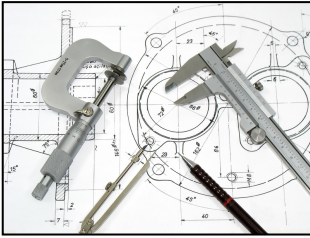


**Technology Education Curriculum**  
**Level: Secondary**

# Quality Measures: Metrology



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# Technology Education Curriculum

## Level: Secondary

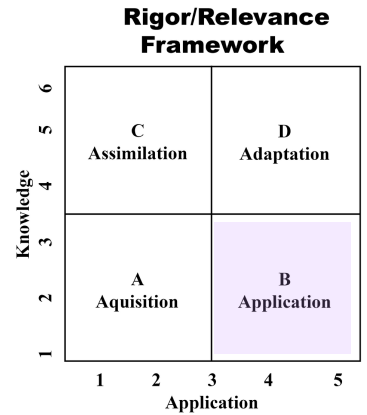
### Teacher Lesson Plan

#### INDUSTRIAL & TECHNOLOGY EDUCATION Career & Technical Learning Activity - CTLA

#### Lesson Objectives & Student Expectations

Rigor/Relevance Framework: *B*

Length of lesson: 4 class periods



The student will:

1. Discover uses of metrology in manufacturing.
2. Identify variations of Quality Measurements used in manufacturing.
3. Analyze the types of equipment used in metrology.

#### Common Core Standards Addressed

Benchmark#	Description
LACC.68.RST.1.1	Cite specific textual evidence to support analysis of science and technical texts
LACC.68.RST.1.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions
LACC.68.RST.3.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table)
LACC.68.WHST.1.1	Write arguments focused on discipline specific content
LACC.68.WHST.3.9	Draw evidence from informational texts to support analysis reflection, and research

#### Key Vocabulary Terms

Accuracy	Metrology	Optical	Calibration
Precision	Retrofitting	Fabrication	





## Materials & Supplies Needed For This Activity

Article, Portfolio/Notebook Paper, Teacher PowerPoint, Projector, Student Worksheets.

## Teacher Sequence To Present Lesson *Day 1 of 4*

Est. Time (minutes)	Description of Teacher Action	Notes
5	Bell work activity - Have students answer the question then review the answer. Page 2 of presentation.	Use the Quality Measurements PowerPoint to guide your lesson.
10	Show students the video about metrology in daily life. Have students do a think, pair, share to address the question, "What measurements of your world do you take on a daily basis?" Page 3 of presentation.	Prepare videos and groups ahead of time. Link to video: <a href="http://www.youtube.com/watch?v=vRnT8hIxjqk">http://www.youtube.com/watch?v=vRnT8hIxjqk</a>
5	Review vocabulary words with students Page 4 of presentation	Prepare word boards or add words to your word wall
15	Hand out the article "Metrology Market Expected to Reach \$720M by 2018" and student worksheets. Prepare students for reading by explaining the text marking process and that students will read the article silently marking the portions of the article. Mark "P" if the text is describing a process, Mark "\$" if financial information is being described, Mark "I" if the text is describing specific industries. Allow students time to read the article.	Prepare copies ahead of time
10	Have students answer the questions from the text- Page 6 of presentation	
5	Have students cleanup and complete a daily reflection.	Do any type of reflection, ex. Exit slip, daily reflection log, discussion, or answering a question.

## Student Procedures To Do This Lesson *Day 1 of 4*

1. Begin Bell work activity per teacher's directions.
2. Participate in Bell work discussion.
3. Watch the metrology video.
4. Answer the discussion question.
5. Review vocabulary terms and mark paragraphs in the article.
6. Read the article and answer questions.



### Teacher Sequence To Present Lesson *Day 2 of 4*

Est. Time (minutes)	Description of Teacher Action	Notes
5	Bell work activity - Have students answer the question, then review the answer. Page 7 of presentation.	Use the PowerPoint presentation to guide your lesson.
10	Review the answers from the text questions, with the students.	
5	Direct students to the company profile worksheet. Explain that students will be using the computers to do a preview of the company they will be visiting. They will look for key elements that they should observe on the company tour.	Review searching criteria with students or direct them to the exact company website. Prepare this ahead of time.
15	Allow students to go to the computer and begin working.	Prepare copies ahead of time
10	Review the answers with the students.	
5	Discuss with students the process of taking notes while on the trip using the directed note taking worksheet.	Collect students' note-taking worksheets to pass out when on the field trip.

