

The Architecture of Thomas Jefferson: Integrating Math, Science and History

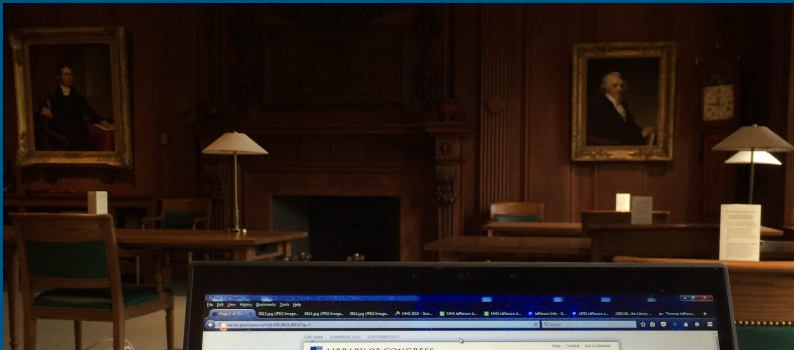
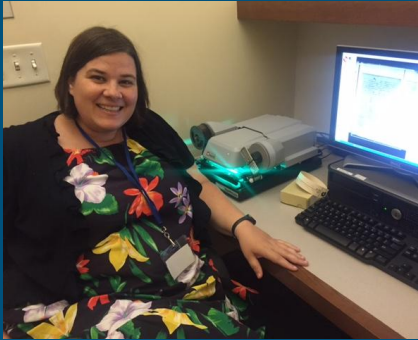


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<https://goo.gl/fme05S>

Swensrud & Kaas Fellowships - 2015

Thomas Jefferson and the Built Environment



Agenda

- Warm-Up Kahoot (4 minutes)
- *Jefferson as Architect*
- Geometric Concepts in Architectural Drawings (20 minutes)
- Google Earth Tour (3 minutes)
- 3-D Visualization: Sketch-Up Overview (3 minutes)

Architecture, Gardens, and Science

Environmental Science Connections:

Architecture

Urban Planning

Materials Science

Building Design (Before Technology)



Gardens

Invasive Species

Seasonality of Vegetables

Farming Methods



Kahoot.it -- Jefferson Style

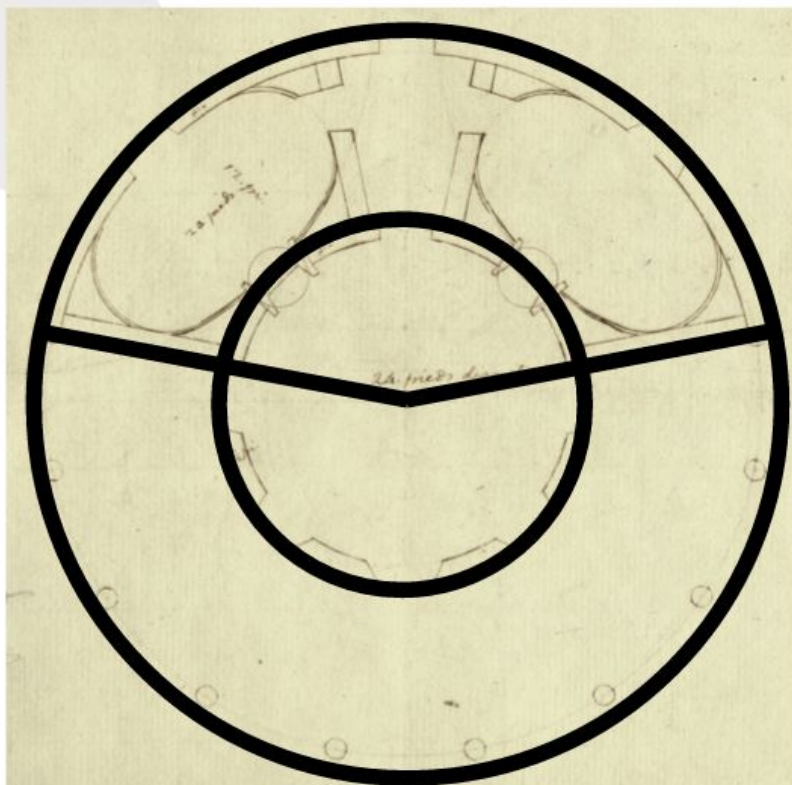


Jefferson Architecture Conference Presentation

Warm Up Overview - goo.gl/2aQ3LC

Name of Warm Up File	Skills used in Geometry Problem
Jefferson Circles - Sector Area WarmUp	Calculate the area of a sector based on a given diagram. Needs to use protractor to measure angle.
Jefferson Concentric Circles Area WarmUp	Calculate the area between the concentric circles based on a diagram.
Jefferson Isosceles Triangle Construction WarmUp	Use geometry tools to construct a copy of a triangle given. <i>use compass to measure sides to see that it is isosceles.</i>
Jefferson Quadrilateral Classification WarmUp	Identify quadrilaterals (trapezoid, parallelogram, rectangle, square, etc) in a diagram. Should use geometry tools for measuring sides, angles & diagonals. <i>Extension: classify triangles & look for symmetry</i>
Jefferson Reading a Floor Plan WarmUp	identify the features of a floorplan (i.e. doors, windows, & stairs).

