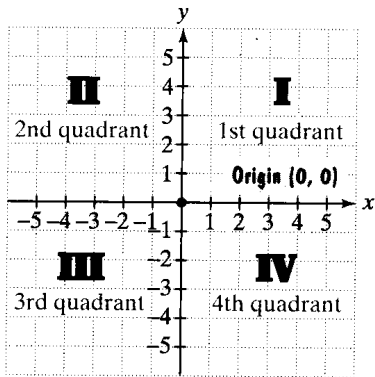
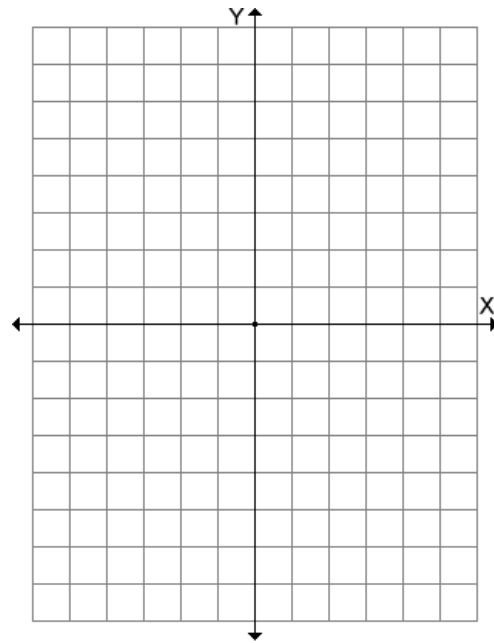


1.1 The Distance and Midpoint Formulas

Cartesian Coordinate System –



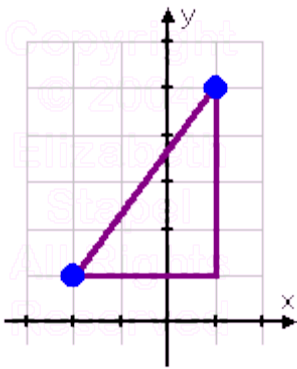
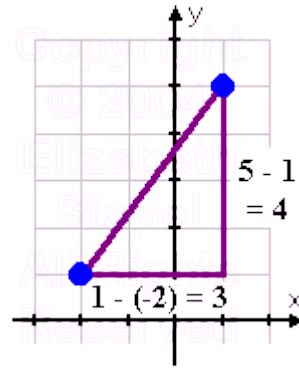
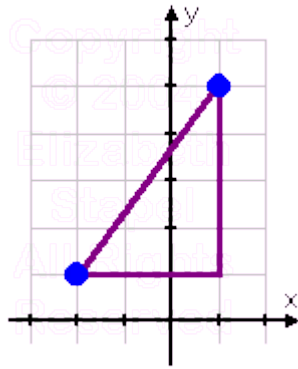
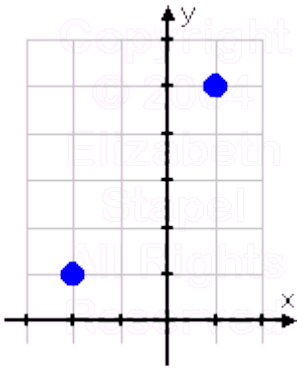
EXAMPLE: Plot $(-1, 4)$, $(-4, -2)$, $(3, -2)$, $(0, -3)$, $(2, 3)$.



Distance Formula

The distance formula is used to find the distance between two points (x_1, y_1) and (x_2, y_2) .

Let's first start with two points, $(-2, 1)$ and $(1, 5)$. First we plot the points. Then we will connect the points with a line. I will also darken the vertical and horizontal differences of the points. A right triangle is now formed. I will now label the actual vertical and horizontal distance.



Distance formula is $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

EXAMPLE: Use the distance formula to find the distance between the points $(-2, 4)$ and $(1, 6)$

Midpoint Formula

The midpoint is the halfway point on a line. If the line is formed by the points (x_1, y_1) and (x_2, y_2) , then

The midpoint is: $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$.

Notice our answer is a point (x, y) . This divides the line into two pieces of equal length.

EXAMPLE: Find the midpoint of a line segment containing $(2, -3)$ and $(4, 2)$.

EXAMPLE: If the point $(11, 14)$ is shifted 5 units to the right and 2 units down, what are the new coordinates?