### Student Procedures To Do This Lesson *Day 2 of 4*

1. Begin Bell work activity per teacher's directions.
2. Participate in Bell work discussion.
3. Review answers from the text questions.
4. Complete the company profile worksheet and review with your instructor.
5. Discuss the directed note taking process with your teacher and prepare for the field trip.

### Teacher Sequence To Present Lesson *Day 3 of 4*

Est. Time (minutes)	Description of Teacher Action	Notes
60	Pass out the students directed note-taking worksheet. Review the procedures for asking questions while on the tour.	
5	After the tour collect the students' worksheets to redistribute in class the following day.	

### Student Procedures To Do This Lesson *Day 3 of 4*

1. Ask questions while on your tour.
2. Write down notes from your tour.



## Teacher Sequence To Present Lesson *Day 4 of 4*

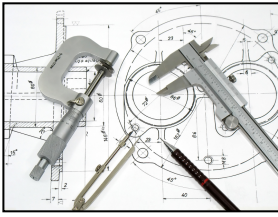
Est. Time (minutes)	Description of Teacher Action	Notes
5	Bell work activity - Have students answer the question, then review the answer.	Use the PowerPoint presentation to guide your lesson.
10	Have students share their observations from the tour on the previous day. Encourage students to write additional observations based on their classmates' experiences. Have students put a check mark in the box that best matches the statement.	If a note doesn't match a check box it's okay. These are for students to begin identifying topics for their writing.
20	Using their notes, instruct students to draft an essay on the student worksheet. Remind students to use both their notes from the tour and textual evidence when writing the essay.	
5	Review and collect all student work	

## Student Procedures To Do This Lesson *Day 4 of 4*

1. Begin Bell work activity per teacher's directions.
2. Participate in Bell work discussion.
3. Review and share notes from your tour.
4. Analyze notes.
5. Write an essay that includes information from the text and tour observations.
6. Turn in your essay and cleanup for dismissal.

## Evidence of Student Achievement

Students will complete an essay that uses evidence from text and observations they make while on the company tour. The essay will be graded by the teacher for accuracy, punctuation, spelling and format.



Student Name \_\_\_\_\_  
 Class Period \_\_\_\_\_ Date \_\_\_\_\_

### Essay Grading Rubric

Category	4 Points	3 Points	2 Points	1 Point
<b>Focus &amp; Details</b>	There is one clear, well focused topic. Main ideas are clear and are well supported by detailed and accurate information.	There is one clear, well focused topic. Main ideas are clear but are not well supported by detailed information.	There is one topic. Main ideas are somewhat clear.	The topic and main ideas are not clear.
<b>Organization</b>	The introduction is inviting, states the main topic, and provides an overview of the paper. Information is relevant and presented in a logical order. The conclusion is strong.	The introduction states the main topic and provides an overview of the paper. A conclusion is included.	The introduction states the main topic. A conclusion is included.	There is no clear introduction, structure, or conclusion.
<b>Word Choice</b>	The author uses technical words and phrases. The choice and placement of words seems accurate, natural, and not forced.	The author uses technical words and phrases. The choice and placement of words is inaccurate at times and/or seems overdone.	The author uses words that communicate clearly, but the writing lacks variety.	Jargon or clichés may be present and detract from the meaning.
<b>Sentence Structure, Grammar, Mechanics, &amp; Spelling</b>	All sentences are well constructed and have varied structure and length. The author makes no errors in grammar, mechanics, and/or spelling.	The author makes a few errors in grammar, mechanics, and/or spelling, but they do not interfere with understanding.	The author makes several errors in grammar, mechanics, and/or spelling that interfere with understanding.	The author makes numerous errors in grammar, mechanics, and/or spelling that interfere with understanding.

**Total Points:** \_\_\_\_\_

**A = 16 – 14, B = 13 – 11, C = 10 – 8, D = 7 – 5, F = 4 or less**

