

Log Cabin Construction: Middle Grades

Overview



Learning Outcomes*

The student will learn about the process of constructing a log cabin, while applying relevant mathematical skills to a real-world scenario.

Georgia Standards of Excellence*

- **MGSE6.G.1:** Find area of right triangles, other triangles, quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
- **MGSE6.G.2:** Find the volume of a right rectangular prism
- **MGSE7.G.6:** Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
- **MGSE8.G.7:** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

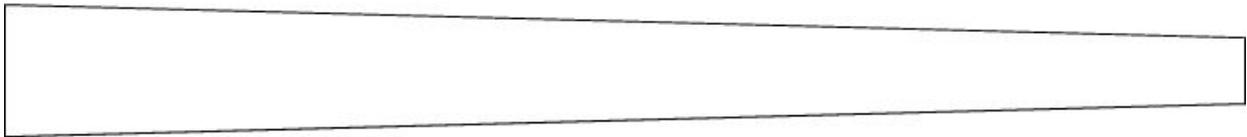
Materials

- Scrap paper
- Pencil
- Calculator
- Popsicle sticks
- Glue
- Cotton balls or tissue paper

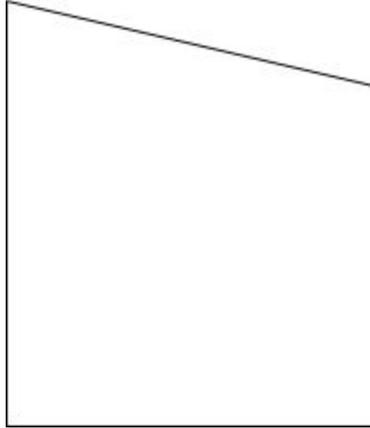
*Note: Adapt to your context as needed

Activity/Procedures

1. Watch this [video](#) on how to hew a log, then answer the following questions.
 - a. What are some reasons to hew a log?
 - b. What was an alternative to a chalk line?
 - c. What is the first type of axe Barry uses? Why does he use this particular style for scoring?
 - d. What's the purpose of scoring a log?
 - e. What's another use for hewn logs, aside from log cabin building?
2. Prep your cabin!
 - a. Time to metaphorically hew your own log! You've cut down a 15 foot tree. You need a log 12.5 long for your cabin. How much do you cut off?
 - b. Now that your log is trimmed, it's time to score. Make a scoring mark with your axe every six inches. If your log is 12.5 feet long, how many marks should you make?
 - c. Your finished log is 6 inches wide in the center. Because it was cut from a tree, it tapers towards one end. Look at the drawing below. What shape is this?



- d. If the length of the log is 12.5 feet, the left end is 6.5 inches wide, and the right end is 5.5 inches wide, what is the surface area of the log face?
 - e. Using the height at the middle of the log (6 inches), calculate how many logs you would need to construct a square cabin 10 feet tall, keeping in mind that there is a 6 inch gap between each log. (Don't forget the other three sides!)
3. Now that you have all of your logs cut and hewn, let's put your cabin together.
 - a. Log cabins are constructed using different notches at the corner, to hold them together. Think about if you've ever played with Lincoln logs--each log has a flat notch in the round log. In Southern Appalachia, people used a half-dovetail notch (see image below)



- b. What shape is this?
- c. Given the following dimensions, find the area.
 - i. Left side height: 8 in
 - ii. Right side height: 6 in
 - iii. Width: 5.75 in
 - iv. Length of top slope: 6 in
- d. Look at the pictures below. What might be the advantage of using this type of notch? Discuss with your classmates.



- 4. Finishing the cabin
 - a. You've constructed the base of your square cabin, but you'd like to add a loft to sleep in. You are 5 foot 6 inches tall, and you'd like to be able to stand up at the center. What is the slope of the roof? (hint: solve for hypotenuse)

*Note: Adapt to your context as needed

- b. alternative: You are 5.5 feet tall and want to stand up in the center of your loft. If the slope of the roof is 7.5 feet, what is the volume of the loft space? (hint: find base area first!)
 - c. What is the volume of the whole cabin?
5. Make a model
 - a. Gather the following supplies and try building a model of a cabin you'd like to live in:
 - i. popsicle sticks, or small sticks gathered outdoors
 - ii. glue (hot glue works best, but some students may need assistance)
 - iii. Cotton balls or tissue paper
 - b. Using popsicle sticks, or those you've gathered outdoors, try building a model cabin by stacking them on top of each other, overlapping at the ends. Is your cabin stronger if you lay the sticks flat or if you stack them on the thin edge? (hint: try building a structure before you glue it!)
 - c. Glue the ends of your cabin together where the notches would be.
 - d. Notice the gaps between the sticks. This is due to the fact that the sticks are overlapping and stacking as you build. The same thing happens when building a real cabin. What might happen if someone was to leave their walls open like this? To close up the cabin, people would use a mixture of clay and sand to make chinking. This is the red or gray stuff you see between logs. Chinking provides insulation, and helps keep pests out. Make your own chinking by stuffing cotton balls or tissue paper between your sticks!
6. Reflect
 - a. What are some differences between log cabins and the house you live in?
 - b. Why do you think people stopped building log cabins?
 - c. Most cabins were one or two rooms, and families often had 8 to 10 children. Where do you think people spent most of their time if they had such a small house? Where do you spend most of your time?
7. Expand ELA learning by having your students read these recommended titles, or have them write a story about a log cabin
 - i. *The Foxfire Book*
 - ii. *The Sign of the Beaver* Elizabeth George Speare
 - iii. *Where the Lilies Bloom* Bill and Vera Cleaver