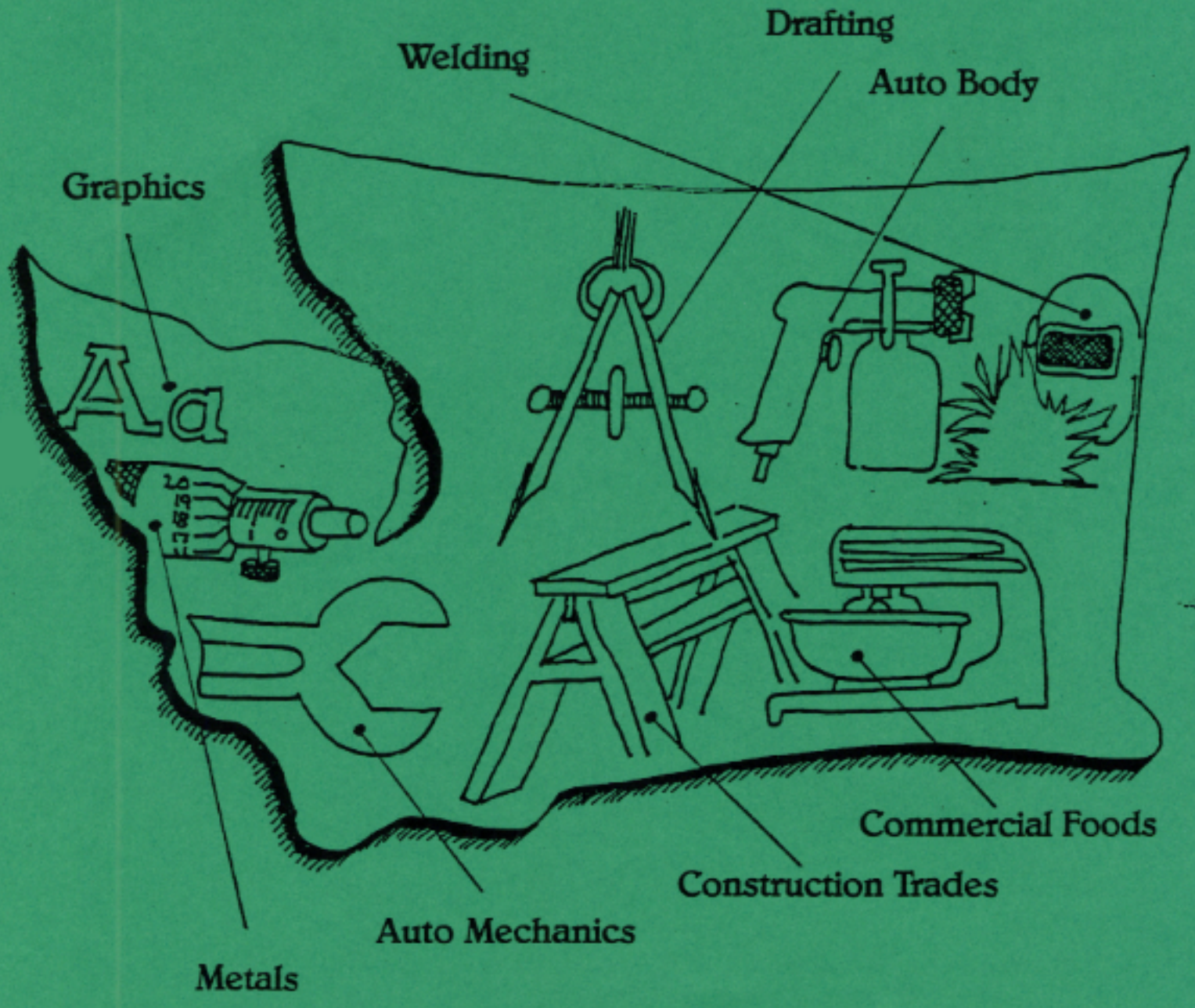
Safety Guide for Vocational, Trade and Industrial and Technology Education



Safety Guide for Vocational, Trade and Industrial and Technology Education

This guide is intended to be a REFERENCE document that is available to COMPLEMENT other printed materials produced and made available at the state and national level.

This Safety Guide has been validated by industrial committees, whose members are actively engaged in these occupations and who represent a major part of the State of Washington. Vocational program course objectives should prepare students to meet these safety standards. Workers meeting these standards, as established by industry, will have the best safety record in the world of work.

This document is information in nature only. The writers of this material take no liability as to the accuracy or completeness of this document. Further, the writers make no warranty or responsibility for loss of assume damage suffered due to reliance on this material.

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References

This Safety Guide is a compilation of safety information and materials which in small part is original, but is primarily a result of gathering, selecting, and utilizing portions of existing works.

This Safety Guide was reviewed and validated by the Trade Industrial and Technology Education Board, a section of the Washington Vocational Association. It has also been reviewed and validated by local program Advisory Committees.

Materials were selected and reviewed from the following publications, and in many instances, were incorporated in the formation of this guide.

Washington Department of Labor and Industries —

General Safety and Health Standards, CH. 296-24WAC

Chemical Hazard Communication, Guidelines, WAC 296-62-054 through WAC 296-62-05425

Delaware Safety Manual

I.N.A. Loss Control Services Bulletins

Kansas State Educational Handbook

Maryland Health and Resource Guide

Missouri Vocational Safety Guide

National Institute for Occupational Safety and Health Handbook (NIOSH)

Occupational Safety and Health Administration Handbook (OSHA)

Oregon Standards Guidelines

Utah Safety Recommendations

Washington State Booklet — "Eye Safety in the Classroom"

Washington State Department of Labor and Industries Booklet, "Right to Know"

Washington State I.A. Safety Guide

Edmonds School District Safety Guide

American Red Cross

Superintendent of Public Instruction (SPI) General Safety Manual, State of Washington

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Introduction

The safety mistakes a student/technician/instructor makes today could have future ramifications both personally and environmentally. This guide is designed to help instructors/teachers instill safety awareness in their students. It is also intended to alert the school district staff to their areas of responsibility and, at the same time, to reduce accidents and exposure to litigation.

Effective safety awareness education leads to safer attitudes and safety consciousness which in turn lead to safer working practices and accident prevention within the school Industrial Arts laboratory.

The task of overcoming the "It can't happen to me" attitude is a big one and requires that safety awareness be an integral part of the every day instruction program.

In addition to the traditional safety point of view in both personal and area safety, new emphasis should be considered in COMPONENT safety, in that new, sophisticated, and computerized equipment must be well cared for because of high replacement costs. One will find that safe operators that save people will also save equipment.

A more recently recognized safety problem concerns hazardous waste and hazardous waste disposal. An unsafe act today could have serious effects years from now.

Safety consciousness requires that the student be educated in safety generally and specifically. The teacher, in working to develop a positive attitude toward safety, should teach the student to ask "Is what I am about to do unsafe in any way to myself, to others, or to property?" It is essential that the instructional methods lend themselves to positive safety attitude development. This includes (1) a clean and orderly working environment, (2) the awareness of possible accident situations where RESPECT replaces fear, (3) the importance of rules and regulations, (4) the necessity to teach the correct way to perform the first time, (5) the knowledge and skills in the use and the proper maintenance of tools and machines, (6) the reinforcement of safe operating procedures, and (7) proper respect for hazardous wastes and hazardous waste disposal.

Student participation greatly increases the effectiveness of any safety education program. Students should be actively involved in planning and presenting programs and demonstrations that involve the subject of safety as well as the care and maintenance of tools and machines.

Table of Contents

General Safety Practices

INTRODUCTION

Accidents are normally caused by *unsafe acts* or *unsafe conditions.* It is apparent that most of OSHA regulations are aimed at alleviating unsafe conditions. A comprehensive safety program must also use various instructional techniques aimed at alleviating unsafe acts. These techniques must build knowledge, skill, habit and attitude on the individual whether the person be staff, faculty, or student.

In collecting and evaluating information concerned with the safety practices for major program areas, many commonalities were identified. These commonalities were placed in the following categories listed below:

Body Mechanics
Personal Protection
Facility Condition
Housekeeping Practices
Gas Control
Electrical
Equipment
First Aid
Recordkeeping
Fire Safety
Eye Protection
Ladders
Hand Tools
Hazardous Materials
Scaffolds

BODY MECHANICS

1. As many muscles as possible are used, distributing the workload.
2. Both hands are used to pick up heavier objects..
3. Lifting heavy objects alone is avoided. Help is requested.
4. Pushing is preferred to pulling.
5. Leg muscles are used to lift heavy objects rather than back muscles.
6. Bending and unnecessary twisting of the body for any length of time is avoided.
7. Work is done at the proper level.
8. Long pieces of materials are carried by two people.

PERSONAL PROTECTION

1. Confine long hair so that it is not exposed to machinery and does not interfere with vision.
2. Require the wearing of safety goggles, glasses or other eye protection when there is a danger of eye injury.
3. Provide respirators for use where harmful dusts or fumes exist.
4. Determine the physical defects and limitations of all students so that they will not be assigned tasks detrimental to their health or physical condition.
5. Prohibit the wearing of loose clothing in the laboratory and shop areas.

General Safety Practices (continued)

6. Require students to remove rings and other jewelry while working in the laboratory and shop areas.
7. Where noise levels are excessive over long periods of time, ear protection should be worn.
8. Protective apparel, including safety shoes, aprons, shields and gloves are worn properly as required by the nature of the task.
9. Provisions are made for cleaning and sterilizing respirators, masks and goggles.
10. Head protection is worn in all areas where there is danger of falling and/or flying objects.

FACILITY CONDITION

1. Aisles, machines, benches, and other equipment are arranged so as to conform to good safety practices.
2. Stairways, aisles, and floors are maintained clean, dry, with no protruding objects, and unobstructed.
3. Walls, windows and ceilings are clean, maintained in good repair and free of protrusions.
4. Illumination is safe, sufficient and well placed.
5. Ventilation and temperature controls are proper for conditions.
6. Fire extinguishers and other necessary fire equipment are properly selected, adequately supplied, properly located, inspected and periodically recharged as required.
7. Exits are properly identified and illuminated.
8. Lockers and drawers are clean, free of hazards, and doors kept closed.
9. Personnel know the procedures for notification of fire and evaluation of premises.
10. Laboratories and workplaces are free from excessive dust, smoke, and airborne toxic materials.
11. Utility lines and shutoffs are properly identified.
12. Stairways, floor openings and overhead storage areas are properly guarded with rails and toe boards.
13. Stairways are constructed with proper clearance.

HOUSEKEEPING PRACTICES

1. Provide for the storage and daily removal of all sawdust, shavings, metal cuttings, rags and other waste materials.
2. Provide properly marked boxes, bins or containers for various kinds of scrap stock and rags.
3. Utilize sturdy racks and bins for material storage, arranged to keep material from falling on students and to avoid injuries from protruding objects.
4. Employ a standard procedure to keep floors free of oil, water and foreign material.
5. Provide for the cleaning of equipment and facilities after each use.
6. Provide regular custodial service in addition to end of class cleanup.
7. Prohibit the use of compressed air to clean clothing, equipment and work areas.
8. Keep walkways and work areas free of all obstructions.
9. Floor surfaces must be maintained in a "nonskid" condition.

General Safety Practices (continued)

10. Tools and materials are stored orderly and safely.
11. File cabinets and other tall cabinets should be anchored.

GAS CONTROL

1. The flow of gas to gas appliances is regulated so that the flame is of proper height when the appliance valve is turned on full.
2. Gas appliances are properly insulated from tables, benches, adjacent walls, or other flammable materials.
3. No gas hose is used where pipe connections can be made.
4. Gas appliance valves are adjusted so that they may be lighted and maintained at proper height without undue hazard.
5. Operators are instructed how to light gas appliances.
6. There are no apparent gas leaks, nor is there any odor of gas detectable in any part of the shop or laboratory.

ELECTRICAL

1. Equipment shall be properly grounded.
2. All switch boxes, junction boxes, wires, and conduits shall be properly covered or closed.
3. Defective, inadequate, worn, frayed, wet, oily, or deteriorated insulation should be replaced.
4. Defective switches, receptacles, extension cords, lamp sockets, tools or equipment should be repaired immediately or properly marked and made inoperable.
5. All stationary and portable electric tools should be properly connected and grounded according to manufacturer's specifications (except double insulated tools).
6. Broken housing and loose or vibrating machine parts should be replaced before equipment is used.
7. Equipment and tools not meeting the approval of the Underwriters Laboratories should not be used.
8. Electrical panels, switch boxes, motors and other electrical equipment should never be cleaned with water or dangerous solvents.
9. Never overload circuits or overfuse circuits by using the wrong size or type of fuse.
10. Hazardous locations should be equipped with explosion-proof or other special wiring methods as defined in the National Electrical Code.
11. All equipment or circuits being worked on or repaired should be locked out or otherwise de-energized and tagged.
12. All installation or extension of electrical facilities must comply with the National Electrical Code.
13. Only heavy duty, grounded extension cords designed for industrial service should be used.
14. Extension cords should never be used to operate stationary equipment or other permanent operations.
15. Clearance of 30 inches and clear access should be maintained around all electrical panels.
16. Work practices which overload motors, insulation, wires or electrical accessories should be avoided.
17. Electrical cords should be disconnected by pulling on the plug, not the cord.

18. Metal ladders should not be used when working on electrical equipment.
19. All switch panels, circuits, outlets, and boxes should be labeled properly.
20. A master control switch should be utilized for all electric installations.
21. All motors should be equipped with magnetic switches to prevent automatic restart after shutdown.

EQUIPMENT

1. All equipment should be operated in accordance with specifications as stated in the owners manual.
2. Machines, apparatus is arranged so that operators are protected from hazards of other machines or passing individuals.
3. Point of operation zones are properly identified and guarded.
4. Pulleys, gears and belts are properly protected by permanent enclosure guards.
5. Guards are removed only for repair purposes and then replaced immediately.
6. Equipment control switches for each machine are easily available to the operator.
7. Machines are turned off when the instructor is out of the room and/or if the machine is unattended.
8. Proper cleaning equipment is used (avoid air for cleaning purposes).
9. Nonskid areas are maintained around dangerous equipment.
10. A preventive maintenance program is established for all equipment.
11. Machines are guarded to comply with OSHA code.
12. Cutting tools are kept sharp, clean, and in safe working order.
13. All hoisting devices are maintained in a safe operating condition and specified load ratings are easily identified.
14. Machines which are defective or being repaired are clearly marked and made inoperable by locking out the machine power switch.
15. Machines and apparatus are marked with proper color code.
16. Equipment cords and adapters are maintained in a safe working condition.
17. Adjustment and repair of any machine is restricted to experienced persons.
18. Ladders are maintained and stored properly.
19. Machines designated for fixed location are securely anchored.

FIRST AID

1. The first aid is administered by a qualified individual.
2. A list of the qualified first aid personnel is posted.

RECORDKEEPING

1. An adequate record of accidents is made and reported through proper channels.
2. An analysis of accidents is made for the purpose of corrective action.

General Safety Practices (continued)

FIRE SAFETY

1. Provide and properly mount approved fire extinguishers in the shop area. Multipurpose dry chemical units are most effective for general use. General purpose fire extinguishers should have at least a 2-A: 10-B: C rating. Water backup for extinguishers is always desirable. Multipurpose dry chemical can damage delicate electrical equipment. Gas type extinguishers eliminate that problem. Halon 1211 is more effective and less costly than CO_2 for extinguishing electrical fires.
2. Store flammable liquids in approved (Underwriters Laboratories or Factory Mutual labeled) safety containers and cabinets.
3. Provide for the inspection and testing of fire extinguishers at regular intervals to ascertain that they are fully charged and in proper working condition. (See National Fire Protection Association Pamphlet 10, "Standard for Portable Fire Extinguishers" for details).
4. Provide instruction to students in the location and proper use of fire extinguishers and other fire-fighting equipment.
5. Provide for the bulk storage of flammable materials in an area removed from the main school building.
6. Segregate oxidizers and oily materials in storage. Do not use oxidizer (peroxide catalyst) containers for other purposes.
7. Prohibit use of flammable liquids for cleaning purposes.
8. Provide Underwriters Laboratories Listed oily waste containers for oily and paint soaked rags. It is a good policy to place waste with spontaneous combustion potential in waterfilled containers. (See National Fire Protection Association Pamphlet 30, Para. 4450, "Flammable and Combustible Liquids Code.")
9. Post fire alarm and evacuation procedures.
10. Students should know remote shutoff valve or switch locations for gas or oil-fired equipment and how to de-energize electrical equipment in an emergency.
11. Deluge showers and fire blankets should be in all shops and laboratories, especially where there is danger of fire igniting clothing made of synthetic materials.
12. Do not stack materials within 30 inches below a sprinkler head.

EYE PROTECTION

1. Appropriate protective eyewear (i.e., safety goggles and/or safety glasses, face shields) should be worn in all areas where there are activities potentially hazardous to the eye.

   Specific usages that should be mentioned include:

   a. when grinding with a fixed or portable grinder;

   b. working around or with storage batteries, refrigerants, acids, chemicals (solids, liquids or gas) or other eye irritants;

   c. using compressed air for drying tools or parts;

   d. welding;

   e. working around any rotating equipment such as fan blades, belts, saws, drills, etc.

2. Eye baths should be accessible to areas where chemicals are being used that could be hazardous to eyes.

General Safety Practices (continued)

LADDERS

1. Hold on with both hands when going up or down.
2. If material must be handled, hoist it up and lower it down by using a rope.
3. Always face the ladder when climbing up or climbing down.
4. Be sure that your shoes are not greasy, muddy, or slippery before climbing.
5. Do not climb higher than the third rung from the top on straight or extension ladders.
6. Do not climb higher than the second tread from the top on stepladders.
7. Always use one hand to hold onto ladder.
8. Do not reach or extend your body to a point where your belt buckle is beyond the side rails.
9. Do not use metal ladder near or while working on electricity.
10. Special precautions should be taken when erecting and climbing a ladder on a windy day.
11. Place a ladder so that the horizontal distance from the base to the vertical plane of the support is approximately 1/4 the ladder's length between supports.
12. Ladders, unless otherwise specified and designed, shall not be used by more than one person at a time, nor with ladder jacks and scaffold planks where use by more than one person is anticipated.
13. Ladders shall not be placed in front of doors, unless the door is blocked off, locked or guarded.
14. Ladders shall not be placed on boxes, barrels, or other unsuitable bases to obtain additional height.
15. No ladder should be used to gain access to a roof or any other elevated position unless the top of the ladder shall extend at least three feet above the point of support.

HAND TOOLS

1. Instruct students to select the right tools for each job.
2. Establish regular tool inspection procedures to ensure tools are maintained in safe condition.
3. Instruct students in the correct use of tools for each job.
4. Provide proper storage facilities.
5. Do not lay tools on operating machinery or equipment.
6. Keep tools out of aisles and working spaces where they may become tripping hazards.
7. Do not put sharp objects or tools in pockets. This could result in cuts or being stabbed.

HAZARDOUS MATERIALS

1. Never use or smell the contents of an unmarked container.
2. Do not store any chemical or chemical solution in an unlabeled container, or above eye level.
3. Do not work alone in the lab or shop. At lease one other person should always be in the same area.
4. When using heat or open flames, do so only in the area set aside for this purpose.
5. All equipment operated under pressure must have a vented safety diaphragm or safety valve.

6. When getting material stored out of reach, use only approved stepstools or ladders with safety feet and place them on the floor so they will not slip.
7. When conducting accelerated tests, you may need additional protection because you are using toxic chemicals in higher concentrations than you used in normal application.
8. Know and follow the rules for disposing of chemicals.
9. Keep all chemicals — solids, liquids, or gas — off your skin and away from your eyes.
10. If chemicals or solvents get on skin, they should be washed off immediately.
11. Read complete label or directions before using any material.
12. Use extreme care when using caustics, acids, solvents, epoxies and adhesives.
13. In areas where skin and eye irritants are used, eye wash fountains and safety showers should be provided.
14. Although lead pipe has been largely replaced by copper tubing, steel and plastic pipe, do not underestimate the hazards of lead poisoning involved in working with lead.
15. Clothing should be changed and washed daily if it becomes contaminated with toxic chemicals, dusts, fumes, liquids, etc.
16. Toxic and corrosive refrigerants (i.e., methyl chloride and ammonia) may be flammable in concentrations exceeding 3.5 percent by volume. Ammonia is the most common refrigerant in this category. It is very irritating to the eyes, skin and respiratory system. Should large amounts be released, the area must be evacuated. Re-entry to the area should only be made by personnel wearing appropriate respiratory protection and protective impervious clothing.
17. Personnel should not be permitted to eat around toxic chemicals or in contaminated areas.
18. Insure that personnel are not allergic to dyes and solutions, particularly if they are different from what you have been using before. Have neutralizing agents, for dyes and solutions being used, ready and available for immediate use.
19. Make sure that all materials used, creams, lotions, dyes, etc., are not toxic or injurious by inhalation or absorption.

SCAFFOLDS

1. The footing or anchorage for scaffolding shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement.
2. Unstable objects such as barrels, boxes, loose bricks or concrete blocks shall not be used to support scaffold or planks.
3. No scaffold shall be erected, moved, dismantled or altered except under the supervision of the instructor.
4. Guard rails and toeboards shall be installed on all open sides of platforms more than 10 feet above the ground or floor.
5. Scaffolds 4 to 10 feet, having a minimum horizontal of less than 45 inches in either direction, shall have standard guard rails installed on all open sides and ends of the platform.
6. Scaffolds and their components shall be capable of supporting without failure four times the maximum intended load.
7. All planking of platforms shall be overlapped a minimum of 12 inches or secured from movement.

8. An access ladder or equivalent safe access shall be provided.
9. Scaffold planking shall extend over their end supports not less than 6 inches nor more than 12 inches.
10. The use of shore or lean-to scaffolds is prohibited.
11. The poles, legs or uprights of a scaffold shall be plumb and securely and rigidly braced to prevent swaying and displacement.

COLOR CODING

The following safety color codes shall be used for marking physical hazards (according to UOSHA GIS 1910 144).

1. **RED.**
   Fire. Red shall be used as the basic color for the identification of fire protection equipment and apparatus.

   Stop: Emergency stop bars, buttons, or electrical switches on hazardous machines shall be red.

   Danger: Safety cans and safety signs shall be painted red.
2. **ORANGE.**
   Orange shall be used as the basic color for designating dangerous parts of machines or energized equipment. Orange shall be used to emphasize hazards when enclosure doors are open or when gear bolts, or other guards around moving equipment are open or removed, exposing unguarded hazards.
3. **YELLOW.**
   Yellow shall be the basic color for designating caution and for marking physical hazards. Solid yellow, yellow and black stripes, or checkers (or yellow with suitable contrasting background) should be used interchangeably using the combination which will attract the most attention.
4. **GREEN.**
   Green shall be used to designate safety and the location of first-aid equipment (other than fire-fighting equipment).
5. **BLUE.**
   Blue shall be the basic color for designation of Caution, limited to warning against the starting, use of, or the movement of equipment under repair or being worked upon.
6. **PURPLE.**
   Purple shall designate radiation hazards.
7. **BLACK AND WHITE.**
   Black, white, or a combination of these two shall be the basic colors for designation of traffic and housekeeping markings.

Colors shall meet the tests specified in section 3, color definitions, of ANSI 253.1-1967 Safety Color Code for marking physical hazards. UOSHA GIS 1910 144.2.

NOISE CONTROL

The ability to hear is a precious gift. Without it, it is difficult to lead a fully productive life either on or off the job. Noise can destroy hearing, create physical and psychological stress, and thereby contribute to accidents in addition to the obvious cause by making it impossible to hear warning signals. Practical arts and vocational education laboratories and shops are not exempt from noise pollution considerations — particularly if maximization of learning and safety are the goal!

Noise is an unwanted sound. It is a form of energy or vibration that is conducted through the atmosphere. There are four variables that can affect the intensity of noise and its potential danger.

1. The level of the sound, as measured in decibels (dB)
2. The length of time to which one is exposed to the sound
3. The numbers and lengths of quiet (recovery) periods between periods of sound
4. Individual sensitivity to or tolerance for sound

Table 1.1 indicates that workers should not be exposed to a sound level which exceeds 90 dB on the average for a eight-hour day. It should be noted that the standards in this table apply only to work, i.e., day-to-day environments, and schools are typically different. In some cases, however, vocational courses approximate the work situation and hence, these standards might well apply. Furthermore, it also deserves noting that instructor exposure is often the equivalent of industry despite the fact that student exposure is not. Since hearing is affected by the totality of the noise that one is exposed to, any precautions are appropriate.

Fortunately, noise exposure can be controlled. No matter what noise problems occur in the laboratory and workplace, the technology exists to reduce the hazard. The responsibility to correct noise problems rests on the individuals, i.e., supervisors, teachers, foremen, etc., involved. In general, there are three basic ways to control noise.

1. **Source Control.**

   The best and most effective approach to control noise is to control it at its source since in this way, no further hearing danger is posed and therefore, other control methods are probably not needed. Techniques of noise source control include:

   a. Reduction of impact noise.
   b. Reduction of the speed of moving and rotating parts.
   c. Reduction of pressures and flow velocities in circulating systems.
   d. Reduction of flow resistance in circulation systems.
   e. Balancing of rotating parts.
   f. Reduction of friction in rotating, sliding, and moving parts.
   g. Isolation of vibration within equipment
   h. Reduction of the size of the surface radiation areas.
   i. Application of vibration-damping materials to vibrating parts and surfaces.

2. **Path Control.**

   If source control is not possible, the next best approach is to control the noise along its path. Although such controls limit the number of persons exposed to the noise, they do not always eliminate the noise problem for all persons affected. In path control, noise is blocked or reduced before it is heard. This can be accomplished by:

   a. containing or enclosing the noise.

   b. absorbing the noise along its path.

   c. deflecting the noise away from our ears.

   d. separating the noise from the hearer.

3. **Hearer Protection.**
   Finally, ear protection equipment is available. This is not as desirable as either source or path control because it affords protection *only* to those wearing the equipment. Students must be willing to wear hearing protectors whenever they are exposed to potentially dangerous noise. Certain conditions and activities can reduce the effectiveness of the hearing protectors themselves.

HEARING PROTECTION REQUIRED (OSHA)

1. When employees are subject to sound levels exceeding those listed in Table 1-1, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce the sound levels within the levels of Table 1-1, personal protective equipment shall be provided and used to reduce the sound levels within the levels of the table.
2. If the variations in noise level involve maxima at intervals of one second or less, it is to be considered continuous.
3. In all cases where the sound levels exceed the values shown herein, a continuing, effective hearing conservation program shall be administered.

TABLE 1.1 PERMISSIBLE NOISE EXPOSURES

Duration Per Day In Hours	Sound Level — dBA — Slow Response
8	85
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼ or less	115

Free Safety and Health Consulting and Education Services are available from the State of Washington, Department of Labor and Industries, Division of Industrial Safety & Health. To contact the Voluntary Services section nearest you, call 1-800-LISTENS.

EAR PROTECTION

Cotton should not be used as protection against abrasive sound. While a wad of cotton may minimize waves of certain frequencies, it fails to alter the intensity; thus providing a false sense of security.

Sound is measured by two fundamental characteristics: frequency (related to pitch) or number of waves per second, and intensity level (related to loudness). The human ear reacts to frequencies ranging from 20 cycles per second to about 20,000. Sound at a level of 85 db. begins to lead to a loss of hearing, depending on: 1) the intensity; 2) the frequency; 3) the duration of exposure; and, 4) individual sensitivity. The following are examples of noise and the approximate db for each.

Busy street traffic at about 100 feet	60 db.
Office tabulating machines (electric typewriter, etc.)	80 db.
20 feet from subway	90 db.
Pneumatic diesel air compressor	90 db.
Diesel shovel (idling)	90 db.
Automatic screw machines	95 to 105 db.
Wire rope stranding machine	102 to 108 db.
Header	103 to 108 db.
Circular saw	105 to 115 db.
Between two compressors	110 db.
Drop hammer (depending on size)	110 to 135 db.
Punch press	112 db.
Between two drills, 20 feet apart	117 db.
5 feet from pneumatic press	130 db.
40 feet from jet engine	138 db.
59 feet from rocket engine	150 db.

EMERGENCY ACTION

EMERGENCY COMMUNICATIONS

It is recommended that the following be implemented to assure proper channels of communication during an emergency:

1. Procedures should be reviewed with the administration and employees as to *set methods* of communications in the event an emergency occurs. (See Suggested Procedure page F-3).
2. Order of notification under the following conditions:
   a. If serious injury (uncontrollable situation)
      — school nurse
      — ambulance
      — principal
      — parents
   b. If serious injury (controlled situation)
      — school nurse
      — principal
      — parents
3. Telephone:
   a. Each department should have communication with the building office.
   b. Emergency telephone numbers should be conspicuously posted and the procedure posted for dialing "outside."
4. A card file should be maintained in each school for *all* students. This card should include the names and telephone numbers of parents or guardians to be notified in the case of injury.

FIRST AID

General

It is recommended that every teacher receive instruction in first aid and have a valid first aid certificate.

Administering

1. First aid should be administered by qualified personnel.
2. Do not diagnose illness or prescribe or administer medication of any sort.
3. Disperse crowds if accident is serious and keep the area as quiet as possible.
4. Stick to basic procedures:

a. Call for aid

b. Stop bleeding

c. Treat for shock

d. Mouth-to-mouth resuscitation (if breathing has stopped)

e. Coronary Pulmonary Resuscitation (C.P.R.) [if required]

General Safety Practices (continued)

Transportation

1. Parents shall be notified immediately of all cases of illness or injury. If the student is to be sent home or elsewhere, the parents should arrange for the transportation. The principal should take appropriate action for the best interest of the student.
2. When the injury is serious, do not attempt to move the student except for first aid procedures until professional medical help arrives.
3. If a school is uniquely located where special transportation may be required, a procedure should be established at the beginning of the school year.

Hazardous Materials and Hazardous Waste Disposal

INTRODUCTION

Until now, most shops and facilities adhered to the OSHA and EPA directives that were brought into effect by the U.S. Government in the late 1960's and the early to mid-1970's. Most shop owners and public school facilities directors were probably content with their applications of compliance with those ACTS. However, in 1986, the OSHA and EPA regulations were issued pertaining to HAZARDOUS MATERIALS and HAZARDOUS WASTES. It is now LAW that all industry facilities comply with the 1986 regulations.

It is very important that employers, instructors, administrators, students, etc. familiarize themselves not only with local OSHA/EPA requirements, but, it is also necessary to know local laws and regulations governing the DISPOSAL of HAZARDOUS MATERIALS.

This compilation is in NO WAY the final word on Hazardous Materials or Hazardous Waste Disposal. The intent of this chapter is to inform the school system staff and students that such new regulations are in effect and that information concerning such — is AVAILABLE.

Standardized material/courses can be obtained from various paint manufacturers and it is recommended that such a course be offered during the training period.

At the end of this section is a list of Governmental and Private Agencies that can provide information not explained or presented here.

Hazardous Material

	HAZARD STATEMENT	SPECIAL CONTENT INFORMATION	HANDLING INSTRUCTIONS PROTECTIVE EQUIPMENT			EXPOSURE SYMPTOMS
			SAFETY EYEWEAR	RESPIRATORY	SKIN	
LACQUERS	Extremely Flammable		Recommended Goggles/ Safety Glasses	Minimum: Particle Mask Confined Areas: Respirator	Gloves Recommended to Prevent Contact	• Headache • Dizziness • Staggering • Confusion • Unconsciousness
ENAMELS & VINYLS	Flammable	Enamels May Contain Lead	Recommended Goggles/ Safety Glasses	Minimum: Particle Mask Confined Areas: Respirator	Gloves Required	• Headache • Dizziness • Staggering • Confusion • Unconsciousness
URETHANES	Flammable	Contain Or Are Mixed With Isocyanates	Recommended Goggles/ Safety Glasses	Self-Contained Breathing Apparatus Required At All Times	Gloves & Impervious Clothing Required	• Watering Eyes • Extreme Breathing Difficulty • Dizziness • Staggering • Confusion • Unconsciousness
THINNERS (lacquers)	Extremely Flammable		Recommended Safety Goggles/ Glasses	Minimum: Particle Mask Confined Areas: Respirator	Gloves Required	• Headache • Dizziness • Staggering • Confusion • Unconsciousness
REDUCERS (enamels/ urethanes)	Flammable	Contain Or Are Mixed With Isocyanates	Recommended Safety Goggles/ Glasses	Minimum: Particle Mask Confined Areas: Respirator	Gloves Required	• Headache • Dizziness • Staggering • Confusion • Unconsciousness
SOLVENTS/ REMOVERS	Flammable Extremely Flammable		Required Safety Goggles/ Glasses	Minimum: Particle Mask Confined Areas: Respirator	Gloves & Impervious Clothing Required	• Headache • Dizziness • Staggering • Confusion • Unconsciousness
HARDENERS/ CATALYSTS	Flammable Extremely Flammable	Contain Isocyanates	Required Safety Goggles/ Glasses	Self-Contained Breathing Apparatus Required At All Times	Gloves and Impervious Clothing Required	• Watering Eyes • Respiratory Irritation • Extreme Breathing Difficulty • Dizziness • Staggering • Confusion • Unconsciousness
FILLERS/ PUTTIES/ FIBERGLASS	Flammable	Prevent Inhalation of Particles	Recommended Safety Goggles/ Glasses	Minimum: Particle Mask Confined Areas: Respirator	Gloves Required	• Headache • Respiratory Irritation • Dizziness • Staggering • Confusion • Unconsciousness
EPOXIES/ ADHESIVES	Flammable		Recommended Safety Goggles/ Glasses	Minimum: Particle Mask Confined Areas: Respirator	Gloves Required	• Headache • Respiratory Irritation • Dizziness • Staggering • Confusion • Unconsciousness
SURFACE PREPARATION PRODUCTS	Flammable		Recommended Safety Goggles/ Glasses	Minimum: Particle Mask Confined Areas: Respirator	Gloves Required	• Headache • Respiratory Irritation • Dizziness • Staggering • Confusion • Unconsciousness

Emergency Phone Numbers: **Police** _____ **Fire & Paramedics** _____ **Hospital — Emergency** _____

Reference Chart

FIRST AID PROCEDURES				SPILL CLEAN-UP	FIRE-FIGHTING PROCEDURES	STORAGE TRANSFER OF LIQUIDS	DISPOSAL
EYE CONTACT	SKIN CONTACT	INHALATION	SWALLOWING				
Flush with Water for 15 Minutes Consult a Doctor	Wash Affected Area with Clean Water Wash Affected Area with Clean Water Wash Affected Area with Soap and Clean Water Wash Affected Area with Clean Water Wash Affected Area with Clean Water Wash with Water If Severe — See a Doctor Wash Affected Area with Soap and Clean Water Wash Affected Area with Clean Water Wash Affected Area with Clean Water Wash with Water If Severe — See a Doctor	Move to Fresh Air Restore Breathing Keep Warm & Quiet Consult a Doctor	Do Not Induce Vomiting Consult a Doctor Immediately	Remove Ignition Sources Avoid Breathing Fumes Use: Inert Absorbent Non-Sparking Tools To Remove	Extinguisher: Class "B" Foam — Carbon Dioxide — Chemical Powder — Wear Full Protective Equipment Including Air Supplied Respirator Fog Nozzles Recommended If Water Is Used	Transfer & Mixing Small Amounts Only Always Use Static Lines Storage: Below 120°F in Building and/or Metal Cabinet Designed for Flammables	Consult Your Shop Manager for Instructions Follow Local, State, & Federal Require-ments Do Not Incinerate in Closed Containers

Poison Control Center: _____ **MSDS are Located:** _____

Written Hazard Communication Regulation

The HAZARD COMMUNICATION REGULATION is commonly referred to as the "Employee Right to Know" law or just "Right to Know". The law basically states that employees have a "right to know" what hazardous materials they may come into contact with on the job and how to protect themselves from exposure or hazards. OSHA has been appointed by the Federal Government to enforce the Hazard Communications Regulation.

