Be a Digital Mapper!

Estimated Time: 30 minutes

SUMMARY

Digital mappers are people who use maps with data that can be used to study an area. Many people use digital maps daily from finding directions online to looking at population maps or even just seeing which parts of the Earth are land and which are water! In this activity, students will learn this process and make their own digital maps on paper.

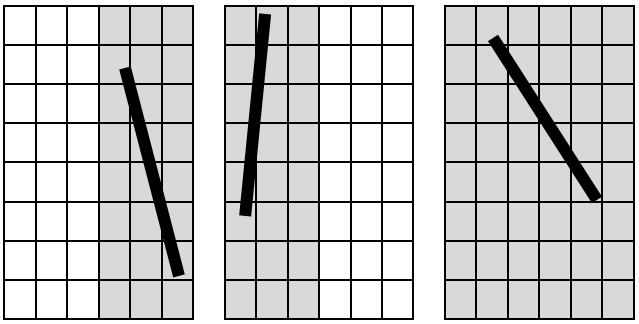
WHAT YOU'LL LEARN

- Learn about resolution and making decisions with maps based on data.
- Learn about coordinates and grid sizes.

Materials Used	
• Large treats like Oreos, Twizzlers, Fun-sized bags of candy. • Small candies like M&Ms, Skittles, or chocolate chips. ***Note:*** *Students will be eating these treats and candies so consider any food allergies.*	• An area grid sheet and a mapping grid sheet per student (or hand-drawn versions) • Paper for notes. • Pencil or pen for each student. • One or more dividers to block view: pieces of cardboard or cereal boxes.

WHAT TO DO

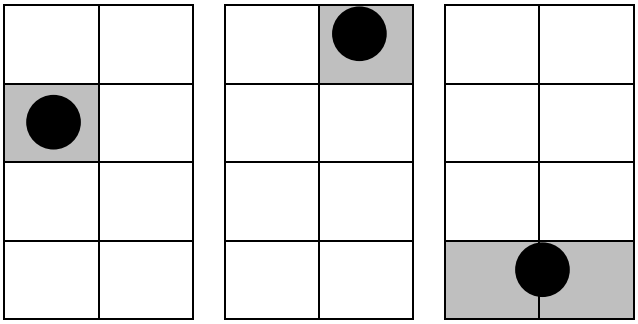
1. Each student will get an area grid (print a version from the end of this activity) as well as a pencil and paper for notes. Start with a short demonstration of the grid system by using a student's area grid and dropping a pencil randomly on the page.
    a. Looking at the area grid, see if the pencil falls in the right half or the left half… or both? Use a mapping grid sheet, show how you would shade in a grid to show any half with pencil in it.
    b. Depending on how the pencil falls, you could get a half-filled grid or a completely filled grid depending on how the pencil falls. This could imply that there are dramatically different numbers of pencil in each case, but it is always just one.



Three example grids with the same pencil in different positions

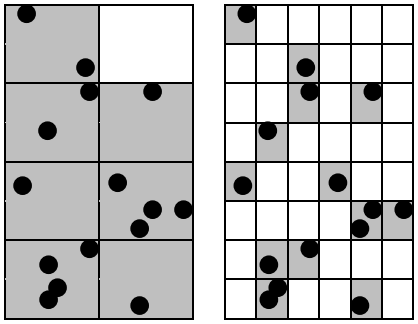
    c. Briefly talk to students about how to improve your grid map to be more accurate. One very effective way is to reduce the grid size.

2. Instead of splitting the grid into two sections, consider a grid of eight spaces. The grid is shaded into eight sections for your convenience. Have each student sit with their grid in front of them and place the dividers between so that they cannot see each other's grids. If it's not possible to block the view, having the students sit in different parts of the room can also prevent them from seeing each other's grids.
3. Using the large treats, have students drop one randomly on their grid. When they do, have them use a grid to color in any of the eight sections with cookie in them. Most of the time this will show just one section which contains a cookie



Three example grids with Oreo cookies dropped on them. The right one has two sections colored in because it overlaps.

4. Help students trade mapping sheets so that they can look at others' sheets. Can they guess where the Oreo is on their partner's area grid based on their map? If they do, they get to eat the cookie!
    a. When an Oreo falls in two sections, the guesser only gets the cookie if at least half of it is in the section they picked.
    b. It's not always accurate but this grid size mostly works for this size item. If you did half the grid at a time the accuracy would be much less.
    c. You probably want to give a cookie to guessers who missed out after they take in the lesson to avoid waste and hurt feelings.
5. Now, try the same activity with small candies. Have students scatter their candies over their area grids and then shade on their mapping grid any of the eight sections containing candies.
6. Students trade mapping grids and their partner picks one of the eight sections. They get to eat all of the candies in that section. This will be harder than with the larger cookies since a shaded section could have just one candy or it could have ten!
7. Try scattering candies again as above but this time have students shade *individual cells* on their grid mapping sheet to show where the candies fell. Trade mapping sheets again and have partners pick any two-cell-by-three-cell section to get their candies. With this smaller grid it is *much* easier to find the best choice on your partner's area grid.



The same scattering of candies in a medium grid and a small grid, with very different shading patterns.

