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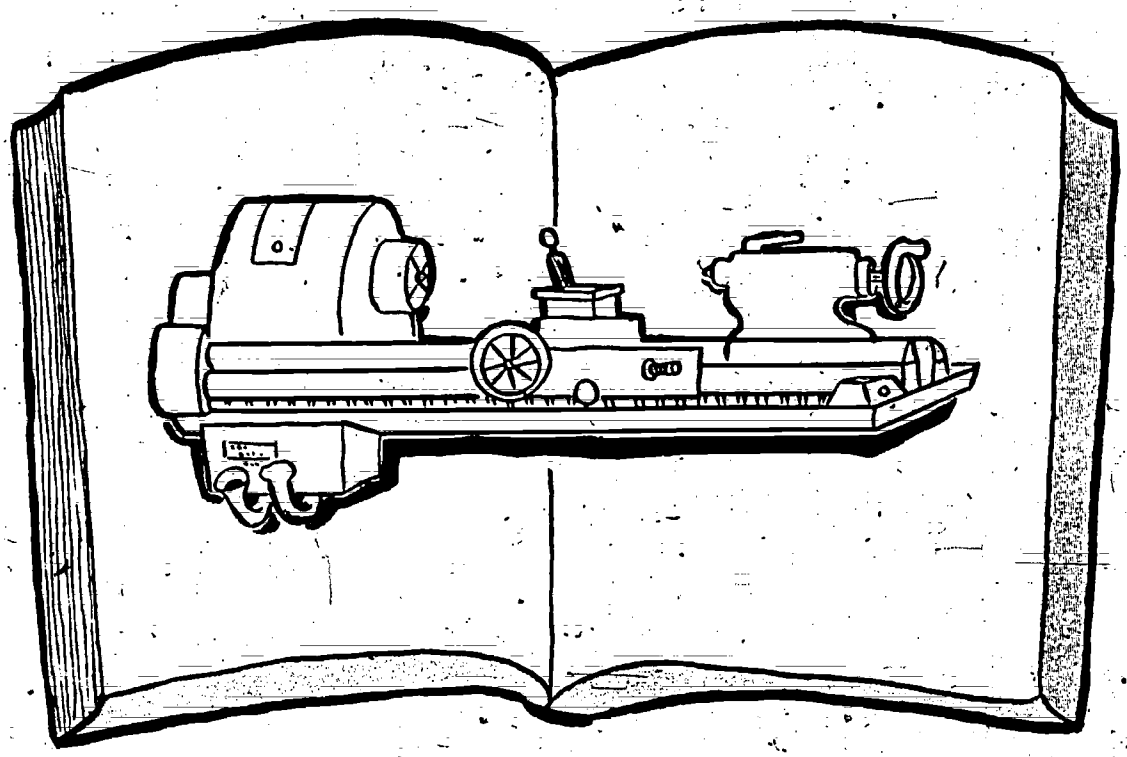
ABSTRACT

This curriculum guide, one of 15 volumes written for field test use with educationally disadvantaged industrial education students needing additional instruction in the basic skill areas, deals with helping students to develop basic reading and writing skills while studying metalworking. Addressed in the individual units of the guide are the following topics: mastering metalworking and metal shop words; understanding and utilizing the specialized vocabulary of gas and arc welding; and developing the vocabulary necessary to perform metal working operations, use metal working tools, and operate metal working machinery. Each unit contains some or all of the following: a discussion of the major concepts of the technique being covered, instructions to the teacher concerning the use of the given technique, suggested related activities, student instructions, a student assignment, supplemental activities, and one or more worksheets. A basic skills checklist and a basic skills verification form are also provided to assist teachers in identifying those students who require additional help with basic skills. (MN)

"LEARNING TO READ AND WRITE THE METALWORKING WAY"



DEVELOPED BY

THE EDUCATIONALLY DISADVANTAGED COMMITTEE

INDUSTRIAL EDUCATION INSERVICE PROJECT

in cooperation with

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Field Operations Section
Industrial Education Unit

and

California State University - Los Angeles
Industrial Studies Department

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INSTRUCTIONAL TECHNIQUES

INTRODUCTION

These instructional techniques were developed for those industrial education students who demonstrate a need for additiona instruction in the areas of reading, writing, math, verbal and visual communication. They were written by industrial education teachers with a particular emphasis upon teaching a basic skill while retaining a major focus on the subject areas of auto, woods, metals, electronics, and drafting.

Each of these instructional techniques were written using the same format and with guidance from an expert in the areas of reading, writing, math, verbal and visual communication.

In order to help you identify those students who require additional help with the basic skills, a simple easy-to-use BASIC SKILLS CHECKLIST is provided with each subject area module. This Basic Skills Checklist will enable you as the Industrial Education Teacher to better identify those students in your classe who require additional help in the basic skills.