What is the **area** of the **sector**?



Pavilion/Retreat Plan (1794) by Thomas Jefferson

Description: " Plan for a circular pavilion or retreat (54' diameter) with a circular room in the center (24' diameter) and two oval rooms in the upper half of the "ring." A portico with eight columns and two half-columns occupies the lower half of the "ring.""

Note: a portico is a covered porch (supported by columns) that leads to an entrance.

Find the area of the sector in the upper half of the pavilion drawing. *TIP: use your protractor to measure the central angle.*

Find and **classify** the quadrilaterals.

Find & **classify quadrilaterals** in the drawing. *TIP: use your protractor & straightedge to measure sides, angles and diagonals.*

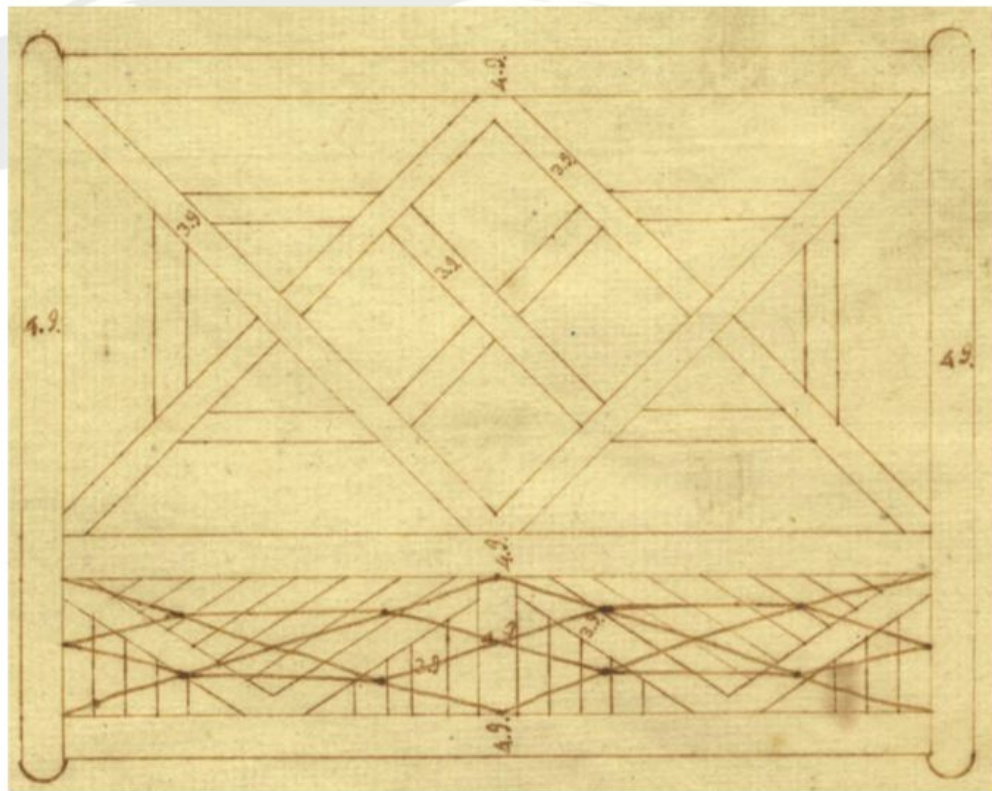
Things to look for:

1. Identify different types of quadrilaterals. Label them on the diagram.

If time permits:

2. Identify any symmetry shown.
3. Find and classify the triangles.

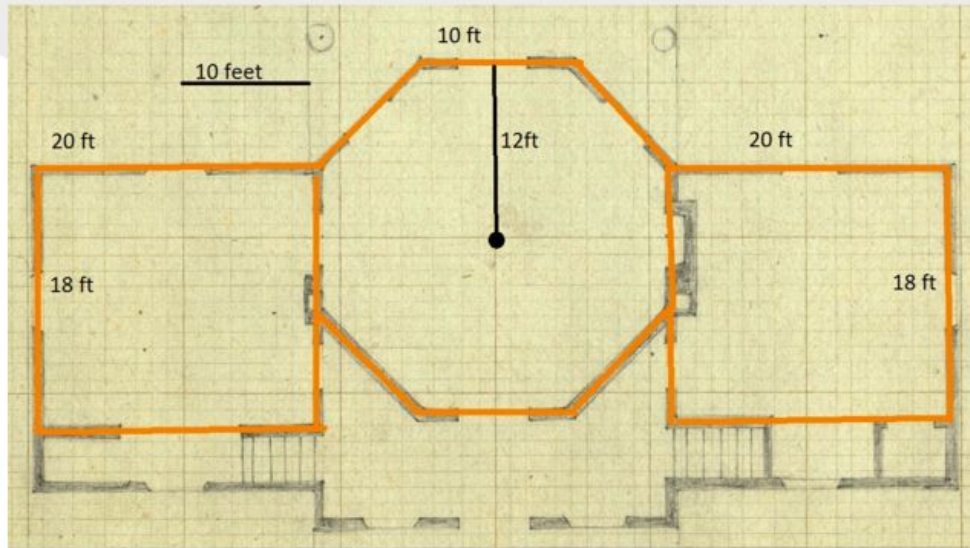
Monticello: chinese lattice gate, 1771 by Thomas Jefferson



