

# Delaney Couri

Per-service Texas A&M University Student

## What I want to do?

---Implement metrology and AutoDesk Fusion 360: Students will be able to measure parts using US customary calipers and model parts on AutoDesk Fusion 360 using extrudes, revolves, and sketches.

## TEKS?

--- Grade 8 Math: solve problems involving the volume of cylinders, cones, and spheres;

## Prior Knowledge?

--- Computer literacy (to an extent), Basic units/measurement techniques, Volume formulas

## How long will it take?

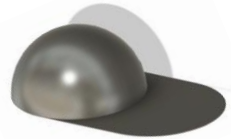
---Approximately 2 weeks.

## How will I check for understanding?

---Have them create a part they see by measuring dimensions for the model

## What do I need to do it?

---AutoDesk Fusion 360, calipers, mugs, hats, chairs.



# Cost and Implementation

Class Size- ~20 students/class, 6 classes

Materials Needed:

Dial Calipers- ~\$20 (<https://www.harborfreight.com/6-in-Dial-Caliper-63730.html>)

Objects to measure/CAD- already owned by myself or students (mugs, hats, chairs, pencils, notebooks, etc.)

Estimated Cost- ~10 calipers (1 for every pair) \* \$20 = \$200

To implement this, I will point out to my principal how the metrology standards and volume objectives both line up with TEKS in 8th grade and years past. I will also show them the relatively low cost and point out the benefits of implementing engineering into math, such as a more well rounded, educationally prepared student.

# Mathematics Background

§111.28. Grade 8, Adopted 2012.

(7) Expressions, equations, and relationships. The student applies mathematical process standards to use geometry to solve problems. The student is expected to:

**(A) solve problems involving the volume of cylinders, cones, and spheres;**

# Teaching Plan

Volume: ~3 days at start, introduce formulae, practice usage as a class, individual practice

Metrology: ~3 days starting on the last day of volume instruction, introduce calipers, practice measuring, measure hat/cup/pencils for activity

Fusion: ~5 days starting on last day of metrology, teach sketching, then extrude, then revolve, have students find volume of objects measured in metrology by hand then CAD on days 3-4 of Fusion instruction/ introduce them to volume features on Fusion to see if their calculations line up with what Fusion says

Check for Understanding- ~1 day, have them use metrology and volume formulas, then CAD as a way to show proficiency in Fusion and check their volume calculations

# Measuring Success

Exam Prompt: At the front of the room there are three objects: a mug, a ring holder, and a jar. Each individual in each row will get up and measure one object using the dial calipers provided. After you have measured your object, you will write down the name of the object and it's dimensions on your exam. Next, you will, using the dimensions, calculate the volume of the object. Hint: Remember your object may be composed of more than one three dimensional shape, and it may be hollow. After you have shown your work on calculating volume you will go to Fusion 360 and make a three-dimensional model of the object using the dimensions you found before. As soon as you have finished, if you remember how, you may use your model to check your work on the volume calculations. Once you are done you will submit your paper and your Fusion model to me.

This prompt allows students to be graded on their metrology skills, math skills, and 3d modeling skills. Success will be measured in each of these areas by looking at how well students complete each task. A grade of over 80% in each area will be deemed satisfactory.