

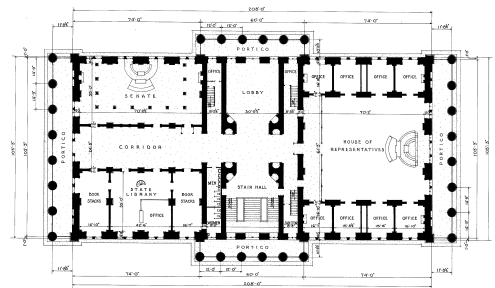
## Lesson Plan

### FINDING THE AREA & VOLUME OF BUILDINGS USING ARCHITECTURAL DRAWINGS

**Grade:** 5  
**Subject:** Math  
**Time Required:** 1-2 class periods, 10 minutes prep (printing images)  
**Author:** Teaching with Primary Sources Across Tennessee

**MATERIALS USED:** *Primary Sources from the Library of Congress*

- [Netherland Inn, Kingsport, Sullivan County, TN](#)
- [Rock Castle, Hendersonville vicinity, Sumner County, TN](#)
- [State Capitol, Nashville, Davidson County, TN](#)  
(pictured at right)



#### OVERVIEW

Students will use real world examples of mathematics to find area and volume of historic Tennessee buildings.

#### UNDERSTANDING GOAL

Volume and area are used in the real world through architecture.

#### OBJECTIVES

Using images from the *Historic American Buildings Survey* collection at the Library of Congress, students will calculate area and volume and discuss architectural features for three specific, historic Tennessee buildings.

#### INVESTIGATIVE QUESTION

What can architectural drawings tell you about real-life buildings? How do architects use and depict area and volume measurements?

#### CURRICULUM STANDARDS

- SPI 0506.4.1: Solve contextual problems that require calculating the area of triangles and parallelograms.
- SPI 0506.4.2: Decompose irregular shapes to find perimeter and area.
- SPI 0506.4.3: Identify a three-dimensional object from two-dimensional representations of that object and vice versa.
- SPI 0506.4.4: Solve problems involving surface area and volume of rectangular prisms and polyhedral solids.
- SPI 0506.4.6: Record measurements in context to reasonable degree of accuracy using decimals and/or fractions.

[http://www.state.tn.us/education/ci/math/2009\\_10/grade\\_5.pdf](http://www.state.tn.us/education/ci/math/2009_10/grade_5.pdf)

## PROCEDURE

**Step 1 Connect** From the link for each primary source, click on the icon for “drawings” in the box towards the top of the bibliographic page. You will be taken to a page (or pages) of thumbnail images that depict architectural drawings of each building.

Click on a thumbnail for a closer look at a drawing, and then select an option to view as a larger, higher resolution picture. (*Note: The letters and numbers are all legible from a larger-sized view.*)

Download and print out the larger images you want to use (for directions, see <http://memory.loc.gov/ammem/help/faq.html#download>). To see photographs of the buildings, click on “photos” from the bibliographic pages.

**Step 2 Connect** Discuss perimeter, area, and architecture with your students. Explain how math is important to architectural drawings and buildings.

**Step 3 Wonder** Start out with the simplest drawings, the ones of the Netherland Inn, and then work your way up to the next level, for Rock Castle. The State Capitol drawings are very complex. Have students first estimate the area of each building.

**Step 4 Investigate** Have students calculate the following: length of outside and inside walls and porches; area of certain rooms, or entire stories, or the entire building; the perimeter of the entire building.

Estimate the thicknesses of walls or the areas of chimneys.

**Step 5 Construct** Compare the drawings of a building to the photographs of the building. Can you recognize a building from its blueprints and vice versa? Share the actual dimensions with your students. Ask students if they were surprised by any of the photographs. Did the buildings look as they had expected?

**Step 6 Express** The photographs and drawings of these buildings come from the Historic American Buildings Survey (HABS). Federal employees have been gathering information about important American houses, stores, barns, schools, and other places since the 1930s. How is the information they gathered important to us today?

**Step 7 Reflect** Ask your students what they would have done differently, had they been the architects. Thicker walls? More chimneys? Different arrangement?

**Step 7 Reflect**

Have you visited any of these historic Tennessee buildings? If you have seen one of them, how does it compare in person to the photographs and drawings in these primary source images? Find more historic Tennessee buildings at [http://memory.loc.gov/ammem/collections/habs\\_haer/placeT.html](http://memory.loc.gov/ammem/collections/habs_haer/placeT.html).

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**EVALUATION**

Student answers can be formally evaluated by the collection of notes and answer sheets, and their responses to class discussion can be informally evaluated.

**EXTENSION**

Find out more about the history and visitor information for these buildings at their Web sites:

- **Netherland Inn:** <http://www.netherlandinn.com>
- **Rock Castle:** <http://www.historicrockcastle.com/>
- **Tennessee State Capitol:** <http://tnmuseum.org/exhibitions/capitol.htm>

If you are able, plan a field trip to one of these sites. Have students compare the historic photographs and drawings with the present buildings. Has anything changed?