

Classroom Restoration Activity



This program teaches students both practical math and restoration of historic places. This document contains all of the information that you will need to run the activity. The program can be run in one sitting (which takes 60-75 minutes) or as an ongoing project.

**Molly Brown House Museum
Department of Learning & Engagement**

Historic Denver/Molly Brown House Museum

Classroom Restoration

Teacher Outline

The outline below was created to help you lead your students through a simulated restoration of either your classroom or another space in your school. The program is designed for classrooms that are rectangular or square. If your room has a different shape, you may want to adjust the student instructions.

- I. Introduction Historic Preservation
 - A. Historic Preservationists are individuals who work to save and maintain historic buildings, sites or objects so that future generations can experience them.
 - B. Historic Preservationists save buildings for many reasons, their aesthetic value, because they can be “recycled” and used for new reasons and because buildings remind us of our past and tell us stories
 - C. Your classroom is certainly something that will always remind you of your years in school.

- II. Restoration
 - A. A building that was preserved by preservationists in 1970 is the Molly Brown House Museum. The Museum was threatened with demolition so a group of private citizens gathered together to form Historic Denver Inc. and bought the house to restore it.
 - B. Restoration is the process of returning a historic structure, site, or object to its previous or original condition, maintaining as much as possible the materials or properties used in its initial construction.
 - C. Recently, the Molly Brown House Museum completed the restoration of Mr. Brown’s Study. When the restoration began, workers went through several steps:
 1. Cleared the room of all furniture
 2. Stripped the paint off the walls, carefully analyzing the layers that lay beneath
 3. Removed a “false” ceiling that was added in the 1930s to uncover historic wallpaper.
 4. Studied the wallpaper fragments to determine how old the paper was. It dated to 1910
 5. Smoothed all the walls with new plaster
 6. Removed the carpet and re-finished the wood floors.
 7. Scanned original wallpaper found on the walls
 8. Ordered reproduction wallpaper
 9. Installed reproduction wallpaper
 10. Refinished and polished all woodwork
 11. Installed a reproduction light fixture.

- III. Lesson Procedure:
 - A. Describe the project to the students.
 1. Present information about preservation and restoration and show examples of Molly Brown restoration project.
 2. Explain that their classroom has been designated an historic landmark, and they need to restore it to its original condition of 1900. To do this, they will need to repaint, wallpaper, carpet and install a chair rail.
 3. Describe the mathematical methods to accomplish these tasks. Including formulas for perimeter and area.
 4. Split the class into teams and provide each team with a measuring tape and clipboard.
 5. Each team will measure each wall, door and window. (Assign teams to begin in different areas of the room so they don’t run into each other.)
 6. Each team will make a map of the room, complete with doors, windows and any other “obstacles”. The map will contain precise dimensions.
 7. Teams will write down their estimates for the following and turn into the program facilitator their calculations worksheet.
 8. Teams will calculate by hand the amounts of materials necessary to complete 7a-f above.

9. Provide teams with a calculator. Teams will use calculator to check their work.
 10. Teams will evaluate their final calculated results with their original estimates.
- B. As groups or as individuals students will create 3 ft. long strips of wallpaper.
1. Distribute three feet long pieces of butcher paper to each student or each group.
 2. Students will select templates of geometric shapes and create patterns according to the definition of “repeat pattern.” Review concept of repeating patterns
 3. Students can view wallpaper samples for ideas.
 4. Hang strips along the bottom portion of the room, as if it were hanging below the imaginary picture rail.

Optional Adjustments: You may also want to have the students conduct the measurements and then walk through the worksheet as a group.

Historic Denver/Molly Brown House Museum Classroom Restoration Student Instructions

Step 1: Begin measuring your room.

1. **Measure the length of each wall in inches** by running the measuring tape *parallel* to the floor from corner to corner. **Record your measurements in the length column below.** Make sure the tape remains level or your measurements will not be accurate.



2. Next, **measure the height of each wall** by running the measuring tape from floor to ceiling. **Record your measurements in the height column below.**



3. Next, **convert your measurements in inches to measurements in feet.** Since there are 12 inches in 1 foot, divide the measurement in inches by 12, and round off to 2 decimal places. Record this number in the right-hand columns.

	Length (inches)	Height (inches)		Length (feet)	Height (feet)
Wall 1					
Wall 2					
Wall 3					
Wall 4					
Wall 5					
Wall 6					

4. **Complete questions 1 and 2** on your “Classroom Calculations Worksheet.”

