

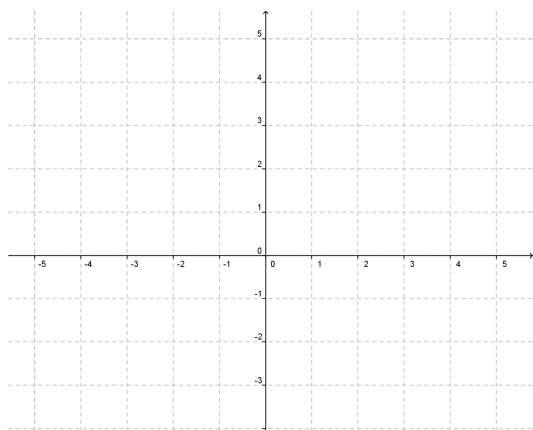
8.1 VECTOR AND PARAMETRIC EQUATIONS OF A LINE IN $\mathbb{R}^2$

In the past you have written the equation of a line in _____ form,
eg. _____ or _____ form e.g. _____.

We will now be using vectors to express lines in the Cartesian plane and we will be using either a _____
equation or _____ equations. (which will be explained throughout the lesson)

Just as we could define a line with a _____ and a _____, we will define a vector or parametric
equation with a _____, $\vec{m} = (a, b)$, and a point _____.

Ex. 1 A line passing through $P(4,3)$ and has $\vec{m} = (-5, 2)$ as its direction vector. Sketch this line and write the
vector equation for this line.



Ex. 2 A line passes through the point $A = \left(\frac{1}{2}, -3\right)$ and $B = \left(\frac{3}{4}, \frac{1}{2}\right)$. Determine the direction vector for this
line, its equation, then convert it to integer performance.

Vector and Parametric Equations of a Line in R^2

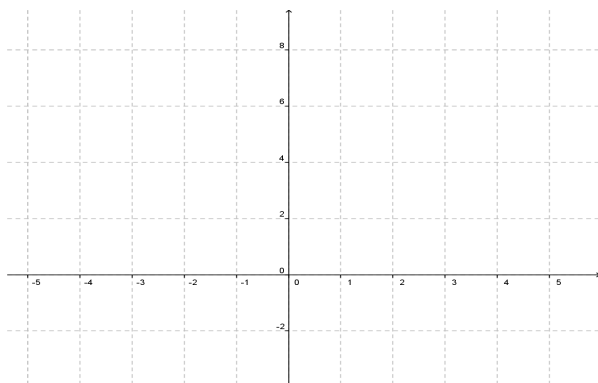
The vector equation is written in the form _____ or
_____ where (x, y) represents any point on the line with a given point (x_0, y_0) on the line and direction vector _____

Then the parametric equations are: _____, _____ where $P_0 = (x_0, y_0)$ represents a given point on the line and $\vec{m}$ is a direction vector with components (a, b)

In either vector or parametric form, t is called a parameter. This means the t can be replaced by any real number to obtain the coordinates of points on the line.

Ex. 3 a) Determine the vector and parametric equations of the line passing through point A(1,4) with direction vector $\vec{m} = (-3, 3)$

b) Sketch the line, and determine the coordinates of four points on the line.



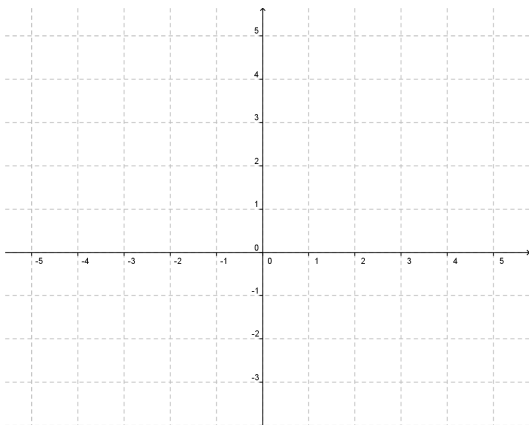
c) Is either point Q(-21,23) or point R(-29,34) on this line?

Ex. 4 a) Determine vector and parametric equations for the line containing point E(-1,5) and F(6,11).

b) What are the coordinates of the point where this line crosses the x-axis?

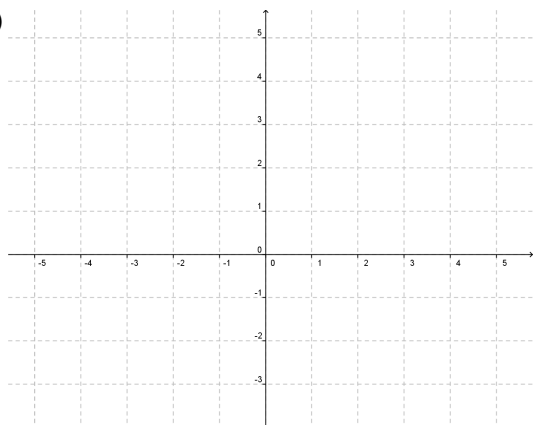
c) Can the equation $\vec{r} = (-15, -7) + t(\frac{14}{3}, 3)$, $t \in \mathbb{R}$ also represent the line containing points E and F?

Ex. 5 Determine a vector equation for the line that is perpendicular to $\vec{r} = (4, 1) + s(-3, 2)$, $s \in \mathbb{R}$, and passes through point P(6,5).



Do Investigation on page 432.

Ai, iv)



Bi,ii)

