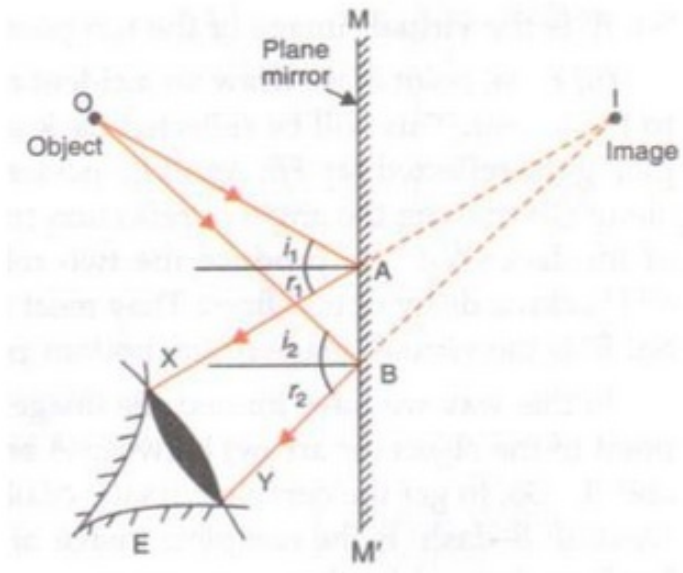


First law of reflection: According to the first law of reflection, the incidence ray, the reflected ray and the normal (at the point of incidence), all lie in the same plane. For e.g., in the figure, the incident ray AO, the reflected ray OB and the normal ON, all lie in the same plane, the plane of paper.
Second law of reflection: According to the second law of reflection, the angle of reflection is always equal to the angle of incidence. For e.g., if we measure the angle of reflection NOB in the figure, we will find that it is exactly equal to the angle of incidence AON.
If the angle of reflection is 47.5°, the angle of incidence will also be 47.5° in accordance with the second law of reflection.
Q28.



Cosider a point source of light O placed in front of a plane mirror MM'. a ray of light OA coming from O in incident at point A on the mirror and gets reflected in the direction AX according to the laws of reflection of light. Another ray of light OB coming from O strikes the mirror ar point B and gets reflected in the direction BY. Rays AX and BY, on producing backwards, meet at point I behind the mirror; which is the image of point source O.
Characteristics of image formed in a plane mirror:

(i) The image formed in a plane mirror is virtual. It cannot be received on a screen.
(ii) The image formed in a plane mirror is erect. It is the same side up as the object.
(iii) The image in a plane mirror is of the same size as the object.
(iv) The image formed by a plane mirror is at the same distance behind the mirror as the object is in front of the mirror.
(v) The image formed by a plane mirror is laterally inverted.
Q29.
(a) We can see the image of our face in a plane mirror but not in a sheet of paper because images are formed by regular reflection of light and in case of a plane mirror, regular reflection takes place; while in case of a sheet of paper, diffuse reflection takes place.
(b) The image is virtual and laterally inverted means it cannot be obtained on a screen and is reversed sideways.
(c) A, H, I, M, O

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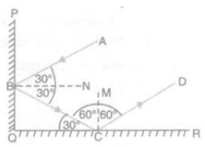
Q36.
Initially, the distance between the man and the mirror is 10m.
So, the distance between man and his image is 10+10 = 20m
Distance between the man and his image is 5 m when the man is 2.5 m away from the mirror.
Therefore, he has to walk 10 m - 2.5m = 7.5 m towards the mirror
Q37.
Initially, the object is placed 20 cm in front of mirror. So the image will form 20 cm behind the mirror.
If mirror is moved 2 cm towards the object,
distance between object and mirror = 20 cm - 2 cm = 18 cm
distance between mirror and image = 18 cm, which is 2 cm less than the initial case.
Since, the mirror has also moved 2 cm away from the position of original image, so the total distance between the positions of the original and final images is 2 cm + 2 cm = 4 cm
Q38.
Distance between the man and the mirror = 2 cm
Distance between man and chart = 50 cm = 0.5 m
Distance between chart and mirror = 0.5 m + 2 m = 2.5 m
Distance between mirror and the image of the chart = 2.5 m
Distance between man and the image of chart = Distance between man and the mirror + Distance between mirror and the image of the chart = 2 m + 2.5 m = 4.5 m
Q39.



Ray AB strikes the mirror PQ at B and gets reflected along BC according to the laws of reflection. The ray BC incident on mirror QR makes an angle of 30^{o} with the mirror. So, the angle of incidence on this mirror is 90^{o}-30^{o}=60^{o}. Hence, the angle of reflection is also 60^{o}.

Ray AB strikes the mirror PQ at B and gets reflected along BC according to the laws of reflection. The ray BC incident on mirror QR makes an angle of 30° with the mirror. So, the angle of incidence on this mirror is 90°-30°=60°. Hence, the angle of reflection is also 60°.
Q40.
The impression on blotting paper is the mirror image of the written massage. Therefore, to read this message we need to hold the written message in front of a mirror so that the mirror produces a laterally inverted image of this message.

********** END **********