OSHA can fine your school district for non-compliance. Also, in extreme cases OSHA can close your facility for non-compliance. However, OSHA does not want to close your facility and will help in any way to insure compliance.

HOW DOES OSHA LOOK AT YOUR FACILITY AND WHAT ARE YOUR DISTRICT'S RESPONSIBILITIES?

1. A list of hazardous materials used in your shop. This list can be made up by taking an inventory (1) using purchase order receipts (2) and by familiarizing yourself (or designated person) with MSDS (Material Safety Data Sheets) you now have. A HAZARDOUS MATERIALS INVENTORY ROSTER or MSDS roster should be displayed in the shop.
2. Staff and personnel (i.e., Administrators/Instructors) must ensure that all containers of hazardous materials and hazardous wastes are appropriately labeled. Each label must include the name of the material, the manufacturer's name and address, and the proper hazard warning. If you transfer the material to a different container, you must post a label on the SECONDARY CONTAINER.
3. Staff or personnel (Administrators or Instructors) must have a written "Hazard Communication Program" in the work area (the shop). The regulation requires a written program that tells how you will inform and educate the students about hazardous materials and hazardous wastes which will be used/disposed in the shop.
4. Each program facility is required to possess a MSDS FOR EACH HAZARDOUS MATERIAL OR HAZARDOUS WASTE ON HAND. Personnel (Instructors/ Staff) must have a MSDS file and Hazardous Material Inventory Roster/Poster prominently displayed in the work area. All students must have access to the file and Roster. New students must be aware of all MSDS information as soon as they enroll in the program.
5. Staff or personnel (Administrators or Instructors) must provide a training program that will teach students about hazardous materials or hazardous wastes in the workplace.
6. Manufacturers of hazardous materials are solely responsible for providing your facility with a MSDS for every hazardous material they sell you. If you don't get a MSDS from the Manufacturer, notify the manufacturer by mail. Then, if you don't get a response within 25 working days—contact your nearest OSHA office and they will do everything they can to obtain the MSDS for you. Remember, photocopy all letters you send; in case a compliance issue is raised.
7. Students are responsible for reading warnings, warning labels, and MSDS's. Students are also required to wear protective equipment when working with hazardous materials. Students also have a responsibility to follow all procedures you have outlined in the training program.

HERE ARE SOME TIPS YOU CAN INCORPORATE TO PROTECT YOUR DISTRICT AND YOUR FACILITY.

1. Keep good records—of injuries or illnesses your students have experienced in case of future litigation.
2. Have a 'sign-in' attendance sheet each time you hold a training session.
3. Be aware of students who 'moonlight.' That is, students that have other jobs where they could be exposed to hazards due to lack of protective equipment.
4. Waivers or documents waiving your responsibility do not protect you or your school district from liability.

"Right to Know"

1. Only you (the student) can really protect yourself (your safety) in the lab or at work.
2. Your teacher has a responsibility to inform you about hazardous materials and hazardous wastes in your work area.
3. You need to read warning labels and obey them. If you do not understand a label — get your instructor to explain the label to you.
4. Your school district must provide a safe workplace for you, even if hazardous materials are used or stored there.
5. The Government's new law, enforced by OSHA is called the "Hazard Communication Regulation." The regulation says that you have a "Right to Know" about hazards you face in the lab or work place.

Safety Quiz – "Right to Know"

Student Name _____

Class _____

Date _____ Grade _____

1. The school district isn't responsible for telling you about hazardous materials or hazardous wastes in the lab or workplace.	T	F
2. Reading and following Hazardous Material Warning labels is very important.	T	F
3. Ask your friend or class buddy any questions about hazards and that will be all you need to know.	T	F
4. Your instructor is totally responsible for your (the student's) safety.	T	F
5. Your school district must provide a safe workplace for you.	T	F

MSDS and Product Labeling

1. The Hazardous Materials Inventory Roster lists all the hazardous materials or hazardous wastes in your shop.
2. MSDS means Material Safety Data Sheet.
3. Do not use a material in a container that does not have a warning label.
4. Warning labels DO NOT contain all the information contained in the MSDS.
5. The school district or your instructor is required to have a MSDS for ALL hazardous materials or wastes in your lab/work area.

Safety Quiz – MSDS and Product Labeling

Student Name _____

Class _____

Date _____ Grade _____

1. Your instructor only needs a MSDS for a few hazardous materials in your work area. T F
2. All the information you need is on the container warning label. T F
3. It is okay to use materials in unmarked containers. T F
4. MSDS means Material Safety Data Sheet. T F
5. The Hazardous Material Inventory Roster should list all Hazardous Materials or wastes in the work area. T F

Hazardous Material Handling

SAFETY SUGGESTIONS

1. Any material that could cause injury or death to a person or that damages and/or pollutes land, air, or water is a hazardous material.
2. A hazardous material is considered flammable if it easily catches fire or can explode.
3. After you identify the hazardous materials in your workplace, the next step is to protect yourself from them.
4. You should use personal protective equipment any time you work with a hazardous material.
5. You should use the Hazardous Materials Inventory Roster to learn what hazardous materials are being used in your workplace.
6. If you are using an Air Purifying or filtering respirator—change filter pads when breathing through the respirator becomes difficult.

Safety Quiz – Hazardous Material Handling

Student Name _____

Class _____

Date _____ Grade _____

1. Only materials that cause death are considered to be hazardous materials. T F
2. It's okay to handle hazardous materials for short periods of time without personal protective equipment. T F
3. You should change respirator filter pads when it gets difficult to breathe through the respirator. T F
4. It's best to consult the Hazardous Material Inventory Roster to know what hazardous materials are in the work area. T F
5. All hazardous materials are flammable. T F

Clean-up of Spills and Disposal of Hazardous Wastes

SAFETY SUGGESTIONS

1. You must be prepared to handle a spill of hazardous waste or material BEFORE it happens.
2. Product warning label and MSDS are the best places to prepare yourself for a spill.
3. No matter how small the spill is you must inform your instructor immediately.
4. It is against the law to pour hazardous materials or wastes down a drain or dump them into a sewer. You could be fined heavily or jailed (in extreme cases) if you do.
5. Hazardous wastes generated in general industrial shops can include: solvents and solvent wastes, batteries (leads) and battery acids, paint wastes,and chemical wastes.
6. The MSDS can tell you how to dispose of the product or you can ask your instructor how to dispose of the product.
7. The Resource Conservation Recovery Act requires that a designated person in a facility be responsible for hazardous waste from the time it is generated until it is disposed of.
8. Your (the student's) duties in the waste disposal process is to be sure to place the wastes into the proper storage containers. You may also be responsible for labeling such containers. Never dispose of wastes in an unmarked storage container.

Safety Quiz – Hazardous Waste Clean-up & Disposal

Student Name _____

Class _____

Date _____ Grade _____

1. A hazardous waste generated in general industry could be: solvents and solvent wastes, batteries and battery acids, asbestos wastes, and chemical wastes.	T	F
2. If you don't know how to get rid of a hazardous waste, just dump it down the drain.	T	F
3. If you spill a hazardous material, the first thing you do is to tell your instructor.	T	F
4. If you dump hazardous material down the drain – you could be fined and/or go to jail.	T	F
5. A container warning label tells you how to dump a hazardous waste.	T	F
6. There is someone in your shop whose job it is to know about all the hazardous materials and their wastes that are being used in your work area.	T	F
7. It's not your job to dispose of hazardous wastes into storage containers.	T	F
8. You don't need to worry about a hazardous waste spill until it happens.	T	F
9. .If it's a small spill, just wipe it up. It's not necessary to tell your instructor about it – he's/she's real busy anyway.	T	F
10. .The MSDS and the Product Warning label are the best places to begin to prepare for a future leak or spill.	T	F

Exposure to Hazardous Materials First Aid

SAFETY SUGGESTIONS

1. Serious damage can take place in your body if a hazardous chemical or waste gets into your blood stream.
2. Your lungs can be affected if you breathe hazardous material vapors.
3. EXPOSURE is coming into CONTACT with a hazardous material.
4. EXPOSURE to hazardous materials can happen in three ways:
   a. Eye contact
   b. Inhalation
   c. Skin Contact.
5. To protect eyes; wear a face shield or safety glasses (goggles).
6. To protect lungs; wear a respirator.
7. To protect the skin; wear rubber gloves or rubber boots.
8. To know what protection to use — check the MSDS file on the product that you are going to use.
9. Check protective equipment before putting it on.
   a. Check eye protection for missing lenses or cracked, blurred lenses.
   b. Check respirators for splits/holes in the face mask, missing lenses or straps, and faulty or missing filter pads.
   c. Check rubber boots or gloves for holes or rips.
10. If you or someone you work with is exposed to a hazardous material, get your instructor immediately. He/She will take the necessary steps to remedy the situation.
11. If you or your co-worker inhale a hazardous vapor, get to fresh air immediately.
12. If a chemical gets on the skin, flush the exposed area with water for at least 15 minutes — GET MEDICAL HELP.
13. If a hazardous material is swallowed, call a doctor immediately; do not induce vomiting.
14. If the eyes are exposed to a hazardous chemical, flush with a deluge of water — call a doctor immediately.

Safety Quiz – Exposure to Hazardous Materials: First Aid

Student Name _____

Class _____

Date _____ Grade _____

1. It's okay to breathe paint vapors.	T	F
2. Coming into contact with a hazardous material is considered exposure.	T	F
3. Three ways you can be exposed to hazardous materials are: a. letting it get into your eyes, b. letting it into your lungs, or c. letting it come into contact with your skin.	T	F
4. Protective clothing or equipment is for geeks and nerds.	T	F
5. It's not necessary to put on a face shield if you're just going to use a tiny bit of chemical.	T	F
6. Rubber gloves are hot and heavy to use, so for comforts' sake, it's okay to leave them off.	T	F
7. You should check protective equipment for tears, holes, missing parts, etc. EVERY time you get ready to use them.	T	F
8. If you breathe hazardous vapors, get to fresh air NOW.	T	F
9. If you get battery acid in your eyes, flush them with mass amounts of water and call a doctor.	T	F
10. You could become very ill if a hazardous material is absorbed into your blood stream.	T	F

Key to Safety Quizzes
Hazardous Materials

"RIGHT TO KNOW"

1. False 2.True 3. False 4. False 5. True

MSDS AND PRODUCT LABELING

1. False 2. False 3. False 4. True 5. True

HAZARDOUS MATERIAL HANDLING

1. False 2. False 3.True 4. True 5. False

CLEAN-UP OF SPILLS AND DISPOSAL OF HAZARDOUS WASTES

1. True 2. False 3. True 4. True 5. False 6. True 7. False 8. False 9. False 10. True

EXPOSURE TO HAZARDOUS MATERIALS: FIRST AID

1. False 2. True 3. True 4. False 5. False 6. False 7. True 8. True 9. True 10. True

Information Guide

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N I O S H A
4676 COLUMBIA PARKWAY
CINCINNATI, OHIO 45226

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E P A REGION X
1200 6th AVE
SEATTLE, WASHINGTON 98101

1-206-442-2870

State of Washington

Department of Labor and Industries
Division of Industrial Safety and Health
300 West Harrison St.
Seattle, WA 98119

Rick Gleason, MS, CIH, CSP SCAN 388-1533
Safety Engineering Consultant (206) 281-5533

Hazardous Materials Inventory Roster

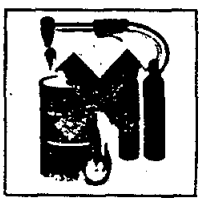
HAZARDOUS MATERIAL	OPERATION OR AREA USED IN SHOP	MSDS ON HAND (YES) OR (NO)

HAZARDOUS WASTE

PAINT WASTE ONLY

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL

WASTE PAINT RELATED MATERIAL NA 1263



Automobile Mechanic
Automobile Technician

Safety is one aspect of the automotive repair industry that cannot be overemphasized. A good mechanic is a safe mechanic. If there is a fast way or a safe way to do the job, take the safe way. Otherwise, you may not get the job done at all. REMEMBER: YOU ARE A MECHANIC 24 HOURS A DAY, 7 DAYS A WEEK — MOST FATAL ACCIDENTS HAPPEN AWAY FROM THE SHOP.

Listed below are some of the potential exposures and safety precautions that you will be confronted with.

GENERAL PRECAUTIONS

1. Oil or adjust moving parts only if authorized.
2. Use caution when working near the fan and belt.
3. Whenever possible, work with the engine switch in the "OFF" position.
4. The fan belt should be tightened only when the engine is stopped.
5. Always consider the engine and exhaust system to be "HOT."
6. Do not pour gasoline from an open container into the carburetor.
7. Use extreme care when welding on vehicles — provide fire protection.
8. Do not work directly above another student.
9. Wait for the radiator to cool before removing the cap.
10. Make sure that hoods are secured in an open position when working on the engine.
11. When "pulling engines" be sure that ropes or slings are properly fastened. **DON'T STAND OR LIE UNDER AN ENGINE OR TRANSMISSION WHEN FASTENED TO A CHAIN OR LIFTING STRAP. THE CHAIN /STRAP COULD FAIL AND YOU COULD BE CRUSHED.**

PERSONAL HEALTH HAZARDS

1. Wear respirators while spray painting. THIS INCLUDES SPRAY PAINT CANS.
2. Do not clean hands in solvent or gasoline. These materials are explosive and also can cause a skin rash.
3. Avoid back strain when it is necessary to lift parts from the engine. Crouch down and let your legs/thighs do the work.
4. Never place hands in front of a high pressure grease gun.
5. Keep open wounds properly dressed and covered.
6. Eliminate loose clothing and confine long hair. (This includes chains and long earrings.)
7. Never spray compressed air into the skin or eyes. A FATAL INJURY COULD RESULT.
8. Wear safety glasses when under a vehicle. This will protect your eyes from falling debris — dirt, sand, glass, metal, etc.
9. Wash hands and clothing frequently — this prevents skin problems and prevents tools from slipping out of your hands.

Automobile Mechanic/Technician (continued)

JACKING AND HOISTING

1. Do not jack up the vehicle if anyone is under it.
2. Jack stands must be used when working under vehicles. When using a hoist, it *must* have air/hydraulic backup controls and/or locks.
3. Avoid excessive shaking of the vehicle when on jack stands.
4. Have the instructor inspect the jack stand supports before students work under any vehicle.
5. Long jack handles are a serious tripping hazard and they should be barricaded or raised out of position.
6. Do not use bumper jacks.
7. Do not run an engine when the car is on the hoist or on jack stands.
8. Caution should be observed when lowering a vehicle.
9. Follow rules 1-8 when at home or on parking lots—not all jacking and hoisting accidents happen in the shop.

DRIVING AND LOCATING THE VEHICLE FOR WORK

1. Do not wear eye protection with restricted vision when driving a vehicle in the shop.
2. Vehicles should be driven only by students with valid driver's licenses and with the instructor's permission.
3. Work should not be performed on vehicles parked in heavily travelled areas or on public thoroughfares.
4. Towing or pushing should be done only with instructor approval.
5. Have a fellow student guide you when parking a vehicle in a congested area.
6. Someone *must* be in the driver's seat of a vehicle when the engine is being started.
7. Reckless driving or "peeling-out" in the work area is forbidden and constitutes a major safety violation that could cause termination of your participation in the Auto Mechanic program.

GREASES, OILS, FUELS AND SOLVENTS

1. Clean up all spills *immediately* and ventilate the area.
2. Use only approved solvents for cleaning parts. Do *not* use gasoline. Wear gloves when cleaning parts with solvents.
3. Be sure that there is proper ventilation before an engine is started.
4. Keep oil-soaked rags in approved rag waste containers.
5. Check fuel connections for leaks before starting an engine.
6. Keep flammable liquids in closed, approved containers.
7. Clean up all oil/fuel/solvent spots and/or spills before a "test" drive. Don't expect someone else to secure your mess.
8. Use drip pan for all vehicles stored overnight.

Automobile Mechanic/Technician (continued)

AIR PRESSURE

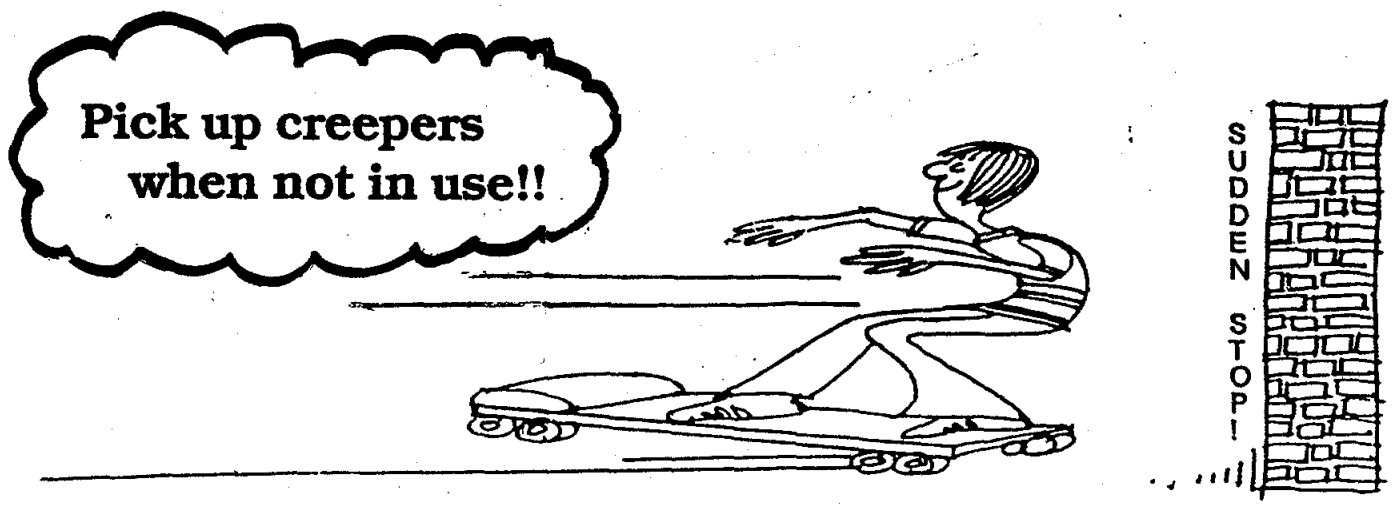
1. Use an air gauge when inflating tires. Do not overinflate tires.
2. When inflating truck tires that have a snap ring, the tire should be confined within an approved cage.
3. Never aim an air hose at another student or at yourself.

WRENCHES AND TOOLS

1. Keep *all* tools clean and free of oil and grease.
2. Keep tools picked up from the floor.
3. Make certain that wrenches fit properly.
4. Hammers with loose handles should not be used.
5. Use tools only for the purpose for which they are designed — never use a file as a pry bar.
6. Creepers should be stood on end or stored in a rack when not in use.
7. Do not use chisels or punches with "mushroom" heads.
8. The palm of your hand is *not* a tool. Install wheel covers with a rubber mallet.

CARBON MONOXIDE

Carbon monoxide is a poisonous gas caused by incomplete burning of gasoline or other fuels. It is present in gaseous form when the engine is running. Even a small amount of carbon monoxide in your body can be fatal. That is why it is imperative that you never run an engine in a poorly ventilated area.



Automobile Mechanic/Technician (continued)

COMPRESSED GAS

The most commonly used gases for cutting and welding are oxygen and acetylene. However, you may also be using hydrogen, nitrogen, Maap gas, argon, helium, "Freon," ammonia, propane (liquefied petroleum gas) carbon dioxide or sulphur dioxide in some of your projects.

To use them safely you need to know their characteristics and be sure you are using the right bottle. There is no standard color code for compressed gas bottles! **Read the labels.**

Treat compressed gas cylinders with the greatest respect. There is an immense amount of power in each cylinder. Careless handling resulting in valve or cylinder damage can produce instant death for you or your friends. Use a cart or hand truck for moving cylinders.

FLAMMABLE GASES Acetylene, hydrogen, propane and Maap gas are highly flammable. They are normally handled in compressed gas cylinders or tanks. Acetylene is dissolved in acetone (Maap gas and propane are liquefied by pressure), so it is especially important that these cylinders be kept upright when in use.

They will all form violently explosive mixtures with air or oxygen, so valves, regulators, hoses and other equipment must be tight and in good repair. **Shut off valves and regulators when they are not in use!**

Store spare flammable gas cylinders in a well ventilated location, separated by a fire resistant barrier — preferably outside.

All gas cylinders must be secured and stored erect at all times. When storing or moving, **cylinder caps must be in place.** Students should not move cylinders unless secured to carts.

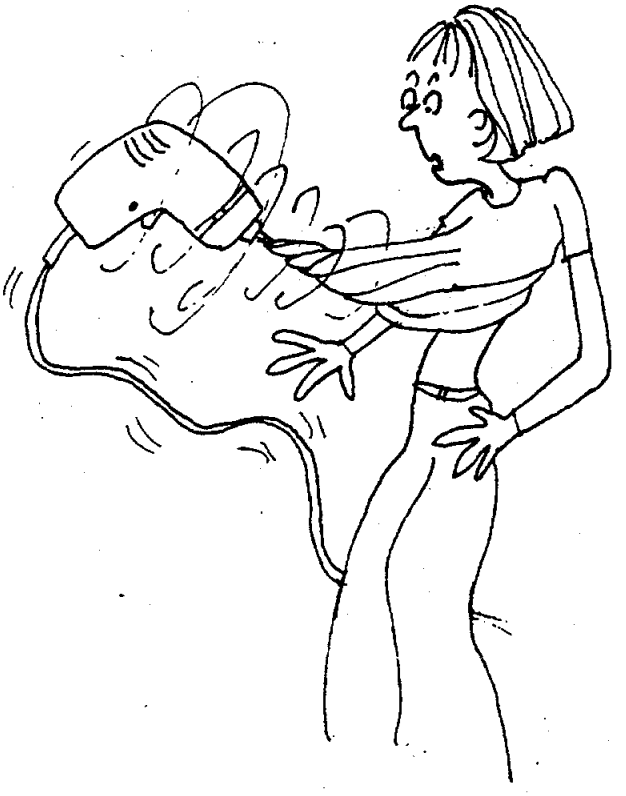
OXYGEN For shop use, this gas is in a class by itself. It will combine with many common materials, and under the right conditions will cause these materials to burn violently or to explode. Oxygen under high pressure can cause oils to explode. **NEVER USE OIL ON ANY OXYGEN VALVE OR REGULATOR EQUIPMENT!**

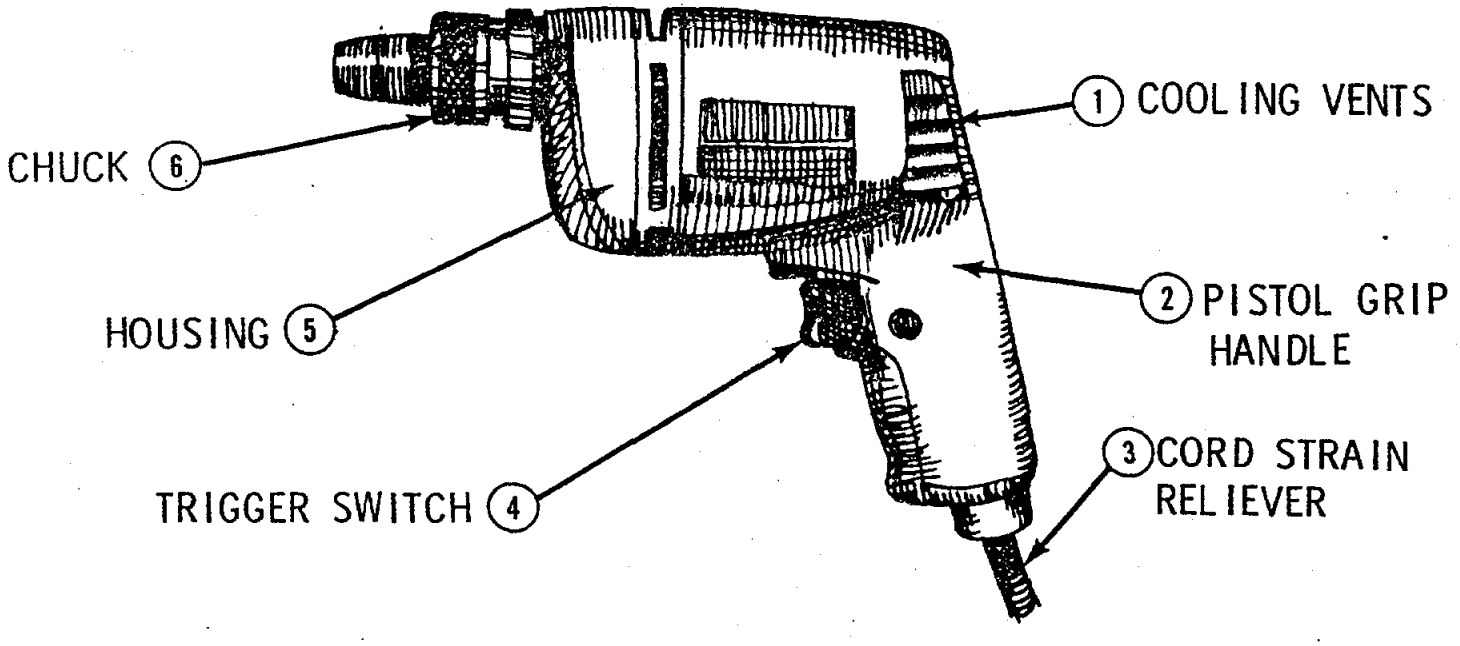
NON-FLAMMABLE GASES These include nitrogen, argon, helium, "Freon," sulphur dioxide, and to some extent ammonia, which is flammable only in high concentrations. Some are odorless, and others (sulphur dioxide, ammonia) have extremely strong odors. None will support life, so adequate ventilation of the use area is essential. Read up on the specific characteristics and detailed safety precautions for the gas you will use and discuss them with your instructor before proceeding.

Portable Electric Drill

SAFETY SUGGESTIONS

1. Wear approved eye protection.
2. Disconnect the electric cord plug from the power outlet when changing drill bits.
3. Be sure the switch is off and the chuck key is removed before you connect the cord plug to the power source.
4. Do not use in damp or wet area.
5. Be sure the material being drilled is tightly clamped or secured.
6. Drill with a straight steady even pressure.
7. Be sure the drill bit is used and properly secured in the chuck.





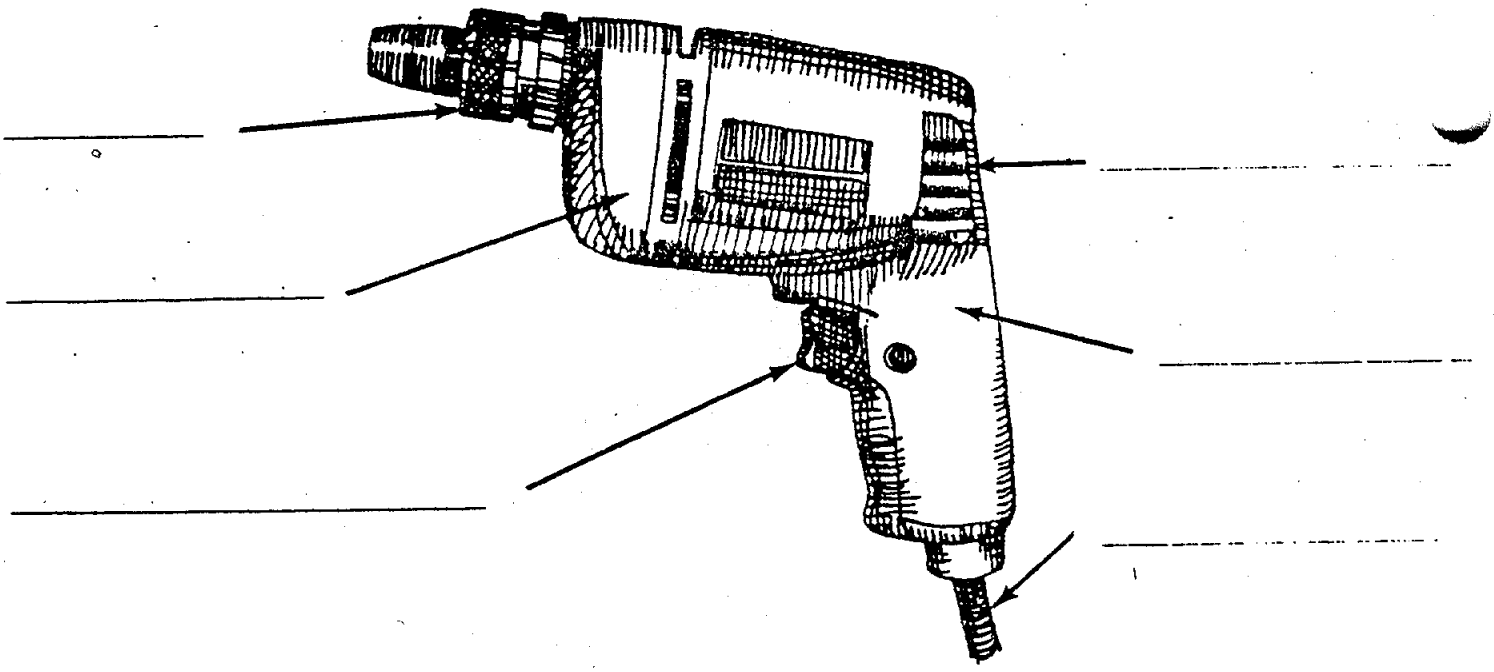
Safety Quiz — Portable Electric Drill

Student Name _____

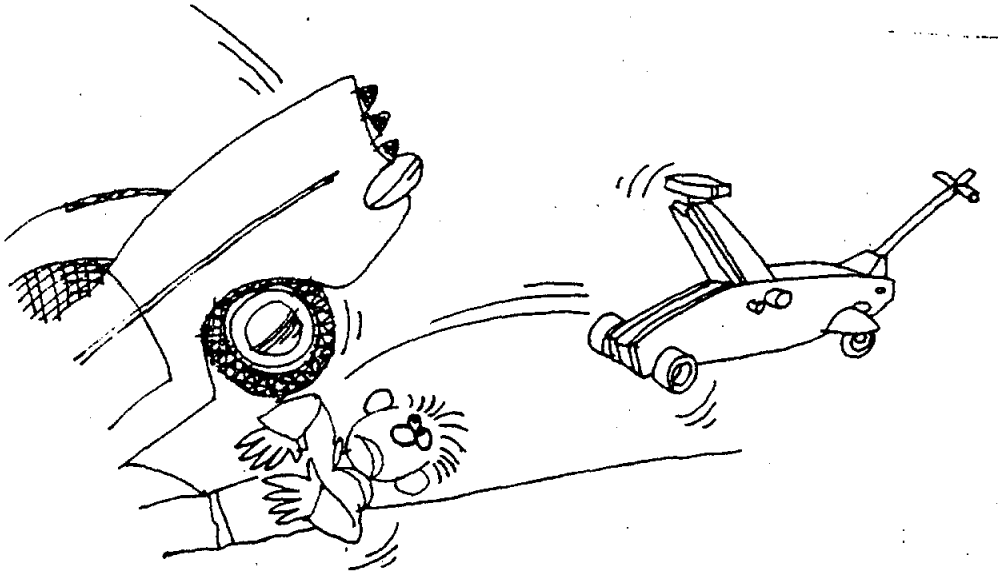
Class _____

Date _____ Grade _____

1. Eye protection is not needed when drilling wood. T F
2. Electric powered portable tools should not be used in wet areas. T F
3. The electrical cord plug of the drill should be disconnected from the power source when changing drill bits. T F
4. Holes should be drilled with short jerky movements. T F
5. The drill bit must be secure in the drill chuck. T F
6. The chuck key should remain in the chuck when drilling. T F

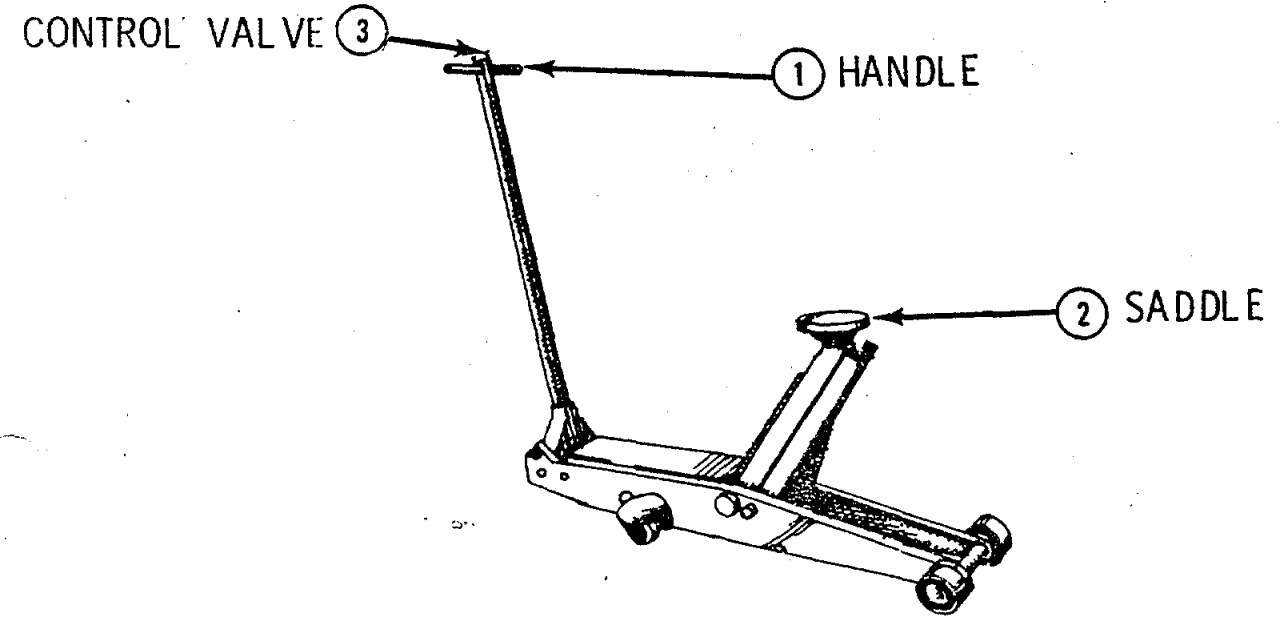


Service Jack



SAFETY SUGGESTIONS

1. When using the jack, be sure it is securely placed and lift saddle properly aligned to prevent slipping.
2. Once saddles are located, apply some pressure, then stop and examine these before lifting the car.
3. Never raise a car while someone is under it.
4. Always use car stands or supports before going under a raised car.
5. Inspect the jack for oil leaks or other malfunctions before using.
6. Never work under a vehicle supported only by a service jack.
7. If possible, use the service jack as a "backup" to your vehicle's jack stands. Bring the saddle just to the crossmember (lifting point) and lock.