Additionally, a BASIC SKILLS VERIFICATION FORM is provided which will enable you to ask your school's reading resource teacher, basic skills teacher, math resource teacher, Hart Bill Conferencing teacher, or grade counselors, to verify your identification and provide you with help in the instruction of the basic skills.

You may wish to use these techniques as instruction for your entire class, or as a take-home, parent-involvement assignment. They may also be used in your school's reading or math lab or in conjunction with your school's basic skills instructional programs

These instructional techniques are successful because your students are able to relate reading, writing, math, verbal and visual communication to their own industrial education classes. When your students succeed, they feel good about themselves, good about their schools, and good about their future.

Name _____

CONFIDENTIAL

Grade _____ Class _____

Date _____

BASIC SKILLS CHECKLIST (METALS)

The following is a list of the basic skills (reading, writing, math, verbal and visual communication) that the student should demonstrate an ability in for the purpose of employment or advanced training in the metals trade.

1.0 Verbal Communication: The student needs additional instruction in verbal communication if any of the items below are checked NO:

1.1 Yes ____ The student understands verbal directions or information given by the teacher.

No ____

Example: The teacher informs the student that safety glasses are required when using the grinder. Does the student use safety glasses when required?

1.2 Yes ____ The student asks questions about instructions or information not understood.

No ____

Example: Did the student ask questions about the operation of a particular machine if it appears that he/she does not understand the instructions given?

1.3 Yes ____ The student is able to apply information and directions heard to work situations.

No ____

Example: After receiving instructions on the proper use of a maching, is the student able to have a basic understanding of its operation?

1.4 Yes ____ The student is able to verbally communicate with the teacher and other students.

No ____

Example: Is the student able to convey instructions/information to other students?

2.0 Writing: The student needs additional instruction in writing if any of the items below are checked NO:

2.1 Yes ____ The student is able to summarize and write a customer work order.

No ____ Example: A customer requests a certain type of welding job; is the student able to convey this request in writing on the job order form?

2.2 Yes ____ The student is able to communicate in writing instructions for a job to be performed.

No ____

Example: Is the student able to convey instructions to another student about a job to be performed at a later date?

3.0 Reading: The student needs additional instruction in reading if any of the items below are checked NO:

3.1 Yes ____ The student is able to read and understand job related materials

No ____ Example: Is the student able to read and understand safety rule and warnings (including the shop safety test), job applications, job orders, and operating instructions for machines?

3.2 Yes ____ The student is able to follow step by step procedures listed on instructional/job sheets.

No ____

Example: Is the student able to perform tasks in a sequence after being given a demonstration and a procedure sheet to follo

4.0 Math: The student needs additional instruction in math if any of the items below are checked NO:

4.1 Yes ____ The student is able to read a rule to increments of 1/16th inch.

No ____

4.2 Yes ____ The student is able to calculate the amount and size of material required to construct a project.

No ____

Example: Is the student able to calculate the amount and size of material required to build an engine stand?

4.3 Yes ____ The student can add and subtract fractions.

No ____ Example: Given metal to dimension, is the student able to add or subtract an amount of metal in order to achieve the correct size?

4.4 Yes ____ The student is able to read a micrometer, ruler, and vernier caliper.

No ____

4.5 Yes ____ The student is able to compute percentages and ratios.

No ____ Example: Is the student able to compute the amount of metal shrinkage, given the normal rate of shrinkage?

5.0 Visual Communication: The student needs additional instruction in visual communication if any of the items below are checked NO:

5.1 Yes ____ The student can understand working drawings and sketches.

No ____ Example: Can a student, given the necessary metal working tools and materials, construct a tool box from a drawing provided by the teacher.

IDENTIFICATION Made by: _____

BASIC SKILLS VERIFICATION FORM

Student _____ Male____ Female____ Grade Level____

Teacher _____ Class_____ Date_____

The Basic Skills Check List (attached) for the above student indicates a need for instructional assistance in the basic skills (reading, writing, math, verbal or visual communication). The following verification and recommendations are made:

____Lacks Reading Skills

____Lacks Writing Skills

____Lacks Mathematical Skills

____Lacks Verbal Communication Skills

____Lacks Visual Communication Skills

METHOD USED FOR VERIFICATION

Recent Test Scores:

Test	Score	Date

Other Verification Methods:

_____

_____

RECOMMENDATIONS

The following instructional assistance is recommended: _____

_____

Verification & Recommendations Made By: _____ Date: _____

Title: _____

_____

_____

FOLLOW UP

Action Taken: _____

Results: ____Qualified for advanced training

____Qualified for employment in the trade

____Other _____

Certified by: _____ Date: _____

Teacher

METALWORKING WORDS

(Vocabulary)

Metals Read/Write 1

METALWORKING WORDS

TEACHER MATERIALS:

1. CONCEPTS OF TECHNIQUE:

a. What SKILL will this technique teach?