What is the **area** of the inside living space outlined in orange?

Poplar Forest House (early plan) circa 1806 by Thomas Jefferson

Description: "Study for plan of a house, unexecuted. Scale: approx. 10'=1".

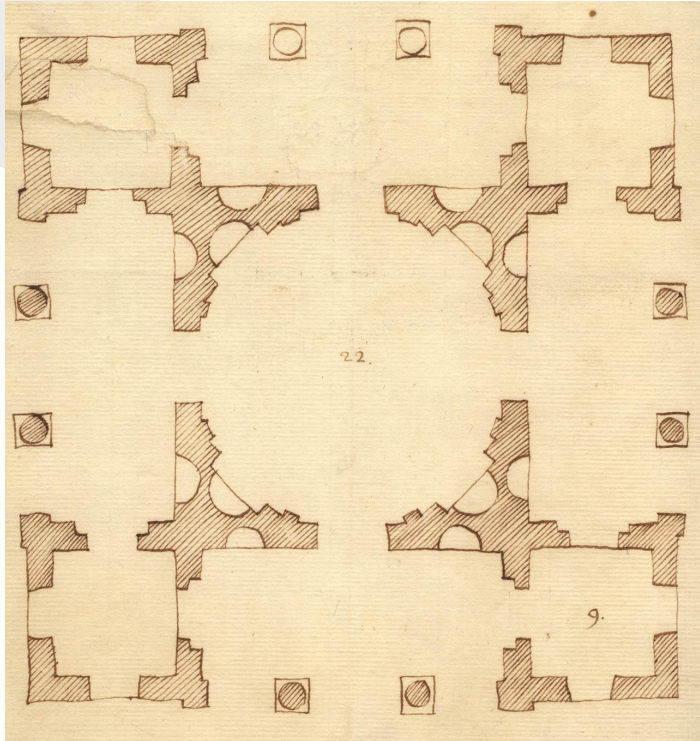


Find the area of the inside living space outline by orange.

What kind of **symmetry** can be found in this image?

Monticello: Garden Temple by Thomas Jefferson

Description: "A temple for a garden." circa 1779-1781

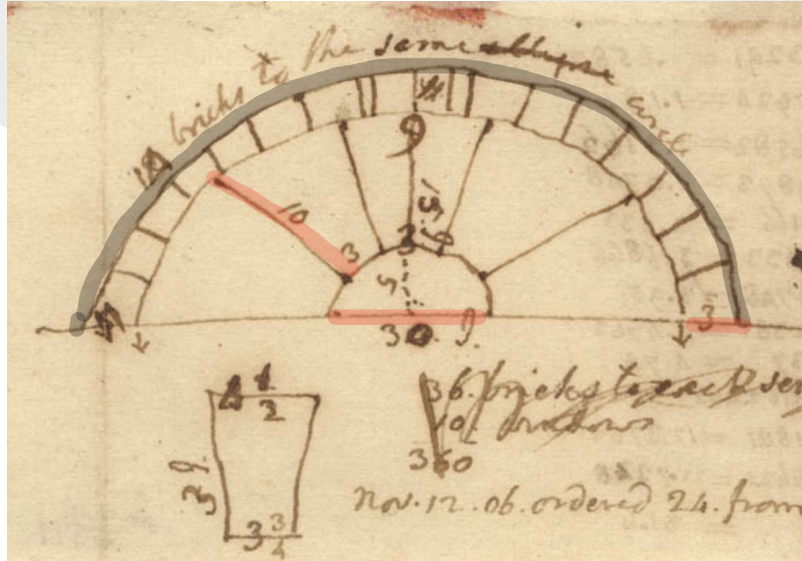


1. Draw in the **lines of symmetry** for this image.
NOTE: you can fold your paper to help you see the lines of symmetry.
2. Does this image show **rotational symmetry**?
If so, identify all the **angles of rotational symmetry** (less than 360 degrees)?

What is the **arc length** of the outer arch?

Monticello: passage arches, 1806, recto,
by Thomas Jefferson. N147w; K149w [electronic edition]

Description: "Notes and sketch for semicircular arches of passages, dated
"May.23.06," with brick calculations oriented perpendicular to notes and
sketch."



