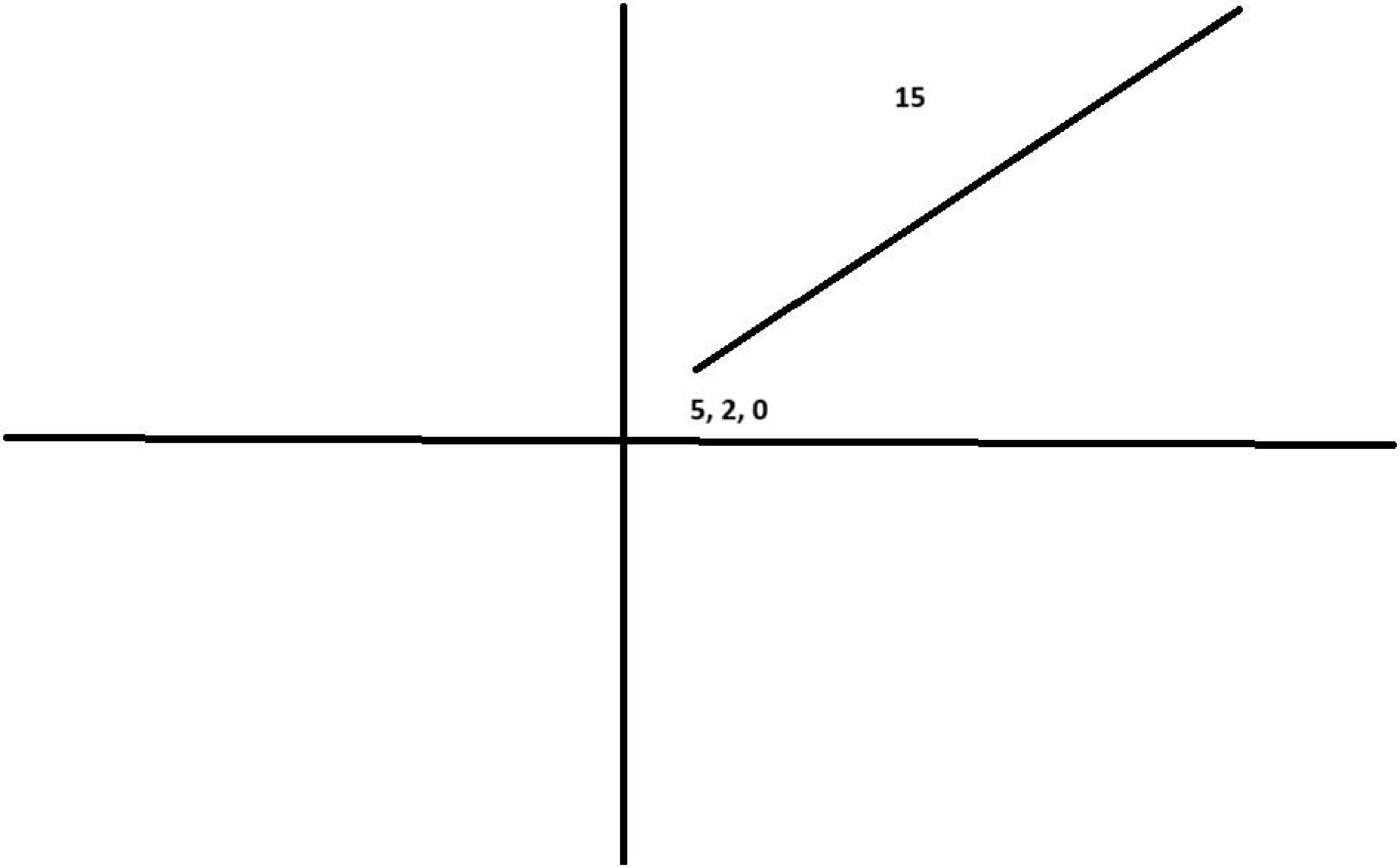
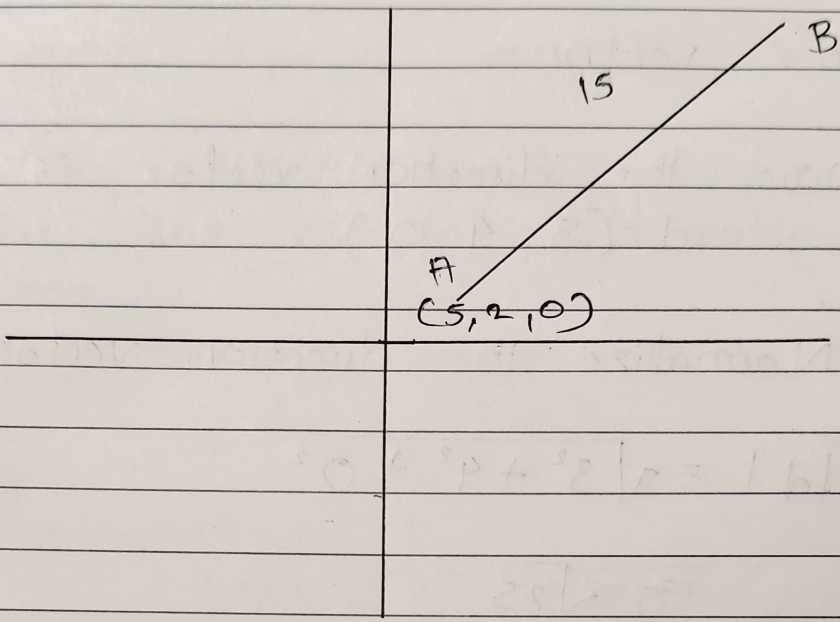

15
5, 2, 0



In this fig, we have a point 5,2,0 and a line & we've to find the point on the line which is at distance of 15 units from point (5,2,0)

Sol^n:- To find the next point on the line AB, at a distance of 15 units from A, this data is not sufficient, in this, eighter we have a direction vector of AB or slope of AB.

Case I :-

1) Direction vector:-

Suppose the direction vector is

$d = (3, 4, 0)$

Now,

Normalize the direction vector,

$|d| = \sqrt{3^2 + 4^2 + 0^2}$

$= \sqrt{25}$

$= 5$

Now,

divide each component of d by unit vector (5,5,5)

$u = \left(\frac{3}{5}, \frac{4}{5}, \frac{0}{5}\right) = (0.6, 0.8, 0)$

Now, find point B at a distance of 15,

$B = A + 15 \times u$

Substitute $A = (5, 2, 10)$ & $u = (0.6, 0.8, 0)$

$B_x = 5 + 15(0.6) = 14$

$B_y = 2 + 15(0.8) = 14$

$B_z = 0$

Hence final point B (14, 14, 0)

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Case II : Slope :-

Suppose slope of line AB is 45°.
then,
A slope of 45° in XY-plane means the line rises at 1:1 ratio in X & Y.
Hence,
The direction vector can be taken as,

$$d = (1, 1, 0).$$

Now,
Normalize d,

$$|d| = \sqrt{1^2 + 1^2 + 0^2}$$
$$= \sqrt{2}$$

Now, unit vector is : $u = \left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0\right)$

find B at distance 15 from A.

$$B = A + 15 \cdot u$$

$$B_x = 5 + 15(0.707) = 5 + 10.61 = 15.61$$
$$B_y = 2 + 15(0.707) = 2 + 10.61 = 12.61$$
$$B_z = 0.$$

Hence,
final point $B = (15.61, 12.61, 0)$