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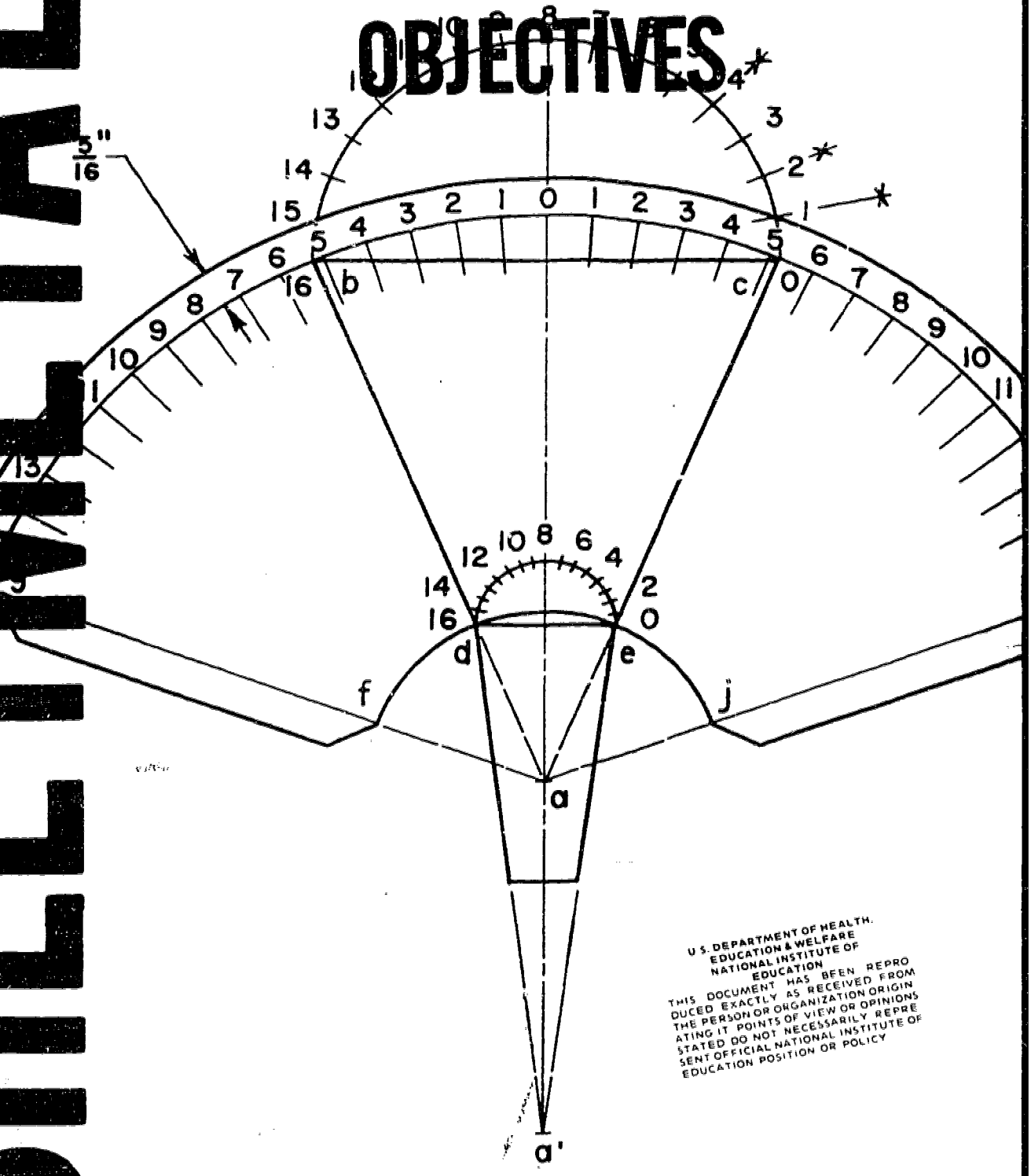
ABSTRACT

Several intermediate performance objectives and corresponding criterion measures are listed for each of six terminal objectives for a basic high school sheetmetal work course. The titles of the terminal objectives are Orientation, Shop Machinery and Material, Soldering, Measurements and Layouts, Assigned Shop Projects, and Radial and Triangulation Layouts. (This manual and 54 others were developed for various secondary level vocational courses using the System Approach for Education (SAFE) guidelines.) (HD)

SHEET METAL

PERFORMANCE OBJECTIVES



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July, 1973

A C K N O W L E D G E M E N T S

This manual was developed using System Approach For Education (SAFE) Guidelines.

