Research and Me

Computer Science, Maths and Physics.

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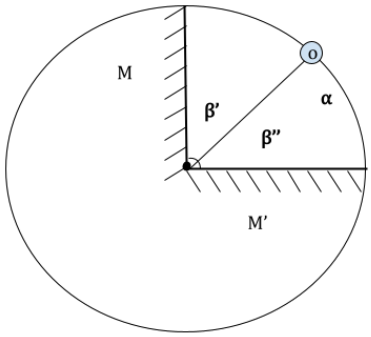
1 N Image Formula

1.1 Introduction

This formula is used to calculate the number of images formed by two mirrors when kept at some angle α.

1.2 Explanation



Let the angle between mirrors M and M' be α.Angle between mirror M and object O be β'. Angle between mirror M' and object O be β''. Then the number of images formed will be

$$n = \lfloor \pi \frac{\sin \alpha}{\beta} \rfloor$$

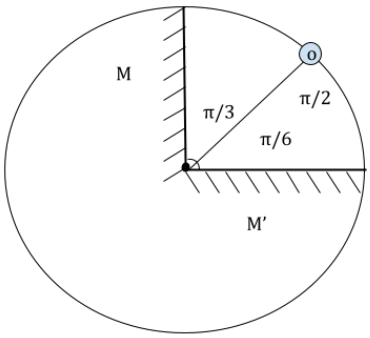
where $\lfloor x \rfloor$ denotes the greatest integer less than or equal to x and all angles are taken in radians.

Conditions for β

- If $\beta' > \beta''$ then β' will be taken as β in the formula.
- If $\beta'' > \beta'$ then β'' will be taken as β in the formula.
- If $\beta' = \beta''$ then any can be taken as β in the formula.

1.3 Examples

[1]
1. Find the total number of images formed if two plane mirrors are inclined at an angle $\pi/2$ and object is situated at an angle of $\pi/6$ from one of them.
Solution:

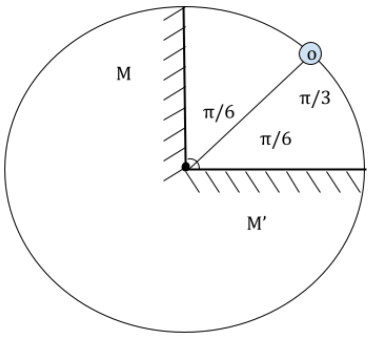


As angle between mirror M and O is greater than angle between M' and O. Then $\alpha = \pi/2$ and $\beta = \pi/3$.

$$n = \lfloor \pi \frac{\sin \alpha}{\beta} \rfloor = \lfloor \pi \frac{\sin(\pi/2)}{\pi/3} \rfloor = 3$$

Number of images formed will be 3.

2. Find the total number of images formed if two plane mirrors are inclined at an angle $\pi/3$ and object is situated at an angle of $\pi/6$ from one of them. *Solution:*



As angle between mirror M and O is equal to M' and O. Then $\alpha = \pi/3$ and $\beta = \pi/6$.

$$n = \lfloor \pi \frac{\sin \alpha}{\beta} \rfloor = \lfloor \pi \frac{\sin(\pi/3)}{\pi/6} \rfloor = \lfloor 5.1961 \rfloor = 5$$

Number of images formed will be 5.

References

[1] Megacosm (2022) Physics Geometrical Optics[XI-XII].