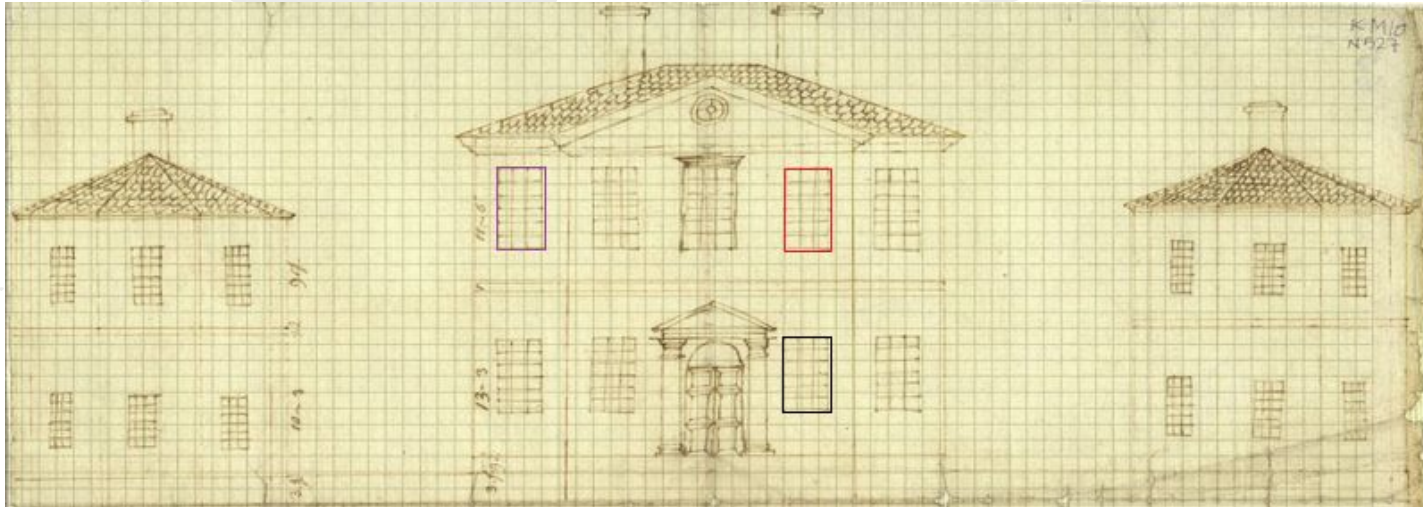
Find the **length of the arc** that is on the outer edge of the arch (highlighted in gray).
NOTE: use symmetry and the markings of the lengths in red highlights.

Write the translation vector.

**Annapolis: Hammond-Harwood house,
[1783-1784] by Thomas Jefferson**

Description: “Hammond-Harwood house -- measured drawings of the elevation (on upper half) showing windows and door...”

Identify the **translation vectors** that could be used to translate the original window (black) to the two additional windows outlined (in red and purple). Write the vectors in **component form**. *Estimate coordinates to the nearest quarter of a unit.*



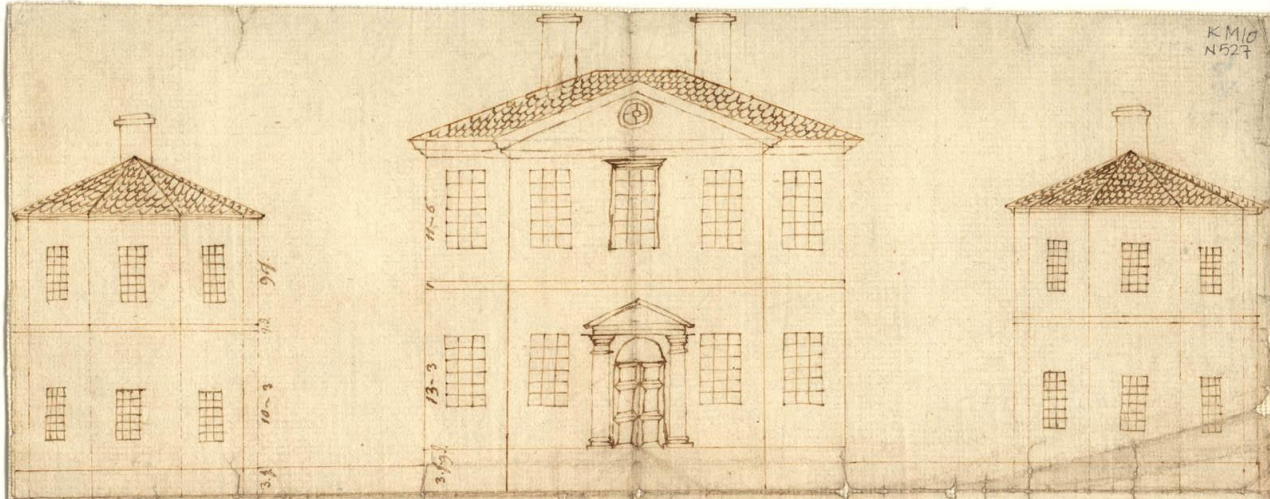
Identify any **symmetry** shown in the drawing.