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SHEETMETAL WORK - BASIC

9853

SYLLABUS OF TERMINAL PERFORMANCE OBJECTIVES

0.0 Curriculum Objective

1.0 Orientation

2.0 Shop Machinery and Material

3.0 Soldering

4.0 Measurements and Layout

5.0 Assigned Shop Projects

6.0 Radial and Triangulation Layouts

ACCREDITATION NUMBER 9853

COURSE TITLE: SHEET METAL (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

ORIENTATION

The student will demonstrate his knowledge of Career Opportunities, Student Organizations, Apprentice Programs and Shop Safety Practices by answering correctly at least 80% of the questions on a teacher prepared test.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.1	The student using a copy of the hand outs on training policies, safety precautions, will indicate the manimum number of students that can operate a single machine with 80% proficiency.	1.1	1. How many students can operate a power shear at one time. 2. Cutting sheet of 16 gage black iron 48" x 120", how many students should handle this sheet. 3. Student should check to make sure that machine is clear of obstruction. 4. Braking a sheet of 28 gage galvenize 36" x 96", how many students should operate brake at one time. 5. Using the lock former to place a Pittsburg lock on a job 36" x 24", how many students should operate machine.
1.2	The student will demomstrate his familiarization of dressing safely for shop work by identifying the proper apparel with with 80% proficiency.	1.2	1. Why does a student have to dress safely in the shop. 2. Is the dress code the same for the shop as the schools. 3. Do students need a change of work clothes, why? 4. Name the proper apparel for safety in this shop.

ACCREDITATION NUMBER 2853

COURSE TITLE: SHEET METAL (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

ORIENTATION

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.3	Given a selection of articles the students will be able to select and purchase those needed for shop work with 80% compliance.	1.3	1. What is the best type of ruler. 2. Why does a student need to have a note book. 3. Is it advisable for a student to purchase his own scribe. 4. Does a student have to purchase material used in the shop for projects. 5. May students purchase materials from the shop for outside projects.
1.4	The students will be able to identify information on sheet metal trades and their importance to the community with 80% proficiency.	1.4	1. Do you have to belong to th the Union to work in the tr trade. 2. Name 4 job positions in the sheet metal trade. 3. What is the average hourly pay scale for a beginning worker in the sheet metal trade. 4. What determines advancement in the trade. 5. At this point in the course do you still want to enter the sheet metal trades as an occupation.
1.5	Given instructions and handouts students will be able to identify shop hazards with 100% proficiency.	1.5	1. Student will explain orally or in writing, necessary safe housekeeping procedures, or safety procedures: (a) Loose stock on floor. (b) Oil on floor. (c) Cluttered bench tops. (d) Using grinder, pedestal and portable. (e) Portable power tools. (f) Mushroom heads on hand tools. (g) Use of protective clothing. (h) Clean up area.

ACCREDITATION NUMBER 985

COURSE TITLE: SHEET METAL (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

ORIENTATION

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.6	The student will with 80% accuracy answer questions about student organizations available to him.	1.6	1. Name one club especially designed for the industrial education student. 2. What does VICA mean? 3. Who can belong to VICA. 4. What benefits are derived from belonging to VICA.

