

# Unit 3 Measurement and Statistics Lesson Plan

**COURSE:**

Introduction to Engineering Design (Honors)

**TEACHER:**

Jason D. Redd

**DURATION:**

15 Days

**STANDARDS:**

This course

## Understandings

Students will understand that:

Error is unavoidable when measuring physical properties, and a measurement is characterized by the precision and accuracy of the measurement.

Units and quantitative reasoning can guide mathematical manipulation and the solution of problems involving quantities.

Dimensions are included on technical drawings according to accepted practice and an established set of standards so as to convey size and location information about detailed parts and their features.

Statistical analysis of uni-variate data facilitates understanding and interpretation of numerical data and can be used to inform, justify, and validate a design or process.

Spreadsheet programs can be used to store, manipulate, represent, and analyze data efficiently.

## Knowledge and Skills

**Knowledge:** Students will:

Identify general rules for dimensioning on technical drawings used in standard engineering practice.

Distinguish between sample statistics and population statistics and know appropriate applications of each.

Distinguish between precision and accuracy of measurement.

**Skills:** Students will:

Measure linear distances (including length, inside diameter, and hole depth) with accuracy using a scale, ruler, or dial caliper and report the measurement using an appropriate level of precision.

Use units to guide the solution to multi-step problems through dimensional analysis and choose and interpret units consistently in formulas.

Convert quantities between units in the SI and the US Customary measurement systems.

Convert between different units within the same measurement system including the SI and US Customary measurement systems.

Dimension orthographic projections of simple objects or parts according to a set of dimensioning standards and accepted practices.

Identify and correct errors and omissions in the dimensions applied in a technical drawing based on accepted practice and a set of dimensioning rules.

Calculate statistics related to central tendency including mean, median, and mode.

Calculate statistics related to variation of data including (sample and population) standard deviation and range.

Represent data with plots on the real number line (e.g., dot plots, histograms, and box plots).

Use statistics to quantify information, support design decisions, and justify problem solutions.

Use a spreadsheet program to store and manipulate raw data.

Use a spreadsheet program to perform calculations using formulas.

Use a spreadsheet program to create and display a histogram to represent a set of data.

## ESSENTIAL QUESTIONS:

Students will keep considering:

Can statistics be interpreted to justify conflicting viewpoints? Can this affect how we use statistics to inform, justify and validate a problem solution?

Why is error unavoidable when making a measurement?

When recording measurement data, why is the use of significant figures important?

What strategy would you use to teach another student how to use units and quantitative reasoning to solve a problem involving quantities?

What would happen if engineers did not follow accepted dimensioning standards and guidelines but, instead, used their own individual dimensioning methods?

When measuring the length of a part, would an inaccurate (but precise) measuring instrument be more or less likely to indicate the actual measurement than an imprecise (but accurate) measuring instrument?

Justify your answer.

EQUIPMENT / MATERIALS / RESOURCES (NT /) STETQ...eW\*nE/F2ff1008Im5 0rg5 0RG(E)QUETQ EM

Assess student presentations/work.  
Provide instructions for the *Unit 3 Test*.

**Guided Practice**

The teacher will:

Review agenda, learning objectives, and essential questions daily.  
Lead students to recall prior knowledge / e