Annapolis: Hammond-Harwood house, [1783-1784] by Thomas Jefferson

Description: “Hammond-Harwood house -- measured drawings of the elevation (on upper half) showing windows and door...”

Describe all symmetry shown:

What aspects of the house (with respect to symmetry) makes home visually appealing?



Hammond-Harwood House



Identify the features in the floor plan.

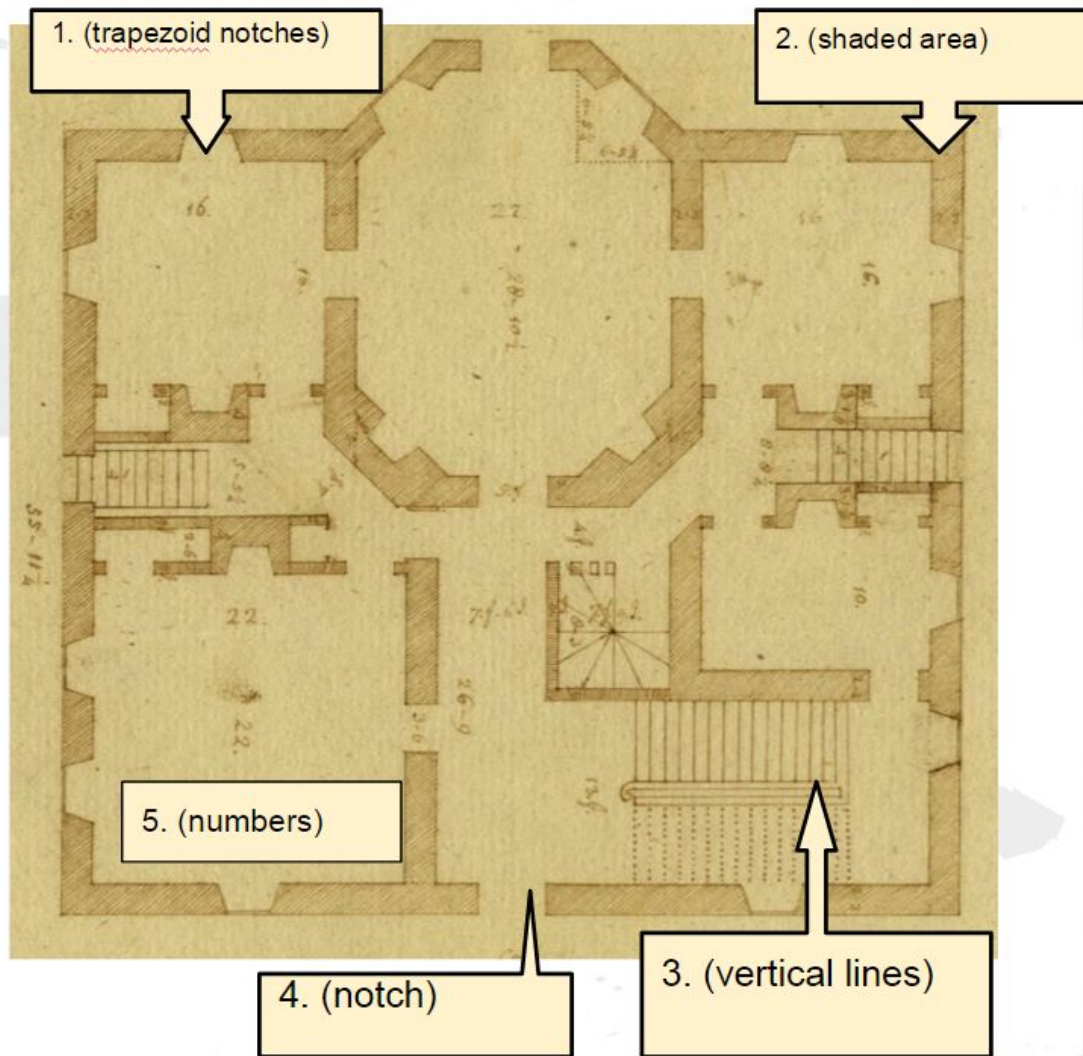
Williamsburg: Governor's Palace, 1779-1781 by Thomas Jefferson

Description: "Final study of plan for remodeling the Governor's Palace."