Safety Quiz – Service Jack

Student Name _____

Class _____

Date _____ Grade _____

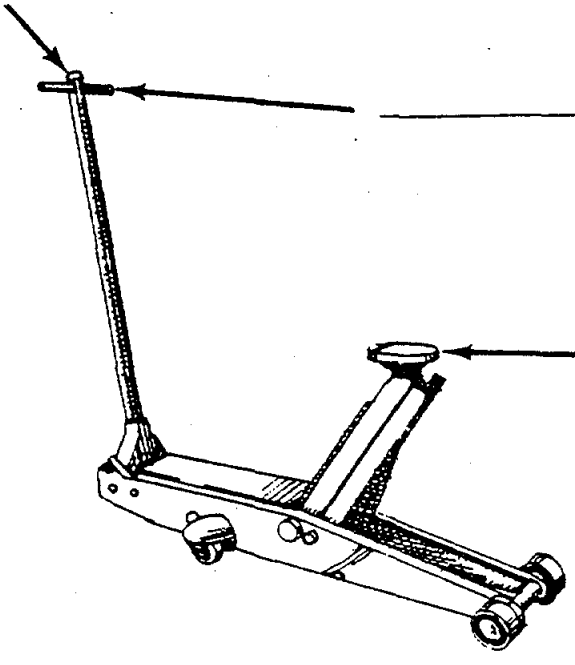
1. It is unsafe to work under a car that is supported with a service jack only. T F

2. It is a good safety practice to raise a car with someone under it. T F

3. It is necessary to inspect the lift saddles for proper alignment when raising a car. T F

4. The service jack should always be inspected for malfunctions before using. T F

5. Car stands on supports should be used before anyone goes under a raised car. T F

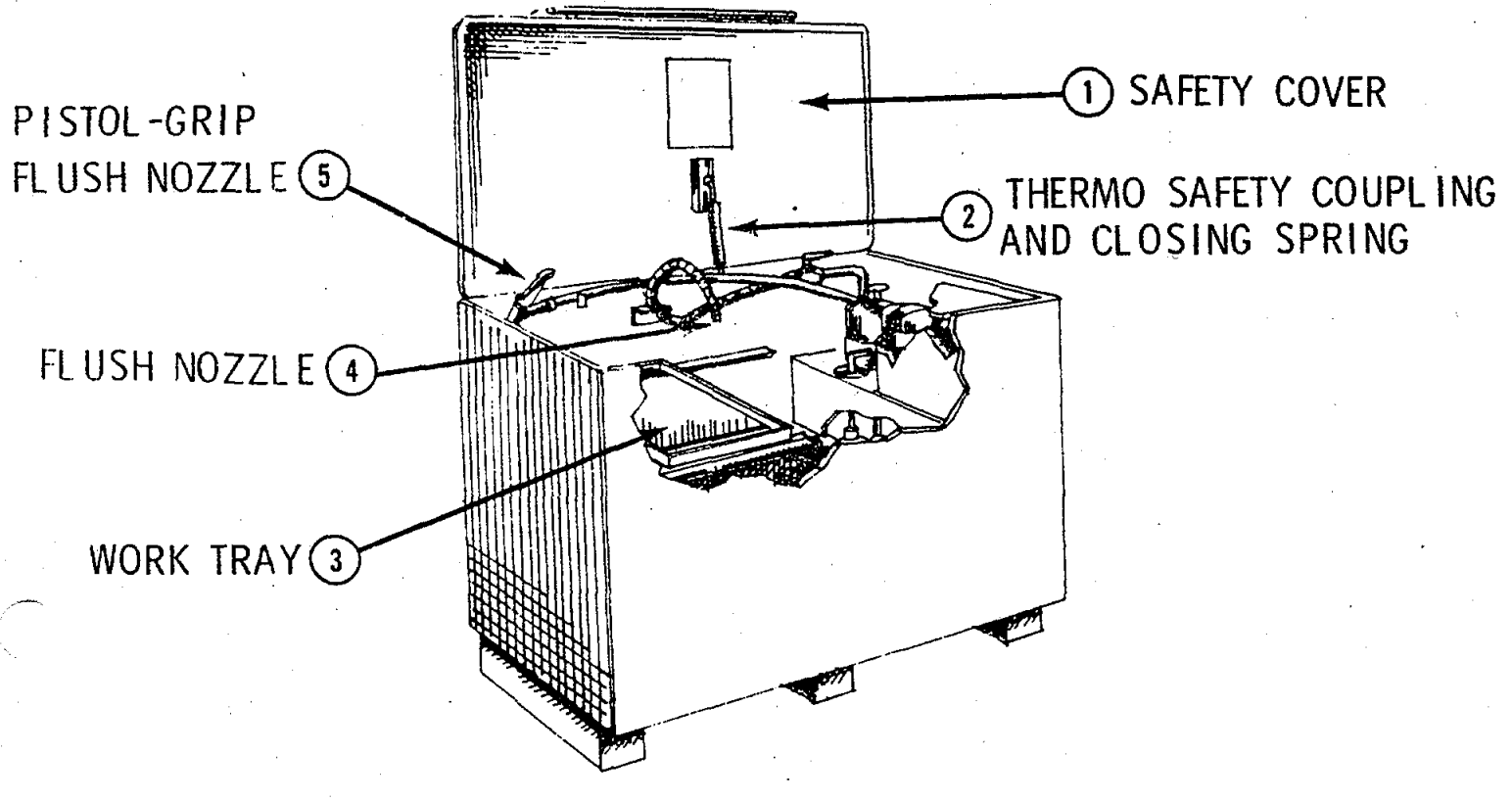


Parts Washer

SAFETY SUGGESTIONS

1. Use in well-ventilated area.
2. Wear approved goggles or face shield.
3. Use cleaning solvents with relatively high flash points (temperature at which vapors will ignite when brought into contact with an open flame.
4. Do not spill or splash solvent on clothing.
5. When brushing parts in solvent, use a nylon or brass bristle brush to avoid sparks.
6. A large tank of solvent must have a lid that is held open by a fusible link (holding device that will melt and drop the lid in the event of a fire.)
7. Wash hands and arms thoroughly when cleaning job is complete. Apply hand-cream or lanolin after washing.

8. Avoid prolonged skin exposure to all types of solvents. USE GLOVES. If *any* rash or redness on skin appears — stop using solvent on skin immediately — use gloves.



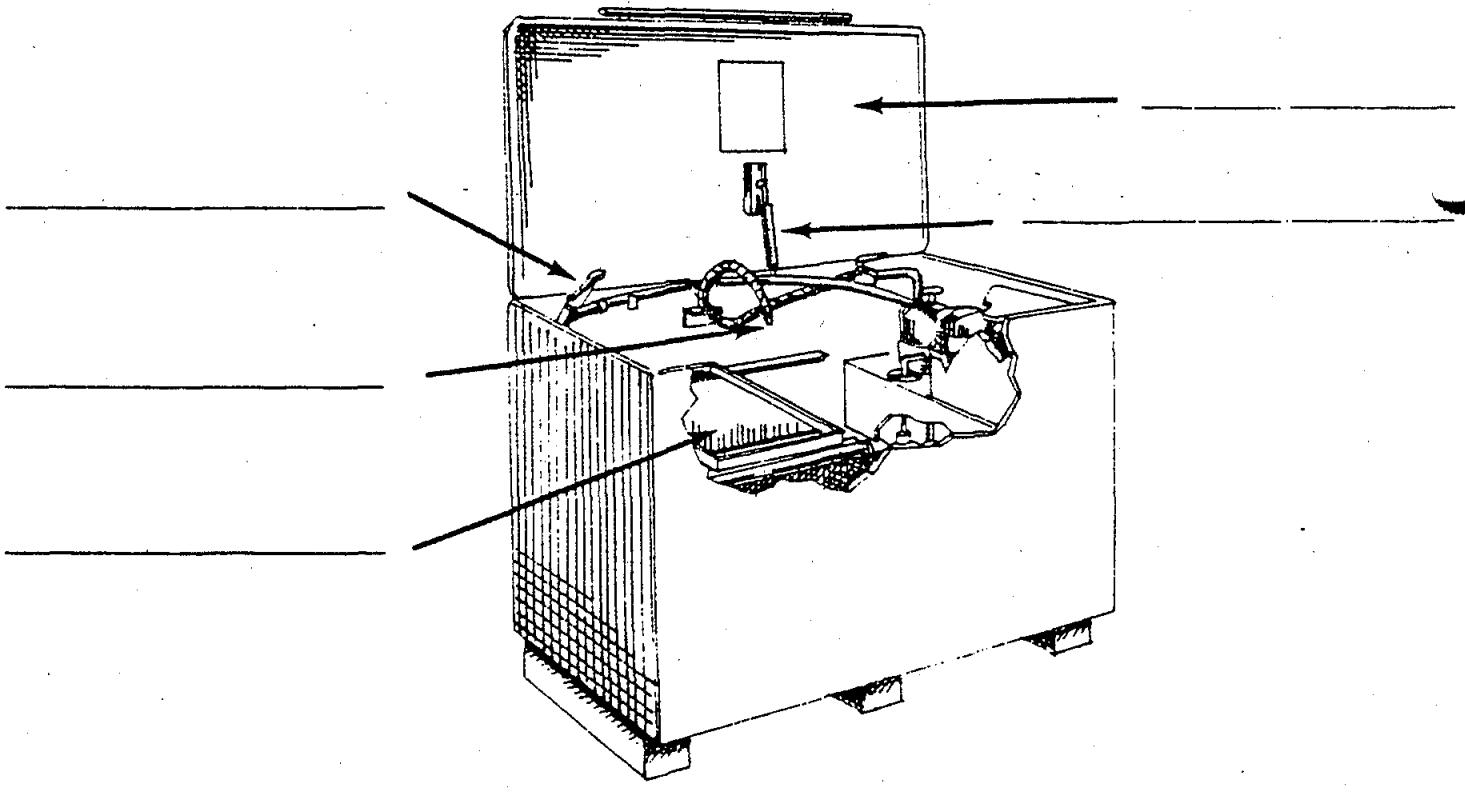
Safety Quiz – Parts Washer

Student Name _____

Class _____

Date _____ Grade _____

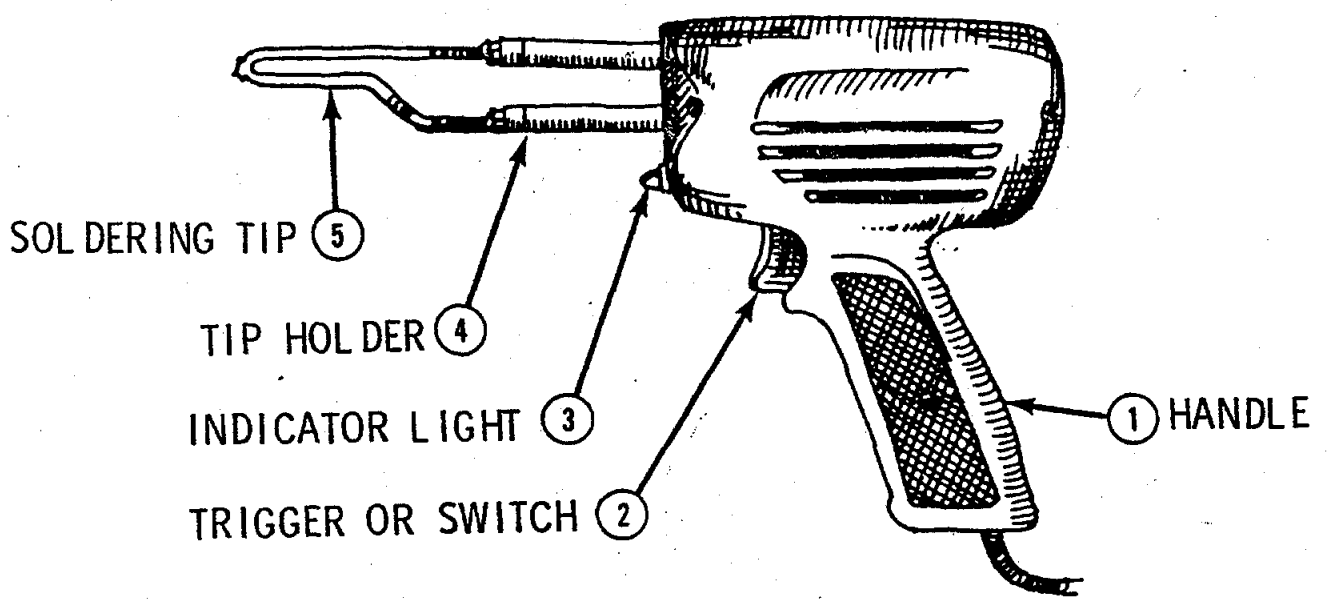
1. When brushing parts in solvent, a nylon or brass bristle brush should be used to avoid sparks. T F
2. It is not necessary to wear goggles or a face shield when washing parts. T F
3. A fusible link to hold the lid open is not necessary on parts wash tanks. T F
4. Parts wash tanks should be placed in a well ventilated area. T F
5. It is not necessary to wash your hands after washing parts in solvents. T F



Solder Gun

SAFETY SUGGESTIONS

1. Always wear approved eye protection.
2. Work in a well-ventilated area and avoid inhaling soldering fumes.
3. Observe all rules for handling *hot* materials.
4. Do not flip excess molten solder off the tip of solder gun. Wipe it off with a piece of steel wool.
5. Do not stand in wet areas while using the solder gun.
6. Never leave the solder gun unattended with the electrical cord plugged in.
7. Always disconnect cord when changing soldering tips.
8. Soldering flux can cause burns. Clean up flux immediately.
9. In case of acid burns, flush immediately with water. (Use baking soda to neutralize acids.)
10. Never use solder gun with worn or exposed wiring or a cracked plastic cover/handle.



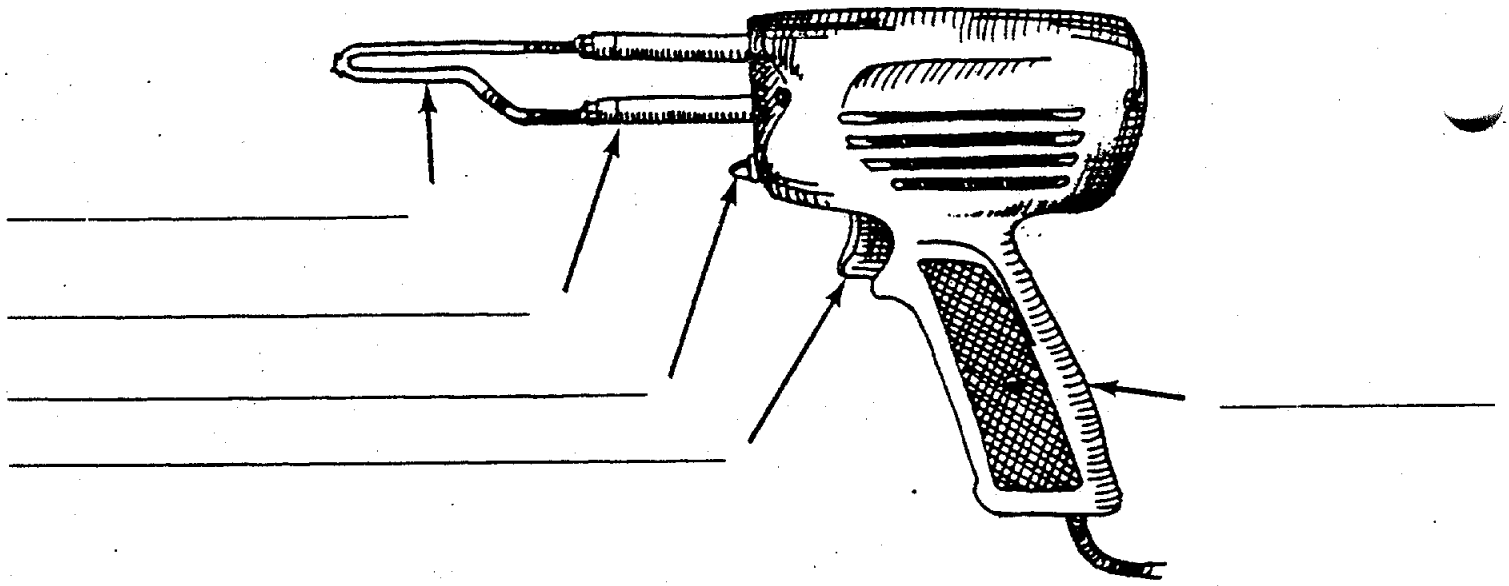
Safety Quiz – Solder Gun

Student Name _____

Class _____

Date _____ Grade _____

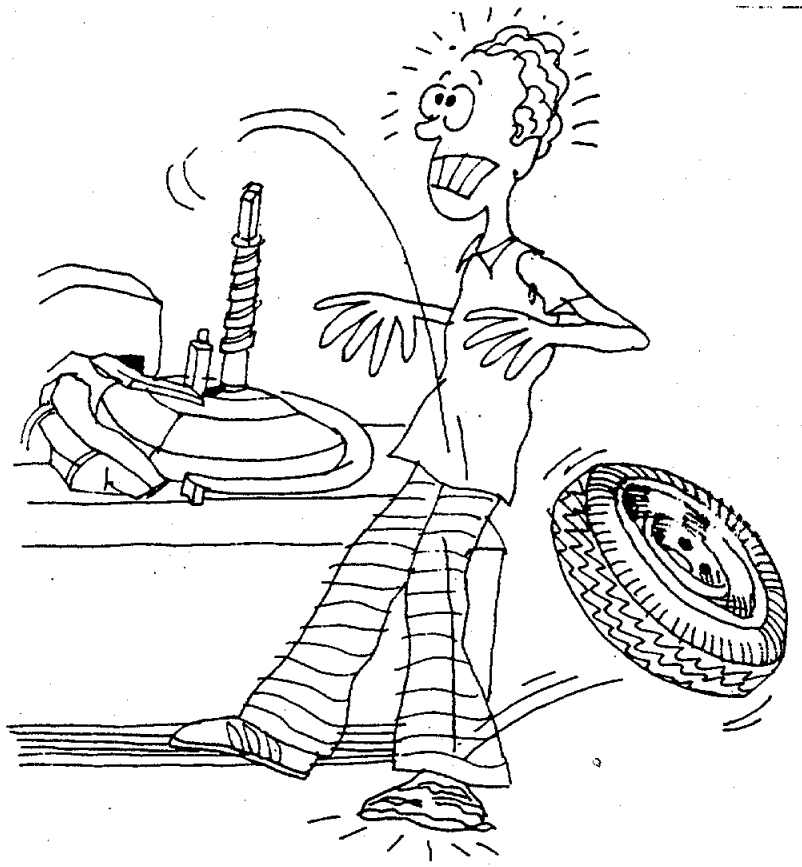
1. Wear safety goggles ONLY if you think solder might flip in your eyes. T F
2. A large, airy room would be a better place to solder than a small closed space. T F
3. Use pliers or a clamp to hold small objects while soldering. T F
4. The most important thing to remember when changing soldering tips is to stand in a wet area. T F
5. Leave your work to cool and come back later to clean up the excess flux. T F

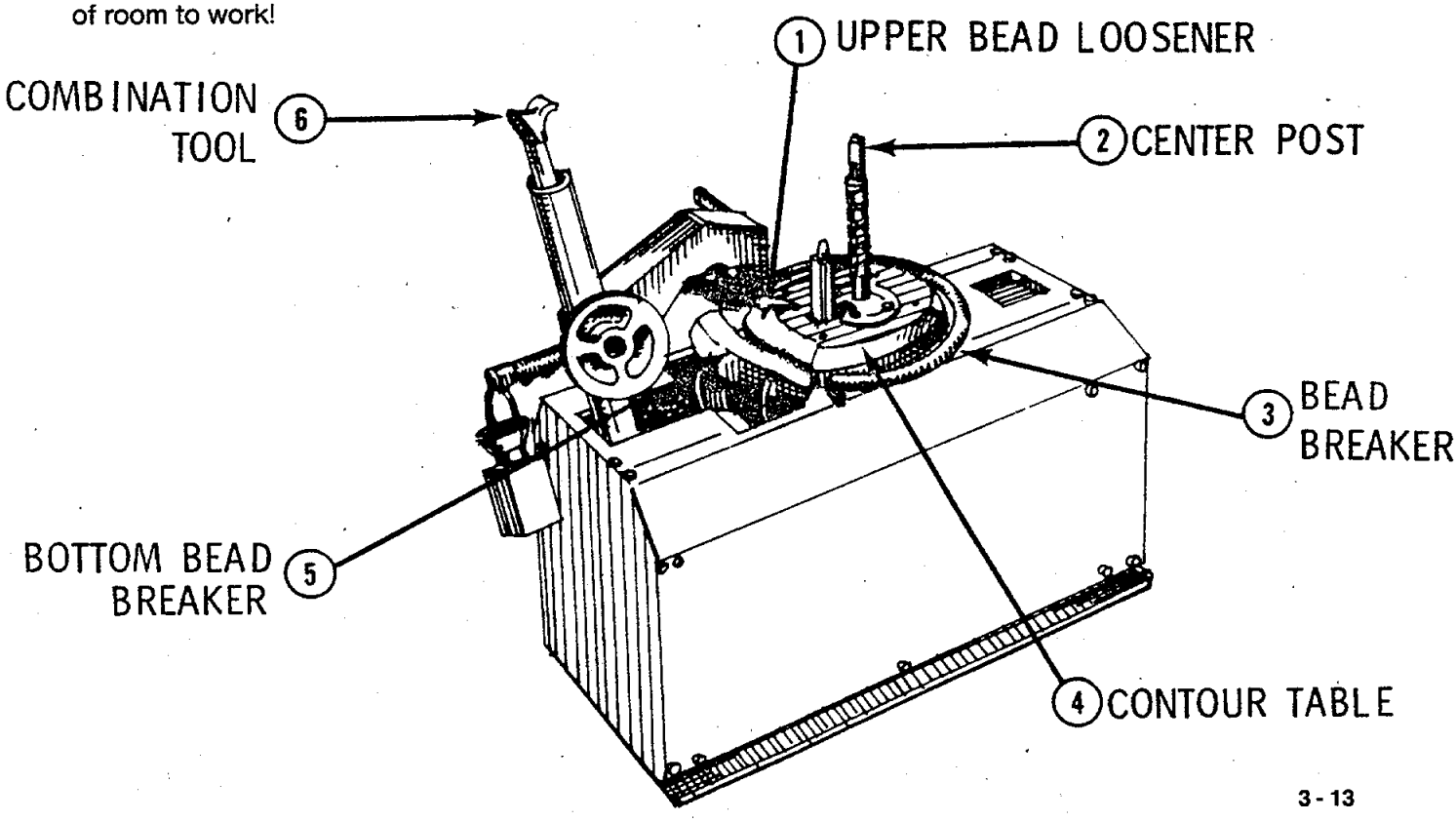


Tire Changer

SAFETY SUGGESTIONS

1. Wear approved eye protection.
2. Use correct lifting techniques.
3. Deflate the tire by pushing the valve core.
4. Use the proper tools in all aspects of changing tires.
5. Truck tires using a split-rim assembly **requires the use of a safety cage.**
6. Be sure that the wheel assembly is securely locked on the mounting machine.
7. Keep fingers away from the tire bead and wheel rim.
8. On tubed tires, be sure that the stem and core are inserted properly.
9. Release the tire wheel assembly from the mounting machine before the air pressure is built up.
10. Eliminate clutter of parts, old tires, etc. from the tire changer area. Have plenty of room to work!





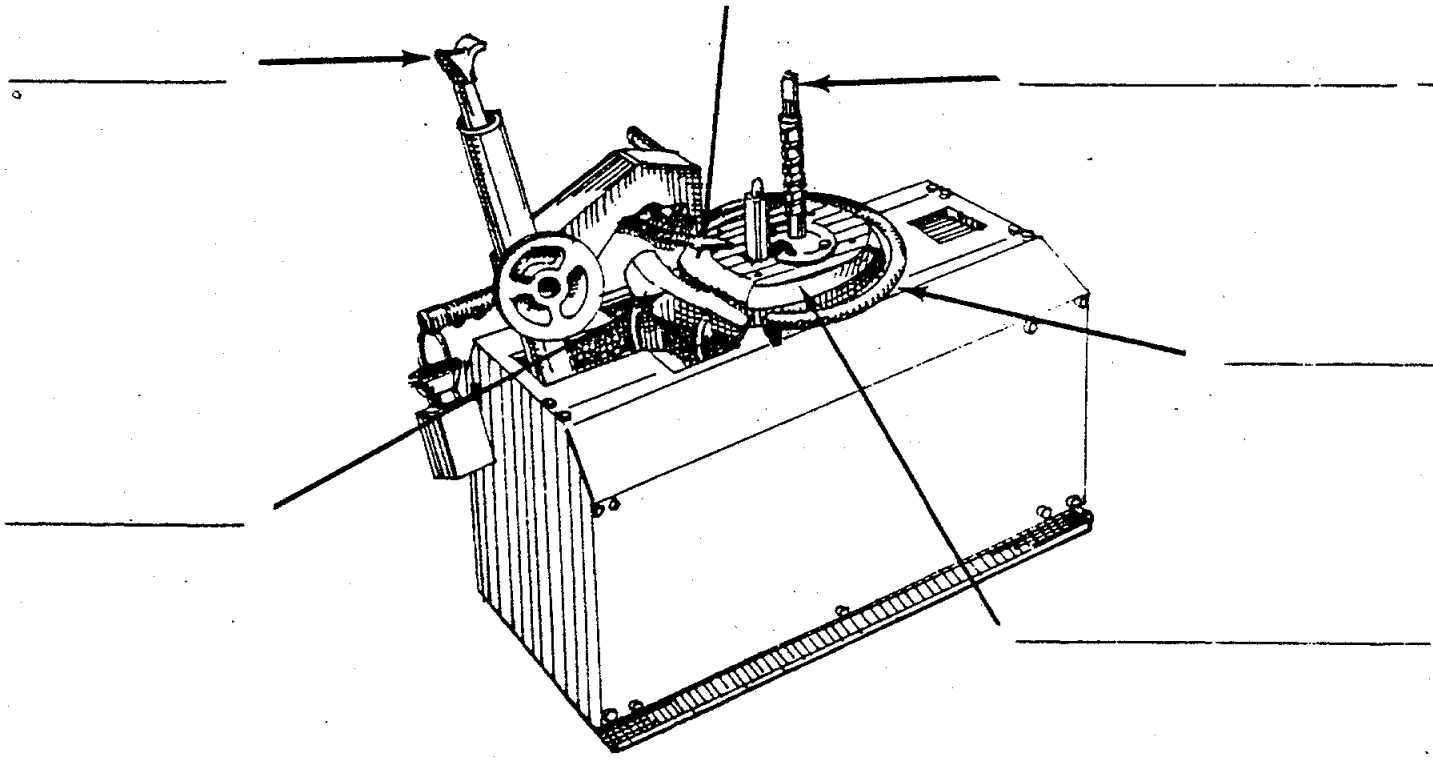
Safety Quiz — Tire Changer

Student Name _____

Class _____

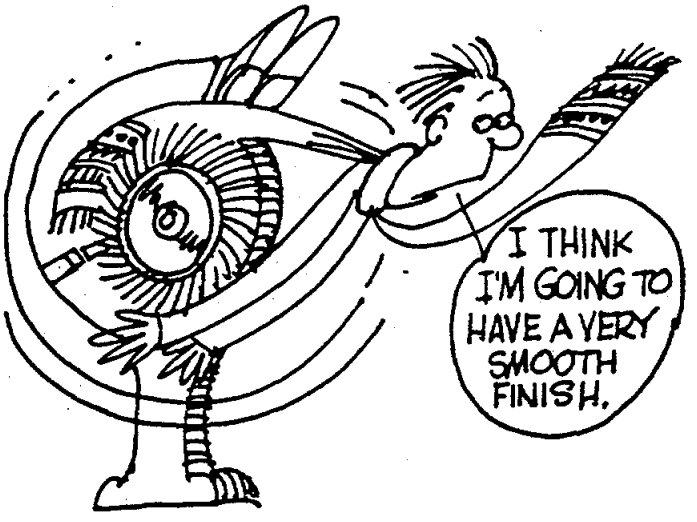
Date _____ Grade _____

1. There is absolutely no danger in using a tire mounting machine. T F
2. Most any type of tool can be used in changing tires. T F
3. Truck tires using a split-rim assembly require the use of a safety cage. T F
4. It is not necessary to wear eye protection when using a tire mounting machine. T F
5. It is important that the stem and core be installed properly. T F
6. Fingers may be pinched between the tire bead and wheel rim. T F
7. Always use correct lifting techniques when handling tires. T F



Buffer

OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THIS MACHINE



SAFETY SUGGESTIONS

1. Always buff using the lower half of the wheel (below center).
2. Always wear eye protection when buffing.
3. Always stand to one side of the wheel when buffing and when applying compound.
4. Never use a rag to hold the work while you are buffing.
5. Use extra caution when buffing around corners, openings or areas where the wheel could grab and throw the work. Do not buff small diameter tubing, wires, chain or similar material.
6. Exercise caution so that the work does not overheat and burn your hands.
7. Be sure the area behind the buffer is open and that no one else is in the safety zone.
8. If your hairstyle presents a potential hazard, you must fasten it securely or wear a protective hair cover.
9. Remove or fasten any loose clothing, neckties or jewelry. Roll loose sleeves to the elbow.

Safety Quiz — Buffer

Student Name _____

Class _____

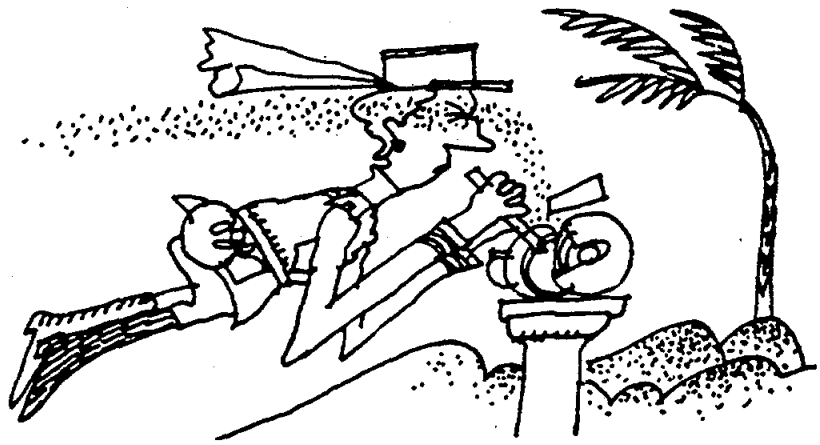
Date _____ Grade _____

1. A rag should be used to hold hot objects while buffing. T F
2. Always buff on the lower half of the wheel. T F
3. Loose clothing or hair must be confined. T F
4. Goggles *must* be worn when buffing. T F
5. Use extra caution when buffing corners or confined areas of the work. T F

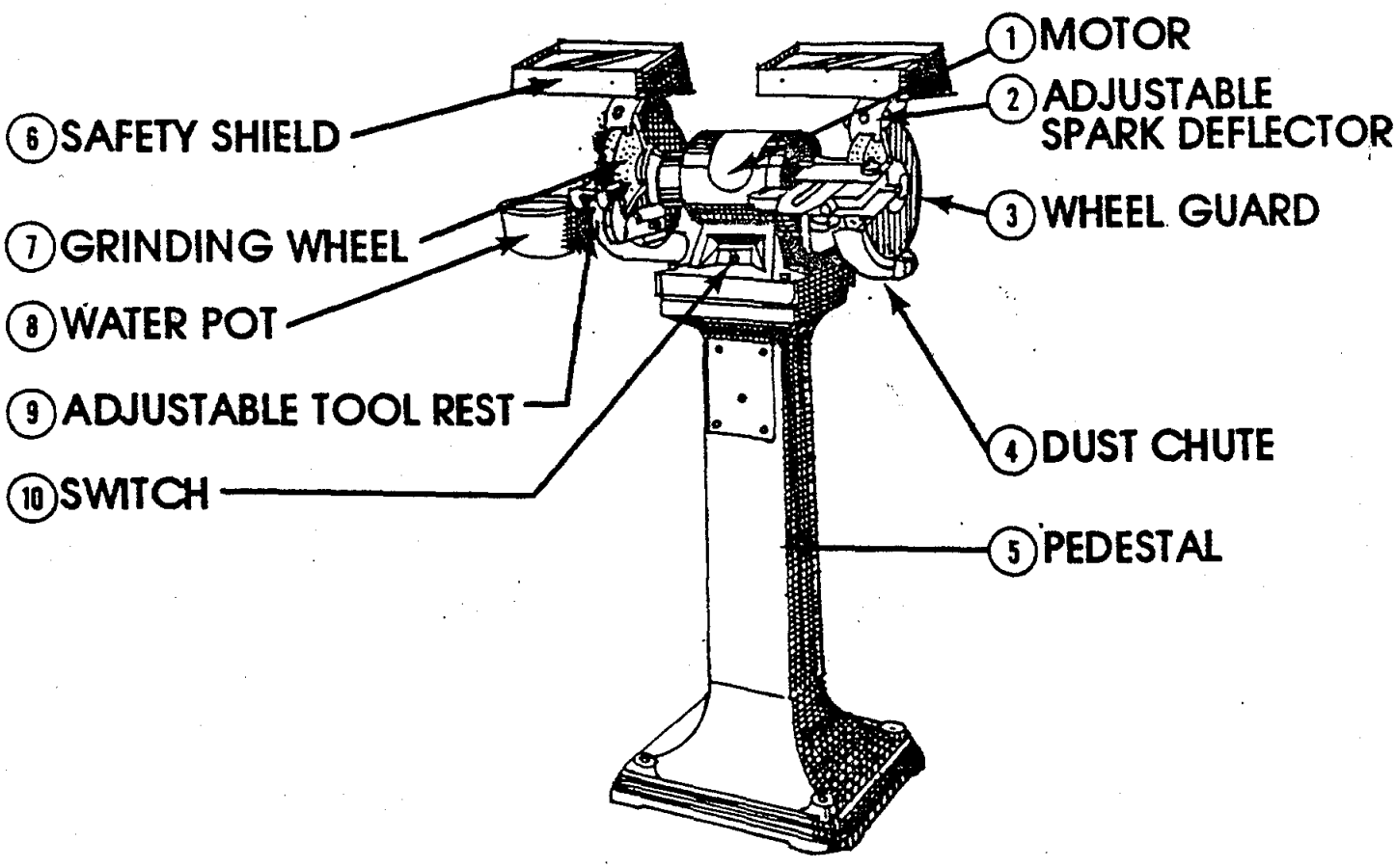
Grinder

OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THIS MACHINE.

SAFETY SUGGESTIONS



1. Eye protection must be worn at all times.
2. All guards must be properly adjusted.
3. The tool rest must be adjusted to 1/8" from the wheel.
4. Do not grind on the side of the grinding wheel.
5. Spark arrestor or top guard must be within 1/8" of wheel.
6. Small pieces should be held with "vise grip" type pliers.
7. A wheel that is excessively worn or cracked should be discarded.
8. The glass safety shield should be clean.
9. Stand to one side when starting the machine.