Vocabulary

b. What student learning problem(s) prompted the development of this technique?

Student drawings give descriptive reference to technical processes but frequently students don't understand the processes they are referring to. Students often don't understand the process because they don't know the related vocabulary.

2. TEACHER INSTRUCTIONS FOR THE USE OF THIS TECHNIQUE:

a. As often as possible, give your students an exercise in vocabulary building.

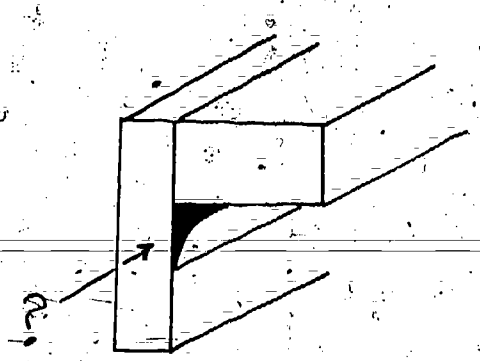
b. Provide students with a worksheet of ten to twenty technical terms. Opposite the term include single word associations from which words can be picked to describe the technical term.

c. Allow students time to complete their worksheets and then go over them together.

3. SUGGESTED RELATED ACTIVITIES:

Show students examples and/or illustrations of each technical term.

METALWORKING WORDS



STUDENT MATERIALS:

1. STUDENT INSTRUCTIONS:

a. Circle the words that mean the same as the technical term. Also circle the words that are closely related to the technical terms.

b. Cross out the words that do not mean the same as the technical terms. Also cross out the words that are not related to the technical terms.

c. Notice the examples before you start.

2. STUDENT ASSIGNMENT:

See Student Page 2

3. EXTRA THINGS THAT YOU CAN DO:

Make a dictionary of technical words you have learned. This can serve as a resource for you to remember new words.

METALWORKING WORDS

EXAMPLES: a. hexagonal four, (six), eight,

b. grind (abrasive), (remove), polish

TECHNICAL TERMS:

1.	bevel	incline, round, slant
2.	boss	recessed, raised, project
3.	cam	irregular, straight, motion
4.	chamfer	cornerless, slanted, concave
5.	counterbore	recess, submerge, raised
6.	cylindrical	round, square, triangular
7.	draft	horizontal, vertical, taper
8.	fillet	round, broken, curve
9.	fixture	tool, holder, guiding
10.	galvanize	anti-rust, iron, plastic
11.	harden	forge, anneal, heat
12.	jig	grinding, tool, holder
13.	knurl	grips, hold, curved
14.	mold	cavity, sand, cut
15.	radius	circle, half, square
16.	ream	enlarge, reduce, hole
17.	schematic	diagram, circuit, picture
18.	tolerance	closeness, bonding, weld
19.	taper	slant, curved, crown
20.	temper	reheat, hardness, anneal

STUDENT PAGE 2

METAL SHOP WORDS (1)

(Reading)

Metals Read/Write 2

METAL SHOP WORDS (1)

TEACHER MATERIALS:

1. CONCEPTS OF TECHNIQUE:

a. What SKILL will this technique teach?

Technical vocabulary and reading skills.

b. What student learning problem(s) prompted the development of this technique?

Students have problems reading textbooks and understanding technical subject area words.

2. TEACHER INSTRUCTIONS FOR THE USE OF THIS TECHNIQUE:

a. Give your students the attached lesson on metal shop words.

b. Briefly explain to your students how to:

1. Alphabetize
2. Complete fill-in questions
3. Define multiple-meaning words

3. SUGGESTED RELATED ACTIVITIES:

Have your students practice writing skills by writing a short paragraph describing their next shop project.

METAL SHOP WORDS (1)

STUDENT MATERIALS:

1. STUDENT INSTRUCTIONS:

Complete the lesson below.

2. STUDENT ASSIGNMENT:

a. Put these words in alphabetical order:

carburizing	1. arc
drag	2. _____
abrasive	3. _____
draft	4. _____
arc	5. _____

b. Select the correct word or words to complete these sentences:

DIESTOCK CUTTING OIL CENTER PUNCH BUFFING PAN BRAKE

1. The first step in drilling a hole is to _____ the work where the hole is to be drilled.
2. The _____ is used to bend metal into box shapes.
3. When using a power hacksaw be sure to use _____ on the surface being cut.
4. _____ is also called polishing.
5. To cut threads on a rod, fit the correct size die into the _____.

STUDENT PAGE 1

c. Use these words in sentences that are not related to metal shop. If you wish, you may use a dictionary.

drag 1. _____

draft 2. _____

brake 3. _____

die 4. _____

3. EXTRA THINGS THAT YOU CAN DO:

Try to think of more words that are used both in metal shop and outside of the shop but with different meanings, for example: facing, punch, etc.

