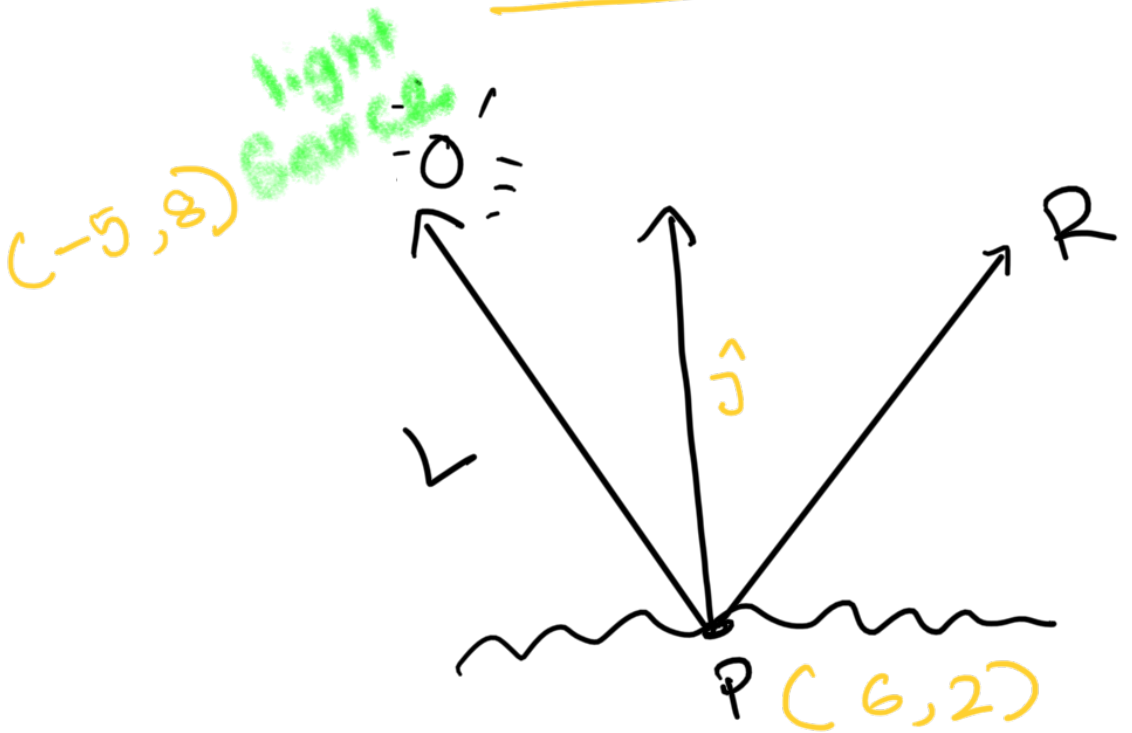
Lighting popquiz



lightsource ⟶ P

L (vector)

reflected ray

R (vector)

(we know)

$R = 2(L \cdot n)n - L$

$L = S - P$

$= (-5, 8) - (6, 2)$

$= (-11, 6)$

$n = (0, 1)$ (only $\hat{j}$ given)

