"n-dimensional real space" is den toted by $\mathbb{R}^{n}$ and it consists of all "n-tuples of real numbers" which are ordered lists $\left(x_{1}, x_{2}, x_{3}, \ldots, x_{n}\right)$ of $n$ real numbers.

Note $\mathbb{R}$ is the symbol for the set of all real numbers. ( $\mathbb{R}$ consists precisely of the numbers that are needed to measure distances between objects.)

Example $\mathbb{R}^{2}$ is the set of ordered pairs $(x, y)$ of real numbers. importantly these ordered pairs correspond exactly to the points in the xy-plane.

Example $\mathfrak{R}^{3}$ consists of ordered triples $(x, y, z)$ and correspond to points in xyz-space. Here's how it works:

Choose three lines which hare a common point of intersection (the "origin") where each (line is perpendicular to the other. Typically these lines might be called the "x-axis", "y-axis" and "z-axis". If we start at the origin and move a units in the direction of the $x$-axis, then $b$ units parallel to $y$-axis and $c$ units in direction of $z$-axis then we arrive at a point $P$ that well identify with the ordered triple $(a, b, c)$. Then every point $P$ in $x y z$-space can be identified this way with a unique ordered triple $(a, b, c)$.
from
Stewart :


FIGURE 5
(Note that $a, b, c$ can be positive or negative and should be interpreted as directed distances.)

Important things to know about xyz-space:
(1) distance formula
(2) now to describe 3 "coordinate planes"
(3) Low to describe 3 "coordinate axes"
(1) what the "octants" are
(5) how to understand the graph in xyz-space associated with an equation with variables $x, y$ and $z$.

