Introduction

The Riverville map you made shows the express stops. But Riverville has the budget to also add three local stations. Local stations must be on the same line, between two express stations. Carefully choose some spots on your map that could use local stations, a closer stop to the museum or school, for example. In the lesson below, you will learn how make sure those local stations are definitely on the subway line.

Linear equations

The subway tracks you created are all line segments between two coordinate points, \((x, y)\). Each segment can be expressed as an equation in the form: \(y = mx + b\)

In that equation, \(m\) stands for slope of the line, and \(b\) stands for y-intercept.

For example, in the equation, \(y = 2x - 3\), 2 is the slope of the line and -3 is the y-intercept.
But in the equation, what are x and y? Answer: Each (x, y) point that makes the equation true is a solution to the equation. And, a point on the line.

To do
You have just been given the budget to add three new local stations to the subway plans for Riverville. Local stations must be on the line segments that you have already drawn between two stations. Follow the steps below meant to help you find equations of lines, and then choose local stations.

1) Choose the approximate spot for your first local station, and fill in the information below.
   Between: __________________ at ( , ) and __________________ at ( , )

2) Find the slope of the line between the two stations.

3) Now, in the equation $y = mx + b$, you know x and y (choose the coordinates for one of the stations) and m, slope. Plug those three numbers into the equation and solve for b, the y-intercept.

4) Now you know m and b, what is the equation of the line between the stations?

5) What is the x coordinate of the local station you are creating? $x = ______$

6) Plug that x value into your equation to find y. $y = ______$.

7) What are the coordinates for your first local station? ( _____ , _____ )

8) In the space below, find two more local stations, show the work you do to find the coordinates of the new stations.
9) Why did you choose locations for your 3 new local stations? Did they serve the city in a way that is helpful for traveling passengers?

10) How can local stations help subway passengers?

11) Do local stations have any drawbacks for passengers or any aspects of the subway system?
The map you use for this lesson should look something like this map. Choreo Graph provides the coordinates and line segments of your subway lines.