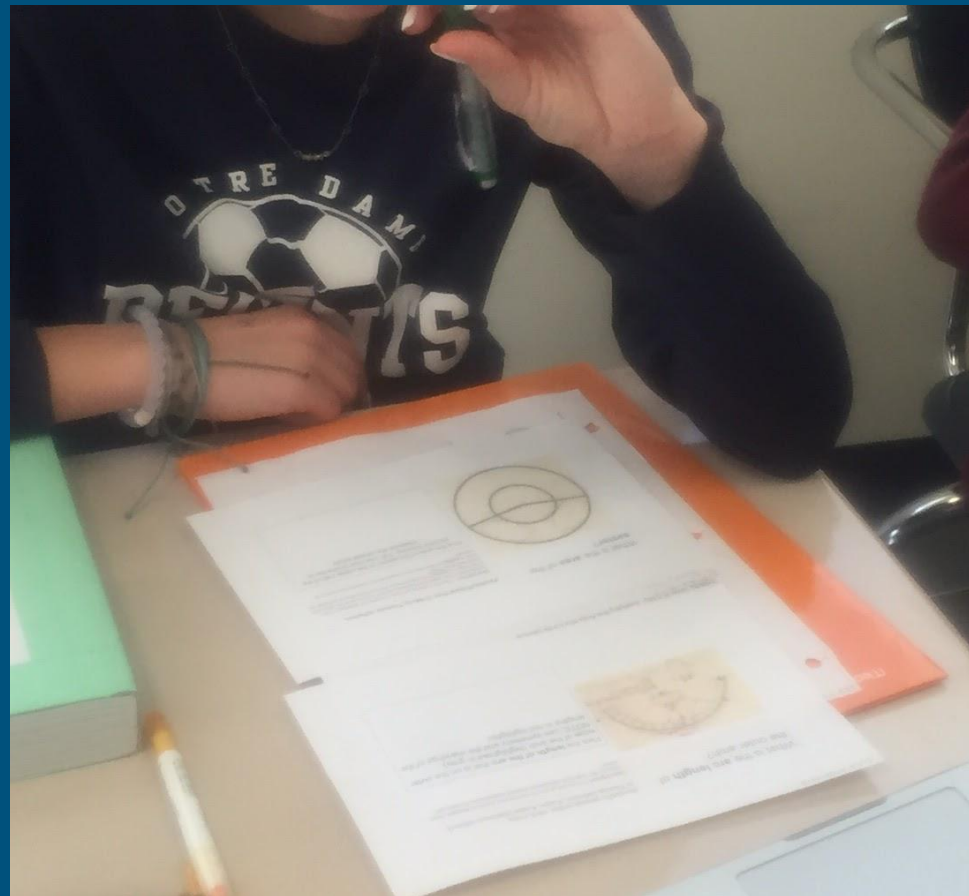
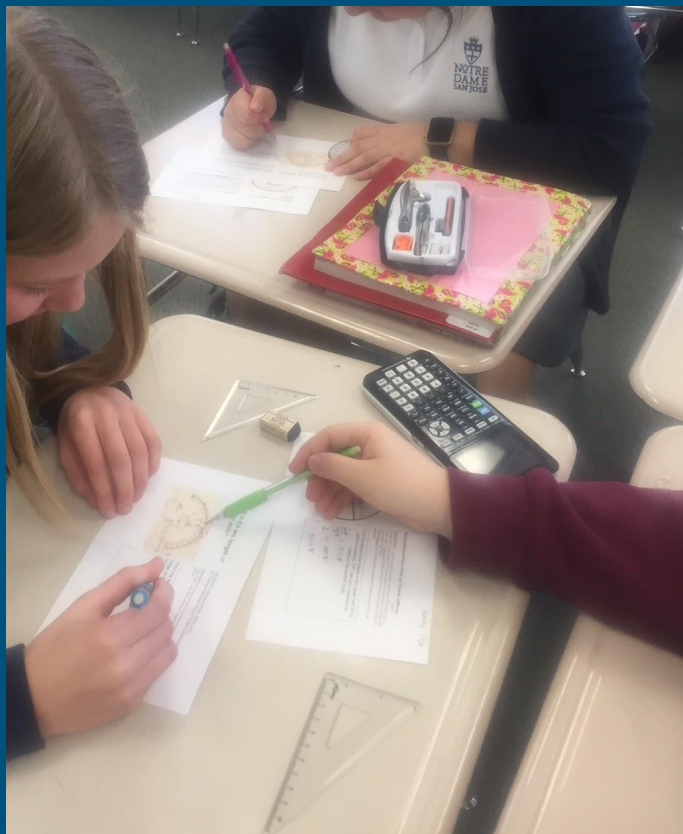
NOTE: The palace burned down on Dec. 22, 1781.

When drawing a floor plan, the architect needs to convey a lot of features in a small amount of space.

