# Egress Mobility: Staircase Design - Student Activity Sheet

Below are the building codes for stairs for non-residential buildings. These codes are to help people safely exit from a building quickly in case of emergencies.
If you were a building inspector, you would be tasked with taking measurements of stairs to check if they comply with the building code. So, read through the building codes below and then take measurements of a staircase in one of your school's buildings. (A floor plan of the building may be needed to accurately determine the square footage for occupancy.)

- Minimum stair width is 44 inches
- 1-foot horizontal spacing distance between stairs after a landing
- Egress capacity for stairs is 0.3 inches/occupant
- Maximum vertical travel distance before a required landing is 12 feet
- Landing width must be at least the stair width
- Tread minimum = 11 inch and maximum = 12 inch
- Riser minimum = 4 inch and maximum = 7 inch
- Risers and Treads can be fabricated to the nearest .001 inch

Task 1. Initial thought questions

a) What is the tread and riser of a stair?

b) Why would a larger building possibly require a wider staircase?

c) Why are there established minimum and maximum code restraints for step tread and riser?



d) What could be a reason an architect might design for steeper stairs?

e) How would various riser and tread lengths affect cost?

f) What would be the stair width minimum if the building total square footage is 10,000 sq ft and designed for 50 sq ft per occupant?
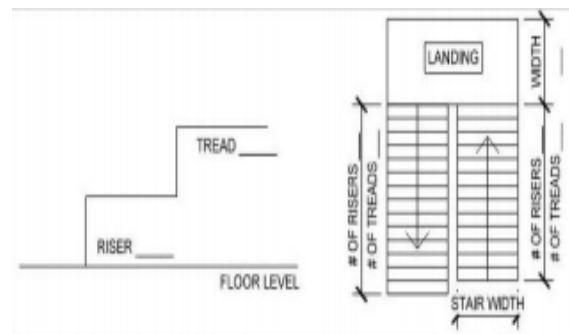
Task 2. Measure an interior staircase at your school to determine if the stairs meet all the building codes stated above. Include all measurements for each item listed below and state why or why not your staircase meets each building code criteria. For schools, recommended space per student is 50 sq ft. Does your school's staircase satisfy a) tread width, b) riser height, and c) stair width? Verify your claims by supporting documentation.

| Item to measure | Measurement with units |
|---|---|
| Stair width | |
| Horizontal spacing distance between stairs | |
| Area of adjoining floors needed to egress using stairs | |
| Landing dimension | |
| Two different treads | |
| Two different risers | |

Task 3. You are a newly hired architect for Moseley Architects, and you have been tasked with creating the design for stairs connecting floors within stairwell A shown below. Using the given building code requirements for stairs, determine the best design possible to connect the first and second floors. The stairwell dimensions are below on the drawing.

Requirements and given information include:

- 13 feet between floors vertically
- For this building use 100 square foot per occupant
- Total floor area of the two-story building is 8,121 sq ft

**10' - 0"**

**16 - 0"**

CONFERENCE

STAIR A

**5' - 0"**

**26' - 5"**

**12' - 5"**

OFFICE          OFFICE
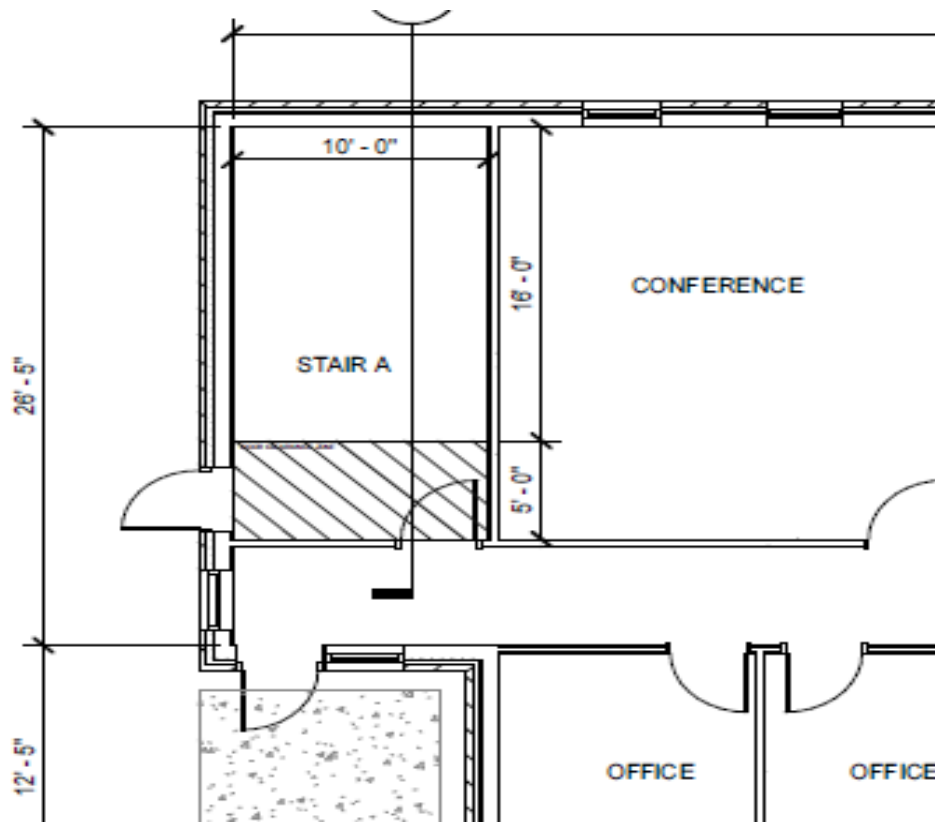
Task 3a. Determine the minimum stair width needed to satisfy the building codes and egress requirements for this building.

Task 3b. Determine the minimum number of risers and treads needed to connect the first and second floors.

Task 3c. Determine the exact dimensions needed for each riser, tread, and stair width. Create a scale drawing for your design stairwell that shows a side view of the stairs and landing. Give the scale you use in your drawing (ex: 1 inch = 1 foot).

Task 3d. The building owner has decided to put an exit door under the stair landing. The minimum height needed for this door is 7.5 ft vertically from floor to landing. Re-design your staircase to be able to add in this exit door. Give number of steps before and after the landing, the dimensions of each riser, tread, and stair width, and the width of the landing.