

Lesson Title: Basic Tape Measurement		Lesson #3
Author(s):	Phone Number(s):	E-mail Address(es):
Jim Ficken	802-476-6237	jfickbvt@u61.net
Sue Abrams	802-225-8072	suea@mpsvt.org
Occupational Area: carpentry/plumbing/electrical		
CTE Concept(s): Use a tape measure to make lineal measurements to the nearest fraction (eighth) of an inch.		
Math Concepts: equivalent fractions		
Lesson Objective:	Students should be able to use a tape measure to measure objects to the nearest 1/8 inch.	
Supplies Needed:	Tape measure for each student, colored markers or post-its, handouts #1 and #2, assorted objects to measure	

THE "7 ELEMENTS"	TEACHER NOTES (and answer key)
<p>1. Introduce the CTE lesson.</p> <p>The tape measure is the most used tool in the trade.</p> <p>Your trade accuracy is based on how well you can read a tape measure.</p> <p>Your pay raises are going to be proportional to your accuracy.</p> <p>Here is what can happen if you make errors in measurement.</p>	<p>This is the very first lesson in using a tape measure.</p> <p>Every student should have a measuring tape in front of him/her.</p> <p>Click on this link:</p> <p>(NOTE: Teacher needs to scroll down to bottom half of page on this link):</p> <p>http://smsread.com/blog/strange-railroad-track-problem-earthquake-damage.html</p>

<p>2. Assess students' math awareness as it relates to the CTE lesson.</p> <p>Look at the numbered marks on your table.</p> <p>With your tape measure, you and your tablemate measure the distance from the left edge of the table to each numbered mark.</p> <p>Each of you should write your answers in Part A of Handout #1. Measurements should be to the closest 1/8th – inch.</p> <p>Also, after you record your measurements, write equivalent fractions asked for in Part A on the handout.</p> <p>Now correct your answers as I tell you what you should have gotten.</p>	<p>Before class teacher should make five numbered marks on each table so that they are located at ¼-inch marks like 7 ¼ in, 10 ½ in etc.(Either draw on your tables, use masking tape, or whatever works for you).</p> <p>Students will be measuring the distance from the left edge of the table to each mark. NOTE: the marks on each table should be the same as the marks on the other tables.</p> <p>Handout #1: Students will do <u>part A</u> only.</p> <p>Closest 1/8th-inch is also called rounding to the nearest 8th of an inch in math.</p> <p>Equivalent fractions are fractions whose values are the same but the fractions look different: for ex. ½ is equivalent to 2/4.</p> <p>After students finish, give the students answers, and students correct their own papers. Discuss for a short period of time. Greater understanding will be developed in the lesson.</p>
<p>3. Work through the math example <i>embedded</i> in the CTE lesson.</p> <p>In this class you are going to be required to cut and install pipes within 1/8th-inch accuracy. So you are going to really need to understand equivalent fractions.</p> <p>Without understanding how to use a tape measure to the closest 1/8th-inch, you will not succeed in the trade.</p>	

These are the 7 fractions of an inch in their simplest, reduced form that are commonly used in the trade:

$$\frac{1}{8}, \frac{1}{4}, \frac{3}{8}, \frac{1}{2}, \frac{5}{8}, \frac{3}{4}, \frac{7}{8}$$

Fractions in **simplest (reduced) form**.

$$\frac{2}{4}$$

Equivalent fraction (not **simplified/reduced**)

$$\frac{2}{8}, \frac{4}{8}, \frac{6}{8}$$

Equivalent fractions

(not **simplified/reduced**)

Here's how you might have learned about equivalent fractions in math class.

Sometimes you were asked to reduce a fraction to its simplest form. Here's one way to do it:

$$\frac{6}{8} = \frac{2 \cdot 3}{2 \cdot 4} = \frac{3}{4} \quad \text{The 2's cancel because } \frac{2}{2} = 1$$

$$\frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

The illustrated inch:

- Handout #2:
- You will be showing equivalent fractions from $\frac{1}{8}$ to $\frac{7}{8}$ of an inch. You will need three colored markers or three different colors of post-it notes for this activity.
- Draw a large line segment to represent a lineal inch on the board. Then lead them through an activity that results in their filling out all the equivalent fractions on the handout. Fractions with the same denominator should be written in the same color (or same color sticky note).
- Be sure to check in continuously throughout this activity to be sure students understand.

Vocabulary:

Simplified or reduced fractions: fractions with the smallest possible **denominator** (bottom of fraction) The top of the fraction is called the **numerator**.

Some math teachers simplify or reduce fractions by factoring out, then canceling, a common factor.

Others divide by a common factors instead.

4. Work through *related, contextual* math-in-CTE examples.

Now we will use these reduced fractions to measure objects to the nearest $\frac{1}{8}$ th-inch.

So when I say to measure to the nearest $\frac{1}{8}$ inch, your answer could be something like $7\frac{1}{2}$ inches because we learned that $\frac{1}{2}$ is equal to $\frac{4}{8}$, but in its simplified or reduced form. Plumbers in the trade always talk with simplified or reduced fractions. Folks will look at you strangely, for example, if you say $\frac{6}{8}$ rather than $\frac{3}{4}$.

I have some objects here that we will measure with my enlarged illustrated inch.

