

Distance Activity

Overview

In this activity, students investigate the **distance formula** using Distance.vi, a LabVIEW Virtual Instrument (VI). The Distance VI calculates the **distance** between two points, (x_1, y_1) and (x_2, y_2) , using the distance formula,

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

Additionally, students explore how distance is related to rate and time. Given information about change in position and time, they calculate the speed an object moves.

Objectives

Students will be able to:

- Graph two points and the line segment connecting the points
- Find the distance between two points
- Calculate the speed an object travels given two points and the time

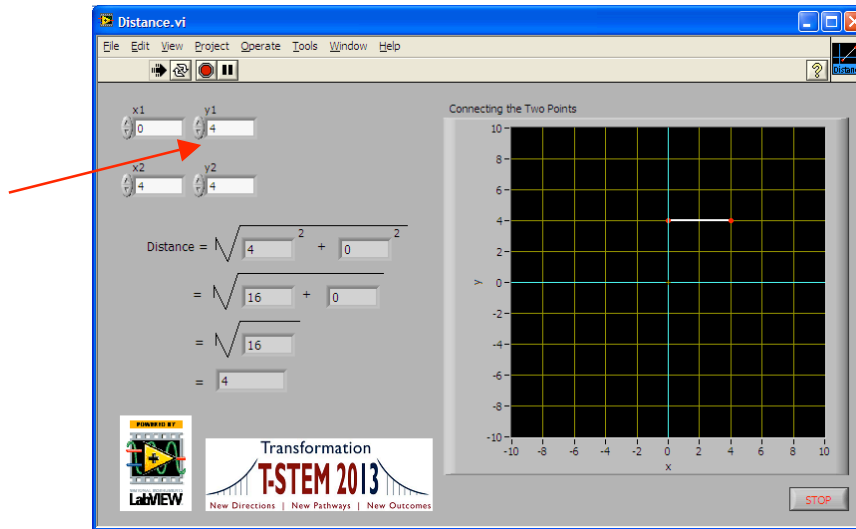
Standards (TEKS)

8th Grade Math: 8.14, 8.15, 8.16

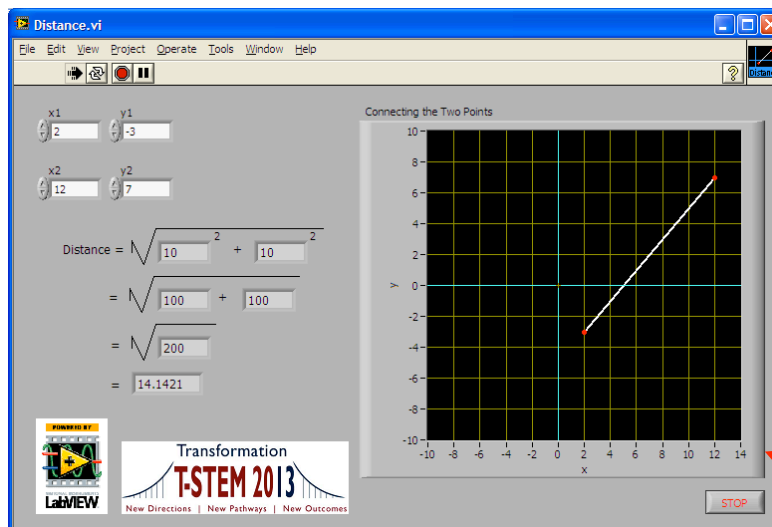
Geometry: G.7A, C

Activity

- 1) Open and run the VI.
- 2) This VI uses $(x_1, y_1) = (0, 1)$ and $(x_2, y_2) = (4, 4)$ as the default points. If necessary, reset the values to these defaults. Note: You can do this by selecting **Edit»Reinitialize Values to Default**.
- 3) Has the distance between the two default points been computed correctly?
- 4) Use the arrow controls on **y1** to increase its value one-by-one until **y1 = 4**.
 - a) Notice the changes in the graph.
 - b) What changes occur in finding the distance between the two points?
 - c) What is the distance between $(0, 4)$ and $(4, 4)$?



- 5) Next, use the arrow controls on y_2 to decrease its value until $y_2 = -4$.
 - a) What changes occur in finding the distance between the two points?
 - b) What is the distance between (0, 4) and (4, -4)?
- 6) Now, find the distance between the following pairs of points:
 - a) (0, 4) and (6, -4)
 - b) (-5, -3) and (8, 5)
 - c) (2, -3) and (12, 7)
- 7) For the last pair of points, (2, -3) and (12, 7), change the x -range of the graph to show both points.
 - a) Double-click on “10” in the lower right corner and change its value to 14.
 - b) You can change the viewing window of the graph by making this sort of change to the minimum or maximum values of x or y .





Distance can also be calculated if you know how fast something is moving and for how long it is moving. Maybe you have seen the formula, $D = RT$, which says **Distance equals Rate times Time**. For example, a scooter traveling 30 mph for 1.5 hours travels 45 miles.

Since $D = RT$, knowing the distance between two points gives you a way to find how fast something is moving (Solve the formula for R). We can use this VI to calculate the distance an object travels. If we know how long it has been moving, then we can find out how fast it was going.

- 8) Let's say you are playing soccer. After a corner kick, you run from the corner straight to the center of the pitch, or field. This means you changed your position by about 32 m across the width and 50 m across the length.
 - a) How far did you run? (Hint: Use (0, 0) as your initial position.)
 - b) If it took you 8 seconds to run that distance, how fast were you running?