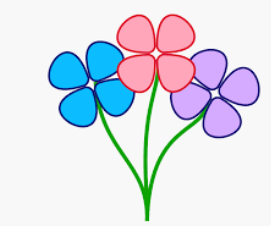
Date: _____



8.2 Cartesian Equation of a Line

The scalar or Cartesian equation of a line in a plane has the form Ax + By + C = 0. Until now, this was called "standard form".

The Cartesian equation can be determined from either the vector or parametric equation in a number of ways.

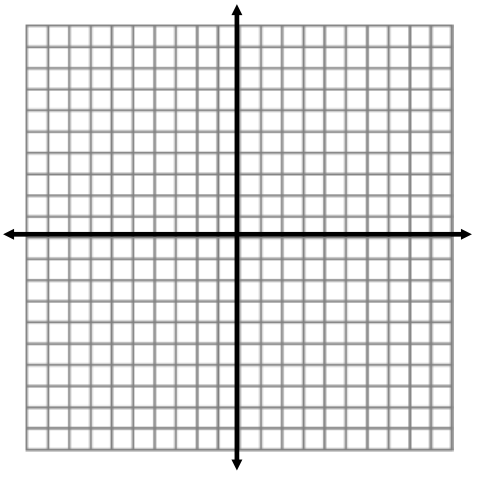
Example: Find the Cartesian equation for the line $\vec{r} = (2, -1) + t(4, 3)$.

Method 1: Using slope (direction vector) and a point.

Method 2: Using parametric equations.

The scalar equation can also be determined by using a vector that is perpendicular to the line. This is called a normal vector, n.

Method 3: Using a normal vector.



General Case:

Find the Cartesian equation of a line with normal n = (A, B) which passes through the point $P(x_o, y_o)$.

Example: Determine a Cartesian equation for a line through $P_o(-1, 2)$ and parallel to the line with parametric equations $x = 1 + 2t$ and $y = 2 - 3t$.

Finding a Vector Equation Given a Cartesian Equation

Remember that A and B are the components of the vector that is normal to the line. The dot product of the normal and the direction vector must be:

Example: Find a vector equation for the line with Cartesian equation $3x - 2y + 6 = 0$.

Finding the Angle Between Two Lines in R^2

Use what you already know about vectors to determine the acute angle formed at the point of intersection of the vectors provided below.

L_1: $(x, y) = (2, 4) + s(-1, 4)$

L_2: $(x, y) = (5, -2) + t(3, 5)$