METAL SHOP WORDS (2)

(Reading)

Metals Read/Write 3

METAL SHOP WORDS (2)

TEACHER MATERIALS:

1. CONCEPTS OF TECHNIQUE:

a. What SKILL will this technique teach?

Technical vocabulary and reading skills

b. What student learning problem(s) prompted the development of this technique?

Students have problems reading textbooks and understanding technical subject area words.

2. TEACHER INSTRUCTIONS FOR THE USE OF THIS TECHNIQUE:

a. Give your students the attached lesson on metal shop words.

b. Briefly explain to your students how to:

1. Alphabetize
2. Complete fill-in questions
3. Define multiple-meaning words

3. SUGGESTED RELATED ACTIVITIES:

Give your students more metal shop words and have them write sentences using these words.

METAL SHOP WORDS (2)

STUDENT MATERIALS:

1. STUDENT INSTRUCTIONS:

Complete the lesson below.

2. STUDENT ASSIGNMENT:

a. Put these words in alphabetical order: →

base line	1. bar folder
center drilling	2. _____
drill margin	3. _____
center punch	4. _____
bar folder	5. _____
drill press	6. _____

b. Select the correct word or words to complete these sentences.

TAP DRILL FILE CARD REAMER BURRS COUNTERSUNK

1. A brush called a _____ is used to remove material clogging the teeth of files.
2. The drill used to make the hole prior to tapping is called the _____.
3. To finish a drilled hole to exact size use a _____.
4. A screw will fit flush with the surface if the hole has been _____.
5. Sharp edges that remain on metal after cutting are called _____.

METAL SHOP WORDS (2)

c. Use these words in sentences that are not related to metal shop. If you wish, you can use a dictionary.

hem 1. _____

drill 2. _____

punch 3. _____

tap 4. _____

3. EXTRA THINGS THAT YOU CAN DO:

Try to think of more words that are used both in metal shop and outside of the shop but with different meanings, for example: file; rolling, etc.

WORD GAME

(Vocabulary)

Metals Read/Write 4

WORD GAME

TEACHER MATERIALS:

1. CONCEPTS OF TECHNIQUE:

a. What SKILL will this technique teach?

Shop vocabulary and word attack skills

b. What student learning problem(s) prompted the development of this technique?

Students have limited vocabularies. This technique will introduce them to new shop words.

2. TEACHER INSTRUCTIONS FOR THE USE OF THIS TECHNIQUE:

a. Photocopy the attached words on stiff paper or cardstock. Then cut on the lines to form a deck of cards. After you have done this, make up 5-6 more sets of cards.

b. Your students will be instructed to shuffle the cards and then play a game where they match the cards to make up pairs of words with the same beginning syllables. Read these instructions to your students.

c. Divide the class up into groups with no more than 4 students in each group. Have the groups play against each other to see which group can be first to match up and pronounce the words correctly in front of the class.

3. SUGGESTED RELATED ACTIVITIES:

Play the game again forming different groups of students. Make up more card games where students have to pair up ending syllables.

WORD GAME

STUDENT MATERIALS:

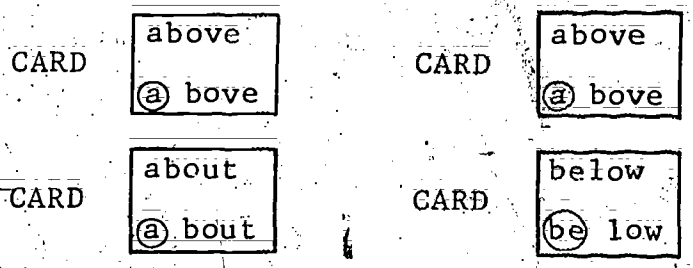
1. STUDENT INSTRUCTIONS:

a. You will be given a set of cards. On each card you will find a word and below the word you will see the same word broken up into parts called syllables. When you read a new word you put these syllables together to form the word.

b. When you get the cards shuffle the deck well. The object of the game is to:

1. Make up pairs of words as fast as you can.
2. Read the words aloud.

c. To play, hold the deck of cards in your hand with the words face up. Lay three cards on the table face up. Read each of the cards on the table aloud and see if there are any pairs. To make a pair the first syllables have to be the same. For example:



These cards make a pair.

These cards do not make a pair.

d. As you make up pairs of cards put them in a separate pile. You must have three cards on the table at all times. As you make up pairs put more cards down on the table in their place.

e. Look at each card in the deck. Say the words and see if they match any cards on the table. Continue doing this until you have paired up all the cards. Take turns letting each person in your group read several cards from the deck.

