Physics
Theory Part 28

Topics: Waves and Oscillation/ Optics

Course: B.Sc/ Physics

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Q1. What is the magnification of a plane mirror. Q2. What is the no. of image formed between M_1, M_2 kept at $\theta = 90°$

① Magnification of a plane mirror

$$M = \frac{h'}{h} = \frac{h}{h} = +1$$

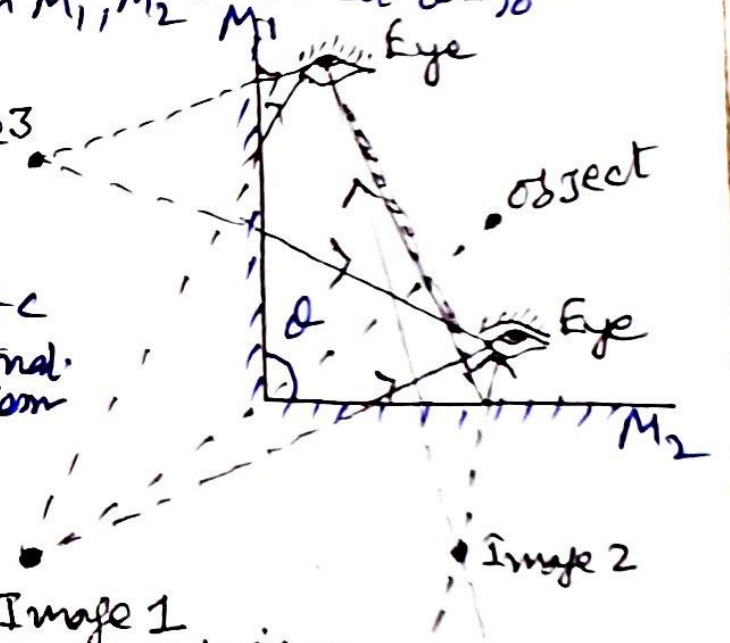
(Since in plane mirror object & image are of same height).

② No. of images formed when two mirrors are placed at angle θ is

$$n = \frac{360}{\theta} - 1 = \frac{360}{90} - 1 = 4 - 1 = 3 \text{ images}$$

are formed.

So. no. of images formed is 3.



DOPPLER EFFECT,

(a) $f_z = 399\,Hz$, $f_o = 414\,Hz$, $v_{sound} = 343\ m/s$, $v_{amb} = 12.42\ m/s$, $f_z = 399\,Hz$. Find the freq. & wavelength (λ) of emitted by ambulance moving towards observer.

$$f_o = f_z\left(\frac{V_{sound}}{V_{sound} - V_{Amb.}}\right)$$ (Source moving towards observer)

or, $\frac{V_{sound} - V_{Amb}}{V_{sound}} = f_z/f_o \Rightarrow 1 - \frac{V_{Amb}}{V_{sound}} = \frac{f_z}{f_o}$

or, $\left(1 - \frac{f_z}{f_o}\right) = \frac{V_{Amb}}{V_{sound}} \Rightarrow \boxed{V_{Amb.} = V_{sound}\left(\frac{f_o - f_z}{f_o}\right)}$

(b) $V_{Amb} = 343\left(\frac{414-399}{414}\right) = 343 \times \frac{15}{414} = 12.42\ m/s$

(c) $f_o = f_z\left(\frac{V_{sound}}{V_{sound} + V_{Amb.}}\right)$ Given $V_{sound} = 343\ m/s$

$V_{Amb} = 12.42\ m/s$

$f_z = 399\,Hz$

$= 399\left(\frac{343}{343 + 12.42}\right)$

$= \frac{136857}{355.42} = \boxed{385.05\ Hz}$

& $\lambda = \frac{v_{sound}}{f_o} = \frac{343}{385.05} = \boxed{0.89\ m}$

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Thanksss