Now we will use a math game I found on the internet to practice locating specific measurements on a ruler. I will move my cursor along the ruler and you tell me when to stop for each fraction.

Teacher holds up various objects (4 or 5) against the enlarged illustrated inch, asking the class to determine how long each one is, rounded to the nearest $\frac{1}{8}$ th-inch. This is done as one large group activity.

Click onto this link. Choose $\frac{1}{8}$ inch increments to start. If students each have access to a computer, challenge them to earn the greatest number of points they can in 5 minutes.

www.rsinnovative.com/rulergame/

5. Work through *traditional math* examples.

We are now going to continue with the ruler game, but using $\frac{1}{16}$ th-inch increments.

Optional reinforcement of reducing fractions to equivalent forms:

Now, to further reinforce equivalent forms of fractions, please find the answers to the problems on part B of the handout #1.

Stay on the same website, but select $\frac{1}{16}$ th inch increments.

<p>6. Students demonstrate their understanding.</p> <p>To show your understanding, you are going to measure the lengths of various objects around the room to the nearest $\frac{1}{8}$th-inch. Write down your answers on handout #1 Part B.</p>	<p>Teacher pre-selects and labels five objects to be measured (with something like masking tape with a letter on it)</p> <p>Discuss results as a large group.</p>
<p>7. Formal assessment.</p> <p>Measure the length of these five objects to the nearest $\frac{1}{8}$ inch.</p> <p>Record your answers on handout #1 Part C.</p> <p>When you finish, turn in your handout to me.</p>	<p>Students are going to measure five objects of teachers' choice, for example:</p> <ul style="list-style-type: none"> • a 2×4 (width-wise) with a $\frac{5}{8}$ sheet of sheet rock on each side. • Pre-cut blocks of wood and pipes <p>These objects should be placed on their tables.</p>

Handout #1

Name _____

Part A.

- Record the measurements of the five marks on your table. Measure the distance from the left edge of your table to each mark.

Measurements must be to the closest $\frac{1}{8}$ th-inch.

1. _____ 2. _____ 3. _____

4. _____ 5. _____

- Convert the following fractions to equivalent fractions:

6. $\frac{3}{4} = \frac{\quad}{8}$ 7. $\frac{1}{2} = \frac{\quad}{16}$ 8. $\frac{5}{8} = \frac{\quad}{16}$

Part B.

Simplify (reduce) these fractions to create equivalent fractions.

1. $\frac{10}{16} =$ 2. $\frac{8}{12} =$ 3. $\frac{10}{14} =$ 4. $\frac{15}{20} =$ 5. $\frac{8}{10} =$

Handout #1, page 2

Part C. Record the measurements of the lengths of the five marked objects around the room.

Measurements must be to the closest $1/8^{\text{th}}$ -inch.

- | | | |
|----------|----------|----------|
| 1. _____ | 2. _____ | 3. _____ |
| 4 _____ | 5. _____ | |

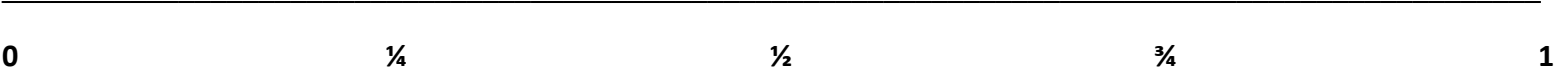
Part D . Final Assessment . Record the measurements of the lengths of the five marked objects I put on your table.

Measurements must be to the closest $1/8^{\text{th}}$ -inch.

- | | | |
|----------|----------|----------|
| 1. _____ | 2. _____ | 3. _____ |
| 4 _____ | 5. _____ | |

Handout #2

The Illustrated Inch



Handout #1 Answer Key

Name _____

Part A. *(Your answers will depend on your choice of where you put the marks.)*

- Record the measurements of the five marks on your table. Measure the distance from the left edge of your table to each mark.

Measurements must be to the closest $\frac{1}{8}$ th-inch.

1. _____ 2. _____ 3. _____

4. _____ 5. _____

- Convert the following fractions to equivalent fractions:

6. $\frac{3}{4} = \frac{6}{8}$ 7. $\frac{1}{2} = \frac{8}{16}$ 8. $\frac{5}{8} = \frac{10}{16}$

Part B.

Simplify (reduce) these fractions to create equivalent fractions.

1. $\frac{10}{16} = \frac{5}{8}$ 2. $\frac{8}{12} = \frac{2}{3}$ 3. $\frac{10}{14} = \frac{5}{7}$ 4. $\frac{15}{20} = \frac{3}{4}$ 5. $\frac{8}{10} = \frac{4}{5}$

Part C. Record the measurements of the lengths of the five marked objects around the room. *(Answers will depend on your choice of objects.)*

Measurements must be to the closest $\frac{1}{8}$ th-inch.

1. _____
2. _____
3. _____
- 4 _____
5. _____

Part D . Final Assessment . Record the measurements of the lengths of the five marked objects I put on your table.

Measurements must be to the closest $\frac{1}{8}$ th-inch. *(Answers will depend on your choice of objects.)*

1. _____
2. _____
3. _____
- 4 _____
5. _____

Handout #2

The Illustrated Inch