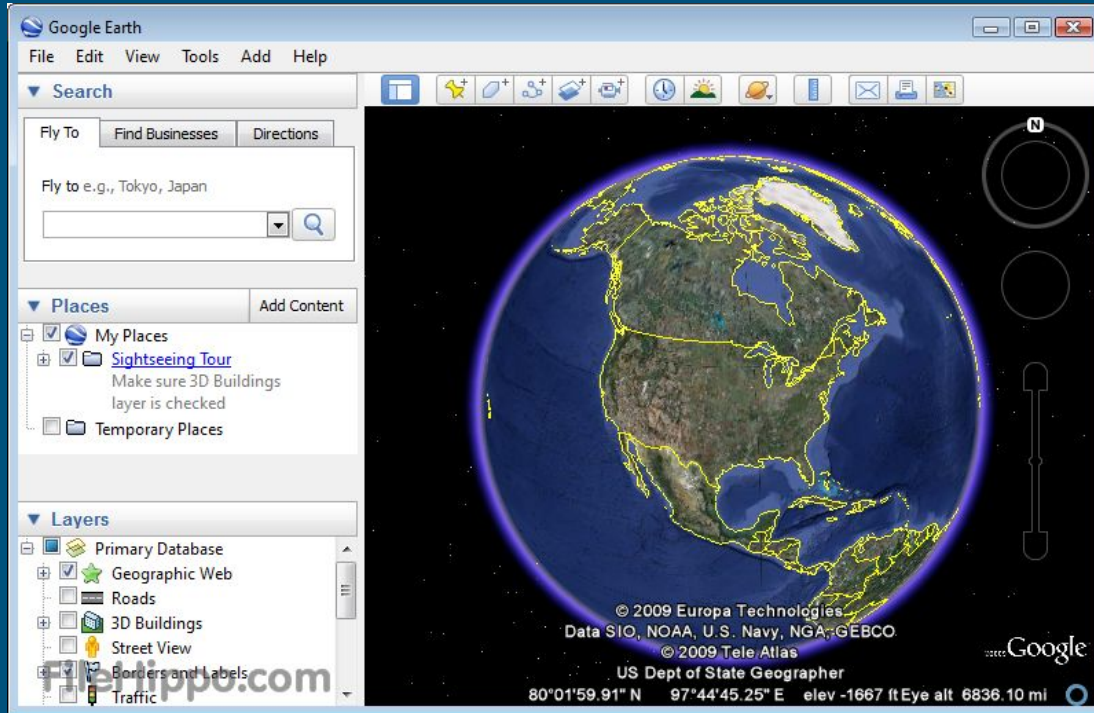
1. What do you think Thomas Jefferson wanted to convey with these distinct markings in his plan of the Governor's Palace? *Identify any other features that you see.*
2. Any descriptions missing that would be helpful for a builder?



student work



Google Earth Tour--Let's visit Monticello



Step#1 - Download Google Earth : <http://ittybittyurl.com/Y8j>

Step#2 - Download the Architecture tour kmz file: <http://ittybittyurl.com/Y8h>

Monticello, VA

Monticello first version (before 1771).

Monticello Virtual Tour.

Thomas Jefferson designed and built his home.



From the Library of Congress: Thomas Jefferson Papers, Monticello Historical Society.