$L \cdot n = (-11, 6)\ (0, 1)$

$= (0, 6)$

$R = 2(0, 6) - (-11, 6)$

$$= (0, 12) - (-11, 6)$$

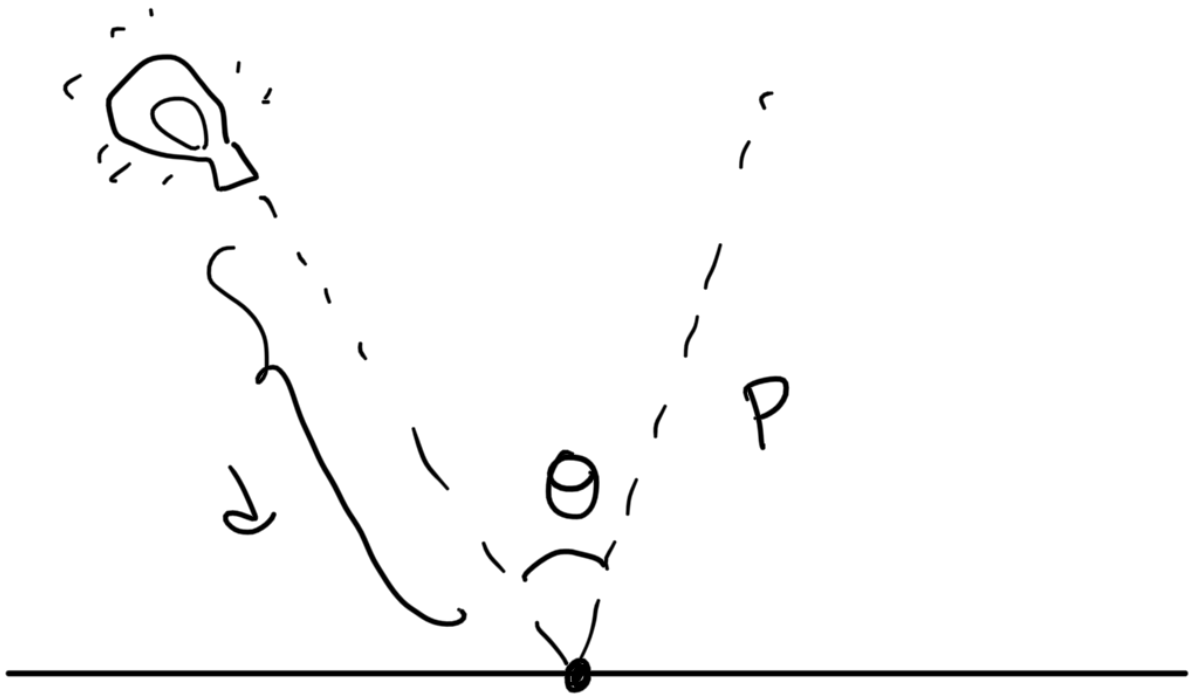
$$= (0+11, 12-6)$$

$$R = (11, 6)$$

$R_x = 11$

$R_y = 6$

Ans



$\theta = 49°$

$I = 132$

$d = 7$

$K_d = 0.6$

we know,

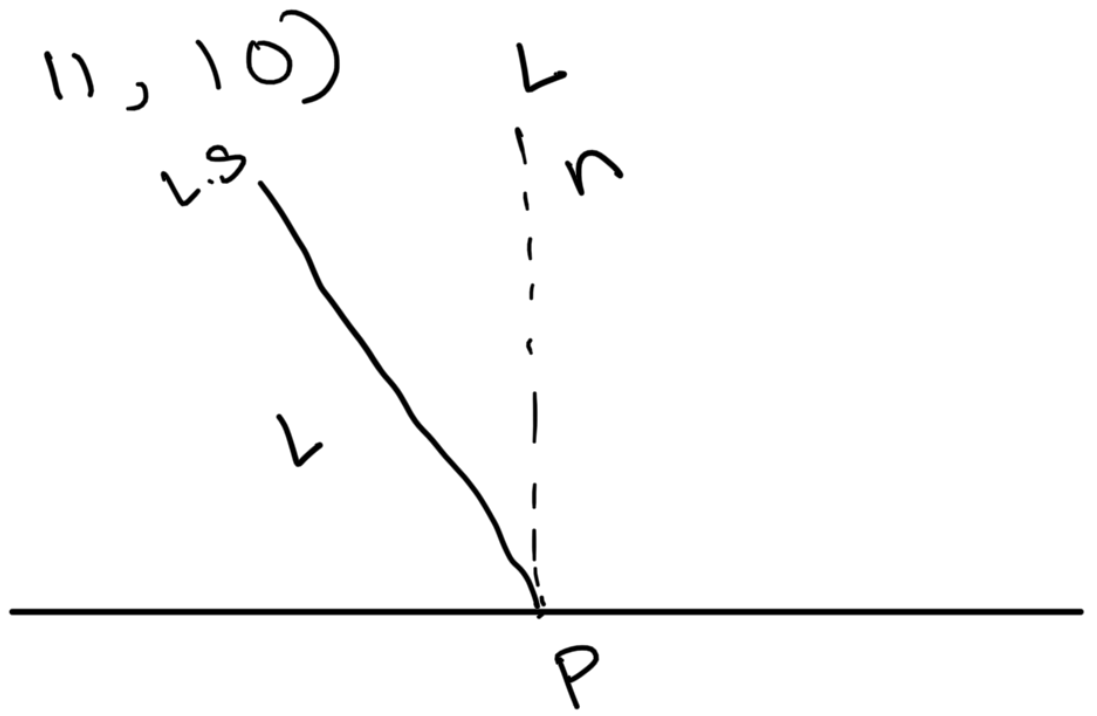
$$D = I_p \times f_{att} \times K_d \cos\theta$$