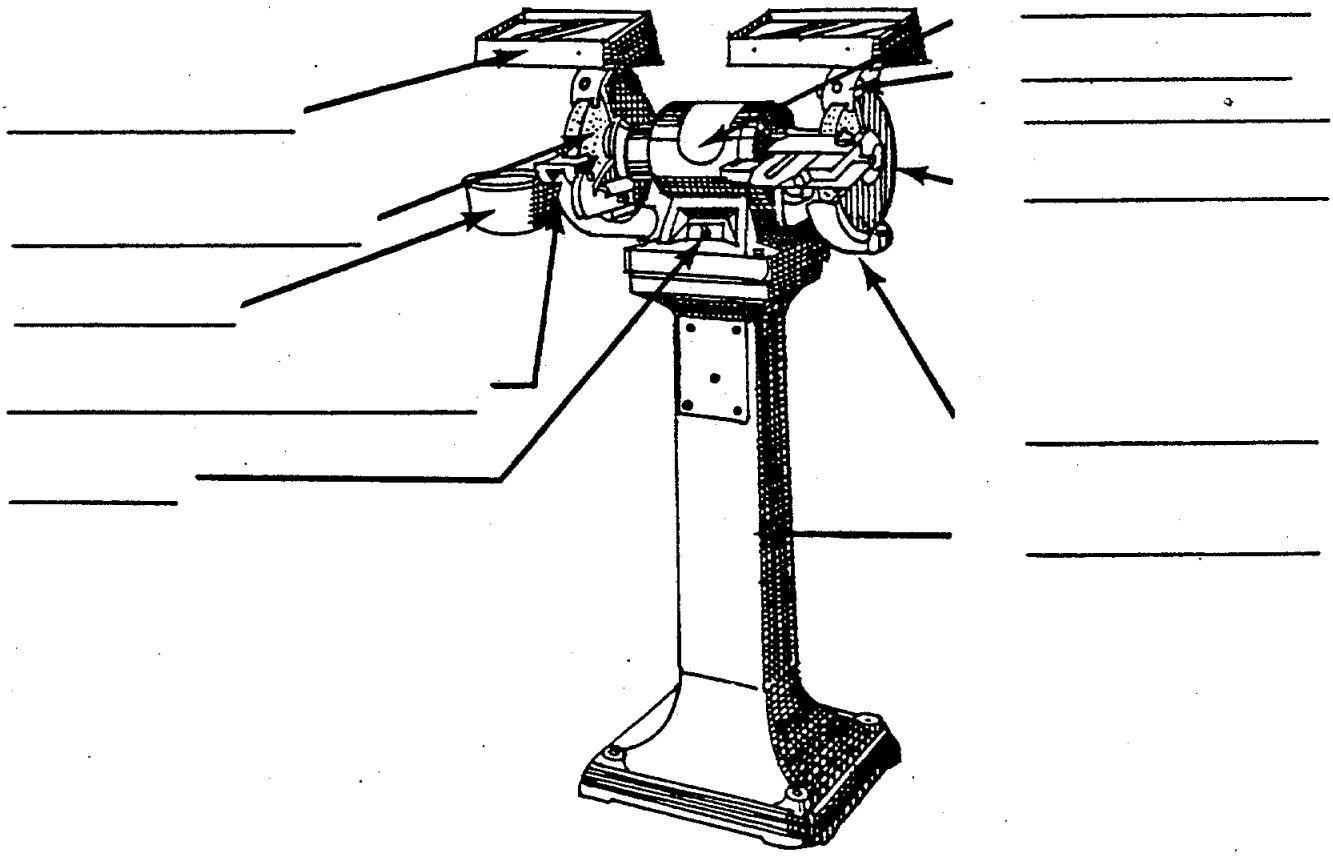
Safety Quiz – Grinder

Student Name _____

Class _____

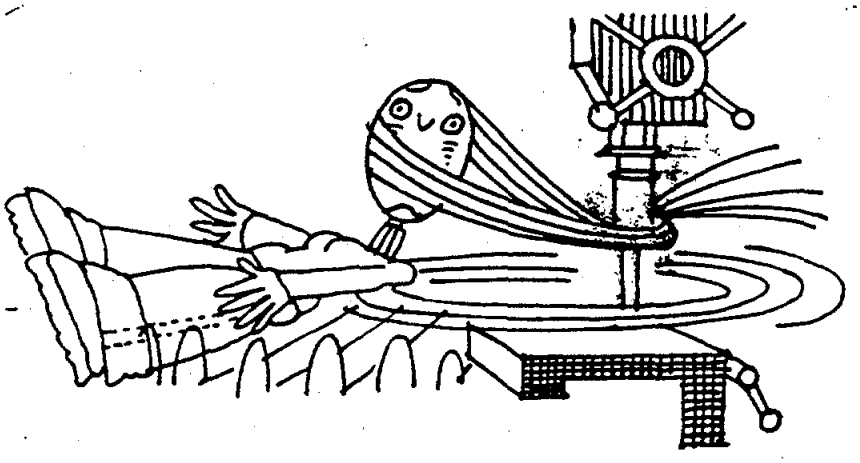
Date _____ Grade _____

1. The tool rest should be adjusted to within 1/2" of wheel. T F
2. Eye protection is not always necessary while grinding. T F
3. Once the "off" switch is in the off position, the operator may leave. T F
4. The safety shield should be clean. T F
5. Wheels that are out of balance may be used. T F
6. The spark arrestor is not necessary if there is a glass safety shield. T F
7. When grinding a small piece of steel, "vise grips" are advised. T F
8. If there is a glass shield, eye protection is not required. T F



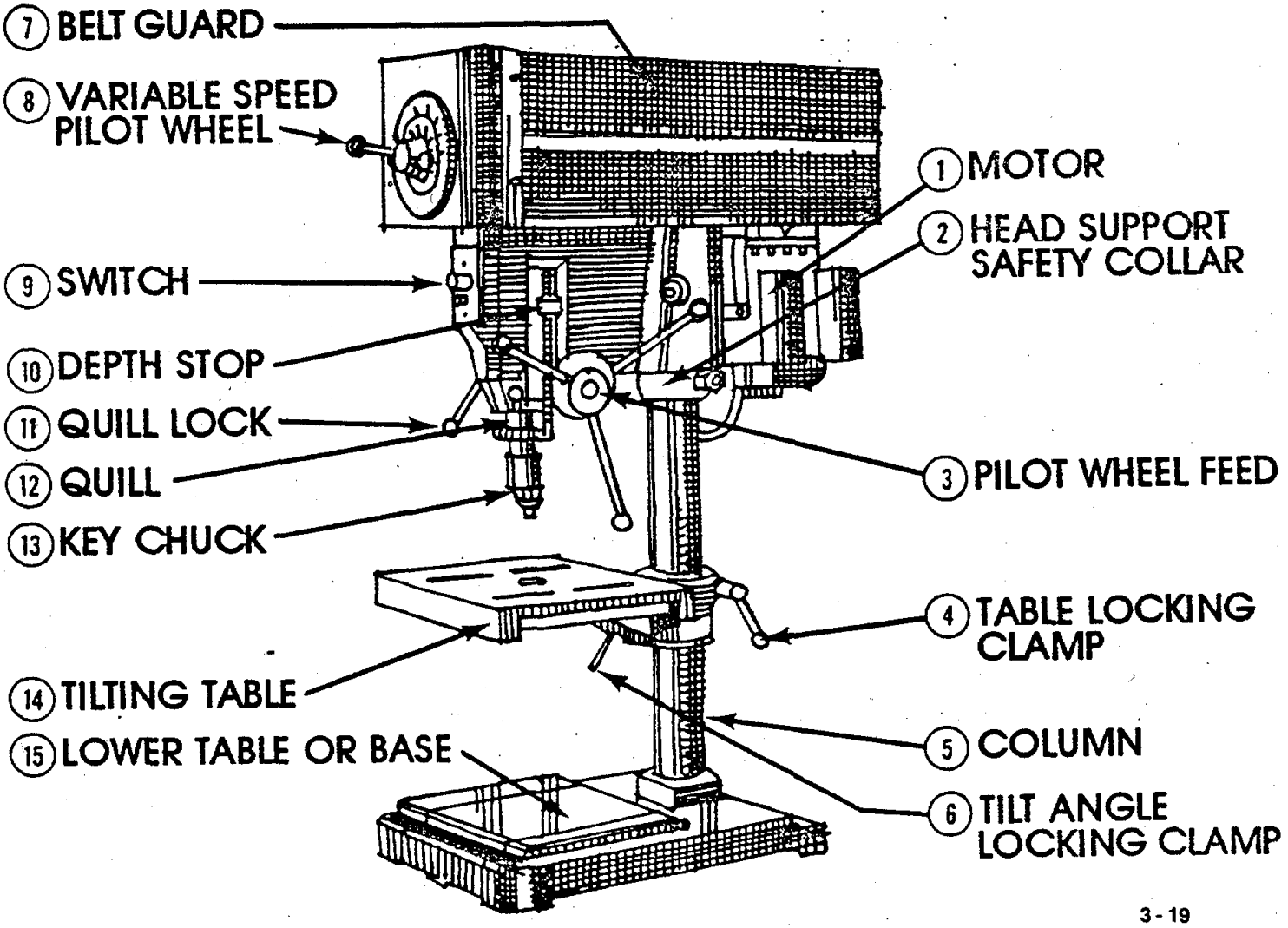
Drill Press

OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THIS MACHINE.



SAFETY SUGGESTIONS

1. Wear appropriate eye protection.
2. Remove jewelry — eliminate loose clothing — confine long hair.
3. Operate only when all guards are in place.
4. Select properly sharpened drill bit — tighten in chuck and *remove key.*
5. Clamp material — check for safety — turn on power.
6. If a piece of work is caught in the drill — turn off power — do not try to stop by hand.
7. Select speed carefully — the larger the drill, the slower the speed.



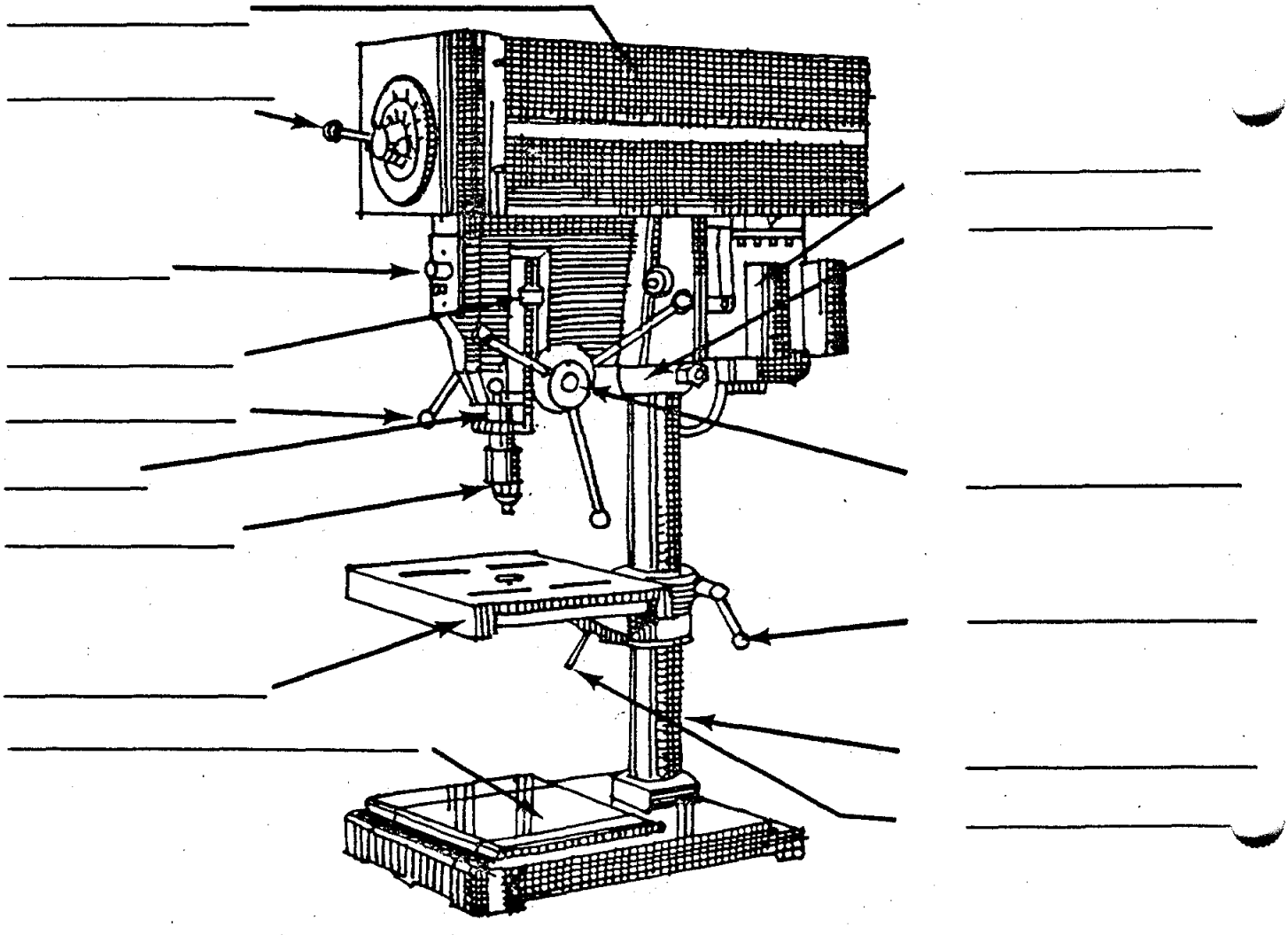
Safety Quiz – Drill Press

Student Name _____

Class _____

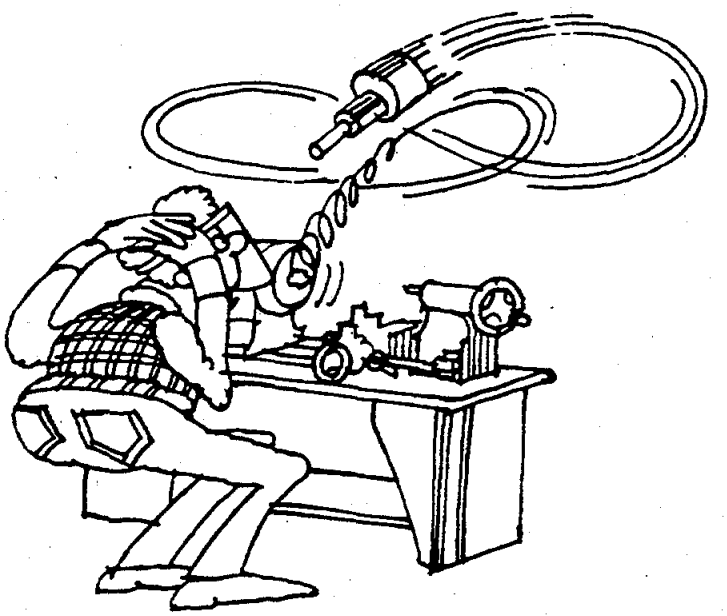
Date _____ Grade _____

1. It is necessary to select the proper speed. T F
2. The chuck key should be kept in the chuck at all times. T F
3. Work should always be secured. T F
4. Rings may be worn while operating a drill press. T F
5. A chip brush should be used for removing chips. T F
6. The drill should be operated at top speed for all work. T F
7. The long end of the work should be at the left of the operator. T F
8. Long hair must be confined in a hat or net, or tied back. T F



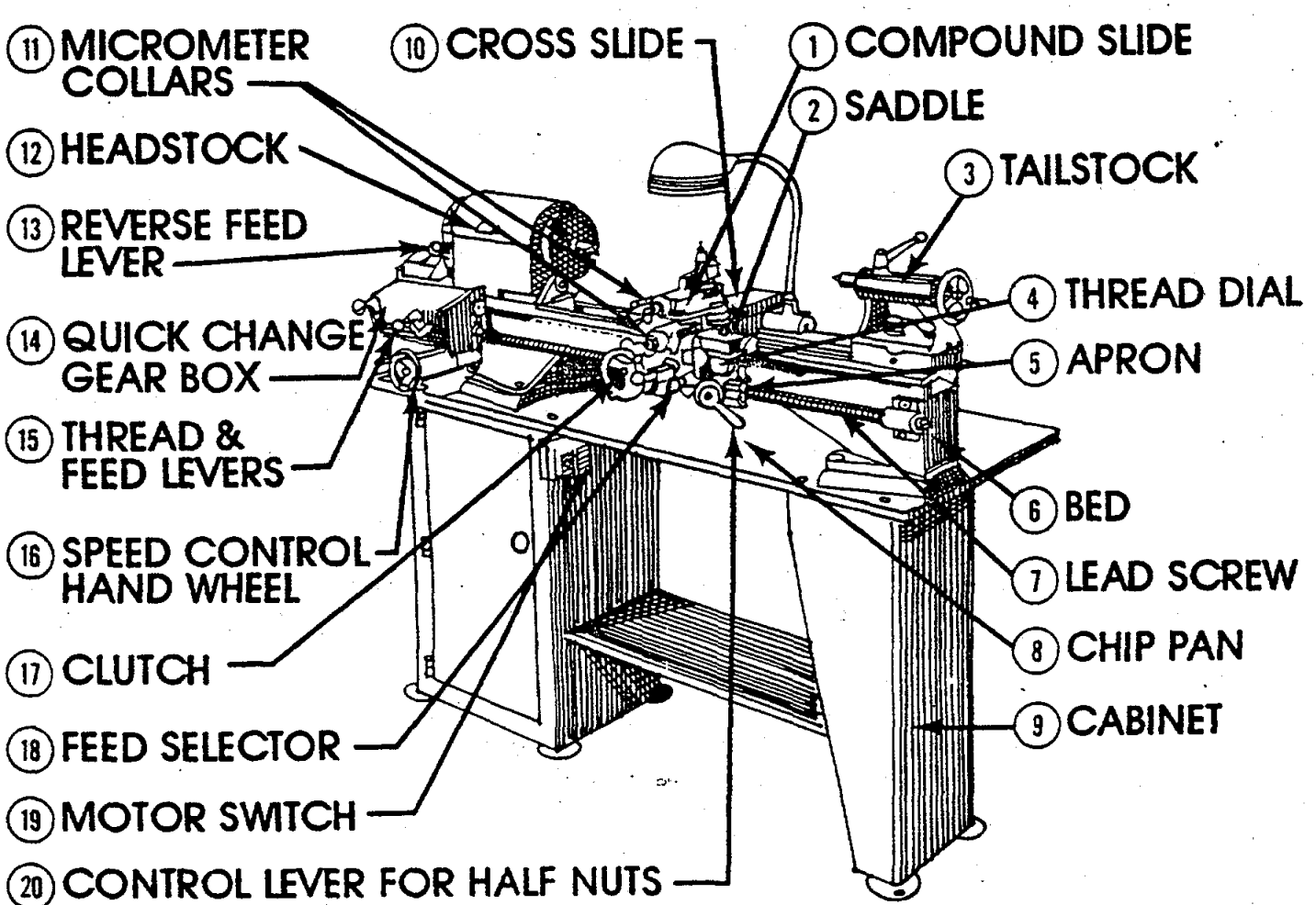
Metal Lathe

OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THIS MACHINE.



SAFETY SUGGESTIONS

1. Wear appropriate eye protection.
2. Remove jewelry, eliminate loose clothing and confine long hair.
3. Do not leave the machine until it has stopped.
4. A brush should be used to remove chips.
5. The chuck should be turned by hand before starting.
6. Never leave chuck wrench in chuck.
7. Stock should be balanced and secured before starting.
8. Operate at the correct speed for the job.
9. Handle chucks with care; keep hands away from moving parts and work.



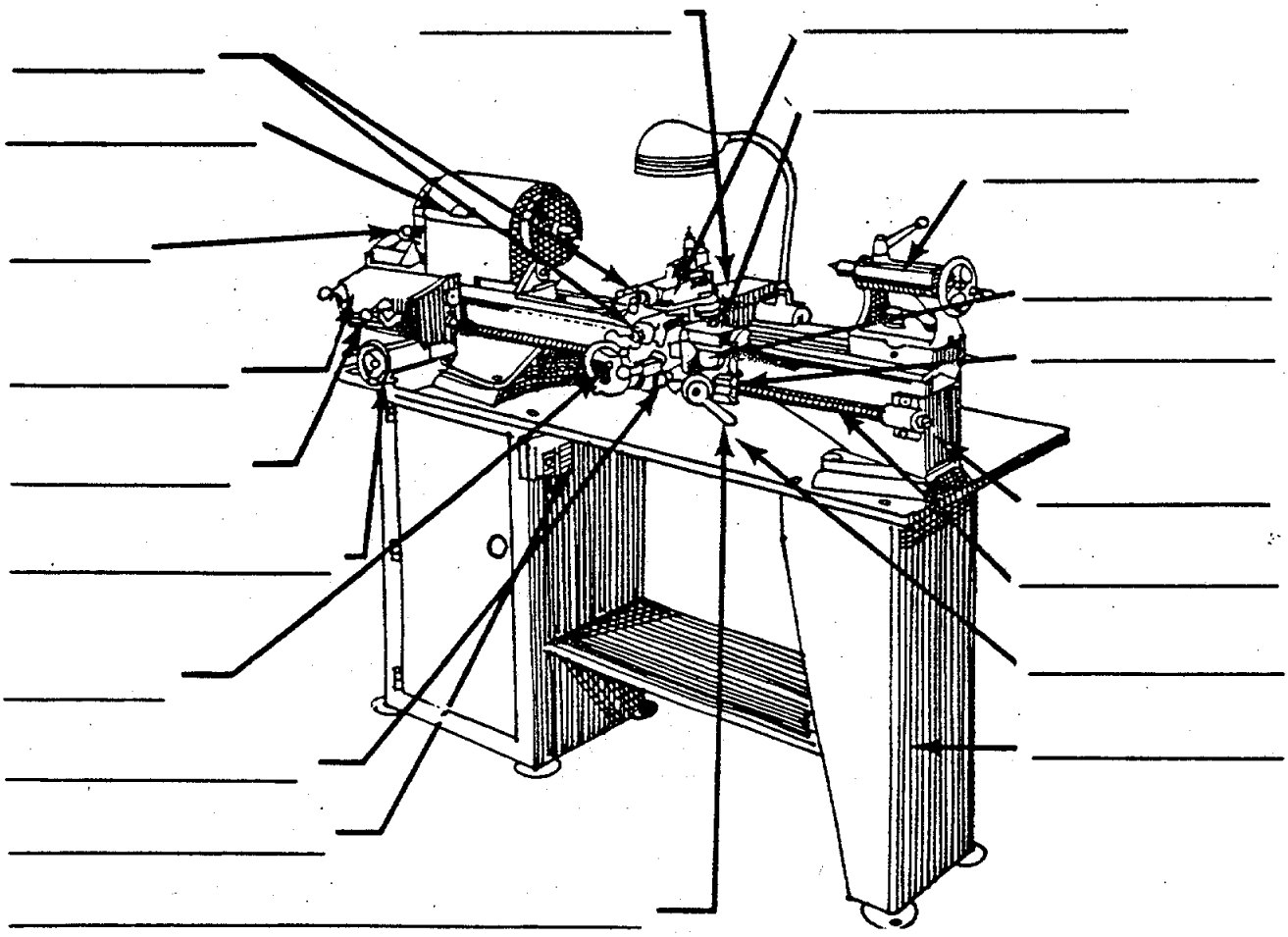
Safety Quiz – Metal Lathe

Student Name _____

Class _____

Date _____ Grade _____

1. A brush should be used for removing chips. T F
2. The tail stock need not be secured to the bed. T F
3. The chuck wrench remains in the chuck when the machine stops. T F
4. It is safe to turn machine by hand before starting. T F
5. Measurements should be made while the machine is stopped. T F

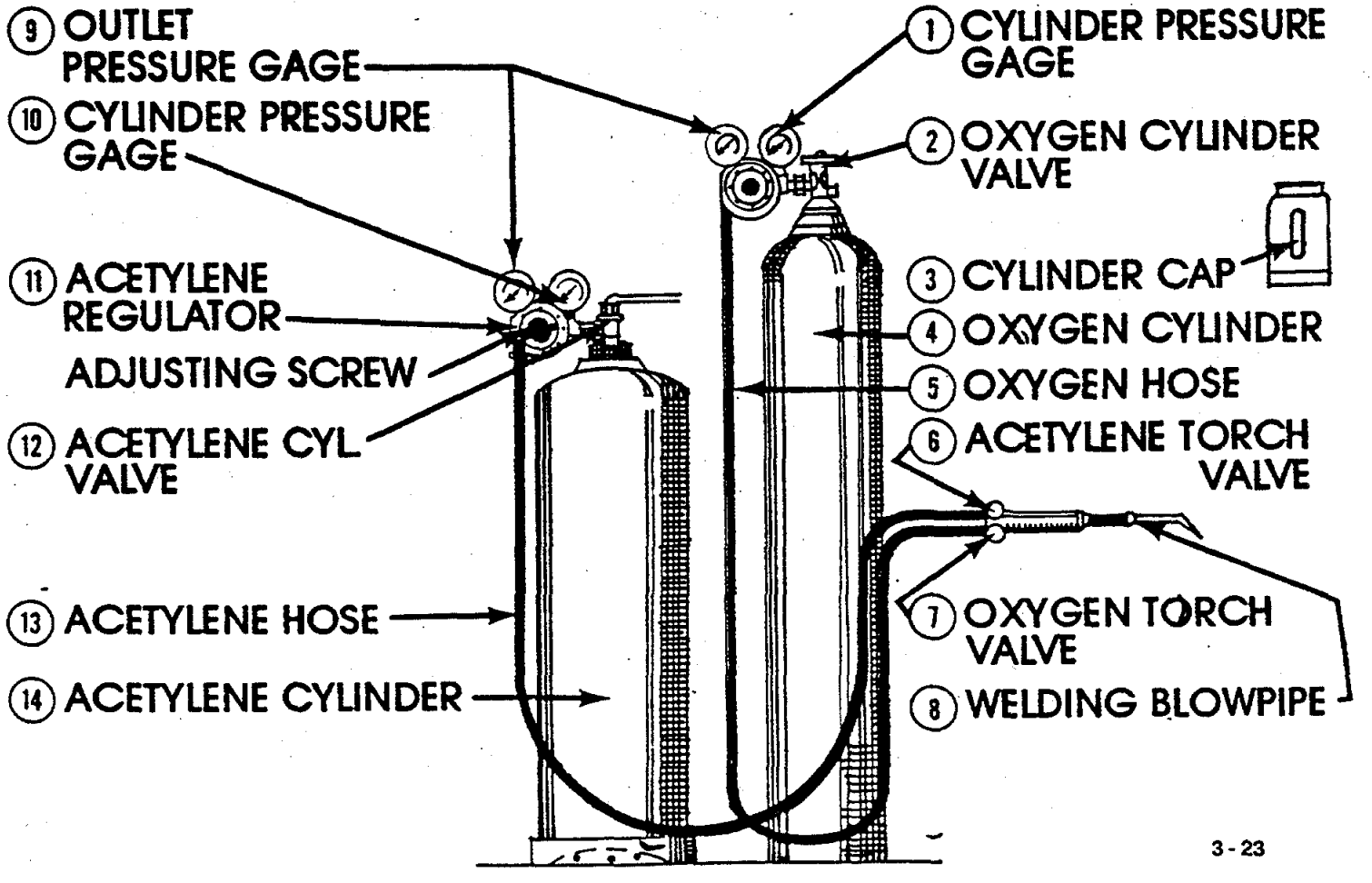


Oxy-Acetylene Welder

OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THIS MACHINE.

SAFETY SUGGESTIONS

1. Do not weld galvanized metal without proper ventilation.
2. Do not allow oil to come in contact with hoses or equipment.
3. Gas bottles must be erect and *secure* at all times.
4. Protective goggles and spark-resistant clothing must be worn when welding.
5. Do not weld or cut on a closed container without instructor's approval.
6. Confine all cutting and welding to the designated area in the shop.
7. Turn off torch valves when finished with equipment.
8. Keep the cylinder caps on the bottles when not in use.
9. Turn off gas and oxygen at tanks or stations at the end of class session.
10. Bend the end of long welding rods to identify hot end and to reduce potential exposure to eye injury.



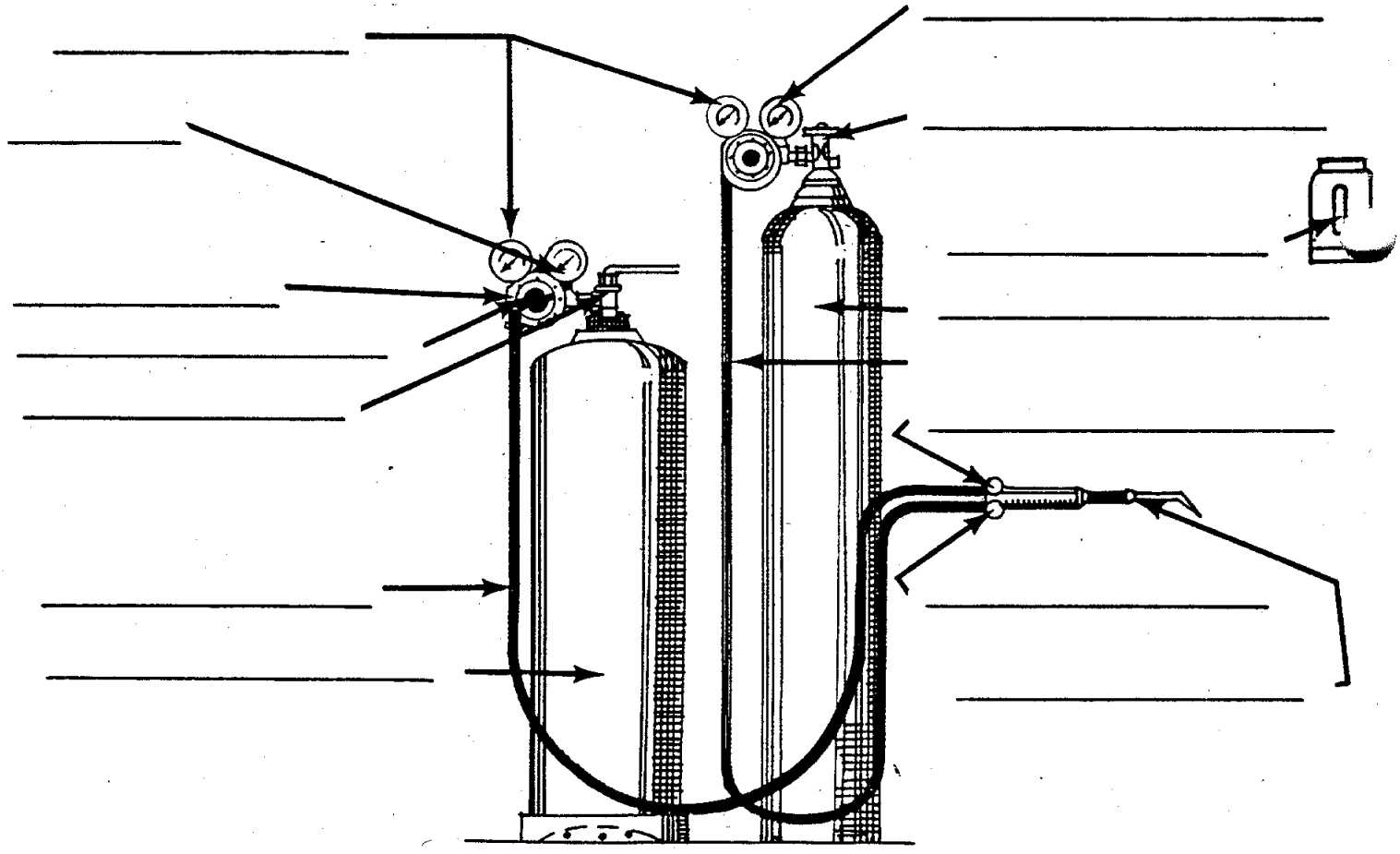
Safety Quiz — Oxy-Acetylene Welder

Student Name _____

Class _____

Date _____ Grade _____

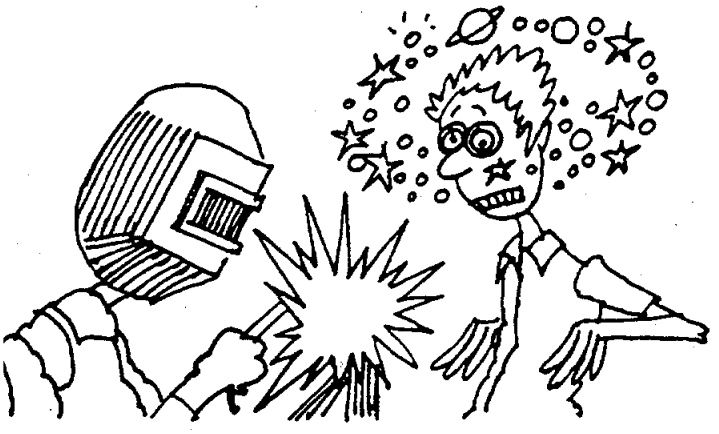
1. Gas bottles may be laid on the floor when not in use. T F
2. Closed containers are not hazardous to weld or repair. T F
3. The cylinder caps should be placed on all bottles when not in use. T F
4. Eye protection must be worn for **all** welding, cutting and chipping operations. T F
5. The equipment should not be wiped down with oily rags. T F



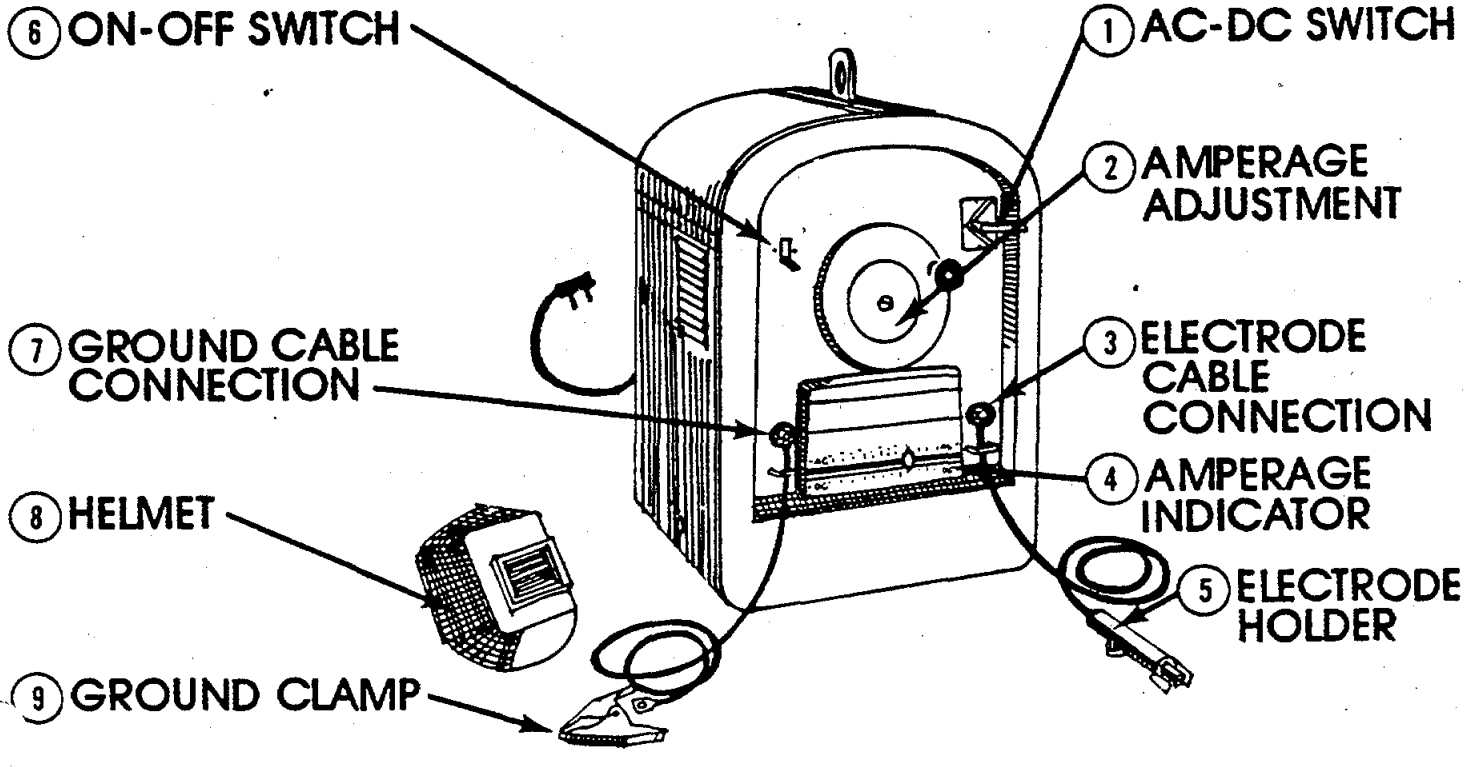
Arc Welder

OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THIS MACHINE.