2. STUDENT ASSIGNMENT:

Your teacher will give you the cards for the game.

3. EXTRA THINGS THAT YOU CAN DO:

Ask your teacher for the cards and play the word game by yourself.

ABILITY a bil i ty	ACETYLENE a cet y lene	ABRASIVE ab ra sive
ABRASION ab ra sion	ALLOY al loy	ALTERNATING al ter nat ing
ANGLE an gle	ANNEALING an neal ing	FACING fac ing

FACET fac et	FABRIC fab ric	FABRICATE fab ri cate
CARBON car bon	CARBURETOR car bu re tor	FINISHING fin ish ing
FINGER fin ger	MACHINE ma chine	MACHINIST ma chin ist

RIVER riv er	SOLDER sol der	SOLDERING sol der ing
TENSILE ten sile	TENSION ten sion	VERNIER ver ni er
VERTICAL ver ti cal	CALIPER cal i per	CALIBRATE cal i brate

MICROMETER mi crom e ter	MICROPHONE mi cro phone	MAGNAFLUX mag na flux
MAGNETIC mag net ic	TEMPLATE tem plate	TEMPERING tem per ing
REAMER ream er	REAMING ream ing	RIVET riv et

METAL SHOP CROSSWORD PUZZLE

(Vocabulary)

Metals Read/Write 5

METAL SHOP CROSSWORD PUZZLE

TEACHER MATERIALS:

1. CONCEPTS OF TECHNIQUE:

a. What SKILL will this technique teach?

Spelling

b. What student learning problem(s) prompted the development of this technique?

This technique was developed because so often students are unable to spell correctly the technical terms used in metal shop.

2. TEACHER INSTRUCTIONS FOR THE USE OF THIS TECHNIQUE:

a. During your regular lecture emphasize the correct spelling of the many different metal shop terms.

b. Explain how a crossword puzzle works.

c. During a few minutes of the period that are normally wasted (just before the passing bell rings, while you are taking roll), pass out this crossword puzzle and allow the students to work on it.

d. Collect the crossword puzzles and allow the students to correct their own puzzles by trading papers.

3. SUGGESTED RELATED ACTIVITIES:

You may wish to have a regular weekly spelling test of metal shop terms (if possible you could offer a prize for the best speller).

Be sure to emphasize correct spelling in all of your lessons and make sure that the students realize that spelling is important.

METAL SHOP CROSSWORD PUZZLE

STUDENT MATERIALS:

1. STUDENT INSTRUCTIONS:

a. This is a metal shop crossword puzzle, just like the cross-word puzzle you may have worked on in the newspaper. In this crossword puzzle you will use only metal shop words.

b. This crossword puzzle has both down and across sections. Simply fill in the missing word from the list of Metal Shop Words.

2. STUDENT ASSIGNMENT:

Your assignment is found on STUDENT PAGE 2.

3. EXTRA THINGS THAT YOU CAN DO:

Your instructor may give you a spelling test using the words in the puzzle.

METAL SHOP CROSSWORD PUZZLE

METAL SHOP WORDS:

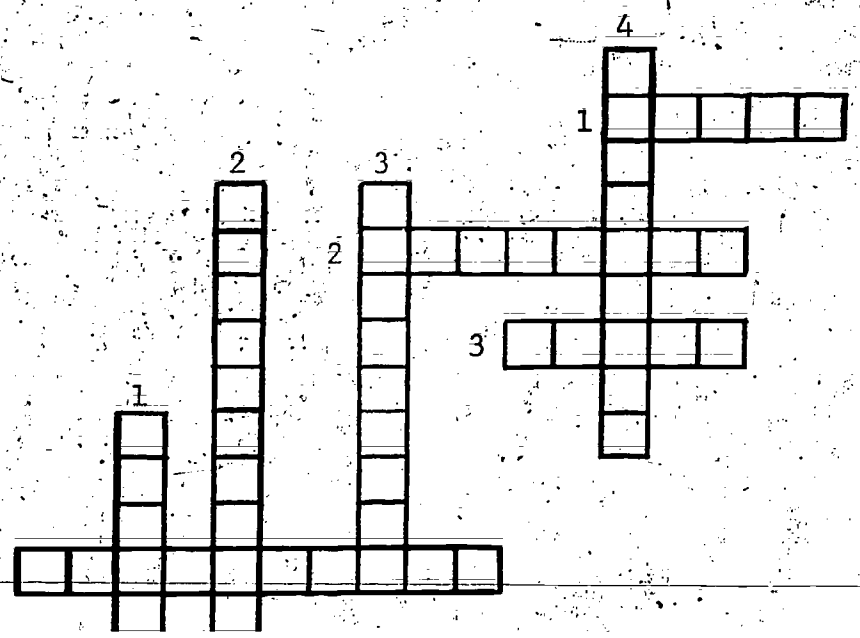
machinist	clamp
abrasive	forging tongs
fabricate	alloy
micrometer	chuck key

ACROSS:

1. When two or more metals are mixed together the new metal is called an _____ metal.
2. Emery cloth is a type of _____ cloth.
3. A _____ is used to hold pieces of metal together while they are being worked on.
4. A tool which is used to accurately measure the thickness of metal is called a _____.