ACCREDITATION NUMBER 9853

COURSE TITLE: SHEET METAL (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SHOP MACHINERY AND MATERIAL

Upon completion of this unit in Shop Machinery and Material the student will identify and demonstrate the use of Bar Folder, Brakes, Power and Slip form rolls, Squaring Shears, Bench Machines and Shop Materials, with 100% accuracy as predetermined by instructors check list.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.1	Given lecture and demonstration using shop brakes, the student will adjust and describe shop brakes with 100% accuracy.	2.1	1. Adjust the upper leaf on a box and pan brake for 16 gage steel, describe orally the use of counter balances on a cornice brake, as judged by rating scale: RATING SCALE Fingers 20 Pts. Clamp screw 20 " Top leaf 20 " Link-adjusting block 20 " Counter balances 20 "
2.2	Given lectures and demonstration using a bar folder, the student will adjust and describe bar folder, with 100% accuracy.	2.2	Adjust the bar folder for bending $\frac{1}{4}$" hem using 24 gage steel, describe orally the use of a shoe.
2.3	Given lectures and demonstation using Power and Slip Form Rolls, the student will adjust and describe Power and Slip Form Rolls with 100% accuracy.	2.3	Adjust the Power Rolls for rolling 8" pipe butt seam, 16 gage steel. Describe orally the use of grooves on a slip form roll.
2.4	Given lectures and demonstration using a squaring shears the student will demonstrare and describe squaring shears with 100% accuracy.	2.4	Demonstrate cutting an angle of 60° from a sheet of 28 gage steel describe orally the capacity of the machine as judged by rating scale: RATING SCALE Safety 35 Pts. Adjustment 35 " Steps 30 "

ACCREDITATION NUMBER 9853

COURSE TITLE: SHEET METAL (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SHOP MACHINERY AND MATERIAL

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.5	Given lecture and demonstrating using shop bench machines, the student will demonstrate and describe bench machines, with 100% accuracy.	2.5	Demonstrate crimping and beading machine on a section of 4" pipe, describe orally why the beading rolls are used. As judged by rating scale: RATING SCALE Measurement 35 Pts. Adjustment 35 " Steps 30 "
2.6	Given lecture and demonstration using shop power froming machines, the student will demonstrate and describe power forming machines with 80% accuracy.	2.6	Demonstrate making a 3/8" snap lock on a sheet of 24 gage steel, describe lock former capacity. As judged by rating scale: RATING SCALE Safety 30 Pts. Measurement 35 " Adjustment 20 " Steps 15 "
2.7	Given lectures and handouts on shop material, the student will determine metal thickness and supplies used in the shop for a specific job with 80% proficiency.	2.7	Demonstrate using a metal gage for determining sheet metal needed to manufacture a tote tray from 24 gage steel. As judged by rating scale: RATING SCALE Measurement 35 Pts. Steps 15 " Material Waste 30 "
2.8	Given lecture and demonstration in patterns and cutting metal the student will describe and demonstrate a pattern, how a pattern is used, how to transfer patterns with 80% accuracy.	2.8	Given shop pattern, demonstrate transferring and cutting pattern out of metal as judged by rating scale: RATING SCALE Safety 25 Pts. Measurements 35 " Steps 20 " Material Waste 20 "

ACCREDITATION NUMBER 9952

COURSE TITLE: SHEET METAL (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SHOP MACHINERY AND MATERIAL

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.9	Given lecture and demonstration on using rivets, the student will demonstrate how to select proper size and distance rivets are used on a specific job with 80% accuracy.	2.9	Demonstrate laying out a feather edge and spece #30 pop rivets. As judged by rating scale: RATING SCALE Safety 5 Pts. Measurements 35 " Steps 20 " Material Waste 20 "

COURSE SHEET METAL (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0 SOLDERING

Upon completion of this unit in soldering, the student will demonstrate the use of soldering coppers, soldering irons and fluxes with 80% accuracy as determined by rating scale.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.1	Given lectures and instruction on soldering, the student will demonstrate how to tin a soldering copper with 80% accuracy.	3.1	Demonstrate tinning a #2 soldering copper. You will be judged by the following rating scale: RATING SCALE Safety 20 Pts. Heating 30 " Filing 30 " Steps 20 "
3.2	Given lecture and demonstration on soldering fluxes, the student will describe orally or in writing how to use fluxes with 80% accuracy.	3.2	Orally or written, describe: 1. The procedure for making zinc chloride. 2. Why should corrosive types of flux be washed from the metal after soldering? 3. When making zinc chloride why should the jar be placed near an open window? 4. What is sal ammoniac used for? 5. Name the different types of corrosive fluxes.
3.3	The learner will properly choose the tools and materials, and will solder a given project with 80% accuracy as judged by the following rating scale: Selection of proper tools 25% Selection of proper materials 25% Amount of solder used 25% Craftsmanship of soldered joint 25%	3.3	Choose the correct tools, flux, and solder, and solder the project given you by the instructor.

