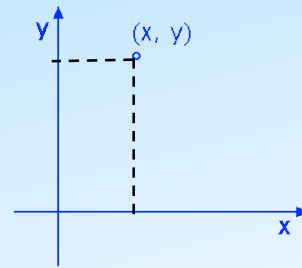


Three-Dimensional Cartesian Coordinates

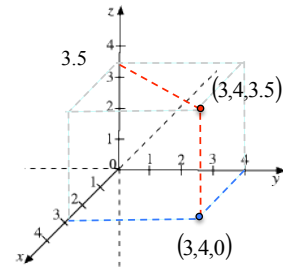
Recall: xy -coordinates (two-dimensional)

- two perpendicular axes
- every point uniquely identified by an ordered pair of real numbers (the coordinates)



Add a third axis, perpendicular to the other two:

Every point uniquely identified by an ordered **triple** of real numbers.



Note:

A point (x, y, z) lies **in** the xy -plane iff $z = 0$;
above that plane iff $z > 0$;
below it iff $z < 0$.

Algebraic conditions defining:
 xy -plane, upper/lower half-space.

$|z|$ units from that plane

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Example

Identify the set of points whose coordinates satisfy the given condition:

- $z = 1$ The horizontal plane 1 unit above **parallel to the xy -plane**
- $z^2 = 1$ The pair of horizontal planes: 1 unit above, and 1 unit below the xy -plane
- $z^2 \leq 1$ The two planes from part b) together with all the points in between
- $x = 3$ The plane **parallel to the yz -plane**, 3 units in front of it (see the picture)