DOWN:

1. Always remove the _____ before turning on the drill press.
2. You would use _____ to pick up and remove hot metal from the furnace.
3. The person who operates a metal machining lathe is called a _____.
4. When designing a new project, the designer needs to consider how hard the project would be to _____.



KEY

METAL SHOP CROSSWORD PUZZLE

METAL SHOP WORDS:

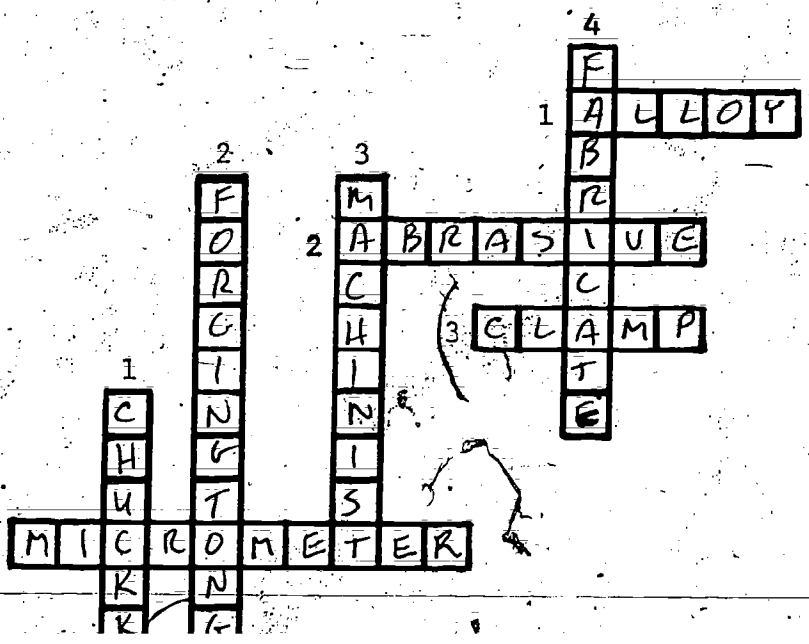
machinist	clamp
abrasive	forging tongs
fabricate	alloy
micrometer	chuck key

ACROSS:

1. When two or more metals are mixed together the new metal is called an _____ metal.
2. Emery cloth is a type of _____ cloth.
3. A _____ is used to hold pieces of metal together while they are being worked on.
4. A tool which is used to accurately measure the thickness of metal is called a _____.

DOWN:

1. Always remove the _____ before turning on the drill press.
2. You would use _____ to pick up and remove hot metal from the furnace.
3. The person who operates a metal machining lathe is called a _____.
4. When designing a new project, the designer needs to consider how hard the project would be to _____.



WORD SEARCH PUZZLE - GAS WELDING

(Vocabulary)

Metals Read/Write 6

WORD SEARCH PUZZLE

GAS WELDING

TEACHER MATERIALS:

1. CONCEPTS OF TECHNIQUE:

   a. What SKILL will this technique teach?

      Vocabulary word recognition

   b. What student learning problem(s) prompted the development of this technique?

      This technique was developed because students are unable to spell and read the technical terms used in gas welding.

2. TEACHER INSTRUCTIONS FOR THE USE OF THIS TECHNIQUE:

   a. You can use this technique after lecturing or reading about gas welding.

   b. Use it to reinforce student vocabulary in metals.

   c. Give students a few minutes to complete the assignment.

   d. Have students trade and correct papers themselves.

3. SUGGESTED RELATED ACTIVITIES:

   Have students write definitions of words.

   Emphasize the importance of correct spelling.

WORD SEARCH PUZZLE

GAS WELDING

STUDENT MATERIALS:

1. STUDENT INSTRUCTIONS:

   a. Look at the word list and become familiar with the terms.

   b. Locate the words in the puzzle.

   c. You will find the words in the puzzle going across or downward.

   d. Draw a light line through each word you find from the list.

2. STUDENT ASSIGNMENT:

   Your assignment is found on STUDENT PAGE 2.

3. EXTRA THINGS THAT YOU CAN DO:

   a. See if you can make your own word search puzzle.

   b. Write a definition for each of the words used in Gas Welding Word Search Puzzle.

   c. Learn how to spell the words and take a spelling test supplied by your instructor.

