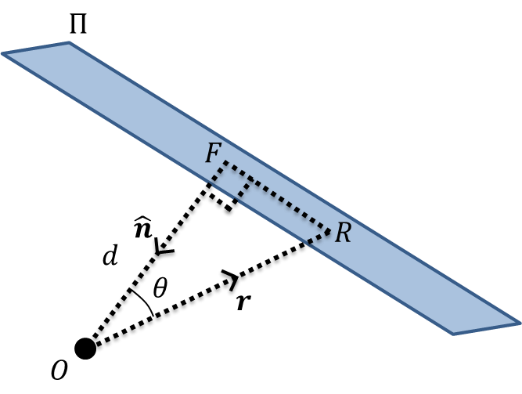
The Shortest Distance from a Plane to the Origin

If equation of plane is , then is the shortest distance between the origin and a point on the plane.



Example

A plane has equation .

Suppose is a generic point on the plane and is the foot of

the perpendicular from the origin to the plane.

Suppose also that is of unit length, i.e. .

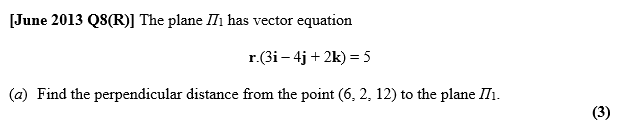
What is the distance ?

The perpendicular distance from the point with position vector to the plane with equation is

Example

Find the perpendicular distance from the point with coordinates to the plane with equation .

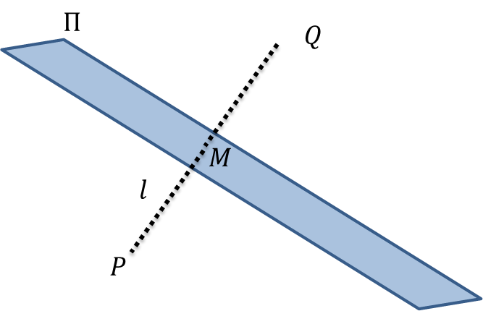
Test Your Understanding



Reflections of Points in Planes

The plane has equation . The point has coordinates .

1. Find the shortest distance between and .

The point is the reflection of the point in .

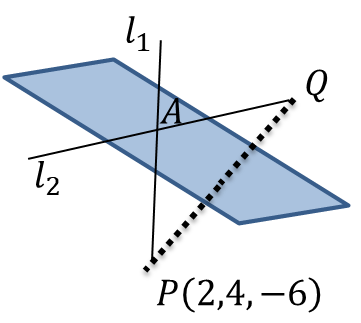
1. Find the coordinates of point .

Reflections of Lines in Planes

The key here is that we need to reflect two points on the line through the plane, then find the equation of the line through these new points.

Example

The line has equation . The plane has equation .

The line is the reflection of line in the plane . Find a vector equation of the line .

Ex 9F Q6,8,10,12