Chapter 14

Three Dimensional Geometry

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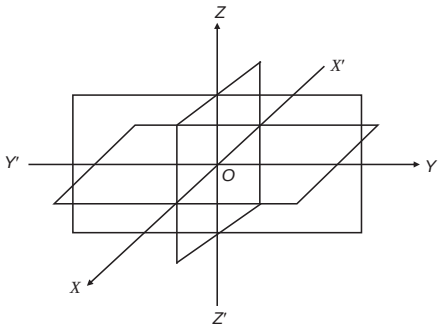
INTRODUCTION

In order to pinpoint a location within a plane, a two-dimensional coordinate system is employed. Similarly, for pinpointing a location within a three-dimensional space, we employ a three-dimensional coordinate system.

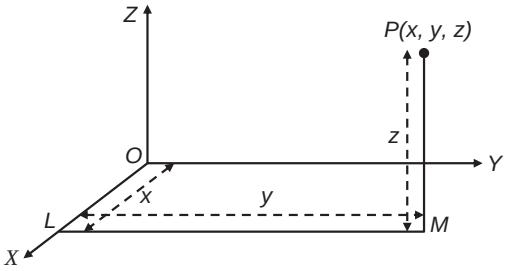
Now, envision three planes converging at a single point, designated as O. The coordinate axes, such as the x-axis, y-axis, and z-axis, are depicted by bold lines. For instance, when referring to an object on the floor of a room, a two-dimensional coordinate system can be employed to specify its position. However, when describing the position of an object like a spider hanging from the ceiling of a room, we rely on a three-dimensional coordinate system.

COORDINATE AXES

The foundation of a three-dimensional coordinate system is created by the intersection of three perpendicular planes, meeting at a common point O.



The lines XOX', YOY', and ZOZ', where the three planes converge, are mutually orthogonal and are respectively labelled as the x-axis, y-axis, and z-axis. Distance measurements made from the XY plane in an upward direction toward OZ are considered positive, while those measured in a downward direction toward OZ' are deemed negative. To define the coordinates of a point, we need to specify its x, y, and z coordinates.



Given that the coordinates of point P are (a, b, c), we position the coordinates of the remaining points as illustrated in the diagram.