SAFETY SUGGESTIONS



1. A welding helmet must be worn when welding.
2. Proper ventilation must be available.
3. Goggles must be worn when chipping slag.
4. Others in the area must be warned prior to striking an arc.
5. Gloves and proper clothing must be worn when welding.
6. Closed containers should not be welded without the instructor's permission.
7. Do not stand in wet areas while welding.
8. Screens to protect others must be in place before welding is started.



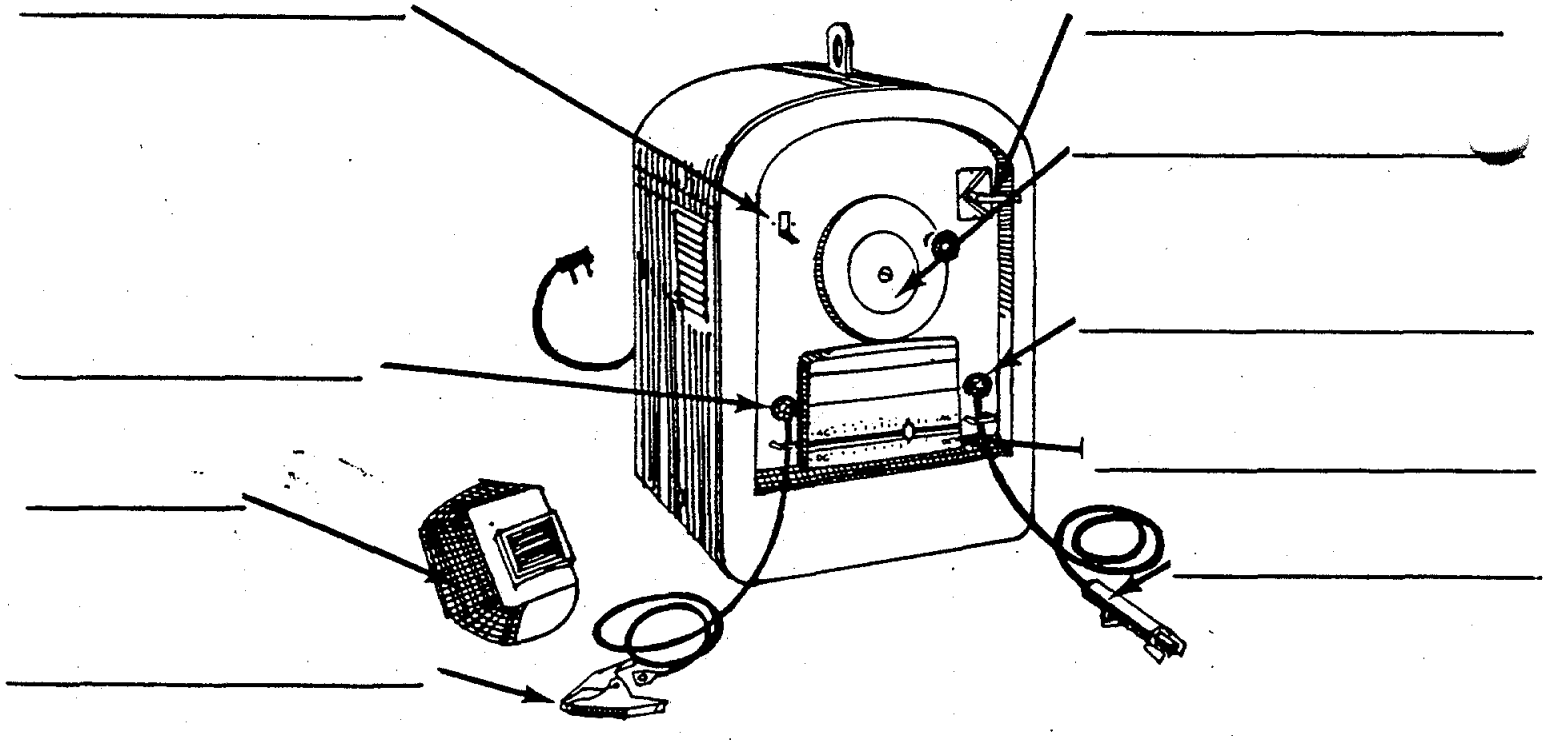
Safety Quiz – Arc Welder

Student Name _____

Class _____

Date _____ Grade _____

1. You should warn anyone nearby when you start to weld.	T	F
2. Goggles as well as a welding hood should be worn before you start to weld.	T	F
3. A closed container is dangerous to weld.	T	F
4. Gloves are not necessary when welding.	T	F
5. It is dangerous to weld without proper ventilation.	T	F



Storage Batteries

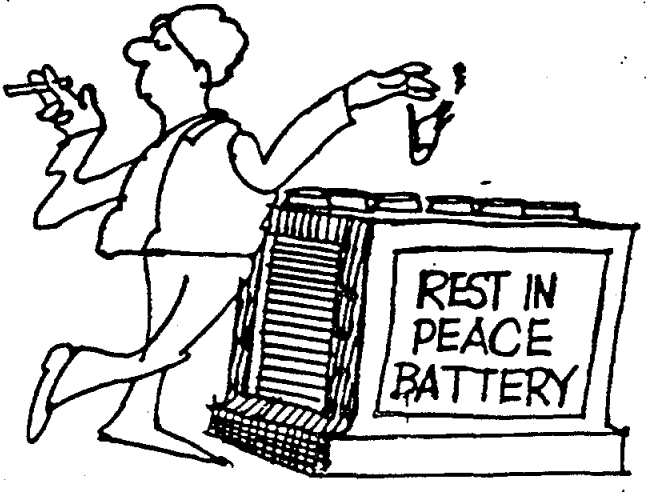
The storage battery that you are most likely to come in contact with is the automotive storage battery. Because of its compact size and the fact that it is so common, sometimes we tend to become careless in our use of the battery.

SAFETY SUGGESTIONS

1. Batteries should be stored or charged only in well ventilated areas. Do not breathe fumes of battery acid. Battery caps should be removed during charging.
2. All sources of ignition should be remote from the battery storage area (i.e., no smoking, no lighted matches, no sparking from tools). Do not touch or "fiddle" with battery charging clamps while the charger is activated or has just finished charging.
3. Do not work on batteries while on discharge or charge.
4. Proper protective clothing should be worn when handling batteries (i.e., rubber gloves, face shield, apron).
5. Metal jewelry such as rings, bracelets or necklaces should not be worn around batteries.
6. Deluge showers and eye baths should be provided adjacent to the battery charging area.
7. Acid spills can be neutralized with a weak ammonia solution or a bicarbonate of soda solution, or diluted by large quantities of water applied immediately.
8. Battery chargers should be connected or disconnected only when charger is off and caps are in place.
9. Disconnect battery ground (—) cables before performing any major component removal from vehicles.

Some of the more serious potential hazards from batteries are:

1. Explosion due to improper connections.
2. Acid spills by incorrectly handling.
3. Back strain from improper lifting.



Safety Quiz – Storage Batteries

Student Name _____

Class _____

Date _____ Grade _____

1. It is o.k. to light a welder near a car while its battery is being charged. T F

2. A closet or small storeroom is a perfect place to charge batteries. T F

3. Jewelry such as rings, necklaces and watches/bracelets should be taken off before charging a battery. T F

4. List 3 potentially serious hazards from batteries.

   A) _____

   B) _____

   C) _____

5. If battery acid gets in the eyes, deluge them with massive amounts of water immediately and get help (aid unit). T F

Hazardous Waste — Asbestos

REFER TO HAZARDOUS WASTE SECTION OF THIS SAFETY GUIDE FOR MORE INFORMATION.

When doing a brake or clutch job, the mechanic/technician could be exposed to hazardous asbestos dust. (Smoking cigarettes can increase health risks when combined with breathing asbestos dust.) Therefore, additional safety measures must be utilized when doing brake or clutch work.

Although synthetic materials are being used to replace asbestos — always ASSUME friction materials ARE ASBESTOS. (Besides, some of the new materials are not tested and could be dangerous, too.)

There are two methods of preventing exposure to asbestos.

1. Vacuuming dust(s) in an enclosure and collecting the particles in a H.E.P.A. (High Efficiency Particle Accumulator) Vacuum.
2. Washing the assembly with an approved wash solution/collection device. Liquid collected in this process must be dumped in a container marked HAZARDOUS WASTE and the container must be dumped by an EPA approved waste disposal company. (There is usually a charge for this service.)

Note: Respirators are NOT suitable to prevent asbestos exposure. Most filter pads cannot filter out the fine particles of asbestos.

SAFETY CONCERNS — ASBESTOS EXPOSURE

1. To the mechanic/technician — by breathing it or rubbing it into skin.
2. To the customer/management — asbestos dust in shop air or on floor.
3. To the environment — in the waste water or swept into the parking lot.

SAFETY SUGGESTIONS

1. Enclose work and use a H.E.P.A vacuum.
2. Don't blow assemblies with compressed air.
3. Don't drop brake drums or clutch housings on floor and dislodge asbestos dust.
4. Do wash hands frequently and change clothes — keep clothes clean. Do not wear shop clothes home.

Safety Quiz – Asbestos

Student Name _____

Class _____

Date _____ Grade _____

1. Asbestos is not a hazardous material.	T	F
2. Smoking cigarettes greatly increases health risks when combined with asbestos exposure.	T	F
3. Only mechanics/technicians can be exposed to asbestos materials.	T	F
4. New cars don't have asbestos, so it is not necessary to utilize asbestos safety steps.	T	F
5. Compressed air is the best way to clean brakes.	T	F

Auto Body

Safety is one aspect of the automotive repair industry that cannot be overemphasized. A good mechanic is a safe mechanic. If there is a fast way or a safe way to do the job, take the safe way. Otherwise, you may not get the job done at all.

Listed below are some of the potential exposures and safety precautions that you will be confronted with.

GENERAL PRECAUTIONS

1. Oil or adjust moving parts only if authorized.
2. Use caution when working near the fan and belt.
3. Whenever possible, work with the engine switch in the "OFF" position.
4. The fan belt should be tightened only when the engine is stopped.
5. Always consider the engine and exhaust system to be "HOT."
6. Do not pour gasoline from an open container into the carburetor.
7. Use extreme care when welding on vehicles — provide fire protection.
8. Do not work directly above another student.
9. Wait for the radiator to cool before removing the cap.
10. Make sure that hoods are secured in an open position when working on the engine.
11. When "pulling engines" be sure that ropes or slings are properly fastened.

PERSONAL HEALTH HAZARDS

1. Wear respirators while spray painting. THIS INCLUDES SPRAY PAINT CANS.
2. Do not clean hands in solvent or gasoline. These materials are explosive and also can cause a skin rash.
3. Avoid back strain when it is necessary to lift parts from the engine.
4. Never place hands in front of a high pressure grease gun.
5. Keep open wounds properly dressed and covered.
6. Eliminate loose clothing and confine long hair. (This includes chains and long earrings.)

JACKING AND HOISTING

1. Do not jack up the vehicle if anyone is under it.
2. Jack stands must be used when working under vehicles. When using a hoist, it *must* have air/hydraulic backup controls and/or locks.
3. Avoid excessive shaking of the vehicle when on jack stands.
4. Have the instructor inspect the jack stand supports before students work under any vehicle.
5. Long jack handles are a serious tripping hazard and they should be barricaded or raised out of position.
6. Do not use bumper jacks.
7. Do not run an engine when the car is on the hoist or on jack stands.
8. Caution should be observed when lowering a vehicle.

Auto Body (continued)

DRIVING AND LOCATING THE VEHICLE FOR WORK

1. Do not wear eye protection with restricted vision when driving a vehicle in the shop.
2. Vehicles should be driven only by students with valid driver's licenses and with the instructor's permission.
3. Work should not be performed on vehicles parked in heavily travelled areas or on public thoroughfares.
4. Towing or pushing should be done only with instructor approval.
5. Have a fellow student guide you when parking a vehicle in a congested area.
6. Someone *must* be in the driver's seat of a vehicle when the engine is being started.

GREASES, OILS, FUELS AND SOLVENTS

1. Clean up all spills *immediately* and ventilate the area.
2. Use only approved solvents for cleaning parts. Do *not* use gasoline.
3. Be sure that there is proper ventilation before an engine is started.
4. Keep oil-soaked rags in approved rag waste containers.
5. Check fuel connections for leaks before starting an engine.
6. Keep flammable liquids in closed, approved containers.

AIR PRESSURE

1. Use an air gauge when inflating tires.
2. When inflating truck tires that have a snap ring, the tire should be confined within an approved cage.
3. Never aim an air hose at another student or at yourself.

WRENCHES AND TOOLS

1. Keep *all* tools clean and free of oil and grease.
2. Keep tools picked up from the floor.

3. Make certain that wrenches fit properly.
4. Hammers with loose handles should not be used.
5. Use tools only for the purpose for which they are designed — never use a file as a pry bar.
6. Creepers should be stood on end or stored in a rack when not in use.
7. Do not use chisels or punches with "mushroom" heads.
8. The palm of your hand is *not* a tool. Install wheel covers with a rubber mallet.

CARBON MONOXIDE

Carbon monoxide is a poisonous gas caused by incomplete burning of gasoline or other fuels. It is present in gaseous form when the engine is running. Even a small amount of carbon monoxide in your body can be fatal. That is why it is imperative that you never run an engine in a poorly ventilated area.

COMPRESSED GAS

The most commonly used gases for cutting and welding are oxygen and acetylene. However, you may also be using hydrogen, nitrogen, Maap gas, argon, helium, "Freon," ammonia, propane (liquefied petroleum gas) carbon dioxide or sulphur dioxide in some of your projects.

To use them safely you need to know their characteristics and be sure you are using the right bottle. There is no standard color code for compressed gas bottles! **Read the labels.**

Treat compressed gas cylinders with the greatest respect. There is an immense amount of power in each cylinder. Careless handling resulting in valve or cylinder damage can produce instant death for you or your friends. Use a cart or hand truck for moving cylinders.

FLAMMABLE GASES

Acetylene, hydrogen, propane and Maap gas are highly flammable. They are normally handled in compressed gas cylinders or tanks. Acetylene is dissolved in acetone (Maap gas and propane are liquefied by pressure), so it is especially important that these cylinders be kept upright when in use.

They will all form violently explosive mixtures with air or oxygen, so valves, regulators, hoses and other equipment must be tight and in good repair. **Shut off valves and regulators when they are not in use!**

Store spare flammable gas cylinders in a well ventilated location, separated by a fire resistant barrier — preferably outside.

All gas cylinders must be secured and stored erect at all times. When storing or moving, **cylinder caps must be in place.** Students should not move cylinders unless secured to carts.

OXYGEN

For shop use, this gas is in a class by itself. It will combine with many common materials, and under the right conditions will cause these materials to burn violently or to explode. Oxygen under high pressure can cause oils to explode. **NEVER USE OIL ON ANY OXYGEN VALVE OR REGULATOR EQUIPMENT!**

If you change cylinders, always have the instructor check your work before opening the valve.

NON-FLAMMABLE GASES

These include nitrogen, argon, helium, "Freon," sulphur dioxide, and to some extent ammonia, which is flammable only in high concentrations. Some are odorless, and others (sulphur dioxide, ammonia) have extremely strong odors. None will support life, so adequate ventilation of the use area is essential. Read up on the specific characteristics and detailed safety precautions for the gas you will use and discuss them with your instructor before proceeding.

DUSTS, FUMES AND COMBUSTIBLE METALS

Dust or fumes (fine metal particles from burning) found in the Industrial Arts laboratory can be irritating to some people. Some can be highly flammable or explosive and possibly cause serious or permanent illness.

It is important to control classroom exposure by:

1. Using the ventilation equipment to remove dusts from your work area;
2. Sweeping or vacuuming and properly disposing of dusts produced;
3. Wearing a dust respirator when working on dust producing operations;
4. Consulting your instructor before cutting, welding or grinding on galvanized metals.

Asbestos dust is a particular hazard that requires extra precaution when cutting or drilling or machining. Respirators and protective clothing must be worn when working with this material

Certain metals such as magnesium are flammable and unstable and should not be used in the Industrial Arts Laboratory.

When working with lead or zinc, whether burning, welding, soldering, melting, or machining, good ventilation is essential.

Auto Body (continued)

FLAMMABLE AND COMBUSTIBLE LIQUIDS

Flammable and combustible liquids are essential in many Industrial Arts classes. They must be stored and used in a manner that will provide a high degree of safety.

Always read the label on the container before using any of these materials.

FLAMMABLE AND COMBUSTIBLE LIQUIDS ARE POTENTIALLY DANGEROUS BECAUSE:

1. Many produce vapors that are heavier than air and can accumulate along floors or other low points, lying in wait for a stray spark.
2. Many are readily oxidized, or release heat in curing so that rags or waste coated with them will catch fire spontaneously.
3. Vapors from some have harmful effects and can cause damage to nervous and/or waste elimination systems of the body.
4. All are poisonous if taken internally.
5. Most will remove protective oils from the skin, and repeated exposure can cause dermatitis (skin rash).
6. Nearly all will burn violently. Such fires are difficult to extinguish without proper extinguishing agents.
7. When burning, most flammable liquids will produce dense black smoke that may drive you from the room before the fire can be put out.

STORE AND HANDLE FLAMMABLE AND COMBUSTIBLE LIQUIDS SAFELY:

1. Be sure the exhaust fan or vents are operating in the flammable liquids store room.
2. Draw out only as much as you need for your class period or particular operation.
3. Dump waste or excess materials only in covered metal containers, as directed by the instructor.
4. Use a funnel when pouring into a small container.
5. Clean up spills and drips immediately, disposing of the rags and waste material as instructed.
6. Read and follow instructions for handling and mixing catalysts with resins or finishes.
7. Never pour catalysts back into the bottle.
8. Always add catalyst to resin, **not** resin to catalyst.
9. Never apply resin, paint or other finishing material near areas used for cutting, welding, grinding or other hot work.
10. Be sure that the working area is well ventilated.
11. Store thinners and solvents only in original purchase containers or approved cans.
12. Use rubber gloves to minimize chances of skin irritation when working with epoxy and polyester resins.
13. Wash hands and other exposed skin areas before leaving the shop.

Auto Body (continued)

Some of the more hazardous flammable liquids that you may encounter in your shop activities are (listed in approximate order of hazard):

Starting fluid
**Aerosol cans
Gasoline
*Catalysts M.E.K. Peroxide
Carburetor cleaner
Acetone
Lacquer and lacquer thinner
Adhering liquid (for silk-screen process)
Paint thinner
Alcohol
Shellac
*Japan dryer
Kerosene
Paint
Resin (polyester)
Stain and varnish
Danish oil

*These materials could accelerate spontaneous combustion or could react violently when mixed with organic material.

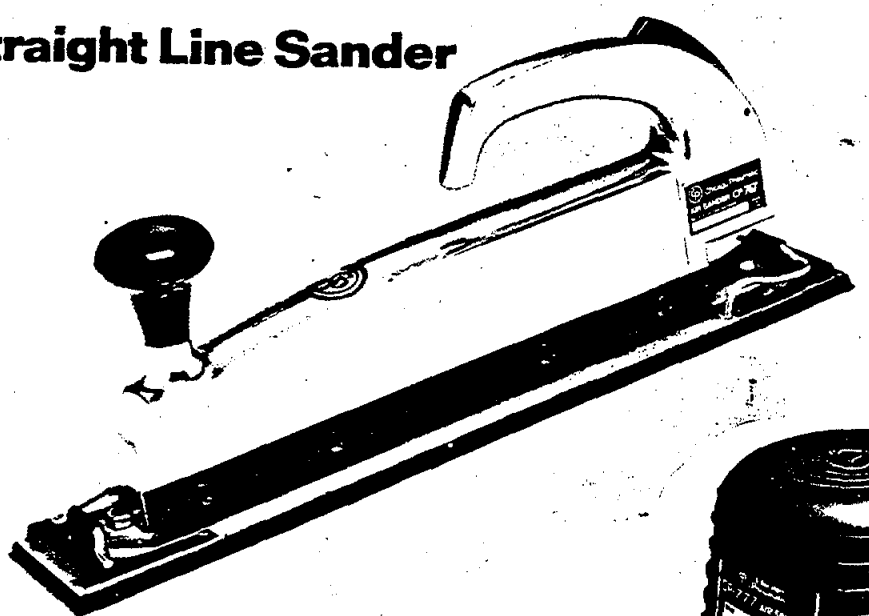
**The hazard could vary greatly depending upon the propellant used in the can.

Air Sanding Tools

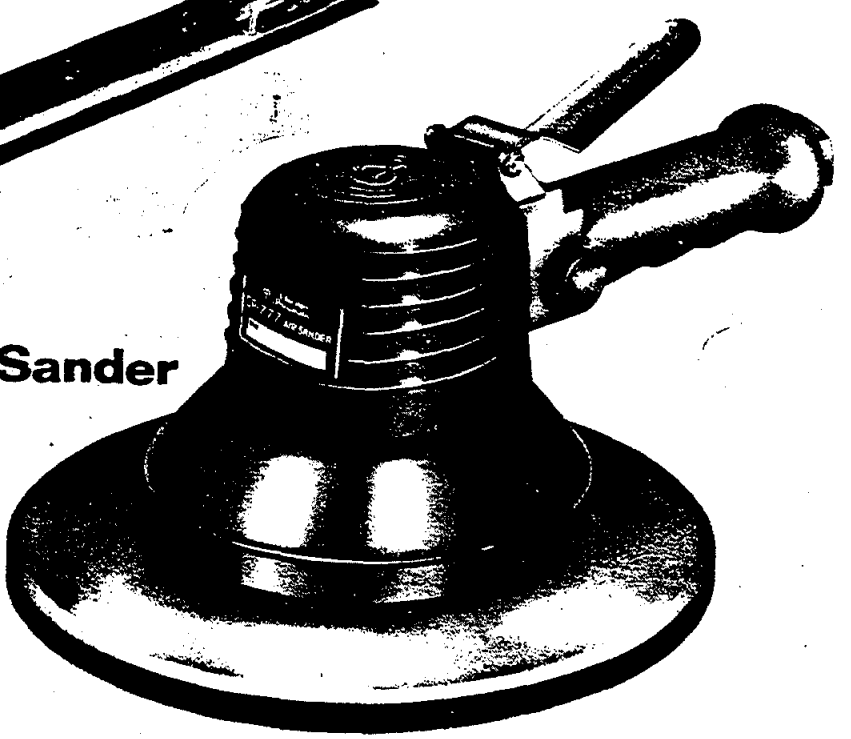
SAFETY SUGGESITONS

1. Always wear proper eye protection.
2. You must wear a particle mask when sanding automotive plastics and paints.
3. Sanding tools must be operated in a well ventilated area.
4. Air sanding tools should be hooked up to a vacuum system if at all possible to eliminate as much of the dust particles as possible.
5. Coveralls should be worn to protect clothing.
6. Never operate tools over recommended air pressure.
7. Never leave tools laying on car when not in use.
8. Keep tool clean and in good repair.

Straight Line Sander



Orbital Air Sander



Safety Quiz – Air Sanding Tools

Student Name _____

Class _____

Date _____ Grade _____

1. Ventilation is not a safety consideration when sanding with air tools. T F

2. Sanding dust from fillers and paints must be removed from the air by means of vacuum connection to the tool and/or use of a particle mask. T F

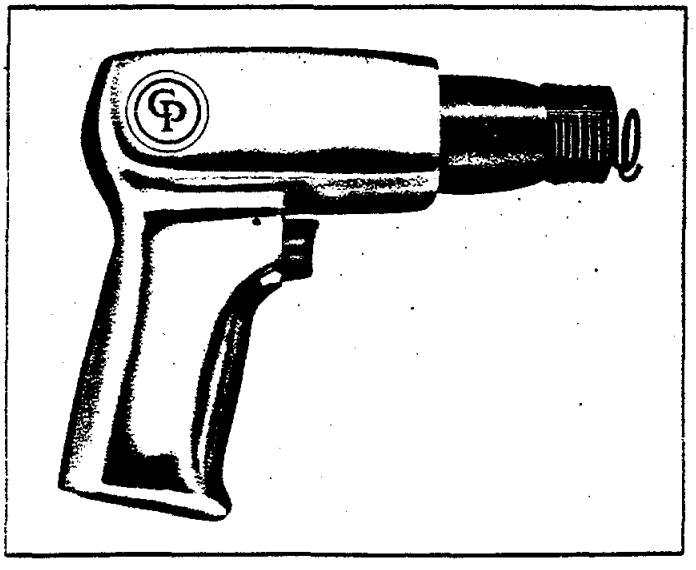
3. The use of higher than recommended air pressure will only make the tool work faster. T F

4. One mark of a good technician is that he/she keeps tools clean. T F

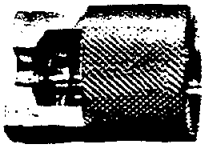
Air Chisel

SAFETY SUGGESTIONS

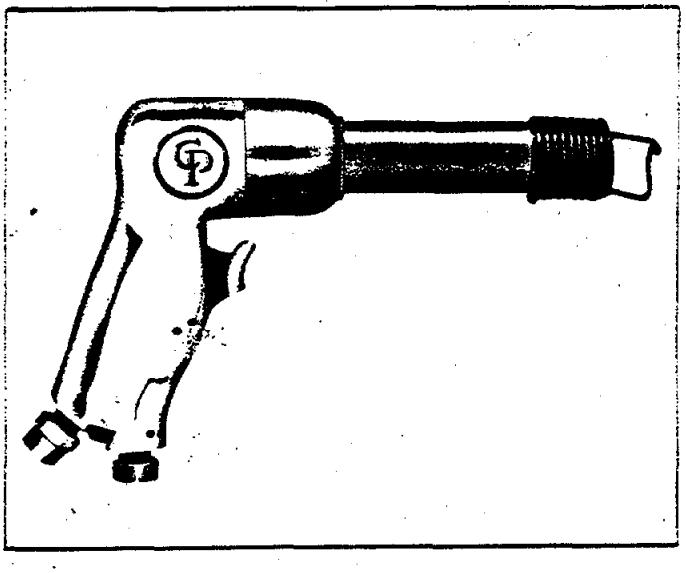
1. Always wear gloves when operating an air chisel.
2. Always wear a protective face shield in addition to proper eye protection.
3. Never point the air chisel toward a person or object which could be damaged.
4. Make sure to have a safety collar screwed on tightly to the chisel to prevent the chisel bit from accidentally shooting off of the chisel gun.
5. Keep the chisel bits sharp.
6. Place metal scraps in the garbage can.
7. Keep fingers away from the chisel while it's in use.



SAFETY CHUCK TOOL HOLDERS



QUICK CHANGE RETAINING SPRING



Safety Quiz — Air Chisel

Student Name _____

Class _____

Date _____ Grade _____

1. You must wear a face shield to protect your face.	T	F
2. Gloves are necessary to protect your hands from injury on sharp metal edges.	T	F
3. Make sure by the end of the week that all metal trimmings are in the garbage.	T	F
4. By holding onto the chisel bit, you can direct the bit more accurately.	T	F
5. Goggles must be worn every time an air chisel is used.	T	F

Electric Grinder

SAFETY SUGGESTIONS

1. Never operate in a wet area.
2. Make sure ground wire is connected.
3. Safety goggles and face shield must be worn.
4. Make *sure* a backing place is used at all times. The backing plate must be the correct size to match the grinding disc.
5. The disc nut must be tight before starting the grinder.
6. The grinder needs to be started off the job and stopped on the job.
7. Never leave the grinder running and left on the ground.
8. Don't let the machine free run and over-rev.
9. Don't wear any loose clothing — keep grinder away from all clothing.
10. Don't direct the spark toward anyone, or anything flammable, or anything which could be damaged by the sparks.
11. Do not grind next to metal edges, sharp edges, holes, or anything loose which could catch the disc.
12. Keep long hair pulled back and/or covered and away from the tool.

Safety Quiz – Electric Grinder

Student Name _____

Class _____

Date _____ Grade _____

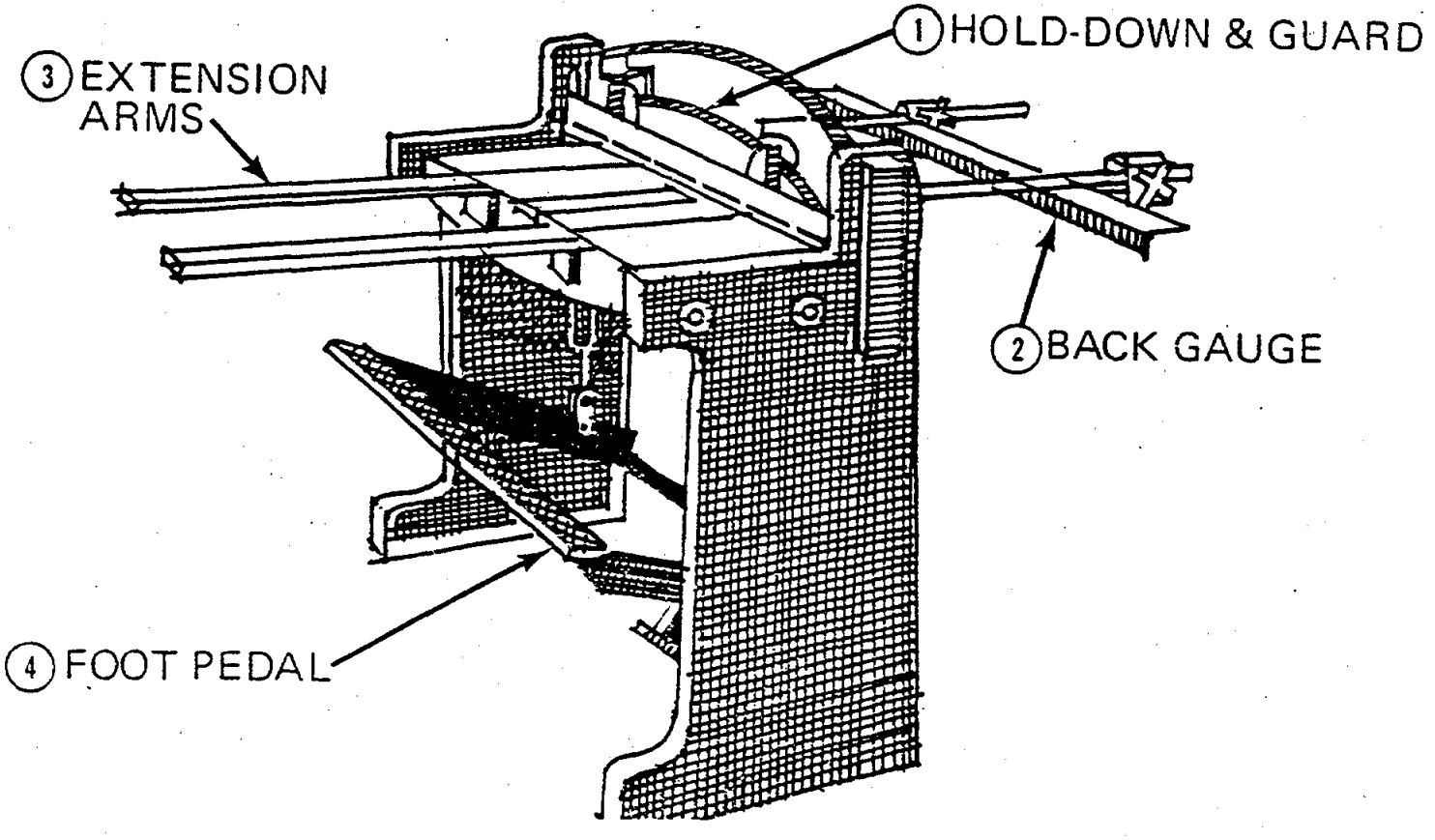
1. A backing plate is not needed when grinding soft materials.	T	F
2. The grinder can be set down and allowed to run to save on wear and tear of switches.	T	F
3. Care must be taken when grinding to keep the sparks directed away from flammables.	T	F
4. Serious personal injury could result from the grinder by not wearing proper attire.	T	F
5. A face shield is an absolute must as well as approved eye protection when operating a grinder.	T	F

Metal Squaring Shear

OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THIS MACHINE.

SAFETY SUGGESTIONS

1. Check setup and machine before operating.
2. Never surpass the capacity of the machine.
3. Feed and operate from the front or the operator's position.
4. Always keep your fingers away from the pressure bar and blade, a minimum of 4 inches.
5. Keep the foot that is not being used out from under the treadle.
6. Allow small pieces to drop; do not attempt to catch them.
7. Remove burrs before working; gloves or pads are recommended for handling sheet metal, especially large pieces.
8. Place scraps or trimmings in metal waste container and return machine to normal position.
9. Whenever two people are needed to operate the shear, one shall be the operator, the other the helper.