WORD SEARCH PUZZLE

GAS WELDING

WORD LIST:

OXYGEN	TORCH	VALVE	CARBURIZING
ACETYLENE	WELDING	POUNDS	NEUTRAL
REGULATOR	BEAD	BLEEDS	OXIDIZING
CYLINDER	PRESSURE	METAL	STRIKER

P A C E T Y L E N E N I B E R Y L E N G H I J K L W N O P
R G L T O X Y G E N A S M I L E Y O U C Y L I N D E R I N
E B O N R H A P P Y E V L P C A R B U R I Z I N G L I C K
S T R O C A R E G U L A T O R O S L T A B G V I Z D R S T
S N E A H N E U T R A L O U V W X E Y Z A B S T R I K E R
U E A S Y V L N I K M V R N G H M E T A L L O B E N E V D
R F G H I J B O L T V E L D O X I D I Z I N G O R G O L D
E B E A D F G L T V I S G S R H G S B J S T O R O S I A N

SAFETY FIRST WHEN ARC WELDING

(Vocabulary)

Metals Read/Write 7

SAFETY FIRST WHEN ARC WELDING

TEACHER MATERIALS:

1. CONCEPTS OF TECHNIQUE:

a. What SKILL will this technique teach?

Safety vocabulary for arc welding
Listening for details (visual communication from a demonstration.)
Reading for specific information

b. What student learning problem(s) prompted the development of this technique?

This technique was developed because arc welding students often don't comprehend safety measures.

2. TEACHER INSTRUCTIONS FOR THE USE OF THIS TECHNIQUE:

a. Distribute the worksheet to each student. Use this handout as a refresher for arc welding safety.

b. Help your students understand the safety rules by demonstrating these eight proper safety habits to the class.

c. Have your students read each of the incomplete statements and from your demonstration, fill in the correct word from the list.

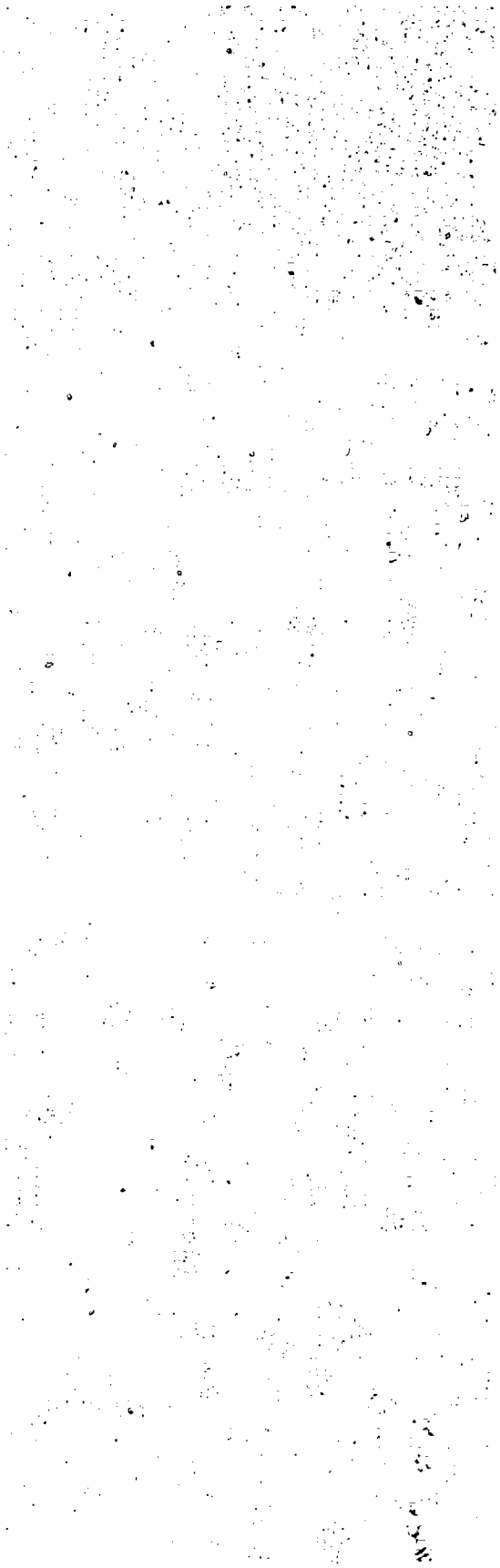
d. To correct the handout, have your students read aloud the question and then correct answer.

ANSWERS:

1.)	leather	5.)	face mask
2.)	tongs	6.)	first class
3.)	hot	7.)	floor
4.)	flammable	8.)	helmet

3. SUGGESTED RELATED ACTIVITIES:

Give your students some type of reward (grade, points, etc.) for locating unsafe conditions in the shop.



