DO IT NOW

What is the slope of the following lines:

a) The line connecting A(4,6) and B(12,10)

b) Through the point A(4,3) and perpendicular to y = -2x - 7

c) Through point B(2,-6) and parallel to y=3x -8

Unit 2: Chapter 2

Analytic Geometry

2.1 Midpoint of a Line Segment

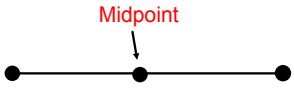
1) Complete Investigation Handout

2) Derive the midpoint formula

3) Examples

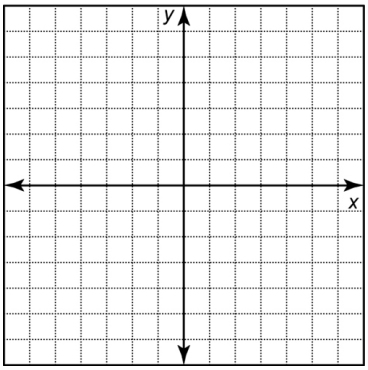
4) Classwork/Homework

Midpoint: point that divides a line segment into two equal line segments



2.1 Midpoint

a) A(-4,2) and B(6,2) b) C(-3,0) and D(2,0)



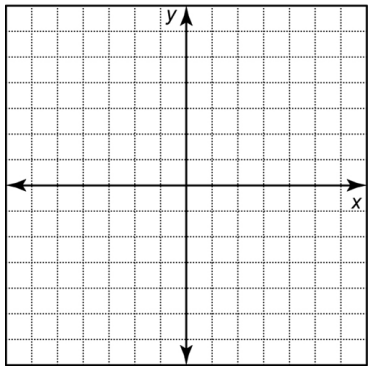
Midpoint of AB

(,)

Midpoint of CD

(,)

b) G(-4,2) and H(-4,6) b) J(-1,7) and K(-1,-2)



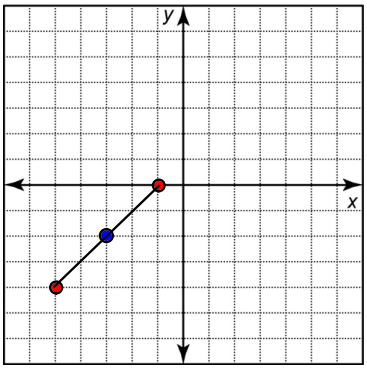
Midpoint of GH

(,)

Midpoint of JK

(,)

c) R (-5,-4) and S (-1,0) b) V (-4,6) and W(3,4)



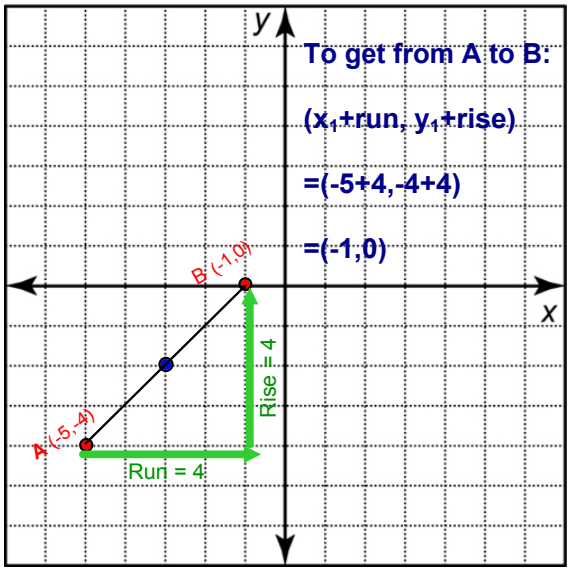
Midpoint of RS

(,)

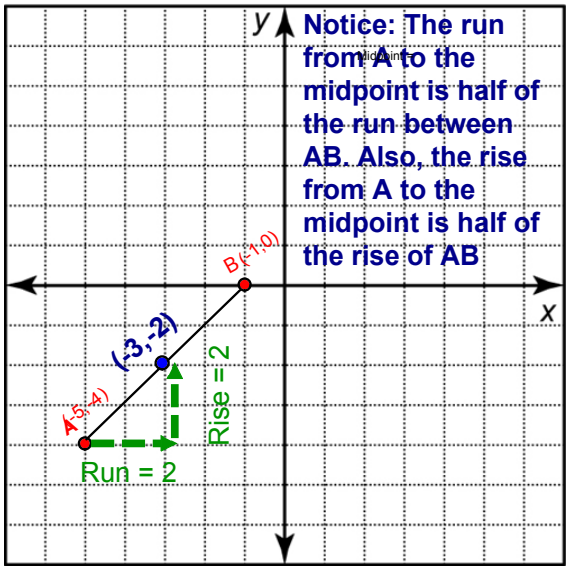
Midpoint of VW

(,)

Rise and Run Method of Finding a Midpoint:



2.1 Midpoint



Notice: The run from A to the midpoint is half of the run between AB. Also, the rise from A to the midpoint is half of the rise of AB

There is an easier way to find the midpoint!!!!