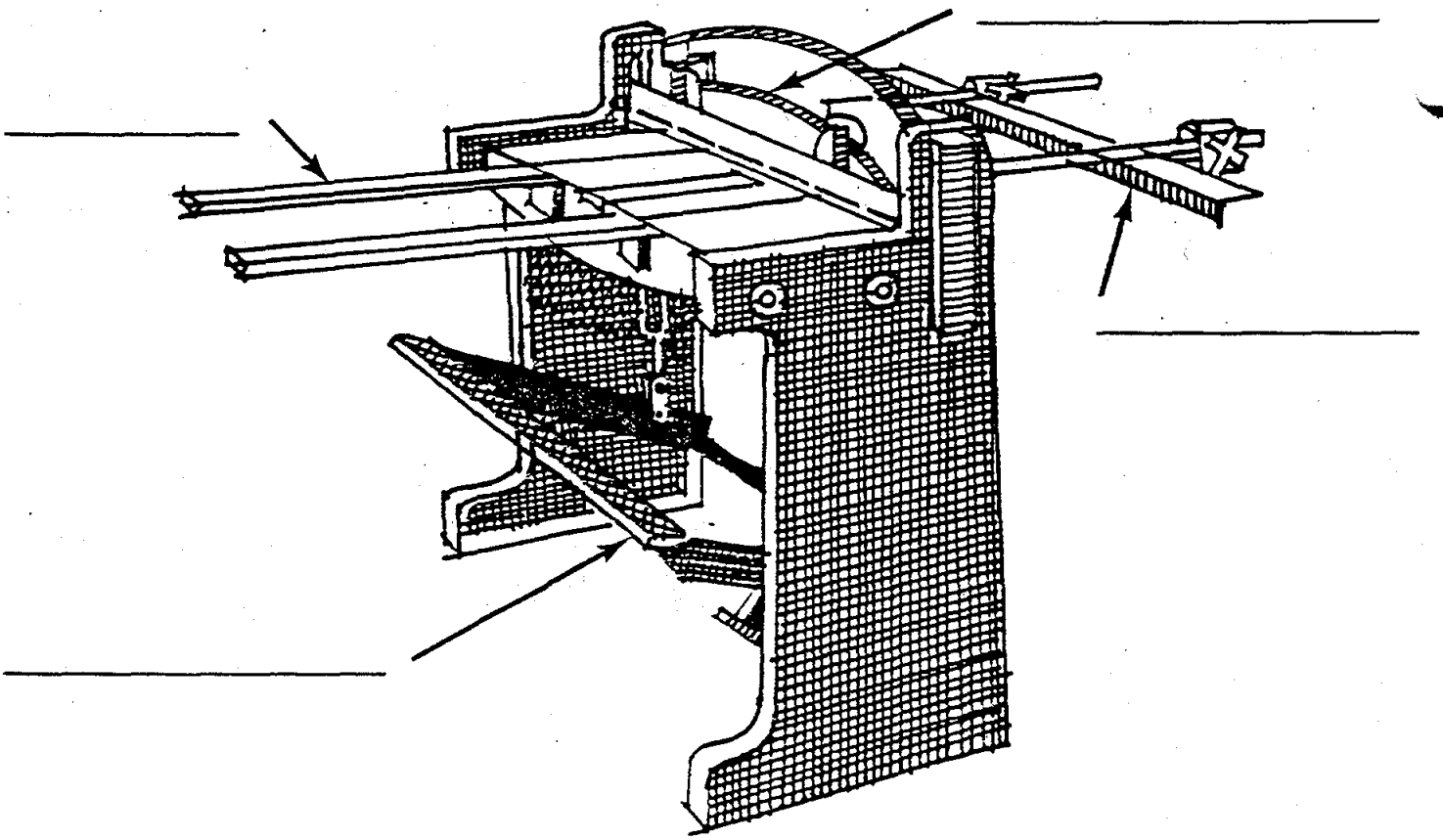
Safety Quiz – Metal Squaring Shear

Student Name _____

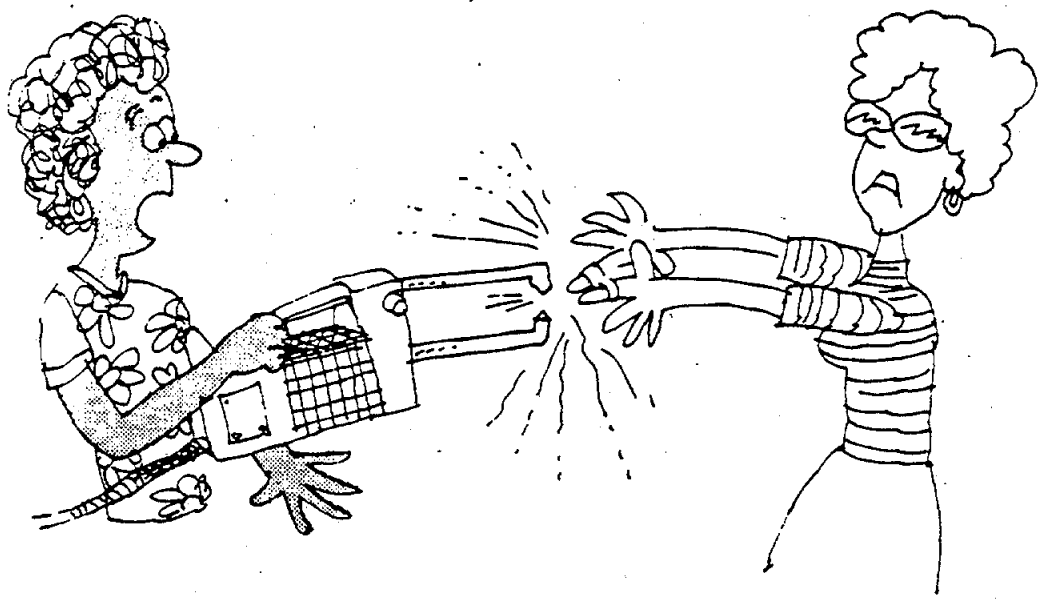
Class _____

Date _____ Grade _____

1. Feed and operate from the treadle side of the machine only. T F
2. It is permissible to let small pieces drop into a box as they are cut. T F
3. Two students may operate the shear together. T F
4. For some projects the guard can be removed. T F
5. The foot treadle should be so arranged that there is a 2" floor clearance at the bottom of a stroke. T F

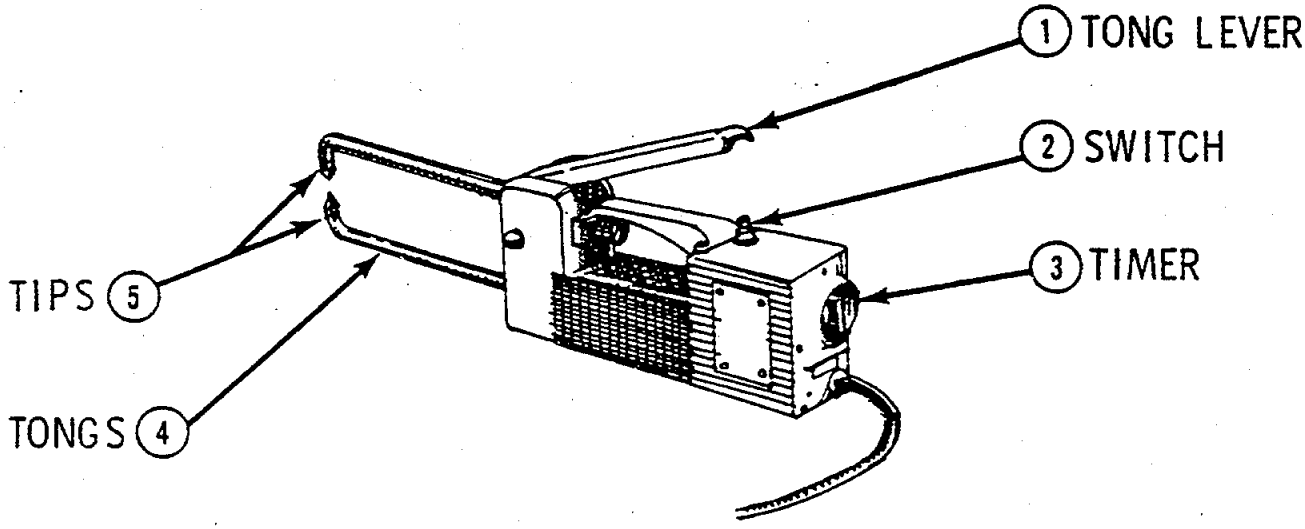


Spot Welder



SAFETY SUGGESTIONS

1. Always wear a protective face shield, in addition to proper eye protection.
2. Do not weld with wet hands or in a damp area.
3. Do not touch the tips, tongs or welded material after welding, as they become very hot.
4. Never leave the spot welder unattended with the electrical cord plugged in.
5. The metal being spot welded must be clean and dry.
6. When spot welding galvanized material remove the galvanize from the area being welded.



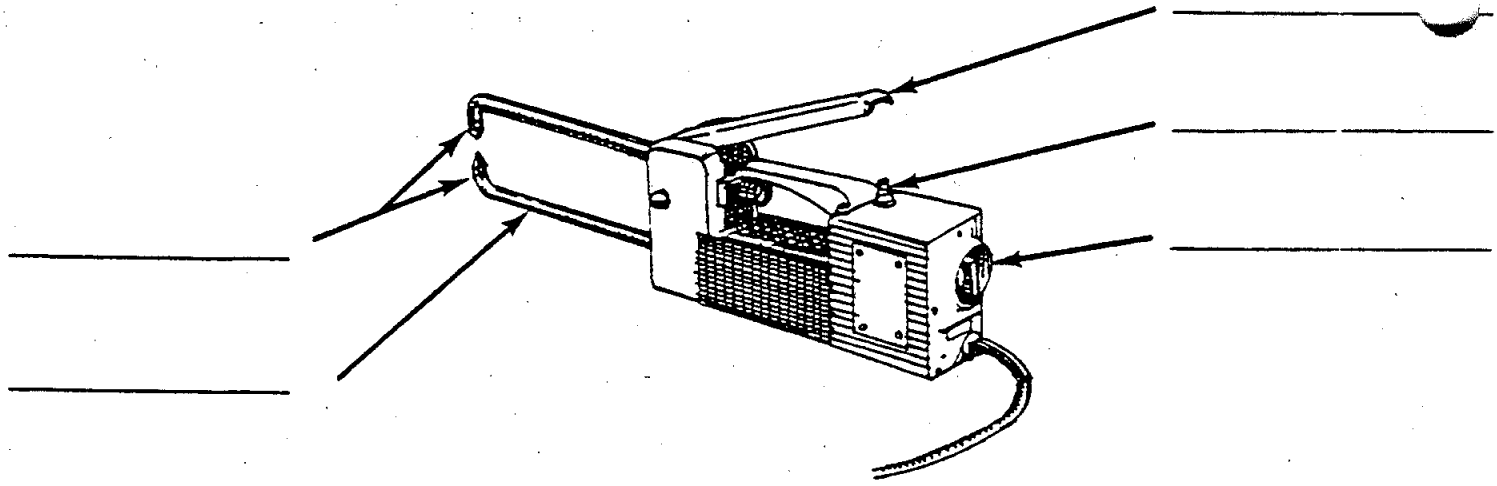
Safety Quiz – Spot Welder

Student Name _____

Class _____

Date _____ Grade _____

1. The spot welder should be used in a wet, damp work area. T F
2. The spot welder should always be left plugged in and the current left on. T F
3. After welding, the tips of the spot welder are very hot. T F
4. The metal being spot welded must be clean and dry. T F

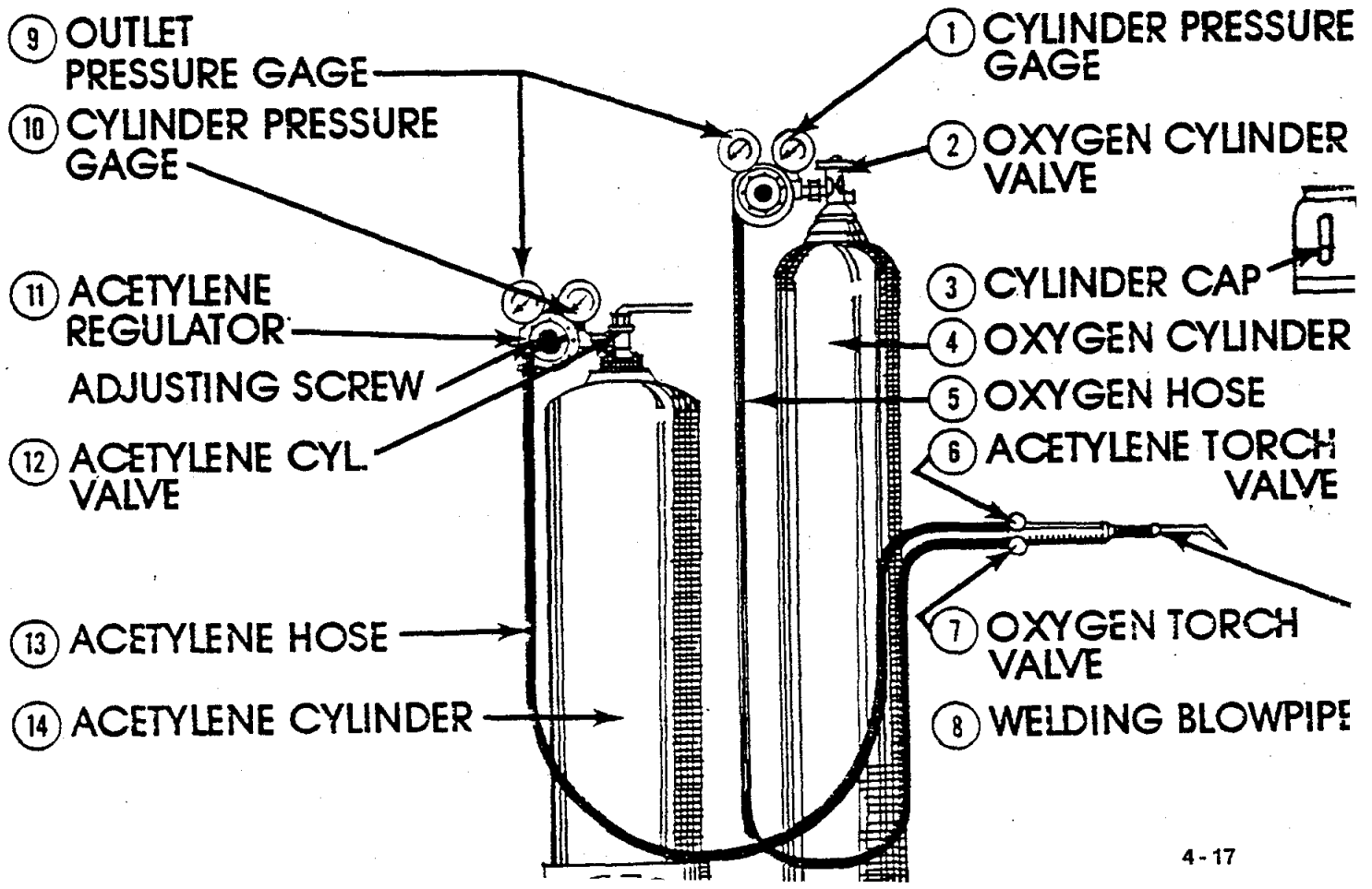


Oxy-Acetylene Welder

OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THIS MACHINE.

SAFETY SUGGESTIONS

1. Do not weld galvanized metal without proper ventilation.
2. Do not allow oil to come in contact with hoses or equipment.
3. Gas bottles must be erect and *secure* at all times.
4. Approved goggles and spark-resistant clothing must be worn when welding.
5. Do not weld or cut on a closed container without instructor's approval.
6. Confine all cutting and welding to the designated area in the shop.
7. Turn off torch valves when finished with equipment.
8. Keep the cylinder caps on the bottles when not in use.
9. Turn off gas and oxygen at tanks or stations at the end of class session.
10. Bend the end of long welding rods to identify hot end and to reduce potential exposure to eye injury.



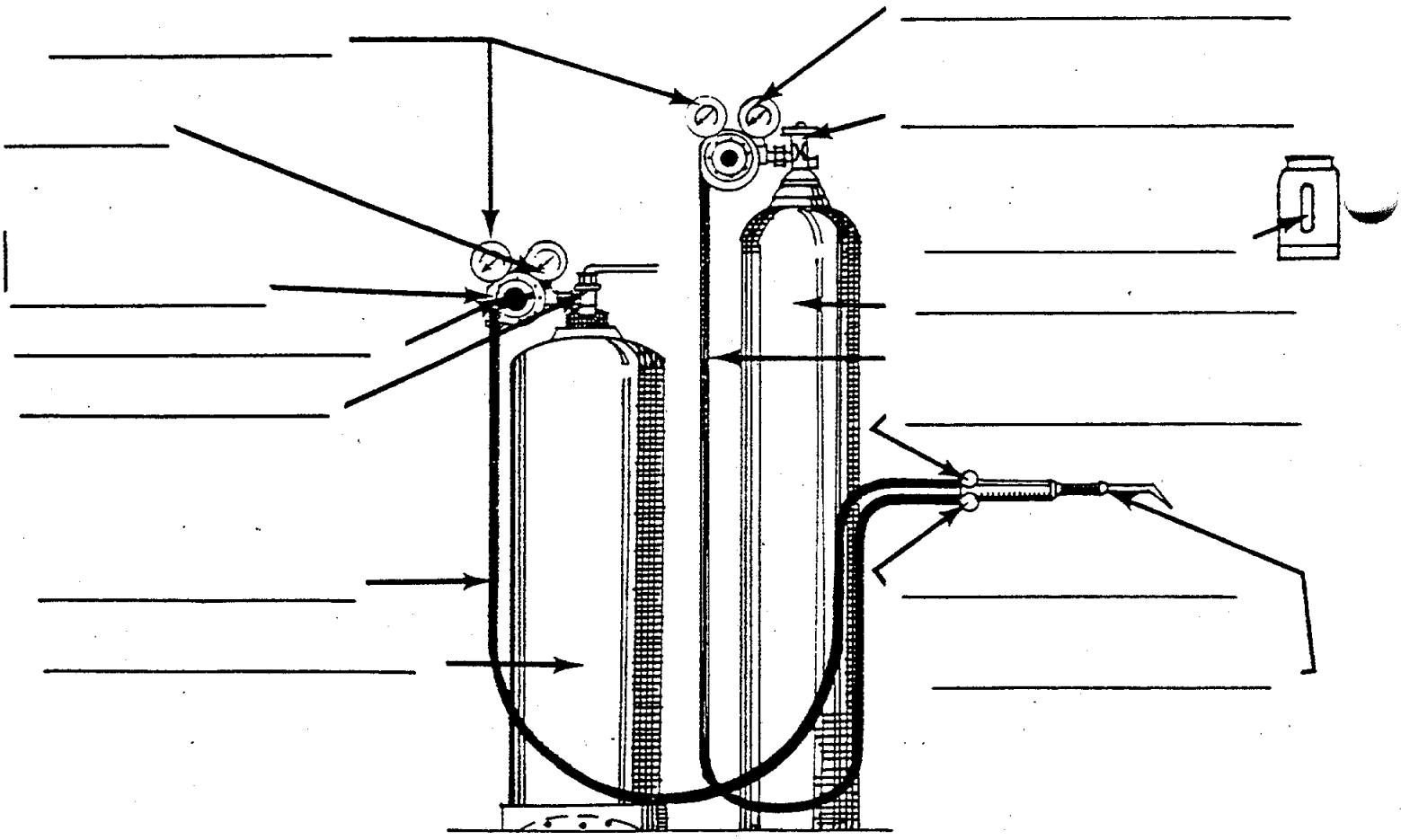
Safety Quiz – Oxy-Acetylene Welder

Student Name _____

Class _____

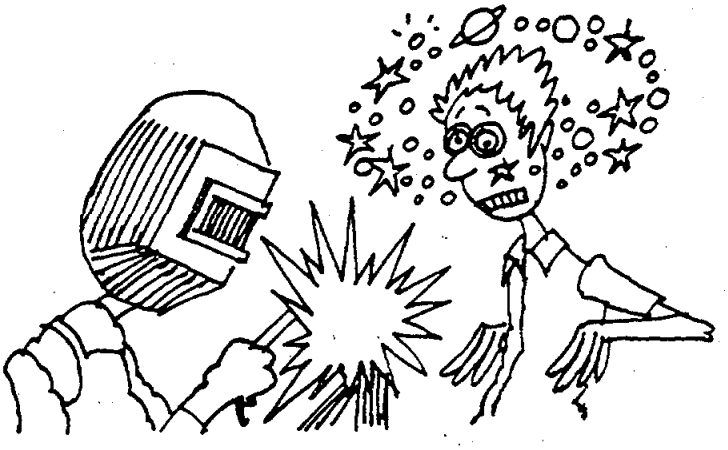
Date _____ Grade _____

1. Gas bottles may be laid on the floor when not in use. T F
2. Closed containers are not hazardous to weld or repair. T F
3. The cylinder caps should be placed on all bottles when not in use. T F
4. Eye protection must be worn for **all** welding, cutting and chipping operations. T F
5. The equipment should not be wiped down with oily rags. T F



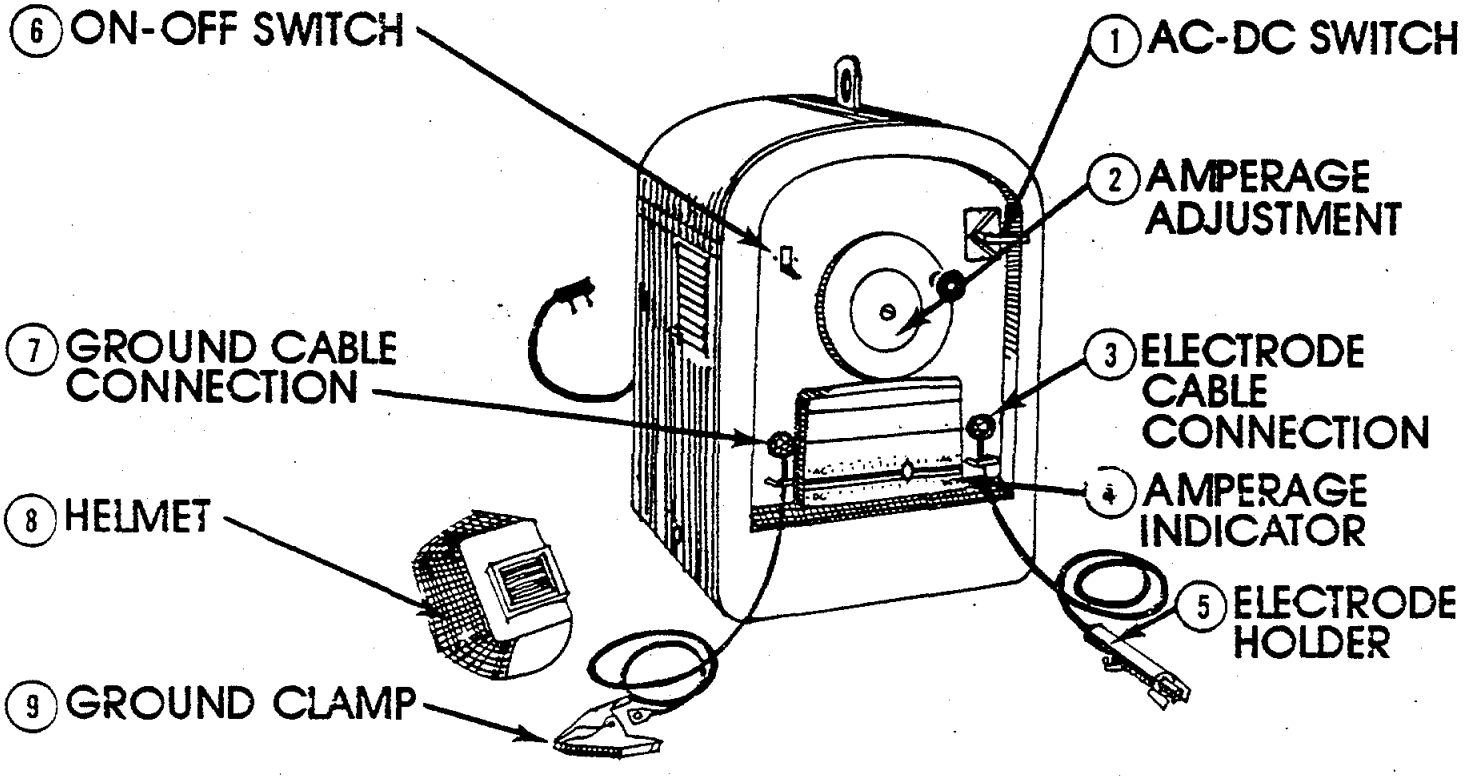
Arc Welder

OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THIS MACHINE.



SAFETY SUGGESTIONS

1. A welding helmet must be worn when welding.
2. Proper ventilation must be available.
3. Goggles must be worn when chipping slag.
4. Others in the area must be warned prior to striking an arc.
5. Approved clothing and gloves must be worn when welding.
6. Closed containers should not be welded without the instructor's permission.
7. Do not stand in wet areas while welding.
8. Screens to protect others must be in place before welding is started.
9. Special caution should be taken when wearing contact lenses.



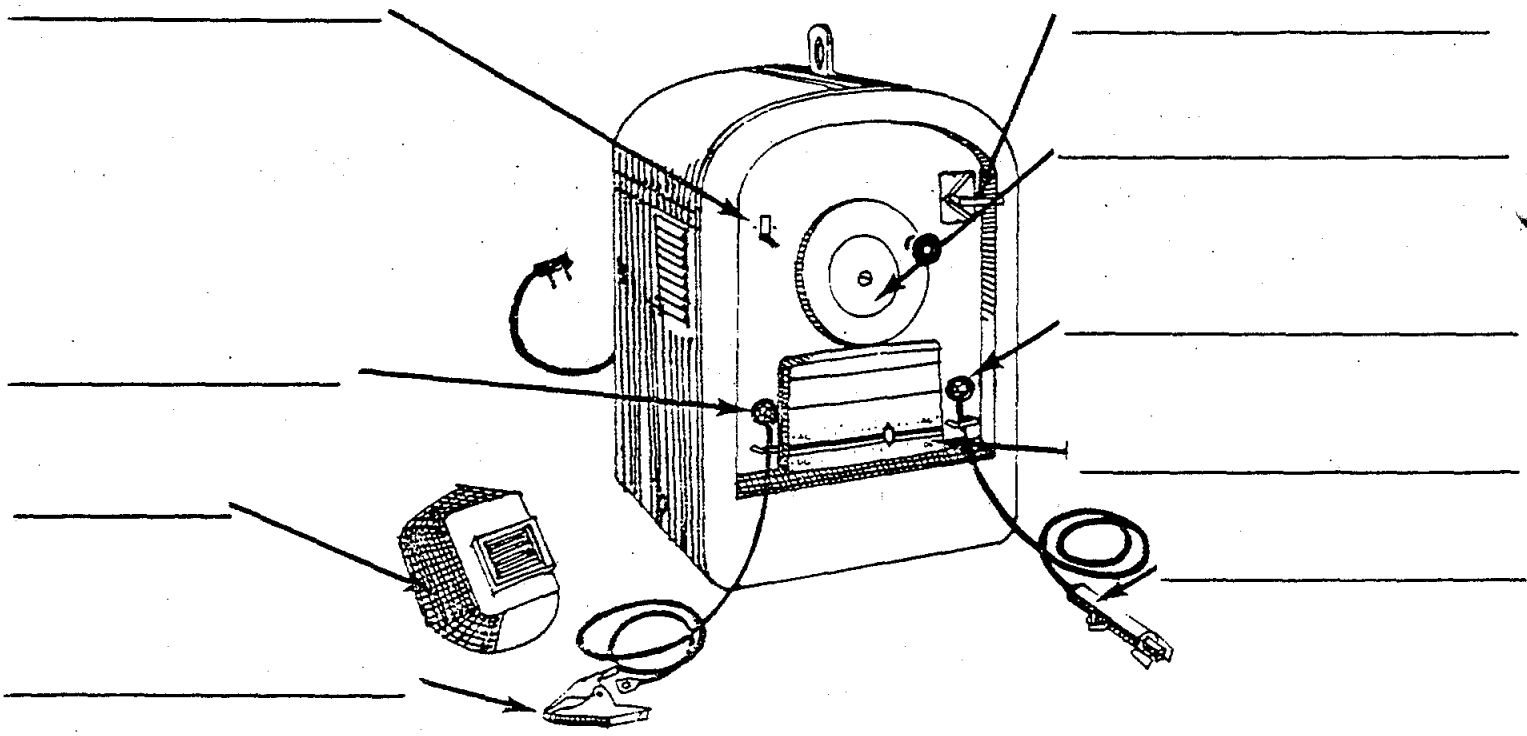
Safety Quiz – Arc Welder

Student Name _____

Class _____

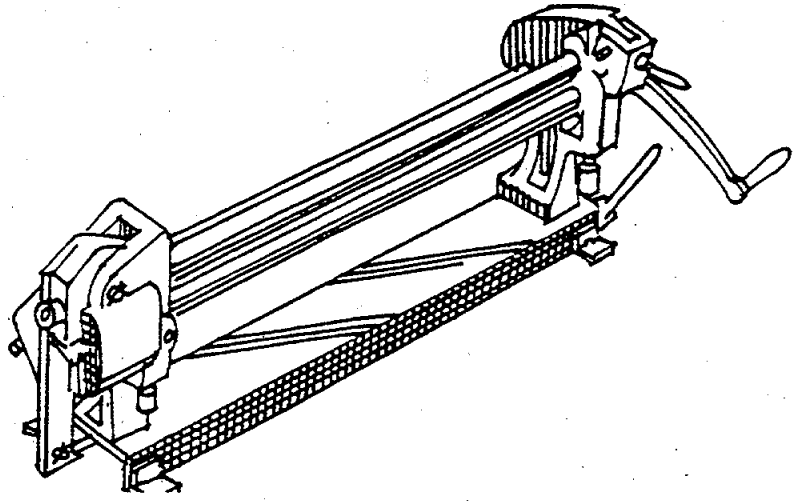
Date _____ Grade _____

1. You should warn anyone nearby when you start to weld. T F
2. Approved goggles and a welding hood should be available before you start to weld. T F
3. A closed container is dangerous to weld. T F
4. Gloves are not necessary when welding. T F
5. It is dangerous to weld without proper ventilation. T F



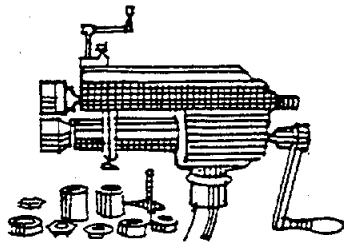
Sheet Metal Machines

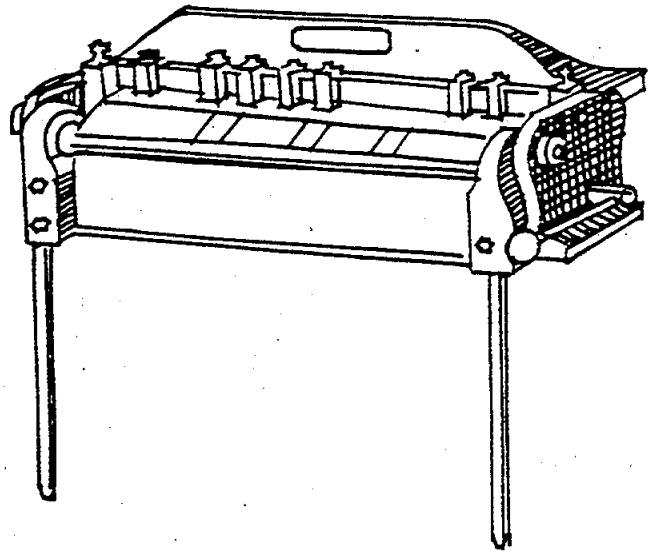
OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THESE MACHINES.



SAFETY SUGGESTIONS

1. Remove sharp burrs and edges from sheet metal before attempting to work it in the machines.
2. Never attempt to bend, roll, crimp, bead, etc., metal which is heavier than the capacity of the machine.
3. Keep hands and fingers clear of moving parts.
4. Never work more than one thickness of metal at one setup.
5. Avoid slamming or dropping the handles of the machine.
6. Be careful that moving parts or metal do not strike others.
7. Take care not to place hands in a position that will allow them to slip into the rolls, jaws, etc.





Safety Quiz – Sheet Metal Machines

Student Name _____

Class _____

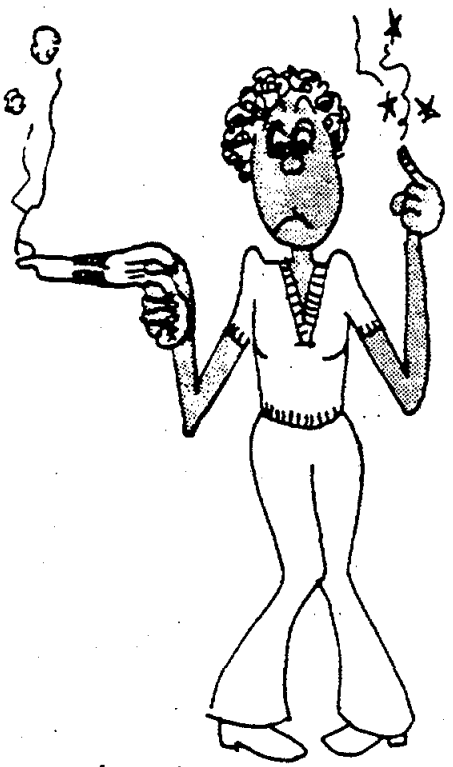
Date _____ Grade _____

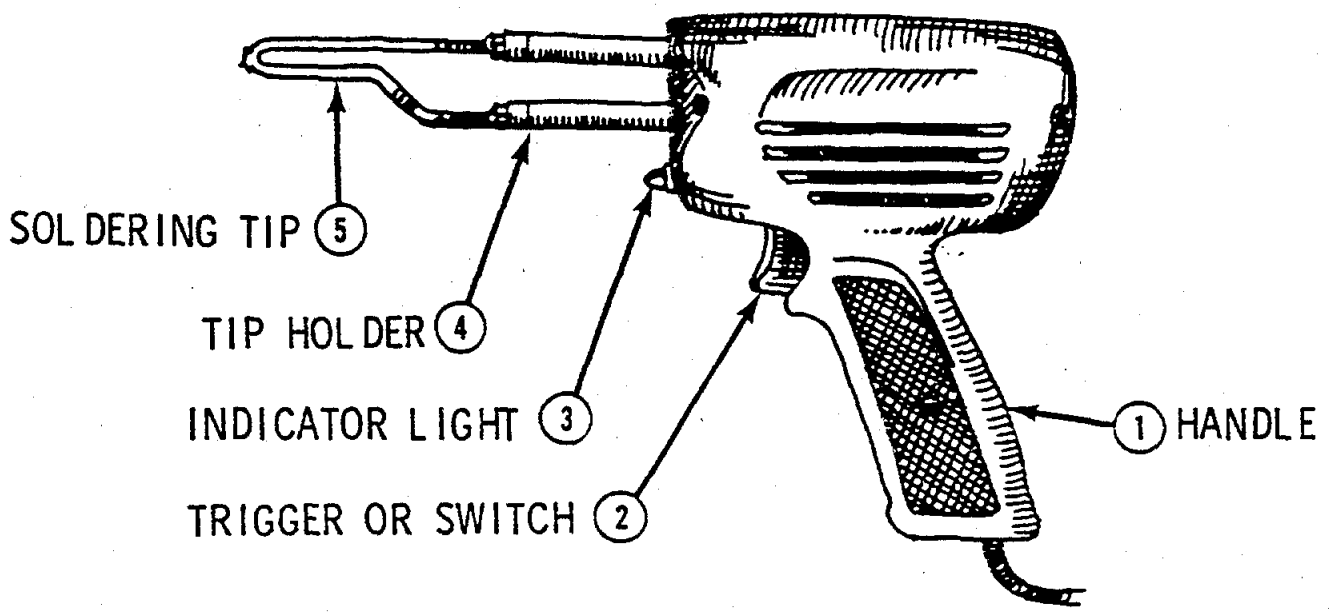
1. The infeed rolls of a roll machine are dangerous to the operator's hands. T F
2. Sheet metal machines can be damaged by overloading. T F
3. Sharp burrs and edges should be removed *before* attempting to place in the machine. T F
4. Fingers must be kept clear of moving parts. T F
5. Quarter inch mild steel stock can be formed on the sheet metal machine. T F

Solder Gun

SAFETY SUGGESTIONS

1. Always wear approved eye protection.
2. Work in a well-ventilated area and avoid inhaling soldering fumes.
3. Observe all rules for handling *hot* materials.
4. Do not flip excess molten solder off the tip of solder gun. Wipe it off with a piece of steel wool.
5. Do not stand in wet areas while using the solder gun.
6. Never leave the solder gun unattended with the electrical cord plugged in.
7. Always disconnect cord when changing soldering tips.
8. Soldering flux can cause burns. Clean up flux immediately.
9. In case of acid burns, flush immediately with water. (Use baking soda to neutralize acids.)
10. Never use solder gun with worn or exposed wiring or a cracked plastic cover/handle.





