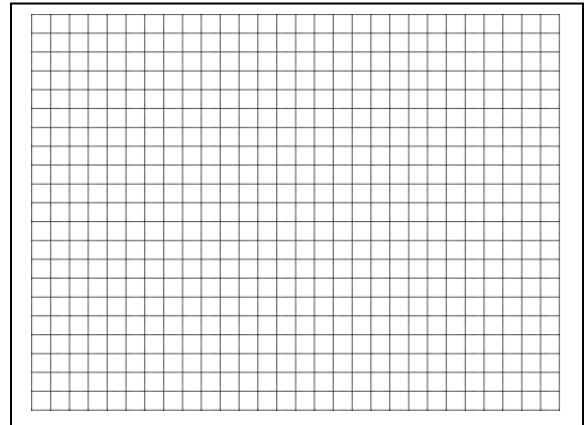


Lesson 1 - The Cartesian Plane, Distance & Midpoint Formula, Equations and Intercepts

1. Consider the points (3,2) and (9,10).
  - a. Plot the points.
  - b. Find the distance between the points (3,2) and (9,10).



- c. Find the “midpoint” between the points (3,2) and (9,10).

- d. Confirm that the points are located on the equation:

$$y = \frac{4}{3}x - 2$$

- e. Find the y-intercepts of the equation above.

- f. Find the x-intercepts of the equation above.

- g. Complete the table below for the equation  $y = \frac{4}{3}x - 2$ .

x	-3	0	3	6	9

**The Distance Formula:**

(Remember: the distance formula comes from the Pythagorean Theorem, using  $(x_2 - x_1)$  and  $(y_2 - y_1)$ .)

**The Midpoint Formula:**

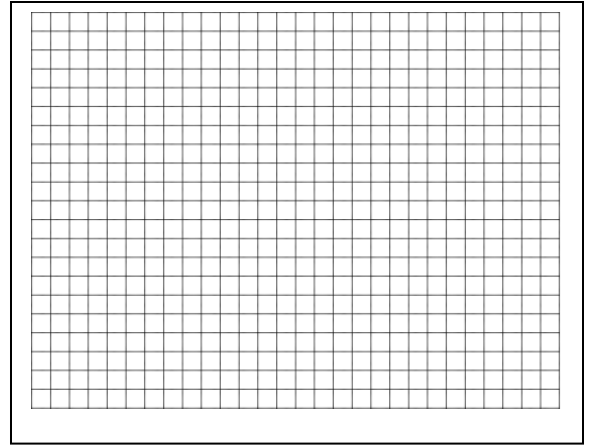
(The midpoint is just average of the  $x$  values and the average of the  $y$  values.)

**Finding Intercepts:**

y-intercepts:

x-intercepts:

2. Consider the points  $(-2, -3)$  and  $(2,5)$ .
- Plot the points.
  - Find the distance between the points.



c. Find the midpoint between the points.

d. Confirm that the two points lie on the equation:  
 $y = x^2 + 2x - 3$

e. Complete the table below and graph the equation:  $y = x^2 + 2x - 3$

$x$	-4	-3	-2	-1	0	1	2
$y$							

**Practice:** For problems #3 and #4, find the y-intercepts and x-intercepts of the following equations:

3.  $y = x^3 - 4x$

4.  $y^2 + 2x = 16$

5. Show that these points form the vertices of an isosceles triangle.  $(1, -3); (3,2); (-2,4)$ .

6. Consider the coordinates  $A(-1,1), B(3,6), C(6,2),$  and  $D(2, -3)$ . Work with a partner to find the lengths of  $\overline{AB}, \overline{BC}, \overline{CD}, \overline{AD}$ . What figure is represented by the quadrilateral formed by these four lengths?