

Puspa Shrestha

Best Quality Resource Site for Class 11 And 12 Students
(Based on Updated Curriculum 2077)

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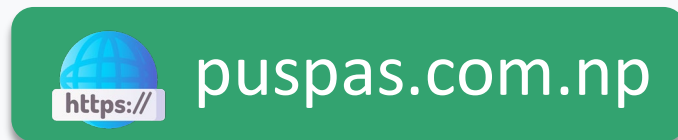


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EXPERIMENT NO. 9

NAME OF EXPERIMENT: TO VERIFY THE LAW OF REFLECTION OF LIGHT

APPARATUS REQUIRED

1. Plane mirror mounted on wooden block
2. Protractor
3. Scale
4. A sheet of paper
5. Drawing board
6. Fixing pins
7. Hair pins

THEORY

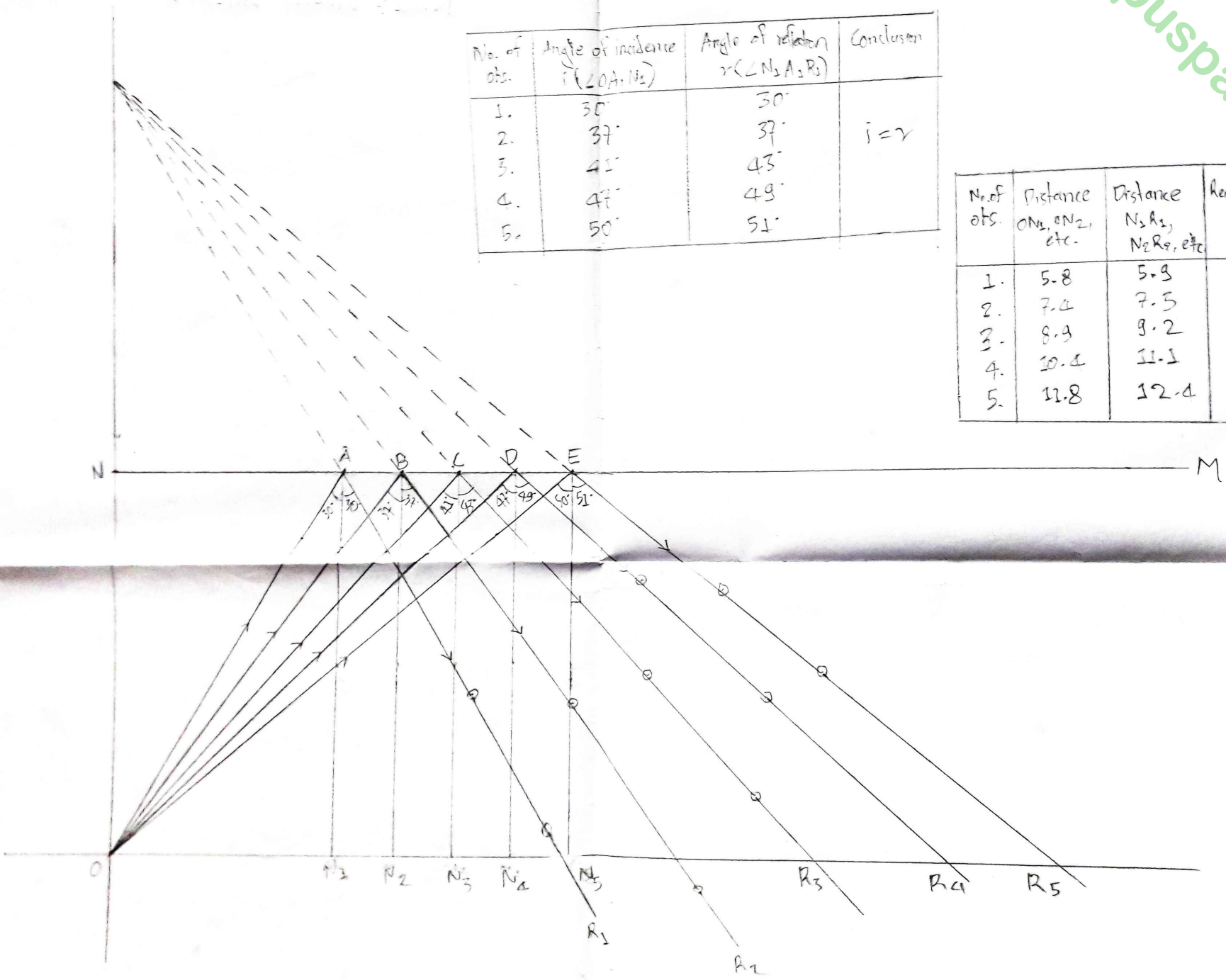
The laws of reflection state that (i) The angle of incidence is equal to the angle of reflection. (ii) The incident ray, the normal at the point of incidence and the reflected ray all lie in the same plane.

