

NAME: _____

P.I. G.G.66: Find the midpoint of a line segment, given its endpoints

1. Give an example from real life when finding the midpoint of a segment might be useful.

2. Prove that the midpoint of \overline{AB} , where $A = (x_1, y_1)$ and $B = (x_2, y_2)$, is $C\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

[1] Answers may vary. Sample: You may need to cut a metal pipe into two equal pieces.

$$\begin{aligned} AC &= \sqrt{\left(x_1 - \frac{x_1 + x_2}{2}\right)^2 + \left(y_1 - \frac{y_1 + y_2}{2}\right)^2} \\ &= \sqrt{\left(\frac{x_1 - x_2}{2}\right)^2 + \left(\frac{y_1 - y_2}{2}\right)^2} \end{aligned}$$

$$\begin{aligned} BC &= \sqrt{\left(x_2 - \frac{x_1 + x_2}{2}\right)^2 + \left(y_2 - \frac{y_1 + y_2}{2}\right)^2} \\ &= \sqrt{\left(\frac{x_2 - x_1}{2}\right)^2 + \left(\frac{y_2 - y_1}{2}\right)^2} \end{aligned}$$

[2] Since $\left(\frac{x_2 - x_1}{2}\right)^2 = \left(\frac{x_1 - x_2}{2}\right)^2$ and $\left(\frac{y_2 - y_1}{2}\right)^2 = \left(\frac{y_1 - y_2}{2}\right)^2$, $AC = BC$ and C is the midpoint.