Step Two: Wait! What about the windows and doors? In order to accurately measure how much paint, wallpaper and chair rail you will need in your classroom, you need to subtract the space taken up by windows and doors.

1. **Measure the length and height of each window and door in inches.** Record your measurements in inches in the table below. Make sure you record your measurements in the two left-hand columns.
2. Next, **convert your measurements in inches to measurements in feet.** Since there are 12 inches in 1 foot, divide the measurement in inches by 12, and round off to 2 decimal places. Record this number in the right-hand columns.

	Length (inches)	Height (inches)		Length (feet)	Height (feet)
Door 1					
Door 2					
Window 1					
Window 2					
Window 3					
Window 4					

3. **Complete questions 3, 4 and 5** on your “Classroom Calculations Worksheet.”

Step 3: Now it’s time to paint! Different types of paint can spread over different size areas. As a rule of thumb, one gallon of quality paint will usually cover 400 square feet. Remember, we are restoring the room to how classrooms looked in 1900. In 1900, most rooms had a piece of wood railing that wrapped around the room a few feet above the floor. The railing protected the wall from chairs, so it was called a “chair rail”. Imagine that you will install a chair rail 3 feet above the floor and only paint the portion of the room above the rail. **Complete questions 6 and 7** on your “Classroom Calculations Worksheet.”

Paint
Wallpaper

Step 4: Ready for wallpaper? Since you’ve already painted the upper portion of the walls, you only need paper for the area below your imaginary chair rail. Remember, the chair rail is three feet above the ground. To help you in your calculations, I’ll give you a hint, the standard width of a wallpaper is 20.5 inches. Most rolls contain 56 square feet. **Complete questions 8 and 9** on your “Classroom Calculations Worksheet.”

Bonus Question: Wallpaper can be tricky because of its patterns. Most wallpapers have a pattern that repeats over and over again. Because you want the pattern to match up, you need to make special calculations. If you want to measure the size of a repeat pattern, run a ruler or measuring tape from the beginning to the end of the pattern, stop where it begins to repeat. If the repeat occurs every 18 inches or less, you want to divide the surface area you are going to cover with paper by 23 instead of 56. If the repeat occurs between 19 inches and 25 inches, divide the surface area you are going to cover by 28 instead of 56. This way you will be sure to have enough extra paper to

make the pattern match all the way around the room. For a challenge, decide which kind of repeat you want and adjust your wallpaper order accordingly.

Step 5: Chair rails were typically just a thin strip of finished wood wrapping all the way around the room. Based on all the steps you have taken to this point, determine how much picture rail you will need to make it around the room. **Complete question 10 on your “Classroom Calculations Worksheet.”**

Step 6: In 1900, most classrooms did not have carpet. The floors would have been wood. Pretend the carpet in your classroom has been removed and the floors sanded and polished. In order to protect your nice new wood floors, you will want to put down a rug. In order to determine how big your rug needs to be, **complete question 11 on your “Classroom Calculations Worksheet.”**

Congratulations! The chair rail is installed, the walls are painted and papered and the rug is ordered. Your room is restored! If you are interested in viewing pictures of historic classrooms, check out the Denver Public Library Western History Collection website.

Classroom Restoration Vocabulary

Area: The extent of a surface of a solid measured in square units. Area equals the length multiplied by the height of a square or rectangle. The area of a circle equals πr^2 . A unit to measure area is a square foot, abbreviated to sq. ft. in this exercise.

Historic Preservation: To protect, rebuild, or save historic artifacts and sites from destruction or decay; the process of physically rehabilitating or maintaining important historical buildings, sites, objects and structures.

Parallel: Two or more lines or planes that do not intersect but run alongside each other. Parallel walls will never meet in a corner. In your classroom, the front wall and the back wall are probably parallel.

Perimeter: The outer limits of an area. The length all the way around a designated, enclosed space.

Perpendicular: Intersecting at or forming right angles. Perpendicular walls meet in corners.

Repeat Pattern: Most wallpapers are composed of a pattern repeated over and over along the strip of paper. For a seamless look, strips therefore have to be lined up correctly so that the pattern flows fluidly across the wall. The pattern repeat is a measurement of one complete pattern. Larger pattern repeats require more paper to seamlessly cover a wall. Some papers, mostly vertical striped and textured wallpapers, have no pattern repeat and therefore require no matching. To measure a pattern repeat, measure from the beginning to the end of one complete pattern.

Restoration: The act of returning a historic structure, site, or object to its previous or original condition, maintaining as much as possible the materials or properties used in its initial construction.