ACCREDITATION NUMBER 9853

COURSE TITLE: SHEET METAL (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

MEASUREMENTS AND LAYOUT

The learner will measure and layout given sheetmetal problems with 80% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.1	Given lecture and demonstration, the students will measure and use hand tools with 80% accuracy.	4.1	Given 2 measuring devices and 5 hand tools, measure and cut meaterial for a job as judged by rat rating scale: RATING SCALE Safety 5 Pts. Measurements 35 " Hand Tools 35 " Material Waste 20 "
4.2	Given lecture and demonstration the student will layout, edge, seam, notch with 80% accuracy.	4.2	Demonstrate a Pittsburgh lock seam as judged by rating scale: RATING SCALE Safety 5 Pts. Measurements 35 " Machinery 20 " Hand Tools 20 " Steps 15 " Material Waste 5 "
4.3	Given lecture and demonstration and proper material, the student will use geometrical problems used in sheet metal layout with 80% accuracy.	4.3	Demonstrate how to erect a perpendicular near the end of a given line, construct an angle similar to a given angle, contruct an approximate allipes when length and width are given, using circular arcs, as judged by rating scale: RATING SCALE Neatness 5 Pts. 5 Measurements 35 " Layout 30 " Steps 30 "
4.4	Given lecture and demonstration and proper materials the student will layout and manufacture simple heating and air condit conditioning patterns with 80% accuracy.	4.4	Manufacture a 90° branch using geometrical layout as judged by rating scale.

ACCREDITATION NUMBER 9853

COURSE TITLE: SHEET METAL (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

MEASUREMENTS AND LAYOUT

No.	Intermediate Performance Objectives	No.	Criterion Measures
4.4	(Continued.)	4.4	(Continued.) Rating Scale Safety 5 Pts. Measurements 30 " Layout 30 " Steps 35 "
4.5	Given lecture and demonstration and proper materials the student will layout and manufacture parallel line problems with 80% accuracy.	4.5	Manufacture a rectangular pipe intersecting a round pipe obliquely as judged by rating scale. Rating Scale Safety 5 Pts. Measurements 20 " Layout 30 " Steps 15 " Solder 10 " Neatness 20 "

ACCREDITATION NUMBER 9853

COURSE TITLE: SHEET METAL (BASIC)

TERMINAL PERFORMANCE
OBJECTIVE NO. 5.0

ASSIGNED SHOP PROJECTS

Upon completion of this unit on Shop Projects, the student will demonstrate the use of shop work orders and blueprints for work orders, with 100% accuracy as judged by instructor check list.

No.	Intermediate Performance Objectives	No.	Criterion Measures
5.1	Upon completion of instruction on live projects, the student will have demonstrated how to use a shop work order for a live project with 100% accuracy.	5.1	Demonstrate how to use a shop work order for a live project as judged by rating scale. Rating Scale Safety 5 Pts. Measurements 20 " Layout 20 " Steps 10 " Neatness 15 " Material Waste 10 " Time 20 "

ACCREDITATION NUMBER 9853

COURSE TITLE: SHEET METAL (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

RADIAL AND TRIANGULATION LAYOUTS

Upon completion of lectures and demonstration on Rafial and Triangulation Layouts and construction, the student will demonstrate the use of Radial Line and Triangulation with 80% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.1	Given lectures and demonstration and proper materials, the student will layout and manufacture a given radial line problem with 80% accuracy.	6.1	Manufacture a cone intersected by a vertical square pipe, as judged by rating scale: RATING SCALE Safety 5 Pts. Measurements 20 " Layout 25 " Steps 25 " Material Waste 25 "
6.2	Given lecture and demonstration and proper materials the student will layout and manufacture a given triangulation problem with 80% accuracy.	6.2	Manufacture a garbage chute head as judged by rating scale. RATING SCALE Safety 5 Pts. Measurements 20 " Layout 25 " Steps 25 " Material Waste 25 "