Distance and Midpoint Formula

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Distance Formula
The distance formula is used in geometry in order to determine the distance between two different points.

Steps to follow:
• Name the first set of coordinates x1 and y1.
• Name the second set of coordinates x2 and y2.

For example:
Name the two given points: (-3,2), (1, -4)

x1:_____ and y1:_____

x2:_____ and y2:_____
Distance Formula

For example:

Find the distance between the two given points (-3,2) and (1,-4).

\[ d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]
Midpoint Formula

The midpoint formula is used in geometry to determine the middle point between two given points.

Steps to follow:
• Name the first set of coordinates \(x_1\) and \(y_1\).
• Name the second set of coordinates \(x_2\) and \(y_2\).

For example:
Name the two given points: (-3,2), (1, -4)

\[x_1:_____ \text{ and } y_1:_______\]

\[x_2:_____ \text{ and } y_2:_______\]

After naming the coordinates, you will add the \(x\)-coordinates and divide by two and add the \(y\)-coordinates and divide by two. You divide each set of numbers by two because you are trying to find the middle number, or the point that is HALF way between the two given points.
**Midpoint Formula**

\[
\left( \frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)
\]

For example:

Find the midpoint of the two given points (-3,2) and (1,-4).
Websites

This is an interactive website that addresses the concept of the distance formula.

http://www.ronblond.com/M10/mid/index.html
This is an interactive website that addresses the concept of the midpoint formula.

http://math.about.com/library/blmidpoint.htm
This website provides information over the midpoint formula in order to grasp a better understanding.

http://www.purplemath.com/modules/distform.htm
This website gives information on the distance formula.
Activity

Pair up with a partner.
Each group should have a die and a coin that represents a positive and negative sign.

First, roll the die and flip a coin. This will represent $x_1$.
Second, roll the die and flip a coin. This will represent $y_1$.
Third, roll the die and flip a coin. This will represent $x_2$.
Finally, roll the die and flip a coin. This will represent $y_2$.

After rolling the die and flipping the coin, you will have two given points. Find the distance and midpoint of these two points using the formulas.

In order to check your answers for the distance, go to:
Plot your two given points on the graph to check your result.

In order to check your answers for the midpoint, go to:
http://www.ronblond.com/M10/mid/index.html
Plot your two given points on the graph to check your result.
Summary

The distance formula determines the distance between two given points from endpoint to endpoint.

\[ d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]

The midpoint formula determines the point that equally divides two given points.

\[ \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \]

In order to enhance students learning with these geometric concepts, you can do an interactive activity that we just practiced in order to visually see why the formulas make sense.