$$= 132 \times \frac{1}{7^2} \times 0.68 \cos 49°$$

$$D = 1.2$$ Ans

$P = (4, 5, 3)$

$L = (8, 11, 10)$



$$L = L.S - P$$

$$= (8-4,\ 11-5,\ 10-3)$$

$$= (4,\ 6,\ 7)$$

(* question asked for unit vector)

$$\hat{n} = \frac{n}{|n|}$$

$$n_x = \frac{4}{\sqrt{4^2+6^2+7^2}}$$

$$= 0.4$$

$$n_y = \frac{6}{\sqrt{101}} \qquad n_z = \frac{7}{\sqrt{101}}$$

$$n_y = 0.6 \qquad n_z = 0.7$$

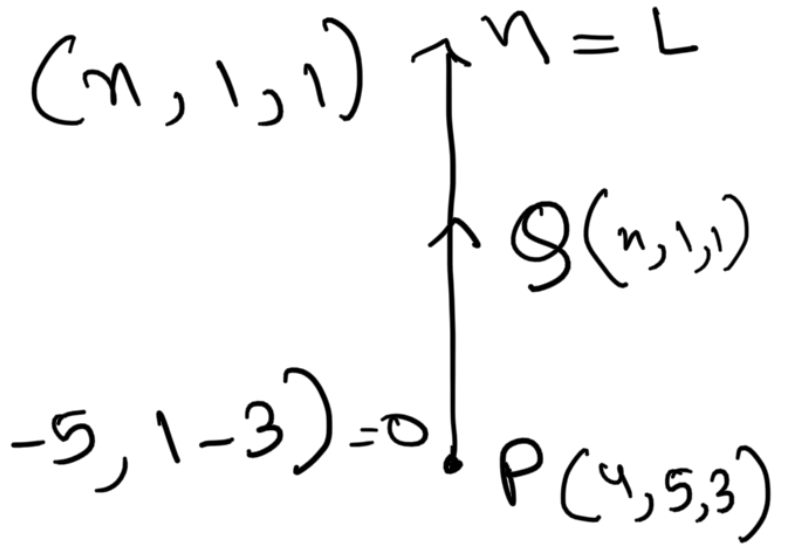
$\therefore 100\, nx = 40$

$100 n_y = 60$

$100 n_z = 70$ Ans

Any point on S, the dot product will be 0.

Let's take another point $Q = (n, 1, 1)$



$L \cdot (Q - P) = 0$

$(4, 6, 7) \cdot (n-4, 1-5, 1-3) = 0$

$4(n-4) + 6 \times (-4) + (7 \times -2) = 0$

$4n - 16 - 24 - 14 = 0$

$4n = 54$

$n = 13.5$.

dot product

$a \cdot b = a_x b_x + a_y b_y + a_z b_z$

$\therefore \alpha = 13.5$, $\beta = 1$, gamma $= 1$.