Note:

The middle of 2 points

=

The average of the 2 points

Don't Forget: Each point has an x and y coordinate. Therefore we must find the average (middle) of each coordinate to find the midpoint of the line joining the points.

Endpoints: $\overset{x_1\ \ y_1}{A\ (-5,-4)}$ $\overset{x_2\ \ y_2}{B\ (-1,0)}$

Midpoint: **(-3,-2)**

Notice:

- the x-coordinate of the midpoint is the mean (average) of the x-coordinates of the endpoints of AB
- the y-coordinate of the midpoint is the mean (average) of the y-coordinates of the endpoints of AB

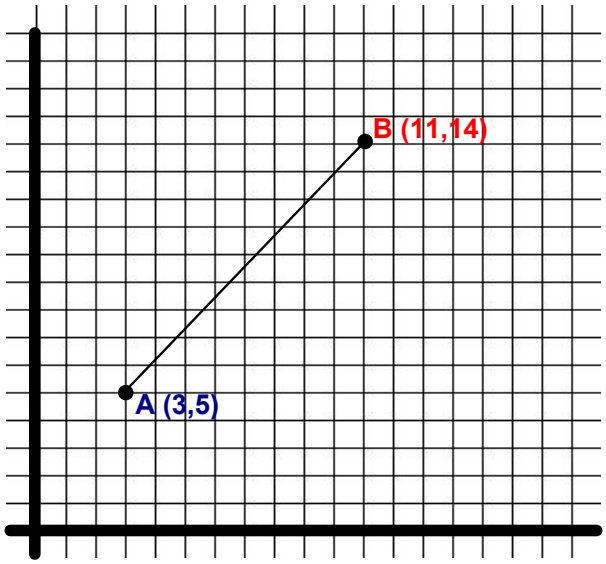
average of x-coordinates:	average of y-coordinates:
$\frac{x_1 + x_2}{2}$	$\frac{y_1 + y_2}{2}$
$= \frac{(-5) + (-1)}{2}$	$= \frac{(-4) + (0)}{2}$
$= \frac{-6}{2}$	$= \frac{-4}{2}$
$= -3$	$= -2$

MIDPOINT FORMULA

$$\text{MIDPOINT} = \left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$$

2.1 Midpoint

Example 1: Calculate Midpoint Using the Formula



$x_1\ y_1$ $\quad$ $x_2\ y_2$

A (3,5) $\quad$ **B** (11,14)

MIDPOINT = $\left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$

Example 2: Calculate Midpoint Using the Formula

$x_1\ y_1$ $\quad$ $x_2\ y_2$

A (5,7) $\quad$ **B** (3,9)

MIDPOINT = $\left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$

Example 3: Determine the coordinates of the midpoint of the line segment with endpoints:
A (-1,0) and B (1,-6)

MIDPOINT = $\left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$

Example 4: Determine the coordinates of the midpoint of the line segment with endpoints:
A (3,-3) and B (7,-5)

MIDPOINT = $\left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$

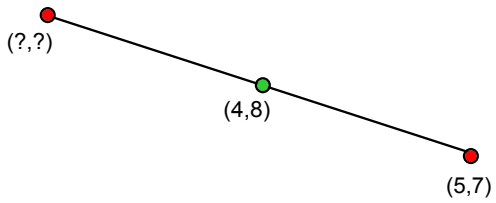
Example 5: Determine the coordinates of the midpoint of the line segment with endpoints:
A (6,-1) and B (-3,7)

MIDPOINT = $\left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$

Example 6: Determine the coordinates of the midpoint of the line segment with endpoints:
A (-5/8,1/8) and B (4,6/8)

MIDPOINT = $\left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$

What if you are given the midpoint, one endpoint, and are missing the other endpoint?



2.1 Midpoint

Example 7: Find the other endpoint of the line segment with the given endpoint and midpoint

Endpoint: (5,7) **Midpoint: (4,8)**

$$\text{MIDPOINT} = \left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$$

$$\mathbf{(4,8)} = \left(\frac{5 + x_2}{2} , \frac{7 + y_2}{2} \right)$$

$$\mathbf{(4,8)} = \left(\frac{5 + x_2}{2} , \frac{7 + y_2}{2} \right)$$

$$\mathbf{4} = \frac{5 + x_2}{2} \qquad \mathbf{8} = \frac{7 + y_2}{2}$$

The other endpoint is:

Example 8: Find the other endpoint of the line segment with the given endpoint and midpoint

Endpoint: (-1,9) **Midpoint: (-9,-10)**

$$\text{MIDPOINT} = \left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$$

Homework:

Complete Worksheet
and
Pg. 66 #2,3