 

**MIDDLE SCHOOL**

**Math & Engineering**

**Measurement Madness**

**Teacher Background Information*:***In all design & construction, precise measurement is critical. Although inches are one of the common units of measure, Architects and Building Contractors must be able to efficiently convert these units to meet specific needs.

**Goals:**

* Students will gain an understanding of the importance of precision in both the design and building industries.

**Objectives:** Students will…

* Make approximate and precise measurements when given a line to measure.
* Calculate and express measurements in a variety of ways by using fraction strips and equivalent fractions.

**Standards met:**

Measurement:

* understand relationships among units and convert from one unit to another within the same system
* develop meaning for integers and represent and compare quantities with them.

ITEA STL’s 1, 2, 8, 11, & 13

**Time required:**

1 - 45 Min. Class Period

**Materials:**

* 30 rulers
* 30 copies of Measurement Madness student worksheet
* 30 copies of measurement madness student chart

**Procedure:**

* Draw a line, less than 12” on the board or on an overhead projector sheet
* Ask how many ways this measurement can be expressed
* Students employ the think, pair, share strategy.
  + Students individually consider potential responses to the teachers’ question.
  + Allow one minute to elapse.
  + Students then share responses with an elbow partner for an additional minute.
  + Share responses (Solutions should include inches, half inches, quarter inches, etc…)
* Ask: What tool should we use to accomplish this?
  + Solutions should include rulers and other measuring devices in the classroom
* Select a student to measure and record the measurement of the drawn line.

(Solutions should be under 12” and to the nearest ¼”)

(The line above is 5”)

* Ask: can the answer of 5” be recorded any other way? While students are considering responses, mark 1” increments on the existing line.

(Yes, remind students of prior responses: halves or quarters 1/2”, or 1/4”)

* Demonstrate that one-inch increments have been plotted on the original line.
* Select a student to plot half-inch increments on the original line.
* Ask: how many halves are on this five-inch line? How did you determine this?

(Ensure that students are counting spaces, not lines)(The result should be 10/2”)

* Select a student to plot quarter-inch increments on the original line.
* Ask: how many quarters are on this five-inch line? How did you determine this?

(Ensure that students are counting spaces, not lines)(The result should be 20/4”)

These conversions can be achieved more efficiently by using equivalent fractions:

5 whole inches can be represented as a fraction: **5 Numerator**

**1 Denominator**

**Converting whole inches to half inches can be achieved by:**

**Step 1:**

5 y (We determine what number that was multiplied by the first denominator

1 x 2 2 to get the second denominator. This number is 2)

**Step 2:**

5 x 2 10 (What we previously did to the denominator we must do to the

1 x 2 2 numerator. This number is again 2)

Therefore, there are 10 halves or 10/2” in 5”.

**Converting whole inches to quarter inches can be achieved by:**

**Step 1:**

5 y (We determine what number that was multiplied by the first denominator

1 x 4 4 to get the second denominator. This number is 4)

**Step 2:**

5 x 4 20 (What we previously did to the denominator we must do to the

1 x 4 4 numerator. This number is again 4)

Therefore, there are 20 quarters or 20/4” in 5”.

**Assessment:**

* Understanding will be assessed by the accuracy of student responses during the whole class lesson.
* Theteacher confirms understanding by having students complete a related support sheet.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Measurement Madness: Student Worksheet**

Using a ruler or other measuring device find the length of each line. Record your answers to the nearest ¼” on the lines provided.

1. Inches

2. Inches

3. Inches

4. Inches

5. Inches

6. Inches

7. Inches

8. Inches

9. Inches

10. Inches

**Measurement Madness: Teacher Key**

Using a ruler or other measuring device find the length of each line. Record your answers to the nearest ¼” on the lines provided.

1. 3 Inches

2. 4 Inches

3. 2 ½ Inches

4. 3 ½ Inches

5. 4 ½ Inches

6. 2 ¾ Inches

7. ¾ Inches

8. 1 ¾ Inches

9. 2 ¾ Inches

10. 1 ¼ Inches

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Measurement Madness: Student Chart**

Directions: Complete the table by making the correct linear conversions.

|  |  |  |
| --- | --- | --- |
| **Inches (1”)** | **Half Inches (1/2”)** | **Quarter Inches (1/4”)** |
| **2 1/2”** |  |  |
|  | **4/2”** |  |
|  |  | **6/4”** |
| **4”** |  |  |
|  |  | **12/4”** |

**Floor Plan (Measurement): Teacher Key**

Complete the table by making the correct linear conversions.

|  |  |  |
| --- | --- | --- |
| **Inches (1”)** | **Half Inches (1/2”)** | **Quarter Inches (1/4”)** |
| **2 1/2”** | **6/2”** | **10/4”** |
| **2”** | **4/2”** | **8/4”** |
| **1 1/2”** | **3/2”** | **6/4”** |
| **4”** | **8/2”** | **16/4”** |
| **3”** | **6/2”** | **12/4”** |