


## Challenge 2: How are neighborhoods engineered?

### Get Prepared

 **Challenge Goal:** Study maps and blueprints to draw a neighborhood map to scale

 **Time Needed:** Two 45-minute sessions

#### Before You Begin:

- Locate your program or school site neighborhood on the Google Maps website using the site's zip code. Print out multiple copies of the neighborhood map on large-size paper for use later in the activity.
- Make four printouts of **Activity Sheet B: Map It** for each team of two in your group.



#### What You Will Need:

##### Printouts

- **Activity Sheet B: Map It**
- Google Maps printouts

##### Materials

- Samsung tablets
- tape or glue
- rulers
- Completed **Activity Sheet A: Engineering in My Community** (from Activity 1)
- graph paper
- pens or pencils
- poster board

**Note:** Kids may use the activity sheet printouts or they may follow along on their tablets at: [www.scholastic.com/sparks3](http://www.scholastic.com/sparks3).

### SESSION 1

## Spark Exploration: STEM Careers 15 mins.



Have kids use their tablets to open the **STEM Career Flip Book**. Point them to the land surveyor in the math section. After kids read the text, ask: **What skills do you need to work as a surveyor? What do surveyors do?** (Answers may include: map the environment to determine property borders, help architects

plan new construction, map crime scenes, survey land under the ocean to look for oil or find dangers to boats.)

#### Goal Selection:

- **What goals would surveyors set?**

## Setting the Strategy: Engineering in the Community 15 mins.

1. Discuss the responses kids wrote on **Activity Sheet A: Engineering in My Community** from the previous activity. Call on volunteers and use a whiteboard or chalkboard to list some of their ideas for engineering projects that could help achieve goals in their community.
2. Explain that nothing is built in a community without the input of engineers called *urban planners*. They

decide on the best places to build roads and parks. They design improvements to things like outdated sewage systems. Get kids thinking about the role of an urban planner by asking: **What are some other parts of neighborhoods that are engineered?**

3. Explain that urban planners rely on maps to do their job. They need to know the location of buildings and streets. They even have maps that show where sewer or electrical cable lines run underground.

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## Challenge 2: How are neighborhoods engineered? (continued)

### Use the Tablets! 15 mins.

1. Have kids use the tablets to search for images of maps and *blueprints* (or design plans) of their city.
2. Then ask kids to open the **Google Maps app** on their tablets and use the zip code of your local program or school site to locate their neighborhood. They can orient themselves by finding familiar locations such as their home, school, or local library.
3. Guide them through the app's features, such as Satellite View to see an aerial image of their neighborhood. For even more detail, they can also access the **Google Earth app** with Street View (drag and drop the yellow Pegman icon) for a pedestrian's-eye view.

### Wrap-up and Reflection Activity:

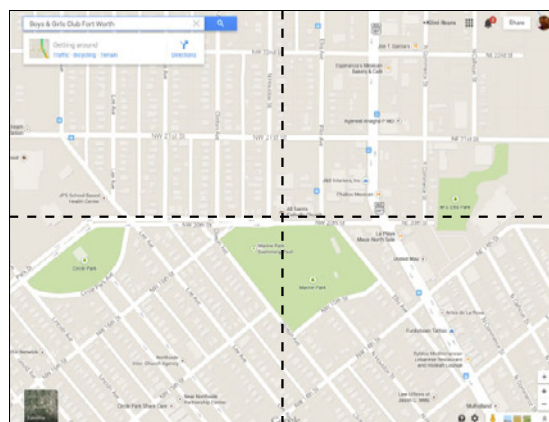
4. At the end of Session 1, have kids team up into groups of two. Explain that kids will remain on these teams for the remainder of the **Building Blocks** program, so they should pair with someone they work well with. You may need to create the pairs, so no one feels left out. Ask the kids to choose a team name and let them know that in the next session they will be working with their teams to create a neighborhood map.
5. Ask kids to discuss within their teams what they discovered in their neighborhood map.

## SESSION 2

### Shifting Gears: STEM Challenge! 45 mins.

**To Get Started:** Remind kids that they discussed maps and blueprints in the last session. They also used Google Maps on their tablets to locate their own neighborhood. Ask them to discuss what landmarks in their community helped orient them while using Google Maps.

1. Have kids separate into their teams and provide each team with four copies of the **Activity Sheet B: Map It** or four sheets of graph paper. They will also need a printout of the map showing the neighborhood surrounding your local program or school site.
2. Instruct kids to divide the map printout into fourths by measuring a vertical line and a horizontal line down the middle of the printout. Be sure to discuss how kids should measure the total length and width, then divide both in half to find the measurements that will create grid lines that separate the map into equal parts.
3. Explain that each team will draw the map grid-by-grid on its **Activity Sheet B: Map It** activity sheets or on grid paper. Each grid square on the map will correspond to one activity sheet or one sheet of graph paper. At



completion, kids will have a larger map hand-drawn to scale of the Google map they've printed.

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## Challenge 2: How are neighborhoods engineered? (continued)

### Shifting Gears: STEM Challenge! 45 mins.

4. Before kids begin drawing, discuss the idea that all maps need scale. Scale is a tool that mapmakers use to make sure the objects they place on the map are the correct size. Make sure that students understand that the size of items on a map relates to the size of the items in real life.
5. Explain that scale is determined by making a comparison called a *ratio*. For mapmaking, ratios compare the measurements of a real place to the measurements on a map. For example, if the width of a drawn map is 6 inches and the width of a Google map is 3 inches then the ratio is 2/1, or 2:1. That means if students are drawing a map with a ratio of 2:1, the objects they draw on their map would be two times the size of the ones on the Google map.
6. Tell groups that they will work together to choose the scale for their map grids. Have students use rulers to measure the width of each grid square on the Google map printout. Then measure the width of the map area on the activity sheet. If kids are using graph paper, they will measure the width of the sheet of graph paper. They will then compare the width of their graph paper to the width of the area on the Google map.
7. After they've determined the scale for the maps, they should each use the same scale to calculate the size of map objects, such as streets or buildings, that will be included in their grid. For example, if their scale is 2:1, a building that is 2 inches wide on the Google map should be 4 inches, or twice as wide, on the maps they draw. Give students time to draw their map grids. When done, teams will piece together their grid squares and attach them to poster board to make a completed neighborhood map. After finishing their map, give teams time to reflect and make adjustments as necessary.

**Example:** 
$$\frac{\text{Drawn Map Width}}{\text{Google Map Width}} = \frac{6 \text{ inches}}{3 \text{ inches}} = \frac{2}{1} \text{ or } 2:1$$

Explain that as groups are working to agree on the scale they will use to draw their map grids, they should simplify the scale to make it usable.





## Map It

When done, tape together each map grid to make a completed neighborhood map. Do the streets match up? Did you and your teammate use the same scale? Don't be afraid to make changes if needed.

This image shows a full page of blank graph paper. The grid consists of thin, light gray horizontal and vertical lines that intersect to form small squares across the entire surface. There are no margins, text, or other markings on the paper.