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## Cookie Excavation

Adapted from *Beyond Artifacts: Teaching Archaeology in the Classroom* produced by the Florida Public Archaeology Network

**Time** Allow 20 minutes for cookie excavation and 5-10 minutes for discussion

### SC Education Standards:

- Math 1.MDA.1, 1.MDA.2; 2.G.3, 2.MDA.1, 2.MDA.2, 2.MDA.3; 3.MDA.3, 3.MDA.4; 5.G.1, 5.G.2
- Science: 1.S.1B.1; 2.S.1B.1; 3.S.1B.1; 4.S.1B.1; 5.S.1B.1

### Materials

For each student

- 1 chocolate chip cookie
- 1 toothpick
- 1 small plate
- Cookie excavation worksheet

### Overview

To provide students with an understanding of the mathematics and process involved with excavating artifacts

### Introduction

Archaeologists use excavation to extract artifacts from the ground. This is extremely precise work due to the fact archaeology is a destructive process. Once the objects are removed from their place, any information associated with their location is lost unless it is recorded. Detailed notes must be kept of how the site is being excavated, what's being found and where. Once the artifacts are taken from the ground, they cannot be put back. Archaeologists cannot know for sure what is under the ground before excavation, so they must plan to excavate slowly and carefully.

### Activity Steps

1. Tell the students that they are archaeologists and have been asked to excavate their artifacts (the chocolate chips) from an archaeological site (the cookie) to the best of their ability while keeping the chips intact
2. Pass out the materials and tell students to read their excavation worksheet carefully before beginning. It will be their field notebook where they keep track of the excavation and their "artifacts."
3. Before they begin, students should outline an "excavation plan" for recovering as many whole chips as possible on their excavation worksheet.
4. After 20 minutes or so, stop the class and find out how many students were successful in excavating whole chips from their cookies.

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### Helpful Hints

- The level of complexity greatly depends on the type of cookie used – younger groups will be easier with M&M candy cookie or cookies with large chips. Older students may enjoy the challenge of an extreme chocolate chip cookie like Chips Ahoy Chocolate Chunk. It is almost impossible to keep all of the chips whole.
- If working on units involving measuring with imperial or metric measurements, have students use rulers and write down measurements coordinates on their grids.
- Have students graph the results of their data (number of chips for each half, quarter; have a class graph of number of chips in each student's cookie)

Have a class discussion about the excavation. What excavation plan did they use? Did they have to deviate from this plan? What would they do differently next time? This emphasizes the importance of planning ahead for a scientific investigation, but recognizes that after experience, some plans can be amended.

Ask students how easy it was to excavate the whole chips. Were there always whole chips or sometimes only parts? Was it easy to tell which chips were whole or broken? Archaeologists encounter similar problems when excavating real sites. In most cases, the artifacts that are found are not whole (especially pottery), but care still needs to be taken when excavating so even the pieces are not further broken.

Ask students if they think they could put the cookie back together now that it has been excavated. Do they think they could re-construct what the cookie looked like from their notes? Explain that is why archaeologists take so many notes when they excavate. They cannot put the artifacts back in the ground once they've been dug up, but through careful note taking, graphing, and photographs they can re-construct what the site looked like and where everything was located.

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### Cookie Excavation Worksheet

1. Place your cookie in the middle of the Cookie Excavation Site grid and trace the outline of your cookie in case it accidentally moves during excavation. Write down the four coordinates below (use the letter and number combination i.e. the tallest part of your cookie may reach I,6, the left side C,7, etc.)

Top of cookie: \_\_\_\_\_ Left side of cookie: \_\_\_\_\_

Bottom of cookie: \_\_\_\_\_ Right side of cookie: \_\_\_\_\_

2. Using your coordinates and information from your Cookie Excavation Site grid, sketch your cookie on your Cookie Excavation Grid Map.

3. Come up with an excavation plan and write it below. How will you excavate the chips? What will you do to avoid damaging chips?

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4. Write down the coordinates of any chocolate chips you can see before you begin excavating sketch and label them on your Grid Map.

5. Use a toothpick and begin excavating your cookie. Be careful not to move it from the Excavation Grid. As you find chips, note their coordinates and sketch them into the Grid Map. Try not to break any chips as you dig.

7. Draw a line down the center of your cookie on your Grid Map so there is a top and bottom half. How many chips were in the top half? How many in the bottom? Now divide it into quarters by drawing one more line. Label each quarter with a number and record how many chips are in each quarter.

6. What problems did you encounter while trying to excavate the chips? Did you have to sacrifice any chips in order to get to another one? Did this kind of work frustrate you, or did you find it a fun challenge?

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### Cookie Excavation Grid Map

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	

Notes:

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Number of chips in top half: \_\_\_\_\_

Number of chips in Quarter 1: \_\_\_\_\_

Number of chips in bottom half: \_\_\_\_\_

Number of chips in Quarter 2: \_\_\_\_\_

Number of chips in Quarter 3: \_\_\_\_\_

Number of chips in Quarter 4: \_\_\_\_\_