Lesson 8.2 – Deriving the Midpoint Formula

1. The midpoint of a segment is the point on the segment that is the same distance from both endpoints. Use the graph below to answer the following questions.

The mean is the number you get by dividing the sum of a set of values by the number of values in the set. For midpoint there are two points, so you add them together and multiply by 2.

Example:

a. What are the x-coordinates of ?

b. What is the average of the x-coordinates of ?

c. What number is halfway between the x-coordinates ?

d. What are the coordinates of the midpoint ? graph and label the midpoint.

e. Explain the relationships among the answers to questions .

They are the same midpoint average.

2. Use the graph below to answer the following questions.

a. What are the y-coordinates of ?

b. What is the average of the y-coordinates of ?

1

c. What number is halfway between the y-coordinates of ?

1

d. What are the coordinates of the midpoint of ? Graph and label the midpoint.

e. Explain the relationships among the answers to questions

They are the same midpoint average.

3. Use the diagram below to answer the following questions.

a. Graph the midpoint of . Label it . What is the x-coordinate of this point?

1

b. What is the average of the x-coordinates of ?

1 how is this related to answer a?

Same!

c. Graph the midpoint of . Label it . What is the y-coordinate of this point?

d. What is the average of the y-coordinates of ?

How is this related to you answer to c? Same!

e. What is the average of the x-coordinates of ?

f. What is the average of the y-coordinates of ?

g. What is the midpoint of ?

h. How is the midpoint of related to the answers to 3e and 3f?

Midpoint average values.

4. Use the diagram below to answer the following questions.

a. What is the average of the x-coordinates of ?

b. What is the average of the y-coordinates of ?

c. What are the coordinates of the midpoint ?

d. Explain the relationships among the answer to questions b, c, and d.

midpoint average of x and y values

5. The endpoints of a segment are .

a. Label the point as and point as .

b. Write a formula for the average of the x-coordinates of .

c. Write the formula for the average of the y-coordinates of .

d. One way to think of the midpoint of is as follows: average of the x-coordinates, average fo the y-coordinates. Use this to derive a formula for the midpoint of .

e. The end point of a segment are . Use your formula to compute the midpoint of .

Midpoint Formula: The midpoint of two points and is the point found by the following formula.

Average the x-values

Average the y-values

Midpoint Practice

Midpoint formula

Find the midpoint of the following line segments with the given end points.

1)

Midpoint:

2)

Midpoint:

3)

Midpoint:

4)

Midpoint:

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

5) Endpoint: , Midpoint:

To find an endpoint when given one endpoint and the midpoint, we need to determine the distance from the given endpoint and the midpoint. In this problem the and the distance from from the given endpoint to the midpoint is . To determine the value of in the other endpoint we need to go 19 spaces from the midpoint x which is that is the value in the endpoint we are trying to find. 19 spaces from 10 is 29. That is our x value.

Now we do the same with . and the distance between is 10 spaces. We now must move 10 spaces from the midpoint, which is . Moving 10 spaces from would leave use at . That is our y value.

Our answer is:

6) Endpoint:

Midpoint:

The distance between and is 10 spaces.

If we move another 10 spaces from 4 we are at 14, that is your x value.

The distance from is 4 spaces.

If we move another 4 spaces from 8 we are at 12, that is your y value.

Our answer is