Lesson Overview
THERE’S BEEN AN EARTHQUAKE IN RIVERVILLE! Students will now use the math they explored in Lessons 1-5 to create a new, highly efficient system of travel for Riverville after the earthquake.

This time around, students are starting with a budget. Along with a total budget of $5,000,000 to build the new subway system they will have a $2,000,000 per year operating budget. They will need to consult the given charts that contain costs for tunneling, new trains, stations as well as myriad operation costs. Students can only spend their allotted money, and cannot go over budget.

Also, students will create a report with schedules and travel times around the city, number of trains in their system, locations of new local stations, and more. All of these exercises are built with the math concepts from Lessons 1 - 5.

Notice that this starter map is different than the starter map from lessons 1 through 5. That’s because of the earthquake! Load this image onto student iPads so they can find it in Choreo Graph and create a new subway map with this as the background.

One unit on the grid in Choreo Graph = ¼ mile = .25 mile
The New Transportation System
Take a look at the student sheets for this lesson, make note of all the information that is given about costs, time for travel, etc. Also notice the template for the final report. After students design their maps, add more trains, etc., they will need to find all the information to complete their report template.

Learning Objectives:

| Design efficient new map after the Earthquake | Activity/Assessment: Students will start with a blank slate, a new map, and from the beginning will incorporate lessons 1-5 to design the most efficient subway system possible. They will also need to think about their budget and prepare a few reports about the efficiency of their new citywide transportation system. |
| **Objective:** SWBAT apply their understanding of the Choreo Graph app and key algebraic concepts in solving a real-world problem. |

What you need to get started: Set of iPads with the Choreo Graph app, student sheets

Time Needed: 1-3 Class periods, also possible to assign various aspects of this lesson as homework.

Collaboration and Group Work
These lessons are designed for students to work individually, in pairs, or in groups. Each student should do all the work on their own sheets, and the iPad should be shared across group members as equally as possible.

We suggest that groups be no larger than four students. Four or more students in a group will require extra attention to make sure that every group member is contributing equally.

Lesson Plan

Introduction
1) Share with students information about real world subways, budgets, safety issues, efficiency. There are lots of great videos online about subway systems, safety, efficiency, etc.
2) Dive into introducing the big project, there is a lot to do! A lot more to consider this time around than just drawing subway lines.

To do
1) By now you and your students have done a lot of work with Choreo Graph and subway maps.
2) Students will follow the guide on their sheets, paying attention to costs, time, speed, and other variables that are new to this lesson.
3) You will notice that there is a lot of information for students to use in this lesson. Help students understand how the information tables are there to help them design their new maps and create reports for the new system.

4) Encourage students to take time to pre-plan, and utilize the math they learned in lessons 1-5 to prepare before they start drawing subway lines.

5) Students will design a new map and need to use all the math to find everything for their reports.

6) Encourage the use of organized scratch paper for all the work that goes into the data on their reports. Announce ahead of time that you will be collecting that additional scratch paper.

Sharing
1) Each student or group will present their final map, budget, and other pertinent data from their report.

2) Assess students on their reports and offer feedback for overall presentation as well.

Wrapup
Discussion questions:
- What did you learn?
- What surprised you?
- Do you love subways now? Dislike them?
- How about budgets?
- Do you feel any differently about the subway in your city after doing this project?
- How did the math from lessons 1-5 help design successful projects in the final lesson?

Questions

1) Which station would you want to live nearest to and why?

2) How would your system benefit from another large amount of money? What would you spend it on to make the subway system even better?

3) Compare the data in your report to your classmates’ data. What are the most and least successful parts of your subway system, and why?
   - Most:
   - Least:
The map that students create should look something like this map. Encourage students to be creative, use the math they learned in the previous lessons to maximize efficiency, and design their own system of lines around the city!