Stanton

Fishersville

Waynesboro

Charlottesville

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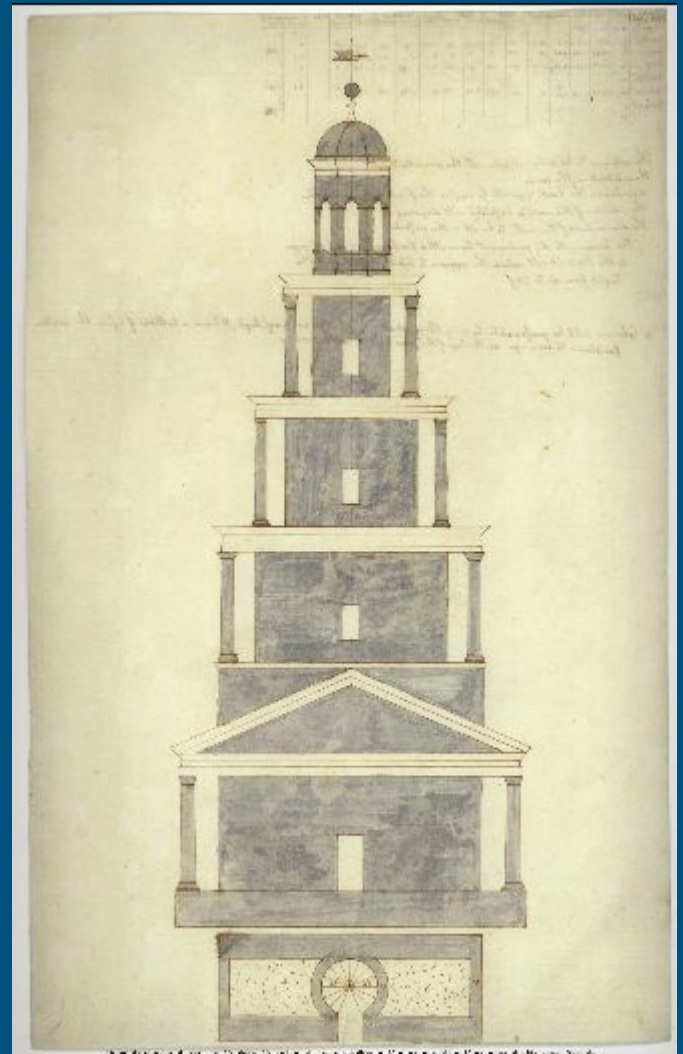
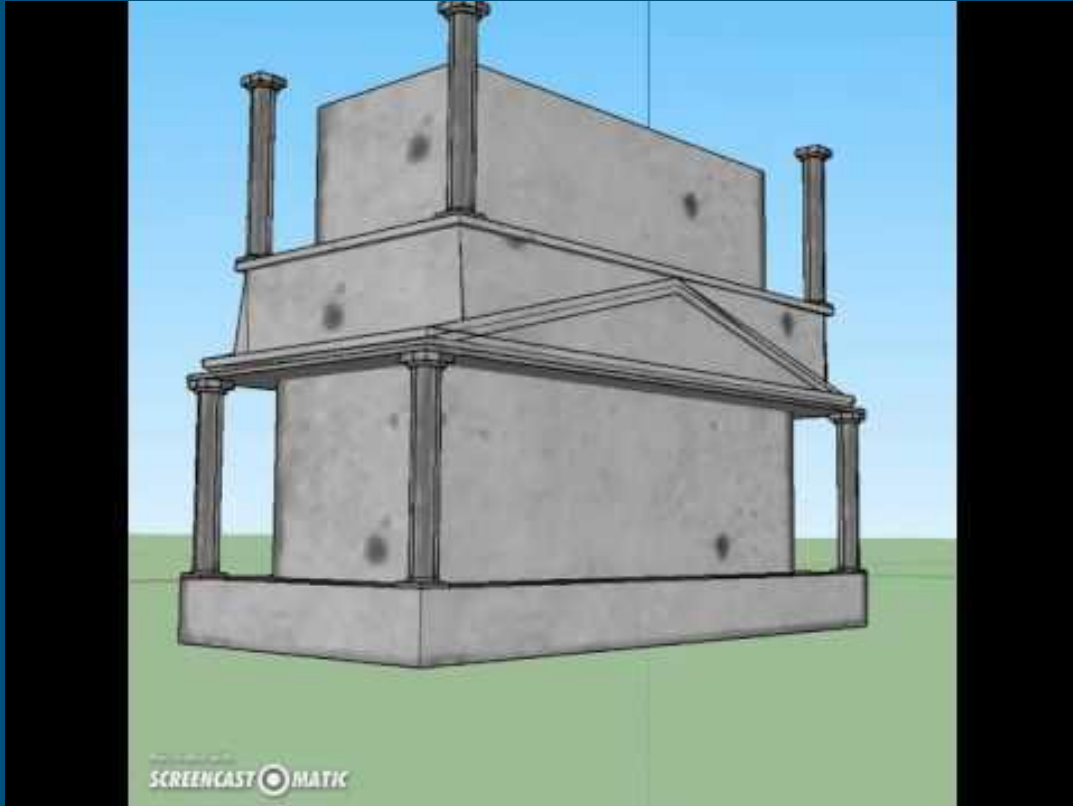
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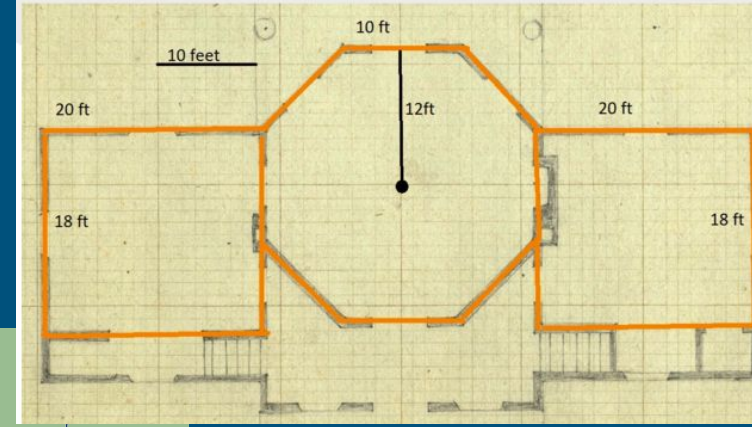
As you visit Monticello and the MHS website, consider the following questions:

1. What features of this building catch your eye?
 2. How is this building heated? How do you know?
 3. Are there any features of this building that you've noticed in your neighborhood?
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4. Where did the building materials for Monticello come from?
 5. Look at the architectural details for Monticello. What order are the columns? What does this word mean? Draw a picture of this order.
 6. Read about privies. What surprises you/what did you learn about bathrooms in 19th century US?
 7. Go to the Monticello image gallery and take a look at the bedchamber. Where is the bed located? What kinds of objects do you see in this room?

3D Visualization in SketchUp



Poplar House



Presentation Resources

Google Drive Folder with all presentation materials.

goo.gl/ngcna3