PROCESS

1. A sheet of paper was fixed on the drawing board with the help of 4 fixing pins.
2. A st. line NM was drawn through the middle of the paper. A point O was marked in front of the line at a distance of 10cms. From O, line OA, OB, OC, OD, OE were drawn so that they make angles of 30° , 37° , 41° , 47° , 50° respectively with the

normal drawn at A, B, C, D and E.

3. The plane mirror was now placed vertically so that its reflecting surface may coincide with the line NM. For a thick mirror, the actual reflecting surface will be at a distance of about two-thirds of the thickness of glass from the first surface.
4. Two pins were fixed on OA at a distance of more than 10 cms. The images of these pins ~~are~~^{were} looked for along AR₁. Placing the eye in such a way that the reflected images of the previous two pins appear to be only one, a third pin was fixed to cover the third point. It should be remembered that the two pins should be at a distance not less than 10 cms.
Pin pricks were marked (1,1)
5. Operation (4) was repeated for other incident rays OB, OC, etc. Pin pricks along reflected ray were marked (2,2), (3,3) etc.
6. The pins and the mirror were removed. Pin pricks (1,1), (2,2) etc. were joined by drawing st. line through them. The lines were produced to meet the line NM. Normals were drawn at A, B, C, etc. Through O, a st. line was drawn parallel to NM and meeting the normals and reflected rays at N₁R₁, N₂R₂, etc.



No. of obs.	Angle of incidence i ($\angle O A_1 N_2$)	Angle of reflection r ($\angle N_3 A_3 R_3$)	Conclusion
1.	30°	30°	$i = r$
2.	37°	37°	
3.	45°	45°	
4.	47°	49°	
5.	50°	51°	

No. of obs.	Distance $O N_1, O N_2,$ etc.	Distance $N_3 R_3, N_4 R_4,$ etc.	Remark	Conclusion
1.	5.8	5.8		$ON = NR$
2.	7.4	7.5		
3.	8.9	9.2		
4.	10.1	11.1		
5.	12.8	12.4		

OBSERVATIONS

No. of Obs.	Angle of incidence i ($\angle OAN_1$)	Angle of reflection r ($\angle N_1AR_1$)	Conclusion
1	30°	30°	
2	37°	37°	
3	41°	43°	$i = r$
4	47°	49°	
5	50°	51°	

No. of Obs.	Distance (ON_1)	Distance (N_1R_1)	Remarks	Conclusion
1.	5.8	5.9		
2	7.4	7.3		
3	8.9	9.2		$ON = NR$
4	10.4	11.1		
5	11.8	12.4		

VERIFICATION OF THE 2nd LAW

This was a case of normal reflection. The incident ray and the reflected ray passed through pin-pricks lying on the plane of paper. Hence the incident ray, the normal and the reflected ray all in the same plane.

ERRORS AND PRECAUTIONS

1. The mirror should be of good glass, thin properly silvered. It should be mounted vertically
2. The back surface of the mirror (silvered surface)

should coincide with the line NM.

3. The linear deviation will be more for a given angular deviation if the distance between the pins is large. Hence small angular deviations can be detected if the pins are fixed wide apart about 10 cm or more.

4. The pin positions on the board are marked clearly by drawing small circles around the pin point with a pointed pencil.

5. The direction of the rays should be marked by arrow heads.

6. The eye should be placed about 25 cm. from the pins while making observations.