SAFETY FIRST WHEN ARC WELDING

STUDENT MATERIALS:

1. STUDENT INSTRUCTIONS:

a. Watch as your instructor demonstrates proper safety habits for arc welding.

b. Read each incomplete statement on the worksheet.

c. Fill in the blank with the correct word from the arc welding words found on STUDENT PAGE 2.

2. STUDENT ASSIGNMENT:

Your assignment is found on STUDENT PAGE 2.

SAFETY FIRST WHEN ARC WELDING

WORKSHEET

ARC WELDING WORDS:

leather	first class
tongs	hot
floor	flammable
face mask	helmet

1. An apron made of _____ should be worn when arc welding.

2. Hot metal should be handled with a pair of _____.

3. If you walk away from the welding table and leave heated metal on the table the metal should have the word _____ written on it with chalk.

4. Do not weld where solvent or paint fumes may collect. Remove all _____ materials from the welding area.

5. Wear a _____ when chipping slag.

6. Before welding all arc welding equipment should be in _____ condition.

7. Electrode stubs should be kept off the _____.

8. Arc welding requires special eye protection. An arc welding _____ will provide this special protection.

Is It A Tool, Operation, Material, Or Machine?

(Vocabulary)

Metals Read/Write 8

IS IT A TOOL, OPERATION, MATERIAL OR MACHINE?

TEACHER MATERIALS:

1. CONCEPTS OF TECHNIQUE:

a. What SKILL will this technique teach?

Vocabulary development and categorizing skills

b. What student learning problem(s) prompted the development of this technique?

Students have limited vocabularies.

2. TEACHER INSTRUCTIONS FOR THE USE OF THIS TECHNIQUE:

a. Your students will be given a list of shop words. They will be asked to list the word in its proper category.

b. The words will fit into only one of four categories:

1. Materials or fasteners
2. Hand or measuring tools
3. Operations
4. Machinery

c. Read the instructions to your class so they understand how to do this assignment.

3. SUGGESTED RELATED ACTIVITIES:

Have your students add more words to the list putting each word in the correct category.

IS IT A TOOL, OPERATION, MATERIAL OR MACHINE?

STUDENT MATERIALS:

1. STUDENT INSTRUCTIONS:

a. You are going to be given a list of shop words. Look at the words and list each word in one of four groups:

1. materials or fasteners
2. hand or measuring tools
3. operations
4. machines

b. Each word belongs in only one group. For example, COPPER is a material and will not fit into any other category. It is not a hand or measuring tool, an operation or a machine.

2. STUDENT ASSIGNMENT:

Your assignment is found on STUDENT PAGE 2.

3. EXTRA THINGS THAT YOU CAN DO:

Make up your own list of tools and see if you can write what you would do with each tool. For example: diagonal cutters are used to cut wire.

STUDENT PAGE 1

WORD LIST

drill press
forging
sheet metal
calipers
threading
grinder
polishing
welder
chisels
clamping
copper
shaper
band saw
snips
machine screws
bender
files
milling
lathe
pliers
bolts
die casting
welding
wrought iron
micrometer
brass
screwdrivers
washers

MATERIALS AND FASTENERS

HAND OR MEASURING TOOLS

OPERATIONS

MACHINERY

THE FOLLOWING INDUSTRIAL EDUCATION BASIC SKILL INSTRUCTIONAL TECHNIQUES ARE AVAILABLE FROM:

VOICE (VOCATIONAL OCCUPATIONAL INFORMATION CENTER FOR EDUCATORS)
721 CAPITOL MALL
SACRAMENTO, CALIFORNIA 95814

"LEARNING TO READ AND WRITE THE AUTOMOTIVE WAY"
"LEARNING TO DO MATH THE AUTOMOTIVE WAY"
"LEARNING TO VERBALLY & VISUALLY COMMUNICATE THE AUTOMOTIVE WAY"

"LEARNING TO READ AND WRITE THE WOODWORKING WAY"
"LEARNING TO DO MATH THE WOODWORKING WAY"
"LEARNING TO VERBALLY & VISUALLY COMMUNICATE THE WOODWORKING WAY"

"LEARNING TO READ AND WRITE THE METALWORKING WAY"
"LEARNING TO DO MATH THE METALWORKING WAY"
"LEARNING TO VERBALLY & VISUALLY COMMUNICATE THE METALWORKING WAY"

"LEARNING TO READ AND WRITE THE ELECTRONICS WAY"
"LEARNING TO DO MATH THE ELECTRONICS WAY"
"LEARNING TO VERBALLY & VISUALLY COMMUNICATE THE ELECTRONICS WAY"

"LEARNING TO READ AND WRITE THE DRAFTING WAY"
"LEARNING TO DO MATH THE DRAFTING WAY"
"LEARNING TO VERBALLY & VISUALLY COMMUNICATE THE DRAFTING WAY"