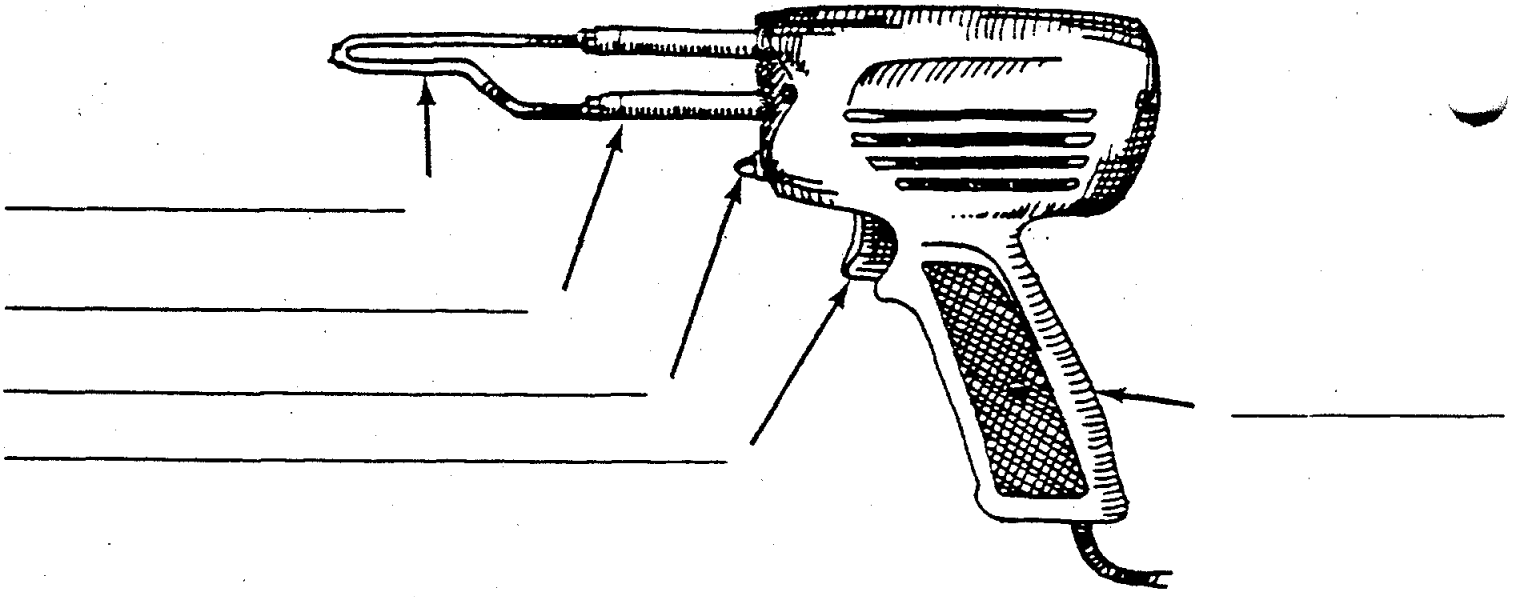
Safety Quiz – Solder Gun

Student Name _____

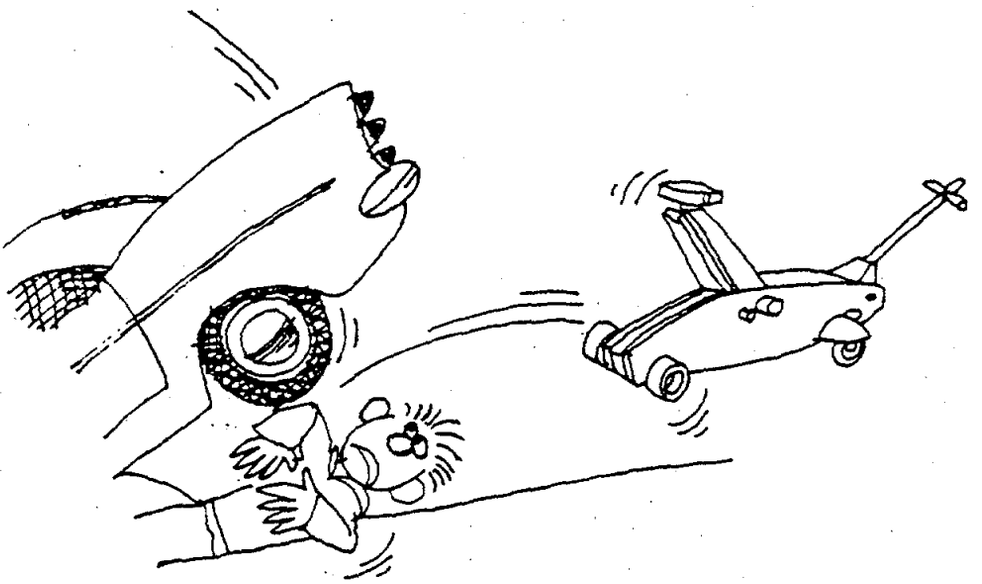
Class _____

Date _____ Grade _____

1. Wear safety goggles ONLY if you think solder might flip in your eyes. T F
2. A large, airy room would be a better place to solder than a small closed space. T F
3. Use pliers or a clamp to hold small objects while soldering. T F
4. The most important thing to remember when changing soldering tips is to stand in a wet area. T F
5. Leave your work to cool and come back later to clean up the excess flux. T F

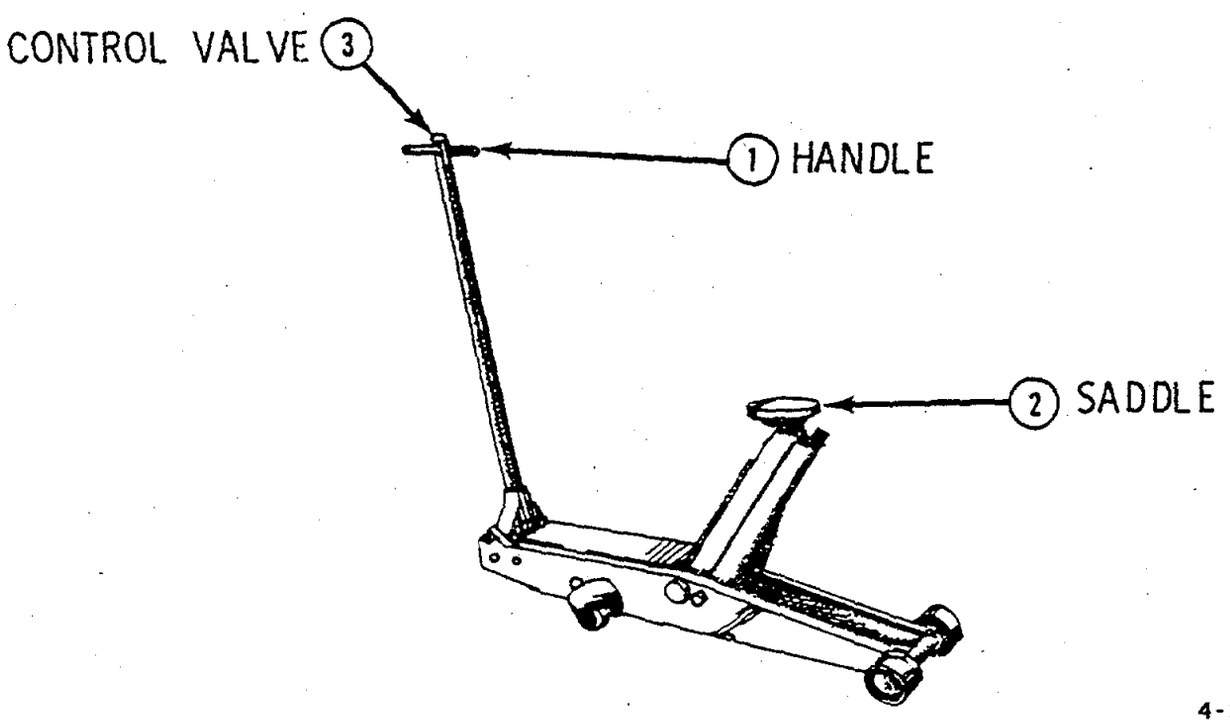


Service Jack



SAFETY SUGGESTIONS

1. When using the jack, be sure it is securely placed and lift saddle properly aligned to prevent slipping.
2. Once saddles are located, apply some pressure, then stop and examine these before lifting the car.
3. Never raise a car while someone is under it.
4. Always use car stands or supports before going under a raised car.
5. Inspect the jack for oil leaks or other malfunctions before using.
6. Never work under a vehicle supported only by a service jack.



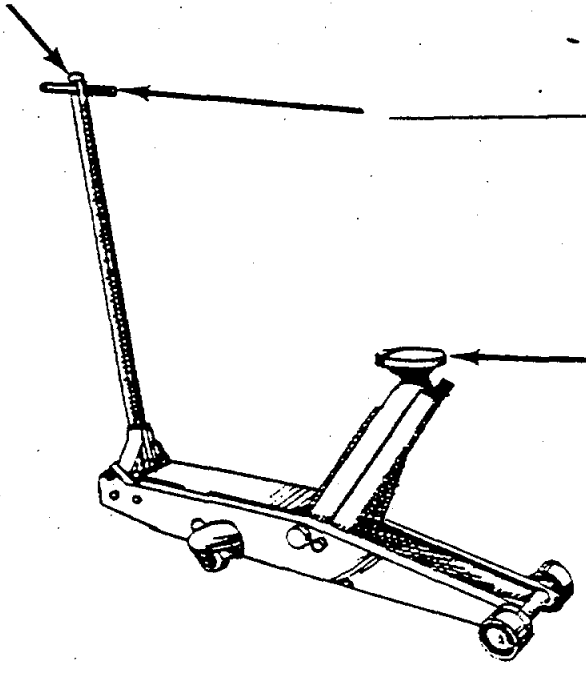
Safety Quiz – Service Jack

Student Name _____

Class _____

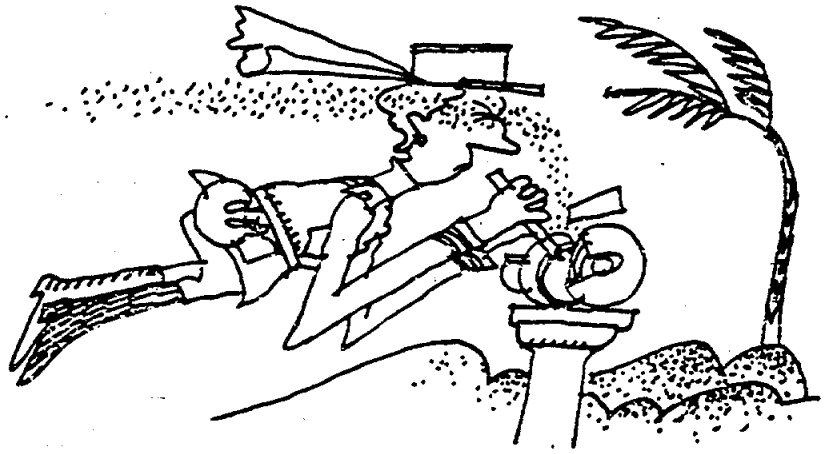
Date _____ Grade _____

1. It is unsafe to work under a car that is supported with a service jack only.	T	F
2. It is a good safety practice to raise a car with someone under it.	T	F
3. It is necessary to inspect the lift saddles for proper alignment when raising a car.	T	F
4. The service jack should always be inspected for malfunctions before using.	T	F
5. Car stands on supports should be used before anyone goes under a raised car.	T	F



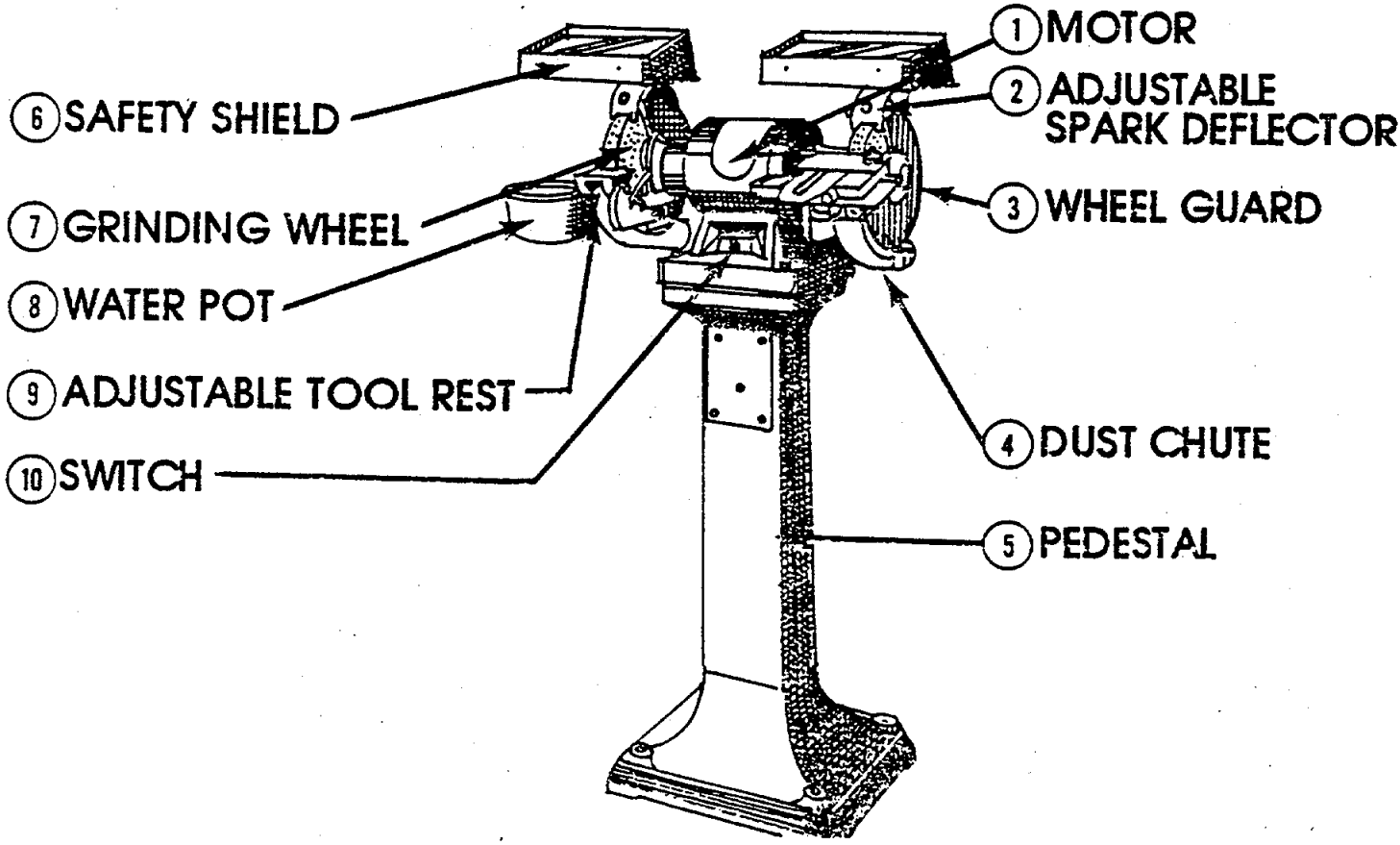
Grinder

OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THIS MACHINE.



SAFETY SUGGESTIONS

1. Approved eye protection must be worn at all times.
2. All guards must be properly adjusted.
3. The tool rest must be adjusted to 1/8" from the wheel.
4. Do not grind on the side of the grinding wheel.
5. Spark deflector or top guard must be within 1/8" of wheel.
6. Small pieces should be held with "vise grip" type pliers.
7. A wheel that is excessively worn or cracked should be discarded.
8. The glass safety shield should be clean.
9. Stand to one side when starting the machine.



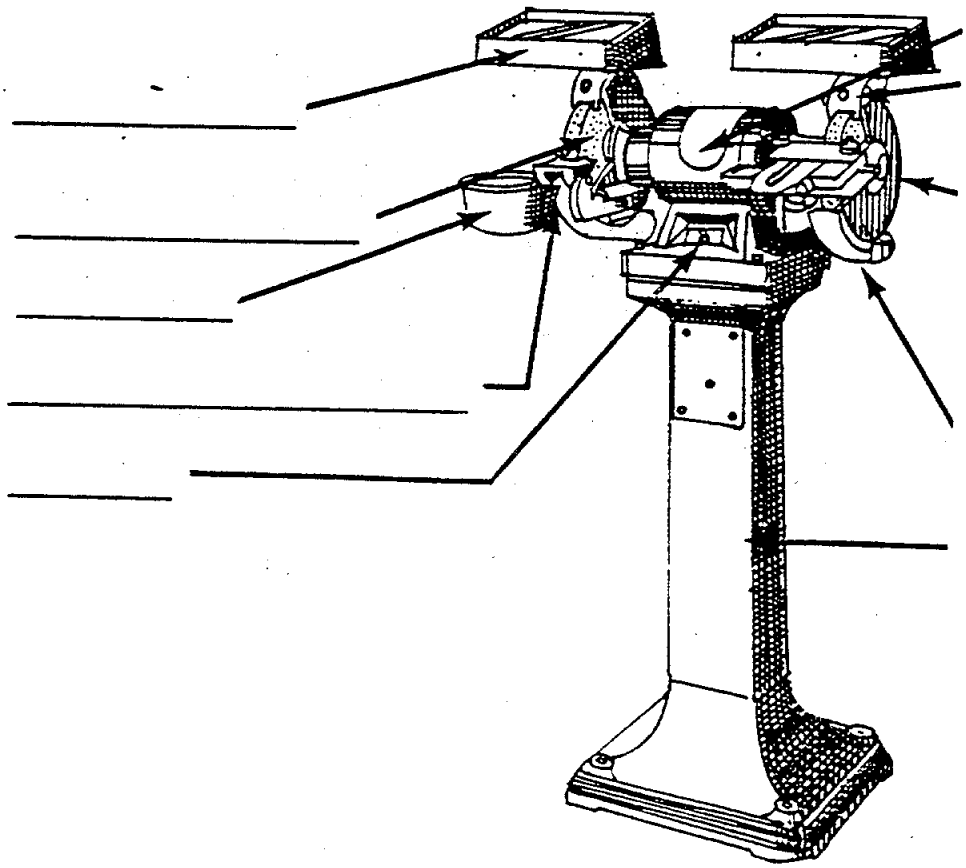
Safety Quiz – Grinder

Student Name _____

Class _____

Date _____ Grade _____

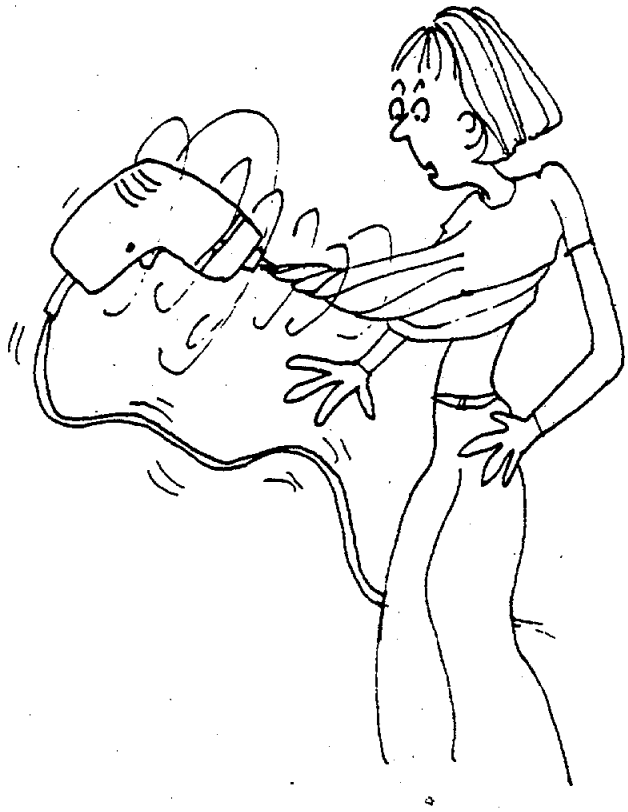
1. The tool rest should be adjusted to within 1/2" of wheel. T F
2. Eye protection is not always necessary while grinding. T F
3. Once the "off" switch is in the off position, the operator may leave. T F
4. The safety shield should be clean. T F
5. Wheels that are out of balance may be used. T F
6. The spark arrestor is not necessary if there is a glass safety shield. T F
7. When grinding a small piece of steel, "vise grips" are advised. T F
8. If there is a glass shield, eye protection is not required. T F

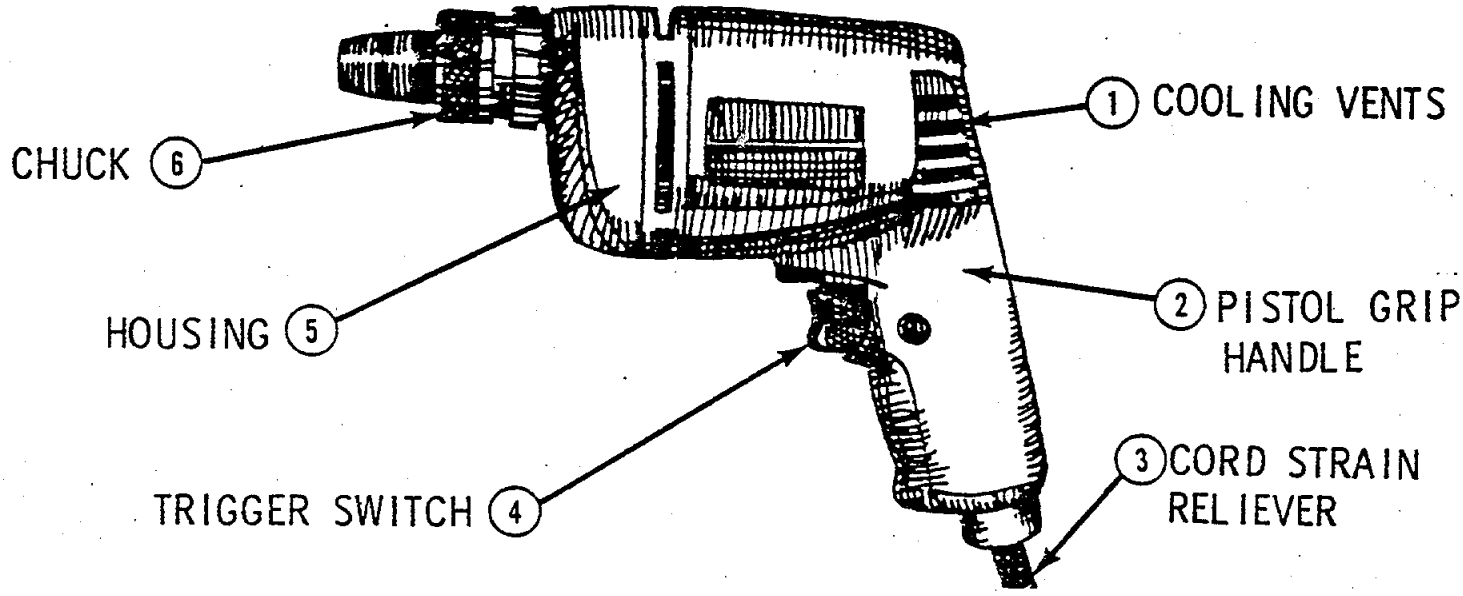


Portable Electric Drill

SAFETY SUGGESTIONS

1. Wear approved eye protection.
2. Disconnect the electric cord plug from the power outlet when changing drill bits.
3. Be sure the switch is off and the chuck key is removed before you connect the cord plug to the power source.
4. Do not use in damp or wet area.
5. Be sure the material being drilled is tightly clamped or secured.
6. Drill with a straight steady even pressure.
7. Be sure the drill bit is used and properly secured in the chuck.





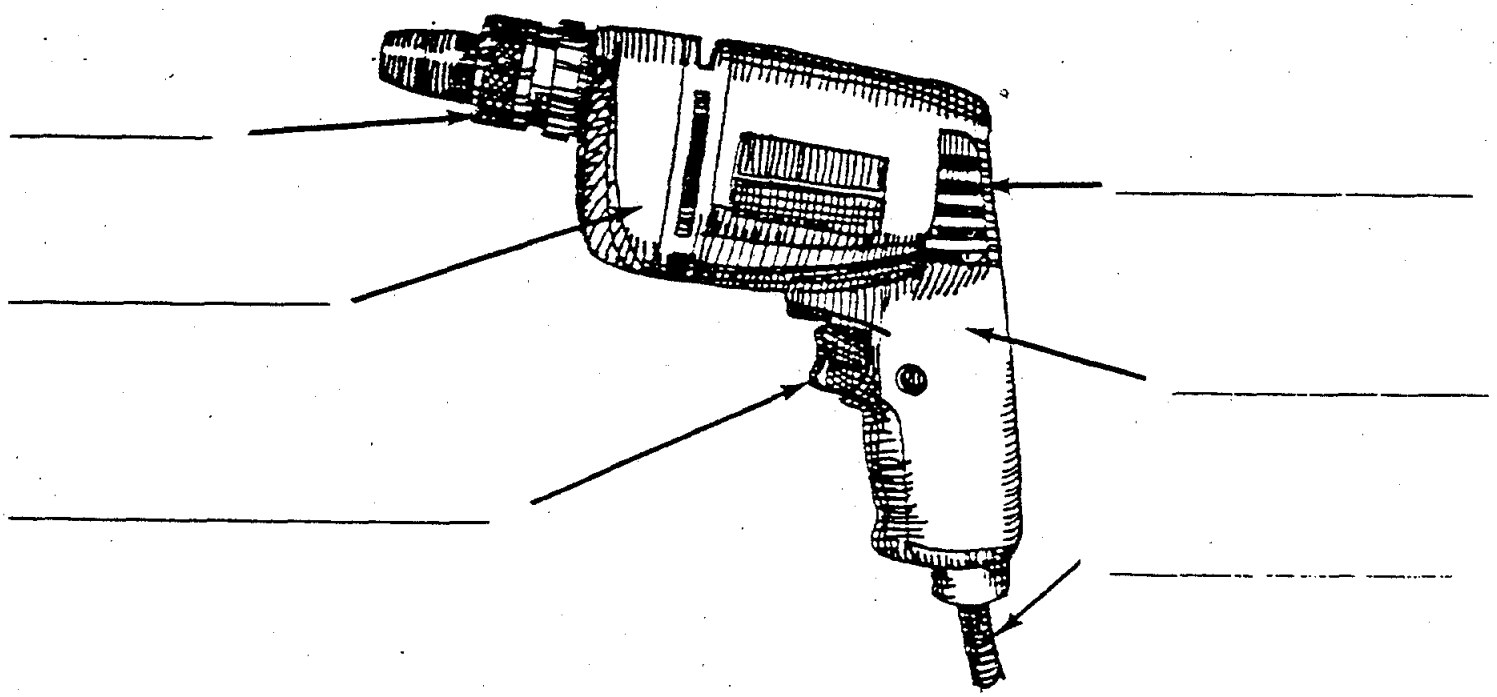
Safety Quiz – Portable Electric Drill

Student Name _____

Class _____

Date _____ Grade _____

1. Eye protection is not needed when drilling wood. T F
2. Electric powered portable tools should not be used in wet areas. T F
3. The electrical cord plug of the drill should be disconnected from the power source when changing drill bits. T F
4. Holes should be drilled with short jerky movements. T F
5. The drill bit must be secure in the drill chuck. T F
6. The chuck key should remain in the chuck when drilling. T F



Buffer

OBTAIN PERMISSION FROM THE INSTRUCTOR BEFORE USING THIS MACHINE

SAFETY SUGGESTIONS

1. Always buff using the lower half of the wheel (below center).
2. Always wear eye protection when buffing.
3. Always stand to one side of the wheel when buffing and when applying compound.
4. Never use a rag to hold the work while you are buffing.
5. Use extra caution when buffing around corners, openings or areas where the wheel could grab and throw the work. Do not buff small diameter tubing, wires, chain or similar material.
6. Exercise caution so that the work does not overheat and burn your hands.
7. Be sure the area behind the buffer is open and that no one else is in the safety zone.
8. If your hairstyle presents a potential hazard, you must fasten it securely or wear a protective hair cover.
9. Remove or fasten any loose clothing, neckties or jewelry. Roll loose sleeves to the elbow.

Safety Quiz – Buffer

Student Name _____

Class _____

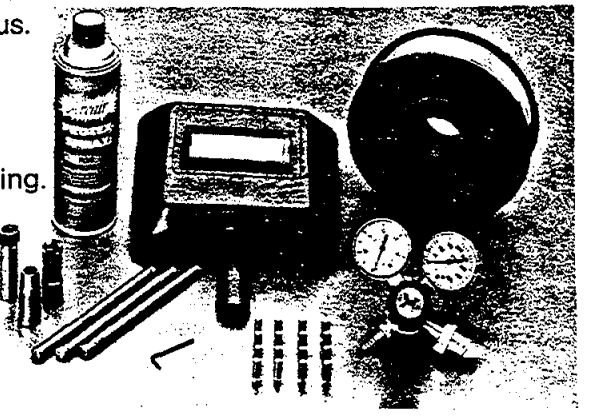
Date _____ Grade _____

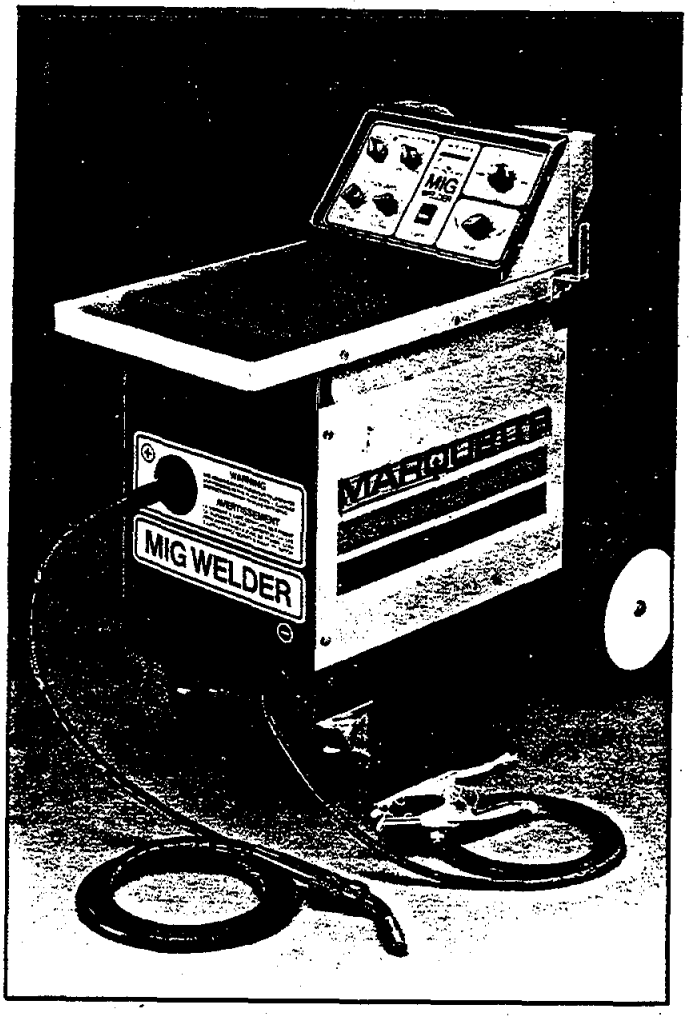
1. A rag should be used to hold hot objects while buffing. T F
2. Always buff on the lower half of the wheel. T F
3. Loose clothing or hair must be confined. T F
4. Goggles *must* be worn when buffing. T F
5. Use extra caution when buffing corners or confined areas of the work. T F

MIG Welder

SAFETY SUGGESTIONS

1. Always use approved helmet, eye protection and the correct shade lens, or eye damage or blindness will occur.
2. Proper ventilation must be available, or suitable breathing apparatus.
3. Approved clothing must be worn when welding.
4. Others in the area must be warned before beginning to weld.
5. Closed containers must be approved by the instructor before welding.
6. Do not stand in wet areas while welding.
7. All flammables must be removed from the area.
8. Screens to protect others must be in place before welding.
9. .Special caution should be taken when wearing contact lenses.





Safety Quiz – Vixen File

Student Name _____

Class _____

Date _____ Grade _____

1. Eye protection is not required when using this tool. T F

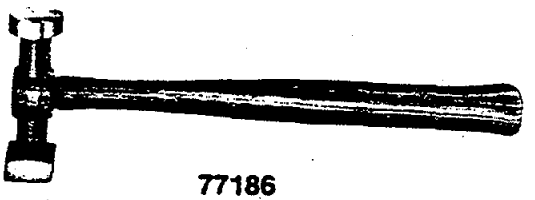
2. You can damage the file blade if you drag it back over the work. T F

3. Gloves are necessary to protect hands from metal shavings. T F

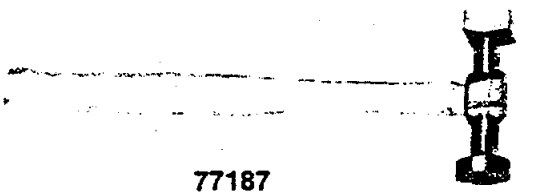
Body Hammer

SAFETY SUGGESTIONS

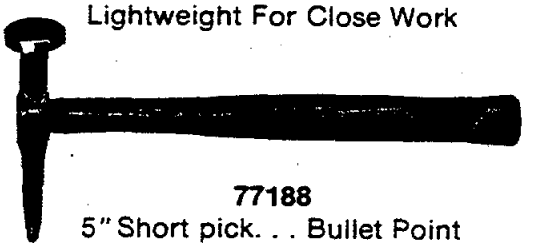
1. Always keep hammer face polished and free from nicks.
2. Never hammer on a hardened metal surface.
3. Always wear approved eye protection.
4. Wear gloves when working around areas which could come into contact with your hand.
5. Never hammer toward a part of your body — direct blows away.
6. Do not allow handle to work loose.
7. Use wrist action to move hammer.



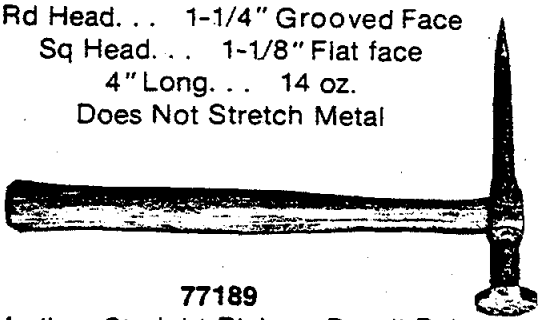
77186
BUMPING & SHORT FINISH HAMMER
Rd Head. . . 1-1/4" Flat Face
Sq Head. . . 1-1/8" Flat Face
4" Long. . . 14 oz.
Lightweight For Close Work



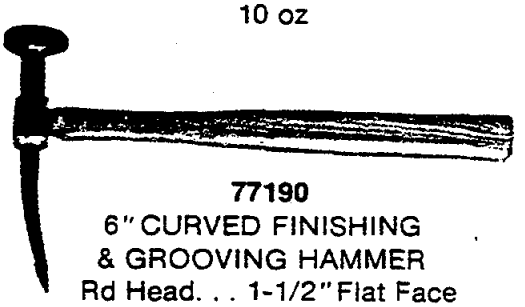
77187
MEDIUM SHRINKING HAMMER
Rd Head. . . 1-1/4" Grooved Face
Sq Head. . . 1-1/8" Flat face
4" Long. . . 14 oz.
Does Not Stretch Metal



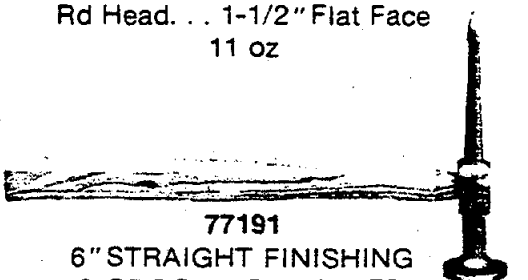
77188
5" Short pick. . . Bullet Point
Rd Head. . . 1-1/2" Flat Face
10 oz



77189
7" Medium Straight Pick. . . Pencil Point
Rd Head. . . 1-1/2" Flat Face
11 oz



77190
6" CURVED FINISHING
& GROOVING HAMMER
Rd Head. . . 1-1/2" Flat Face
Chisel Pt. . . Blunt Head
14 oz.



