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CLASS 11th

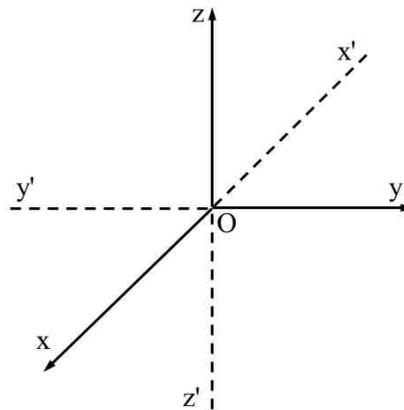
Introduction to 3-D Geometry

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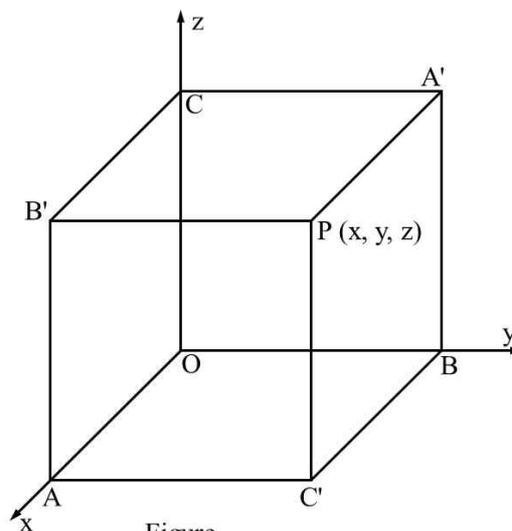
01. Coordinates of A Point In Space

Three mutually perpendicular lines in space define three mutually perpendicular planes which in turn divide the space into eight parts known as *octants* and the lines are known as the coordinate axes.



Figure

Let $X'OX$, $Y'OY$ and $Z'OZ$ be three mutually perpendicular lines intersecting at O . Let O be the origin and the lines $X'OX$, $Y'OY$ and $Z'OZ$ be x -axis, y -axis and z -axis respectively. These three lines are also called the *rectangular axes of coordinates*. The planes containing the lines $X'OX$, $Y'OY$ and $Z'OZ$ in pairs determine three mutually perpendicular planes XOY , YOZ and ZOX or simply XY , YZ and ZX which are called *rectangular coordinate planes*.



Figure

Let P be a point in space. Through P draw three planes parallel to the coordinate planes to meet the axes in A , B and C respectively. Let $OA = x$, $OB = y$ and $OC = z$. These three real numbers taken in this order determined by the point P are called the coordinates of the point P , written as (x, y, z) , x , y , z are positive or negative according as they are measured along positive or negative directions of the coordinate axes.

Also, *the coordinates of the point P are the perpendicular distance from P on the three mutually rectangular coordinate planes YOZ , ZOX and XOY respectively.*

Further, the coordinates of a point are the distances from the origin of the feet of the perpendiculars from the point on the respective coordinate axes.