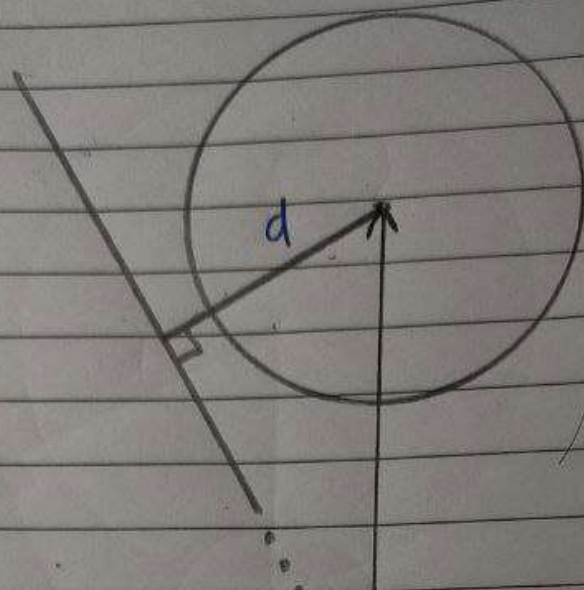


→



normalised direction vector \vec{a}

$\vec{b} \Rightarrow$ position vector of center of sphere

→ known $\Rightarrow \vec{b}, \vec{a}, \text{Radius}$

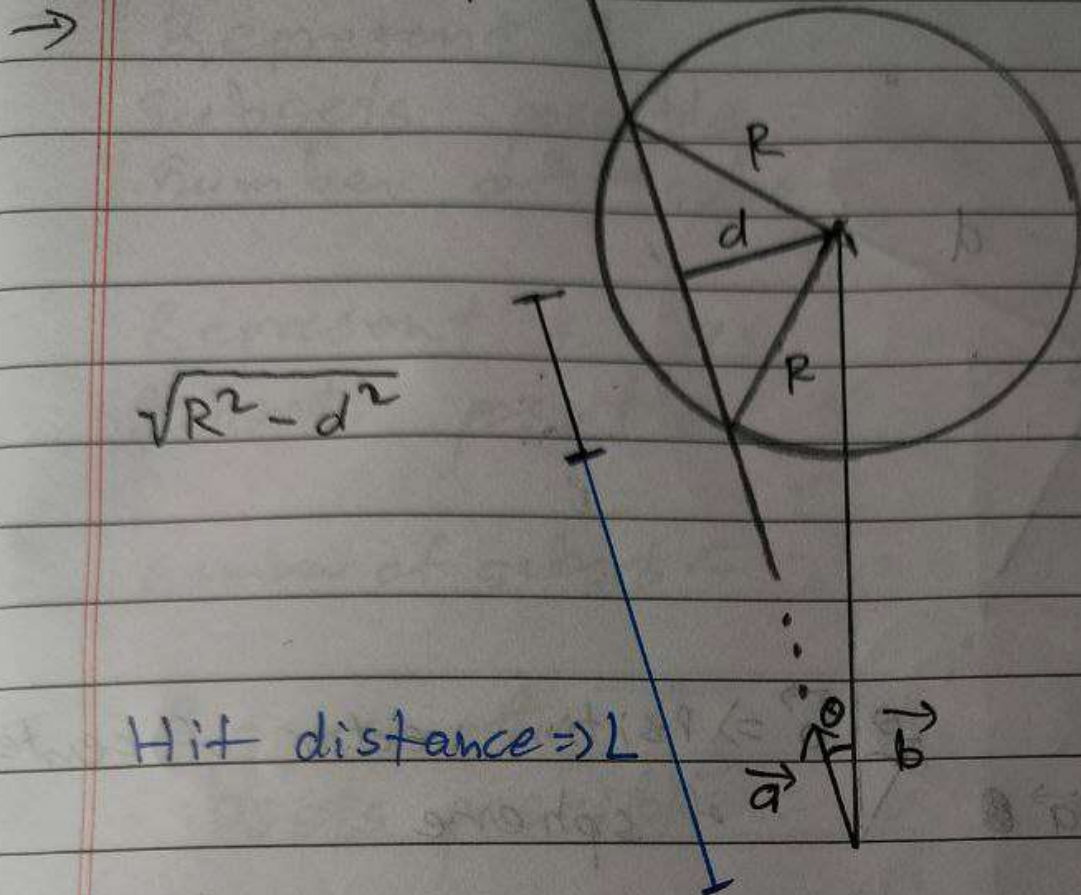
Unknown \Rightarrow perpendicular distance $\Rightarrow d$

→
$$\cos(\theta) = \frac{\vec{a} \cdot \vec{b}}{|\vec{b}|}$$

$$d = |\vec{b}| \sin(\theta) = |\vec{b}| \sqrt{1 - \cos^2(\theta)}$$

$$d = \sqrt{|\vec{b}|^2 - (\vec{a} \cdot \vec{b})^2}$$

if $d \leq R$, then



→ unknown \Rightarrow hit distance L
hit position \vec{L}

→ $L = |\vec{b}| \cos \theta - \sqrt{R^2 - d^2}$

$$L = \vec{a} \cdot \vec{b} - \sqrt{R^2 - d^2}$$

$$\vec{L} = L \vec{a}$$