 

**MIDDLE SCHOOL**

**Math & Engineering**

**Scale the Wall**

**Teacher Background Information:**In both residential and commercial design, architects use a visual aid called blueprint as a plan for their projects. Several of these blueprints are devoted to floor plans. As it is not feasible for architects to create full size plans for their projects, they create multiple smaller drawings, using a graduated line that represents proportional size. This is called ‘SCALE’. For example: ¼” = 1’

**Goals:** To increase understanding of spatial relations

**Objectives:** Students will…..

* Measure spaces in school
* Estimate size of spaces

**Standards met:**

Connections

* Recognize and apply mathematics in contexts outside of mathematics

Measurement

* Understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume

Geometry

* Use visualization, spatial reasoning, and geometric modeling to solve problems

**Time required:** 2-45 minute periods

**Materials (for 30):**

* Sheet of chart paper (per group)
* Clipboard (per group)
* Dimension Table (per group)
* ¼” graph paper (per student)
* 30 copies of “Scale the Wall – Record Sheet”
* 10 tape measures

**Prep:**

* Divide the sheets of chart paper into 3 sections and write “Floor Plan” as the title on top
* You may want to let your colleagues know that students will be measuring the dimensions of various rooms in the school as part of their ‘Green Building’ project.
* Decide which rooms you would like students to measure, and write them in the master record sheet. It is suggested that the teacher limits selections to rooms that are squares and rectangles at this time.

**Procedure:**

* As young budding architects, it is each individual’s job to create floor plans while using an appropriate scale.
* Divide class in to groups of 3.
* Provide each group with a piece of chart paper and 3 markers, one for each group member.
* Advises that each group will use their sheet of chart paper as a ‘Placemat’. This ‘Placemat’ has been divided in to 3 sections, one area for each student.
* Students will write their response to the following questions in their respective sections. ‘What is needed for a floor plan to be effective? What skills or tools should an architect use?’
* Allow students to think in silence for 1 minute. Then have the students record ideas in their sections for an additional minute. Students will then have 2 extra minutes to share their ideas with their group members
* Share student responses and hang their ‘placemats’ around the classroom. These lists may be used as an anchor/reference as students make their own blueprints.

Floor plan (Possible List Items)

* Precision
* Neat and attention to detail
* Necessary Materials: Sharp pencils, erasers and a straight edge (ruler)
* Attention to measurement & scale
* Meet original specifications
* Assign roles to each group member via role cards:

Project Manager- Keeps group on task and facilitates progression.

Surveyor- Takes precise measurements of the necessary dimensions of each room, with the assistance of his group members.

Recorder- Records measurements/dimensions, Room Dimensions Sheet, of each room when advised by the surveyor

* Give groups a copy of the “Scale the Wall Record Sheet” and review the directions:

1. estimate the size of each room and then calculate the estimated area.
2. measure and record actual dimensions on the recording sheet

* Have students measure dimensions to the nearest 1’.

1. return to the classroom and create floor plans for each room using a SCALE of ¼” = 1’

\*Each student is to complete floor plans based on their measurements.

* You may want to do an example in class so students see the process!
* Issue a clipboard, record sheet, and measuring tape to each group.
* Remind groups of expectations as they move throughout the school to take their measurements.

HINT: Have groups start in different areas to avoid congestion and minimize noise.

**Assessment:**

* Teacher observation: Did the groups work hard to complete the task in a precise and timely manner? Did the groups stick to their roles?
* Completed ‘placemats’
* Accuracy of Record Sheet
* Completed and accurate floor plans

**Scale the Wall - Record Sheet**

Group Members: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Directions- To complete this assignment, you must complete the steps listed below:

1. estimate the length and width of each room
2. calculate the estimated area
3. measure actual dimensions
4. record actual dimensions on the recording sheet

* Remember to measure dimensions to the nearest 1 foot!

1. calculate the actual area
2. record actual area on the data sheet
3. return to the classroom and obtain 1 piece of graph paper for each person in the group
4. each person needs to create floor plans for each room

* Remember that the SCALE is ¼ inch = 1 foot!
* all group members will need to share the data on your record sheet to complete the floor plan

\*The record sheet is on the back of this page!

**Scale the Wall - Record Sheet**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Room Name** | **Length (to the nearest foot)** | | **Width (to the nearest foot)** | | **Total Area**  **(Length x Width)** | |
|  | Estimate | Actual | Estimate | Actual | Estimate | Actual |
| Room 1 |  |  |  |  |  |  |
| Room 2 |  |  |  |  |  |  |
| Room 3 |  |  |  |  |  |  |
| Room 4 |  |  |  |  |  |  |
| Room 5 |  |  |  |  |  |  |
| Room 6 |  |  |  |  |  |  |

**Group- Role Cards**

|  |  |  |
| --- | --- | --- |
| **Project**  **Manager** | **Surveyor** | **Recorder** |
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