Classroom Calculations Worksheet

Names: _____

1) **What is the room's perimeter?** Remember to use the measurement in feet, not inches

$$\frac{\quad}{\text{(length of wall 1)}} \text{ ft.} + \frac{\quad}{\text{(length of wall 2)}} \text{ ft.} + \frac{\quad}{\text{(length of wall 3)}} \text{ ft.} + \frac{\quad}{\text{(length of wall 4)}} \text{ ft.} = \frac{\quad}{\text{Perimeter}} \text{ ft.}$$

2) **What is the room's total surface area?** Surface area equals the perimeter multiplied by the height of the walls.

$$\frac{\quad}{\text{(perimeter)}} \text{ ft.} \times \frac{\quad}{\text{(wall height)}} \text{ ft.} = \frac{\quad}{\text{(surface area)}} \text{ square feet}$$

3) **What is the area of each door and window?** Remember: area equals length x height.

Door 1: $\frac{\quad}{\text{(length)}} \text{ ft.} \times \frac{\quad}{\text{(height)}} \text{ ft.} = \frac{\quad}{\quad} \text{ sq. ft.}$

Door 2: $\frac{\quad}{\text{(length)}} \text{ ft.} \times \frac{\quad}{\text{(height)}} \text{ ft.} = \frac{\quad}{\quad} \text{ sq. ft.}$

Window 1: $\frac{\quad}{\text{(length)}} \text{ ft.} \times \frac{\quad}{\text{(height)}} \text{ ft.} = \frac{\quad}{\quad} \text{ sq. ft.}$

Window 2: $\frac{\quad}{\text{(length)}} \text{ ft.} \times \frac{\quad}{\text{(height)}} \text{ ft.} = \frac{\quad}{\quad} \text{ sq. ft.}$

Window 3: $\frac{\quad}{\text{(length)}} \text{ ft.} \times \frac{\quad}{\text{(height)}} \text{ ft.} = \frac{\quad}{\quad} \text{ sq. ft.}$

Window 4: $\frac{\quad}{\text{(length)}} \text{ ft.} \times \frac{\quad}{\text{(height)}} \text{ ft.} = \frac{\quad}{\quad} \text{ sq. ft.}$

4) **What is the area of all the doors and window added together?** Add the results of each door and window in #3.

$$\text{Area of all window and doors} = \frac{\quad}{\quad} \text{ sq. ft.}$$

5) **Subtract the area of the windows and doors in #4 from the room's surface area, the answer in #2.**

$$\frac{\quad}{\text{(total surface area)}} \text{ sq. ft.} - \frac{\quad}{\text{(area of windows and doors)}} \text{ sq. ft.} = \frac{\quad}{\text{(final surface area)}} \text{ sq. ft.}$$

6) **What is the area of the walls above the 3 ft. chair rail?**

$$\frac{\quad}{\text{(height of walls)}} \text{ ft.} - 3 = \frac{\quad}{\text{(room perimeter)}} \text{ ft.} \times \frac{\quad}{\text{(wall area above chair rail)}} \text{ ft.} = \frac{\quad}{\quad} \text{ sq. ft.}$$

7) How much paint do you need to paint the wall area above the chair rail?

$$\frac{\text{_____ sq. ft.}}{\text{(wall area above the chair rail)}} \div 400 = \text{_____ gallons of paint}$$

8) What is the wall area below the chair rail?

$$\frac{\text{_____ sq. ft.}}{\text{(final surface area from #5)}} - \frac{\text{_____ sq. ft.}}{\text{(wall area above rail)}} = \frac{\text{_____ sq. ft.}}{\text{(wall area below rail)}}$$

9) How many rolls of wallpaper do you need to order?

$$\frac{\text{_____ sq. ft.}}{\text{(wall area below the picture rail)}} \div 56 = \frac{\text{_____}}{\text{(number of rolls of wallpaper)}}$$

10) How much picture rail do you need? Hint: the picture rail wraps around the room just like the perimeter.

$$\text{Picture Rail} = \text{_____ linear ft.}$$

11) How big does your rug need to be? Area rugs (rugs laid down on top of a wood floor) do not usually go all the way from wall to wall. You will need to leave some space (1 foot on each side) that is not covered by the rug.

$$\frac{\text{(_____ ft. - 1 ft.)}}{\text{(length of wall)}} \times \frac{\text{(_____ - 1 ft.)}}{\text{(length of perpendicular wall)}} = \frac{\text{_____ sq. ft.}}{\text{(area of rug)}}$$





