

Lab Framework

Text:CORD Classic

Unit number and title: Unit 6 Working with Lines and Angles

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Lab Title

Laying Out a Tool Sharpening Gauge (Sheet Metal Fabrication)

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Short Description: Students will develop a full size drawing/sheet metal layout of a tool sharpening gauge from a scale drawing. Students will measure and layout various angles, a notch, a hole, and a 1/16" rule. Once the layout is approved, students may begin fabrication of the project.

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**

Students will develop measurement and layout skills by completing a sheet metal layout using a blueprint as a reference. Students will use both inch and metric rulers to measure and draw lines and angles. Students will make cuts safely and accurately using a file, aviation snips, drill press, and sheet metal shear.

- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)

Students must be familiar with measuring and angle layout, and understand how to use metric and standard rulers. They should understand basic blueprint reading, and have participated in the teacher demonstration on this project layout, and use of basic sheet metal tools.

- **New Vocabulary**

Dimension lines, scribe, scratch awl, aviation snips, flat file, cold chisel, taper file, layout die, gauge, sheet metal, shear, galvanized.

- **Materials List**

Scrap of 24 gauge sheetmetal (minimal size 2" x 4-1/4")

Scratch Awl

Layout Die

Inch Ruler

Metric Ruler

Angle Measurement Tool

Flat File

Taper File

Blueprint

- **GLEs addressed**

Math:

1.1.7 Apply strategies and uses tools to complete tasks involving computation of rational numbers.

1.1.8 Apply estimation strategies in situations involving multi step computations of rational numbers using addition, subtraction, multiplication, division, powers, and square roots to predict or determine reasonableness of answers.

1.2.3 Apply unit conversions within measurement systems, U.S. or metric, to maintain an appropriate level of precision.

1.2.4 Understand and use a systematic procedure to measure and describe angles.

1.2.6 Understand and apply estimation strategies to obtain reasonable measurements at an appropriate level of precision.

1.3.1 Understand the properties of and the relationships among 1 dimensional, 2 dimensional, and 3 dimensional shapes and figures.

2.2.3 Apply a variety of strategies and approaches to construct solutions.

3.3.2 Evaluate reasonableness of results.

5.1.1 Apply concepts and procedures from two or more content strands, including number sense, measurement, geometric sense, probability and statistics, and/or algebraic sense, in a given problem or situation.

5.2.1 Use mathematical patterns and ideas to extend mathematical thinking and modeling to other disciplines.

5.3.2 Understand that mathematics is used in many occupations or careers.

Reading:

1.2.2 Apply strategies to comprehend words and ideas.

2.3.4 Synthesize information from a variety of sources.

3.3.1 Apply appropriate reading strategies for interpreting technical and non-technical documents used in job-related settings.

3.2.2 Apply understanding of complex information, including functional documents, to perform a task.

3.3.1 Apply appropriate reading strategies for interpreting technical and non-technical documents used in job-related settings.

Writing:

2.2.1 Demonstrates understanding of different purposes for writing.

- **Leadership Skills**

Students are encouraged to work together during layout and fabrication. Advanced students will help beginning students in all phases of the lab. Students may also practice these skills in Skills USA VICA competitions.

- **SCAN Skills**

- Locates, understands, and interprets written information prose and documents –including manuals, graphs and schedules – to perform tasks.

Identifies relevant details, facts and specifications.

Records information completely and accurately.

Makes reasonable estimates of arithmetic results without a calculator.

Approaches practical problems by choosing appropriately from a variety of mathematical techniques.

Receives, attends to, interprets, and responds to verbal messages and other cues such as body language in ways that are appropriate to the purpose.

Organizes and processes symbols, pictures, graphs, objects or other

information.

Recognizes and can use learning techniques to apply and adapt new knowledge and skills both in familiar and changing situations.

- **Set-up information**

After viewing the teachers demonstration, one person from each workbench will get supplies from the tool room, and disperse to students in their work group. They will layout the parts (inch for base, metric for the shelf and brace) and after showing to the instructor for approval, will make cuts, bend, and spot weld together.
- **Lab organization(-Grouping/leadership opportunities/cooperative learning expectations; -Timeline required)**

2-4 class periods. Each student will make a minimum of 1 bookend. Students are encouraged to work together during layout and fabrication. Advanced students will help beginning students in all phases of the lab.
- **Teacher Assessment of student learning** (scoring guide, rubric)

Successful completion of bookend based on accuracy/location of cuts and quality of construction, accompanied with completed problem worksheet
- **Summary of learning** (to be finished after student completes lab)
 - discuss real world application of learning from lab
 - opportunity for students to share/present learning
 - demonstration of skills learned to a beginning student

- **Optional activities**

Make a second bookend to complete a pair.
Reduce the size of the bookend to 75% (on a paper drawing).
Layout and cut from paper (as a prototype).
- **Career Applications**

Measurements of one type or another are used in virtually every occupational field. Students will gain skills in sheetmetal work, which is used extensively in heating/air conditioning fields.

LAB TITLE: Making a Tool Sharpening Gauge

STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**

You will be demonstrating your understanding of basic sheet metal layout and measurement skills by completing this project.

Before beginning this project, you must have viewed the demonstration or have been partnered with an advanced student. You must have also completed all safety related coursework.

- **Grouping instructions and roles**

You are to work in your previously assigned work groups, unless you have been partnered with an advanced student.

- **Procedures – steps to follow/instructions**

Listed on blueprint and from notes taken during teachers demonstration.

***SEE ATTACHED PLAN FOR TOOL SHARPENING GAUGE**

- **Outcome instructions**

Upon completion of the project, complete the written project evaluation/grading form and turn the project into your instructor for recording.

- **Assessment instructions (peer-teacher)**

Lab/project will be graded using the written project evaluation form.

Lab Data Collection

Student: _____ **Date:** _____

Unit: _____

Lab Title:

Criteria: Write the problem/objective in statement form

Data Collection: Record the collected/given data

Calculations: Complete the given calculations to solve for an answer(s)

Summary Statement:

Other Assessment(s)