Computer Graphics Quiz 4

In a ray tracing problem:

Given the equation of a ray $\begin{cases} x(t) = 2t + 1 \\ y(t) = 3t \\ z(t) = t + 2 \end{cases}$

and a plane $3x - 4z + 1 = 0$ with the $k_d = 0.5$

The light source with an intensity of $I = 1000$ is located at $(5, -2, 10)$

Find the diffuse intensity at the intersection point of the ray with the plane.

ignore f_{att}

Intersection of ray and plane:

$$3(2t + 1) - 4(t + 2) + 1 = 0$$
$$6t + 3 - 4t - 8 + 1 = 0$$
$$2t - 4 = 0$$
$$t = 2$$

Substitute t in the equation of the ray:

Intersection of ray with the plane: $(5, 6, 4)$

Find vector from the intersection to the light:

$$\vec{L} = (5, -2, 10) - (5, 6, 4) = (0, -8, 6)$$

Normalized $\hat{L} = (0, -0.8, 0.6)$

Normal to the plane: $\vec{N} = (3, 0, -4)$

Normalized $\hat{N} = (0.6, 0, -0.8)$

$$I_{Diffuse} = I * k_d * (\hat{N} \cdot \hat{L}) = 1000 * 0.5 * 0.48 = 240$$