

Time Limit: 4 minutes

Instructions: Calculator allowed. Closed book. Closed notes.

Instructions for all quizzes: Do not discuss any aspect of this quiz with other midshipmen until after 6th period.

Print your last name above. Also, fill in the bubble for your section.

Fill the bubble for the correct answer. Also, write your answers in any blanks provided.

Your work will not be graded unless the instructions request you show your work.

This quiz deals with the point $P = (0, 1, 5)$ and the plane

$$3x + 2y + 6z = 130.$$

1. Give parametric equations for the line through P perpendicular to the plane.

$$x = 0 + 3t \quad y = 1 + 2t \quad z = 5 + 6t$$

Reason: Take $P = (0, 1, 5)$ as the anchor point of the line. Also, since the line is perpendicular to the plane, a direction vector of the line is a normal vector the plane, which is $\langle 3, 2, 6 \rangle$.

2. Find the point on the plane that is closest to P .

Put your answer here: (6 , 5 , 17)

Show your work below.

Solution: The shortest distance is measured along the line through P perpendicular to the plane. This is the line we found in (a). Substitute the parametric equations from (a) into the plane to find the point of intersection. This will be the closest point on the plane to P .

$$3x + 2y + 6z = 130$$

$$3(3t) + 2(1 + 2t) + 6(5 + 6t) = 130$$

$$49t + 32 = 130$$

$$t = 2$$

With $t = 2$ our parametric equations give $(x, y, z) = (6, 5, 17)$.