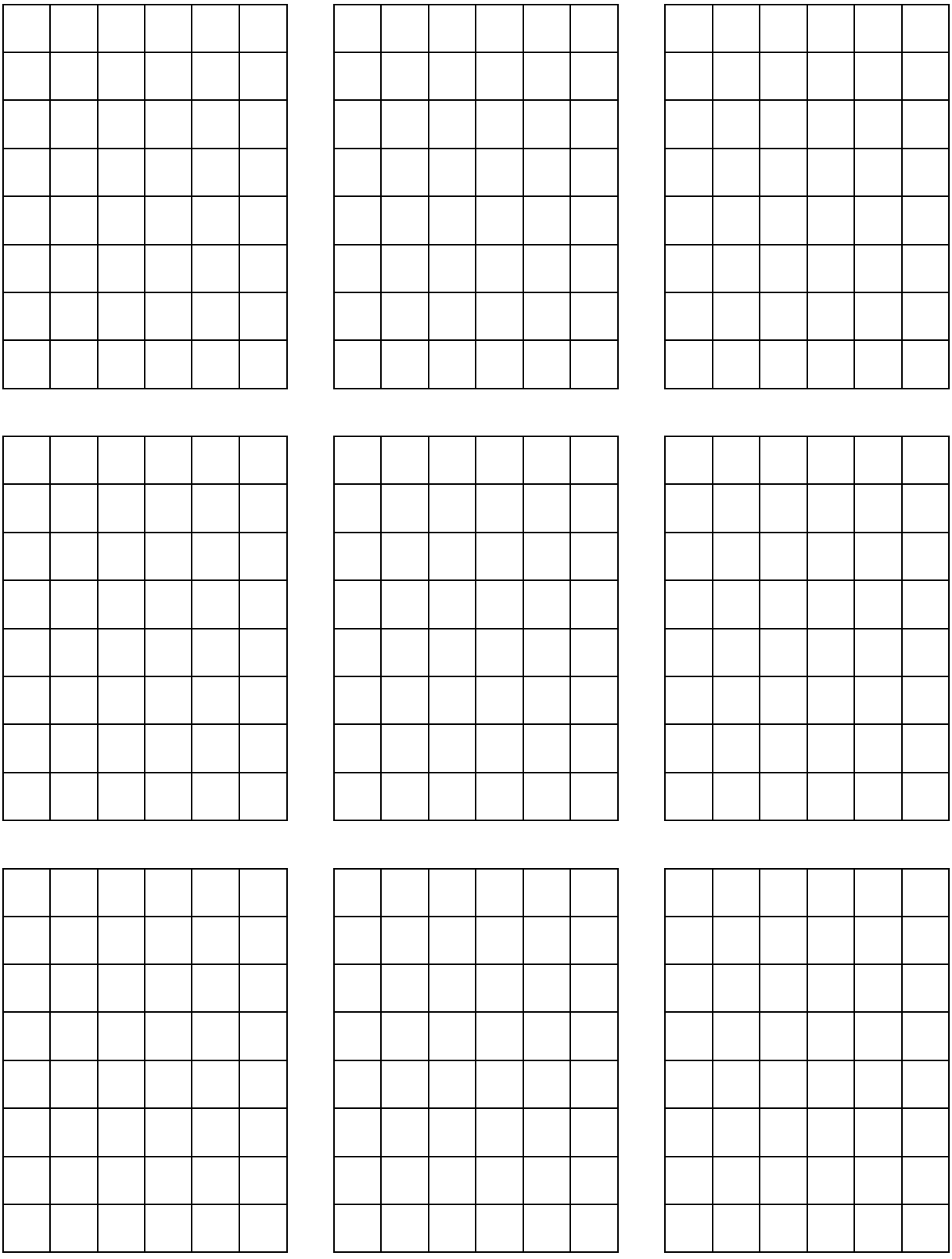
8. Though this activity used candies and cookies, it represents how digital mappers work with data. Some items on a map are large (such as lakes, school buildings, or parking lots) and a large grid can be used to map them. In fact, using a small grid for these things would create a confusing map: imagine a small grid with lots of little lakes indicated when it's actually one big lake overlapping many grid cells. Other items are small (trees, houses, or individual people) and require a smaller grid. Having a large grid for these items creates a map that is too general to be useful. The following questions can help with a final discussion.
    a. What grid size would you use with something else small? What about another large type of item?
    b. What grid size would you use for mixed items like large Macadamia nuts and small peanuts?
    c. (For older students) What coordinate system is used on Earth? How do we account for both large cities and individual buildings with this coordinate system?

TIPS

- Once students have done this activity a few times, it can be attempted again with different sorts of grids: bigger grids, differently-shaped areas, polar coordinate grids, etc. Does the shape make more of a difference or is it the size of the grid?
- This activity has a lot of overlap with the board game Battleship. Students can also learn a lot about maps by playing this sort of game, picking coordinates on their partner's grid and eating the candies when they find it.
- Digital maps work like this but also digital images. The coordinate cells are called "pixels" for digital images and students can create images by coloring in specific cells, particularly using different colors in those cells. Once they try this, students can take a look at digital images from the internet and see that these pictures involve *hundreds of thousands of pixel cells!* Imagine being a computer and having to count and shade in all of those cells in seconds…

	A	B	C	D	E	F
1						
2						
3						
4						
5						
6						
7						
8						

AREA GRID



MAPPING GRIDS