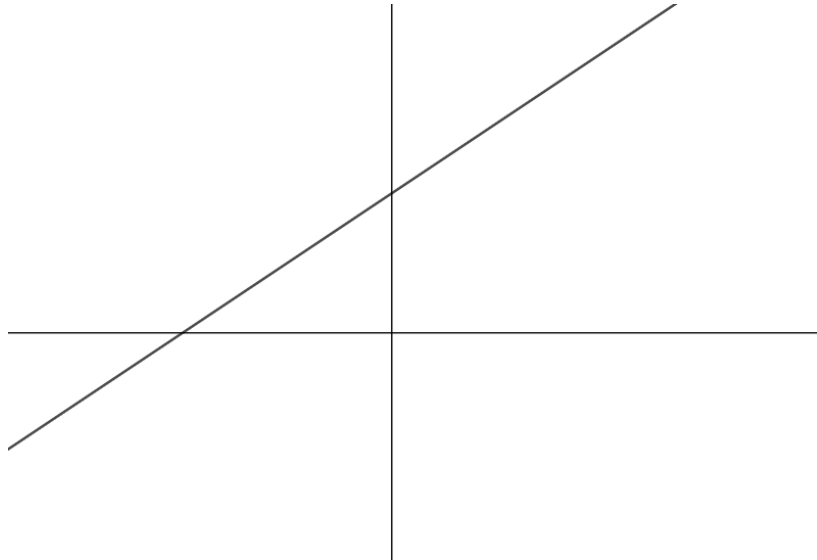2.1 Vector Equation of a Line

In order to properly describe a line, you need _____ and

_____

On the diagram, indicate each of these with an appropriate vector.

How can you use these 2 vectors to get to any point on the line?

Are your vectors exactly the same as those of other students around you? _____

Do they need to be?

The vector equation of a line has equation _____

Ex 1 (a) Determine the vector equation of a line passing through the point A(1, 4) with a
direction vector of $\vec{m} = (-3, 3)$
(b) Determine the coordinates of 2 more points on this line.
(c) Is Q(-21,23) on the line?
(d) $(x, y) = (-2, 7) + t(1, -1)$ how does this line compare to the line from (a)?

Parametric Equation of a Line: take your vector equation and write it as separate equations, one for each component. These equations are called the parametric equations of the line.

Ex 2 Write $(x, y) = (1, -7) + t(-5, 3)$ in parametric form.

_____

_____

Consider a line and its normal. *A normal is a vector perpendicular to something, in this case, a line.* Another way to define a line is to consider all vectors perpendicular to the normal, passing through a certain point.
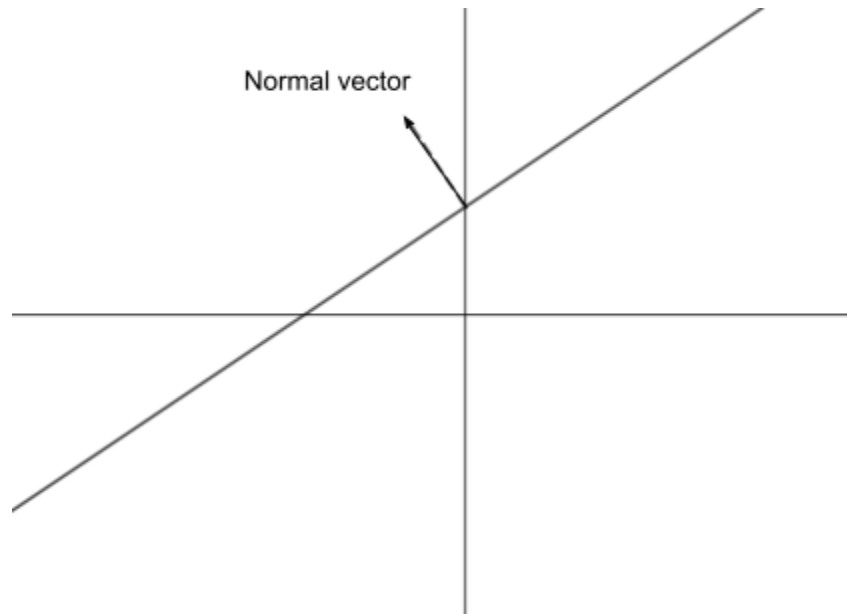
Normal vector

Determine the equation of the line passing through P(x_0,y_0) and perpendicular to $\vec{n} = (A, B)$.

Ex 4 Find the equation of the line that passes through A(2,3) with normal vector (-1,5) in standard form.

Ex 5 Find the angle between the lines $3x + 4y + 5 = 0$ and $x - 3y + 7 = 0$

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