77191
6" STRAIGHT FINISHING
& GROOVING HAMMER
Rd Head. . . 1-1/2" Flat Face
Chisel Pt. . . Blunt Head
14 oz.

Safety Quiz – Body Hammer

Student Name _____

Class _____

Date _____ Grade _____

1. Eye protection is not a consideration when using a hammer. T F
2. Always hammer away from your body. T F
3. You can use tape to repair a broken hammer handle. T F
4. Never use a hammer on a hardened surface. T F

Hand Dolly

SAFETY SUGGESTIONS

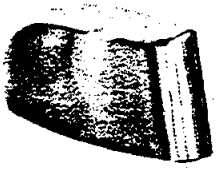
1. Keep dolly free from nicks and chips.
2. Always wear approved eye protection.
3. Wear gloves when using the dolly.
4. Never strike the dolly face directly with the hammer. Besides damaging the tools, you can be injured.
5. Do not leave the dolly laying on the project you are working on when it is not in use.
6. Use the correct shape dolly for the job.

2 lb.
7 oz.

77178
GENERAL PURPOSE RAIL DOLLY
3-1/8" Lg x 3" W x 2-3/8" High
For Bumping, Dinging, Straightening
and Finishing. . . Great Balance
Two Beading and Flaring Lips

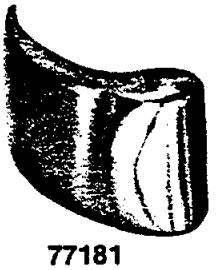
2 lb.
7 oz.

77179
HEEL DOLLY
3-1/8" Lg x 2-1/2' W x 1-3/8' High
Round and Flat Faces. . . Use
in Sharp Corners and With Wide Radii



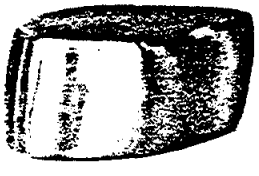
2 lb.
7 oz.

77180
TOE DOLLY
6-3/4" Lg x 2-3/8" W x 1" High
FLAT AND LOW-CROWN DURVED FACES
For Narrow Pockets, Flat Surfaces, Flanges



3 lb.
9 oz.

77181
WEDGE OR COMMA DOLLY
5-3/4" Lg x 2-5/8" W x 2" High
Long and Thin. . . Use Behind Brackets
Braces and Other Reinforcements



3 lb.
5 oz.

77182
BODY DOLLY
4-1/2" Lg x 2-3/8" W x 1-3/4" High
Multi-Crown and Radii For Use
On Body Curves and Contours

Safety Quiz – Hand Dolly

Student Name _____

Class _____

Date _____ Grade _____

1. Nicks and chips must be removed from the dolly before using. T F
2. Striking the dolly directly with the hammer can be dangerous. T F
3. Proper eye protection must be worn when using the dolly. T F
4. Pick the correct dolly shape for the job. T F

Body Spoon

SAFETY SUGGESTIONS

1. Always keep spoon face free from nicks and scratches.
2. Never use a driving spoon as a pry bar.
3. Choose the correct style of spoon for the job.
4. Always use approved eye protection.
5. Gloves must be worn to protect hands from injury.

11 oz.

77183
SLAPPING SPOON
1-7/8" x 4" x 10" Length
Use with Hammer To Reduce Metal Ridges.
Polished Spoon Surfaces

1 lb.
9 oz.

77184
SURFACE SPOON
12" Long
General Purpose Work

1 lb.
9 oz.

77185
INSIDE HIGH CROWN SPOON
15" Long
High Crown and General Purpose Work

Safety Quiz – Body Spoon

Student Name _____

Class _____

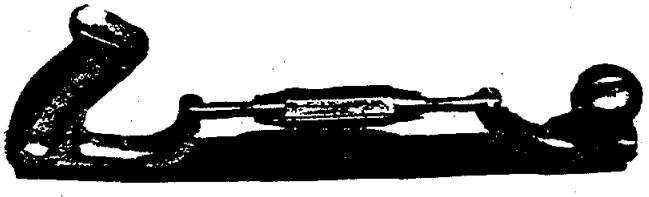
Date _____ Grade _____

1. Keep spoon face free from nicks and scratches. T F
2. Approved eye protection must be worn when using spoons. T F
3. Gloves must be worn for safety's sake when this tool is used. T F
4. All spoons can be used as pry bars if need be. T F

Vixen File

SAFETY SUGGESTIONS

1. Always use approved eye protection.
2. Never drag file back over work as it will dull the blade.
3. Wear gloves to protect hands from metal slivers and the file blade.
4. Adjust file holder to correct setting to keep the file blade at the correct angle to the surface contour.
5. Keep file blade clean.



77348
BODY FILE HOLDER
ALUMINUM . . . ADJUSTABLE

FLAT BODY FILE
"VIXEN" TYPE

6 Tooth	**77346**
8 Tooth	**77347**

Safety Quiz – Vixen File

Student Name _____

Class _____

Date _____ Grade _____

1. Eye protection is not required when using this tool. T F

2. You can damage the file blade if you drag it back over the work. T F

3. Gloves are necessary to protect hands from metal shavings. T F

Commercial Foods

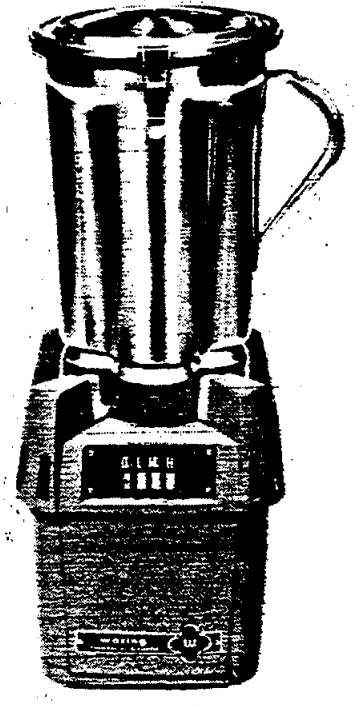
BAKER
CHEF
COOK
PASTRY CHEF

INTRODUCTION

Safety in the Commercial Foods industry is as large a concern as in any other field. Many people fail to realize that in the food preparation areas equipment and personnel can pose potentially dangerous situations. Some of these hazards include: burns from hot stoves, ovens, pans, and/or liquids; cuts from sharp knives, meat and/or vegetable cutting equipment; falls on slippery floors; fumes from cleaning materials; and electric shock from unsafe operating conditions of electical appliances. It is important that students and staff be aware of the specific kinds of hazards presented by equipment used where food is prepared commercially. These include machines that are used to bake, cook, cut, divide, mix, slice, dice, etc. Therefore, it is important that students and instructors become familiar with the many potentially hazardous conditions and operations when using food preparation and cooking equipment.

Blender

1. Make sure all legs are in place.
2. Do not fill blender container more than 2/3 full.
3. Make sure blender container is attached to motor securely.
4. Clamp lid on tightly.
5. Start machine on low speed.
6. Do not put any hand tools in container while machine is on.
7. Make sure motor has stopped before removing container.



Safety Quiz – Blender

Student Name _____

Class _____

Date _____ Grade _____

1. Why is it important to make sure all the legs on the blender are in place?

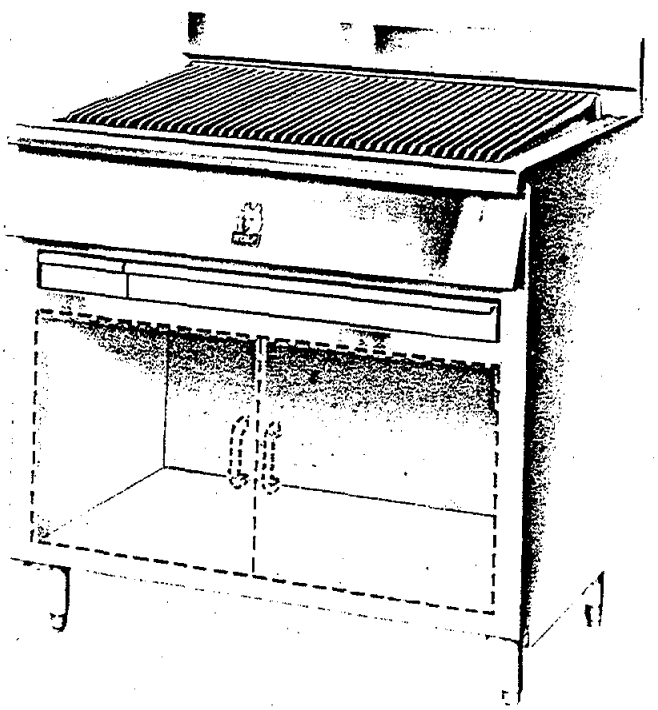
2. Do not fill blender container more than how full?
   a. 1/2
   b. 1/3
   c. 2/3
   d. 3/4

3. What hazard would accrue by not putting the container top on securely?

4. Why is it important not to put hand tools in container while operating?

Broiler

1. Assemble tools necessary to use the broiler (i.e., tongs, wire brush).
2. Before turning on gas broiler check to insure that pilot lights are lit.
3. Have dry towels available.
4. Broiler bars must be wire brushed frequently while being used.
5. Broiler must be cleaned regularly to avoid fat buildup.
6. Tray at bottom of broiler should be lined with aluminum foil and changed frequently (daily).
7. Ventilating hoods above broiler should be cleaned daily to avoid grease buildup.



Safety Quiz – Broiler

Student Name _____

Class _____

Date _____ Grade _____

1. Kitchen hoods above broilers need not be cleaned any more often than the rest of the hoods. T F
2. The tray at the bottom of the broiler needs to be changed once a month. T F
3. Broiler grids need to be wire brushed frequently to avoid buildup of grease. T F
4. Always check to insure that pilot lights are working before turning broiler on. T F
5. Tongs are widely used as a broiler tool. T F

Buffalo Chopper

1. Make sure the switch is in the off position while assembling the cutter.
2. Keep hands from under cover or in the bowl when it is operating.
3. Do not lift the lid until knives have stopped revolving.
4. Note that the leader knife is beveled on one side only. This knife is to be on the shaft first nearest the motor.
5. Always turn off machine before switching speeds.
6. Periodic lubrication of the bowl drive gear is needed. A yearly check should be done.
7. Make sure hand knob for knives is tightened before starting machine.
8. Use care not to overload the machine and to add food in such a way that the cuts are fairly uniform in size.
9. When using the attachments on the food cutter, it is a good practice to remove the knife unit.
10. When operating the dicer, slicer or any attachment, make sure the correct knife cutting frame and pusher plate are assembled according to instructions.

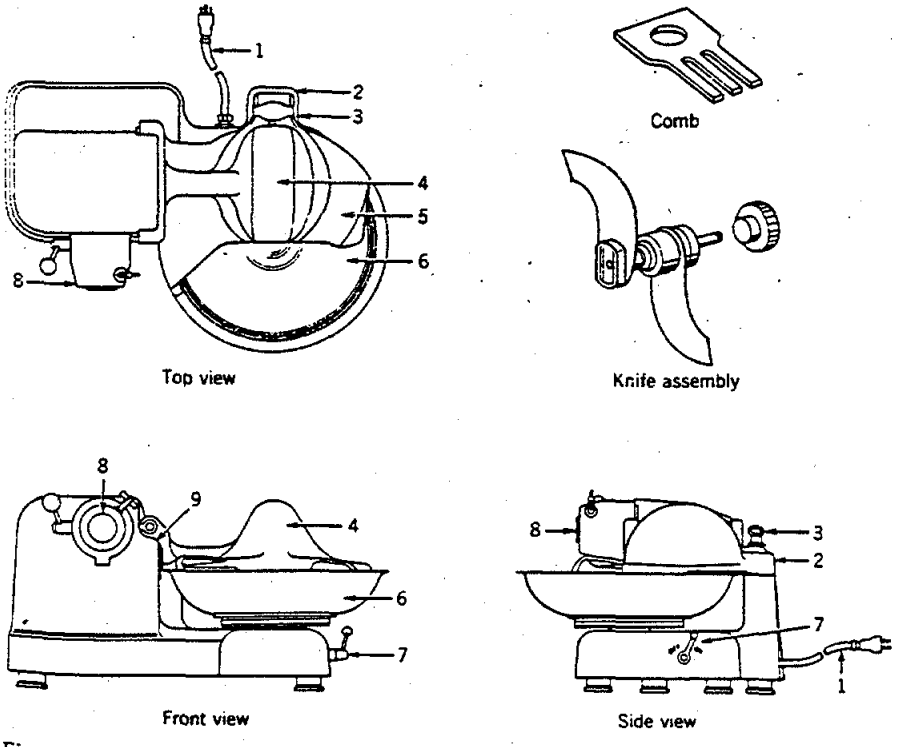


Figure 4.2 Food cutter: 1 electric cord, 2 location of comb, 3 cover-lock knob, 4 location of knives, 5 bowl cover, 6 bowl, 7 switch, 8 attachment hub, and 9 cover hinge.

Safety Quiz – Buffalo Chopper

Student Name _____

Class _____

Date _____ Grade _____

1. What is the best way to learn how to operate a food chopper?
   a. ask a friend
   b. obtain a booklet on the machine and read it
   c. figure it out yoursefl without help.

2. To prevent breakdown, how often should bowl gear be lubricated?

3. Must the machine be stopped to change speeds?

4. List three important precautions to observe when working with a food cutter.

5. When assembling the knives on a food cutter, which knife should be placed on the shaft first?
   a. the one that is beveled on one side
   b. the one that is beveled on both sides.

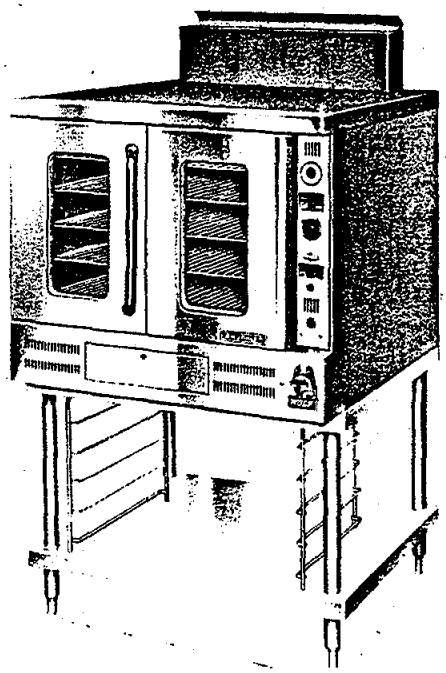
6. Which part of the machine tightens down the knives?

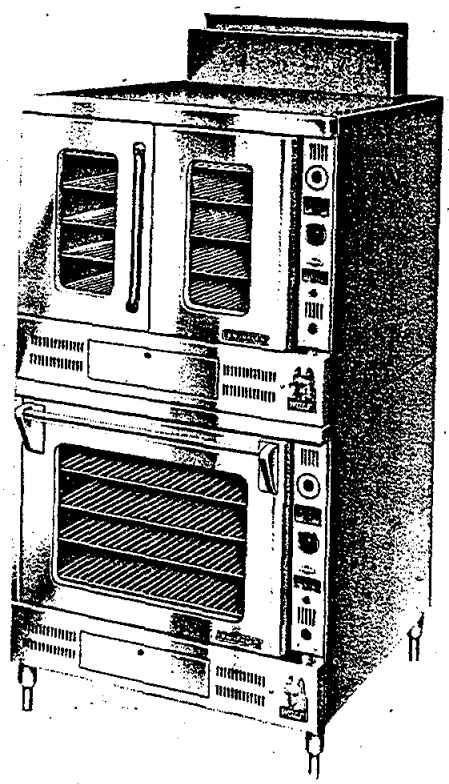
7. What part of the chopper should be removed for using attachments?

8. Can the food chopper be overloaded thus causing injury?

Convection Oven

1. Preheat oven at least 15 minutes before use.
2. Circulating fan must be in operation at all times. Failure to practice this rule will cause the motor to overheat.
3. As with all ovens, always have dry towels or oven mitts available to remove food products.
4. When loading a convection oven, open the door and load quickly to avoid heat loss.
5. If using the timer located on the oven, remember that it does not control the oven temperature.
6. With a convection oven, always keep in mind that the required cooking time is shorter than that of a regular oven. Keep a chart on proper cooking temperatures for your particular oven.
7. Convection ovens must be kept clean. To operate efficiently, check your owner's manual on the proper procedure to clean the interior of the oven.
8. Oven doors must close tightly for proper oven function.
9. Use oven lighting only to check food product. Do not run continuously.





Safety Quiz – Convection Oven

Student Name _____

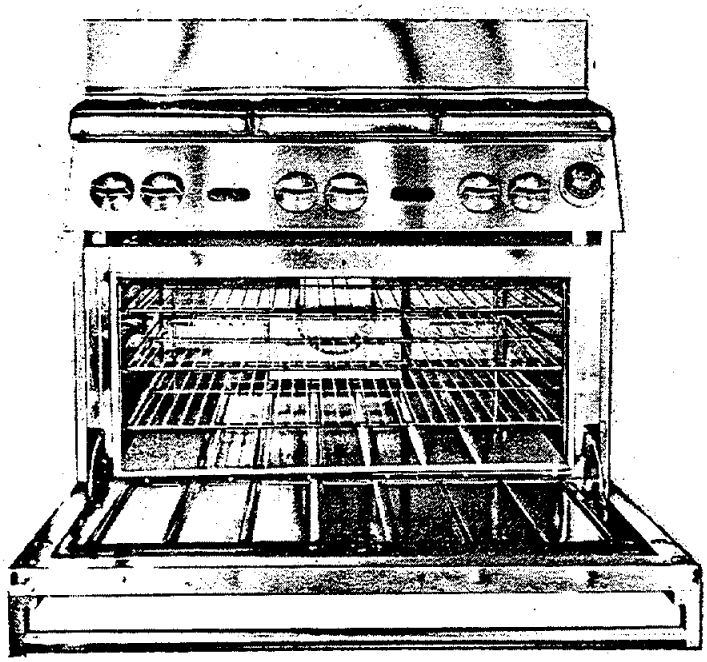
Class _____

Date _____ Grade _____

1. Dry towels are best for removing food items from an oven. T F
2. An oven timer controls the operation of an oven. T F
3. Cooking times are identical for convection ovens or conventional baking ovens. T F
4. Convection ovens must preheat at least 1 hour before use. T F
5. The circulation fan in a convection oven need not run unless there is food product in the oven. T F
6. Oven lights should only be used when checking food product. T F

Conventional Oven

1. For gas oven — make sure pilot is lit.
2. When examining contents, pull pans out with shelf rack they are on.
3. Remember inside of door will be hot.
4. Do not use oven door as a shelf.
5. Do not use excessive amounts of water when cleaning inside of ovens.
6. Always use hot pads or a dry towel when removing contents from oven.



Safety Quiz – Convention Oven

Student Name _____

Class _____

Date _____ Grade _____

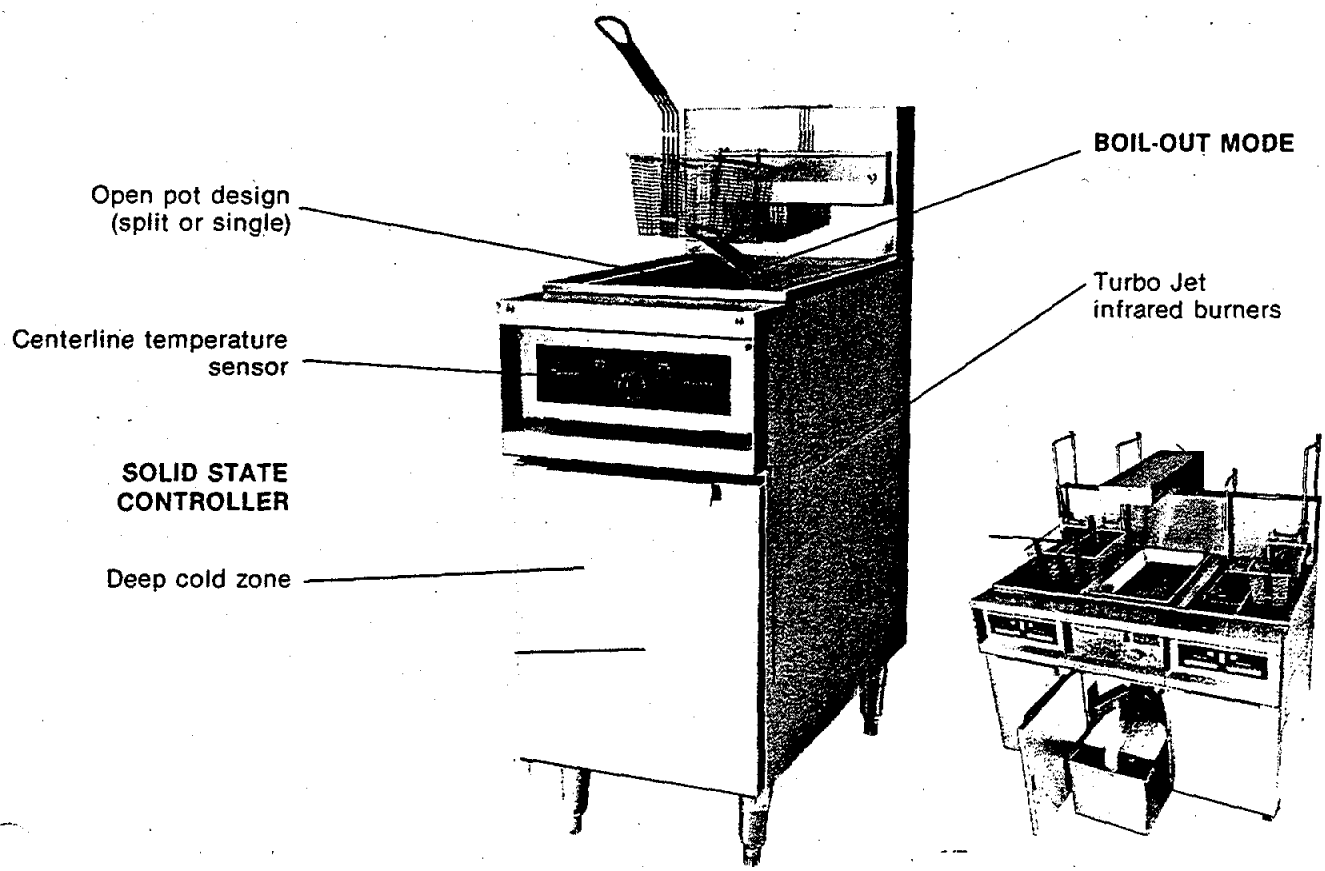
1. When using a gas oven, what is important before setting a gas thermostat?

2. What part of the oven should not be used as a shelf?

3. Before opening oven door to examine contents, what should you have in your hands?

Deep Fat Fryer

1. Fill the fryer with fat to a level at least 2 inches above the heating elements and turn on heat. **It is important to have the fat extend above heat elements when heat is on.**
2. Do not heat higher or longer than necessary. At no time should the fat be heated over 400 degrees.
3. Keep fryer free of sediment and salt.
4. Fryers should be placed where there is sufficient ventilation to prevent fire.
5. Do not overload fryer with food to prevent splattering.
6. Check the outlet to be sure that it is closed. Melted fats on floor is highly hazardous to all kitchen workers.
7. Submerge basket into hot fat cautiously in the event that moisture of food causes hot fat to bubble up.
8. Wash fryer with detergent and hot water, rinse with vinegar solution, then again with water. Dry fryer and elements before using again.
9. When fryer is on standby, the thermostat should be lowered to 200 degrees.



Safety Quiz – Deep Fryer

Student Name _____

Class _____

Date _____ Grade _____

1. How should the fryer well be cleaned?

2. Fryers can be placed anywhere in the kitchen area. T F

3. How much fat should there be in a fryer when ready to use?

4. It is okay to have impurities such as salt in the fryer when hot. T F

5. What temperature should the thermostat be set for when ready to use?

6. What will prevent spattering?

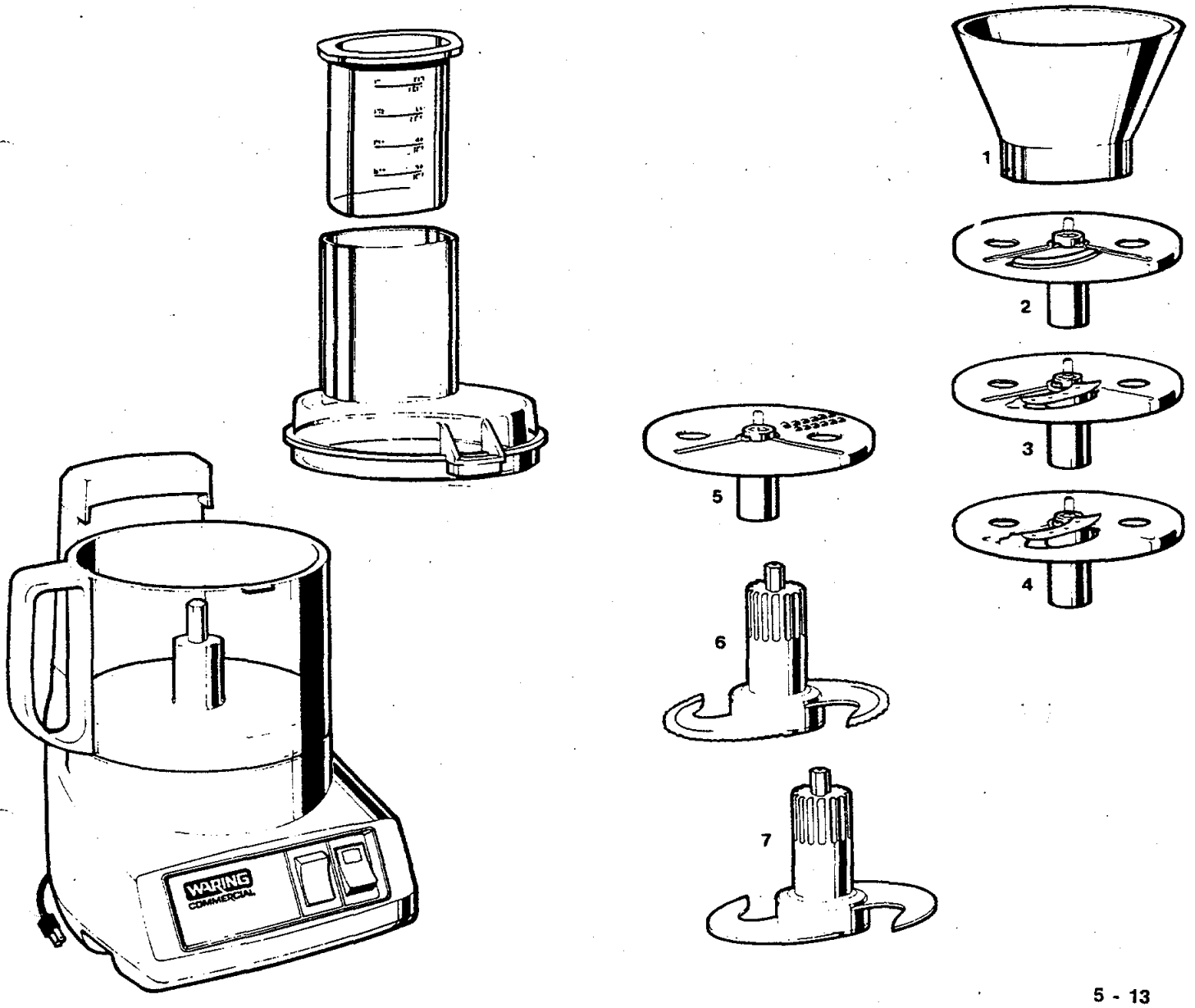
7. What position should the grease outlet be in?

8. What will cause fat to bubble up and cause damage or fire?

9. When fryer is not in use, should the temperature be lowered, and to what degree if any?

Food Processor

1. To protect against risk of electric shock, do not put base or motor in water or other liquid.
2. Unplug cord from outlet when not in use, before putting on, or taking off parts and before cleaning.
3. Do not operate with a damaged cord or plug.
4. Always use attachments that are made for your processor.
5. Never feed food into chute by hand when slicing or shredding, always use a food pusher.
6. Blades and discs are sharp, handle carefully.
7. Blades or disc should come to a full stop before removing cover.
8. Never attempt to defeat the locking system of the processor. It is there for a safety reason.
9. Never use more product that the bowl will accommodate.
10. Do not use near hot surfaces. The cord may melt and cause injury to operator.



Safety Quiz – Food Processor

Student Name _____

Class _____

Date _____ Grade _____

1. Food may be fed into processor by any means available. T F

2. Can a processor be used with a damaged cord?

3. How much food can be put into a processor bowl at one time?

4. Why is the locking system built into the processor?

5. The processor may be used next to a stove or frying unit. T F

6. Can food be removed from the processor while it is in motion?

7. How should blades and disc be handled?

8. Can attachments be interchanged from one machine to another if they are different models?

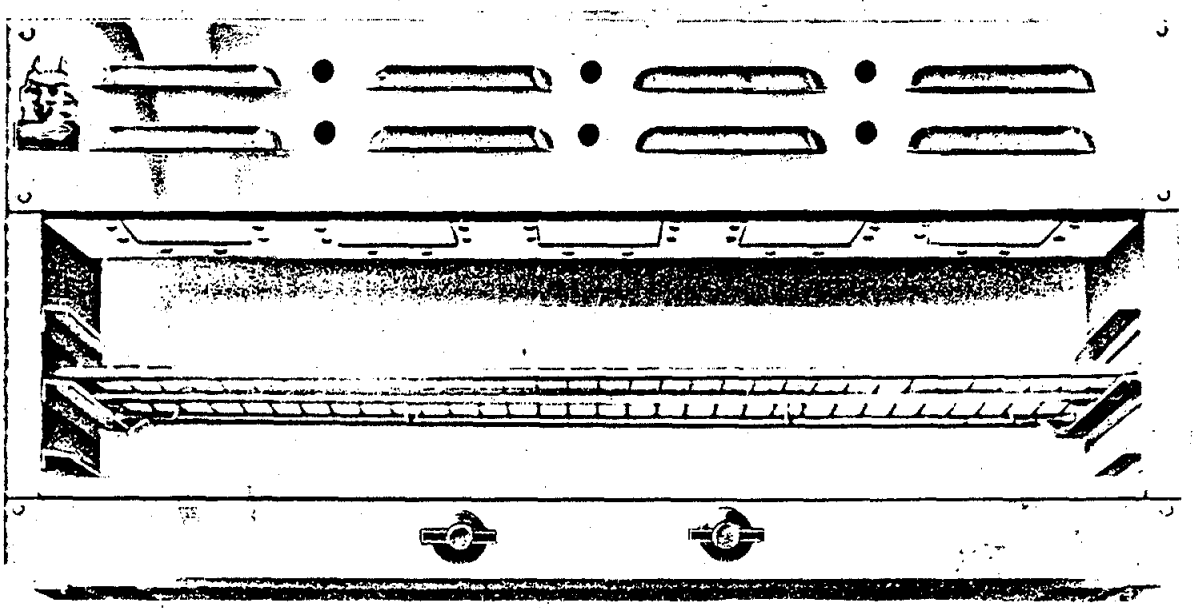
9. When should the processor be unplugged?

10. Can the processor base unit be washed with the attachment?

10a. If the answer is no, why not?

Gas Cheese Melter

1. Make sure pilot is lit before turning machine on.
2. Check heating element for proper ignition while turning on.
3. Keep top and sides free of any excess grease.
4. All outer surfaces will be hot during operation.
5. Clean inside of melter frequently to prevent grease fires.
6. Use hot pads or towels when removing items from the melter.
7. Do not let top of food touch heating element.
8. Do not do "broiling" in the cheese melter.
9. Do not use top of cheese melter for an extra "shelf" while operating. This area will be very hot.



Safety Quiz – Gas Cheese Melter

Student Name _____

Class _____

Date _____ Grade _____

1. What hazard could occur from the pilot not being lit when turning on cheese melter?

2. Grease fires can be a hazard when operating the cheese melter. T F

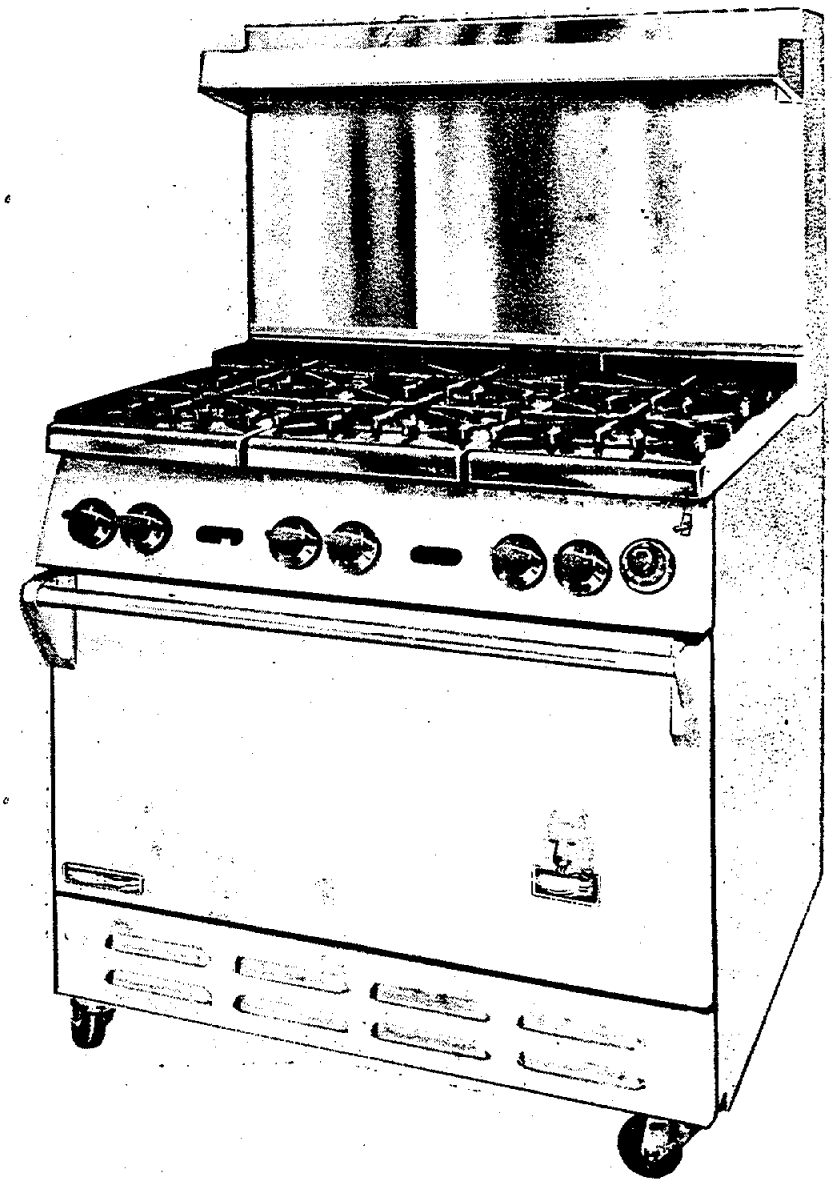
3. What precaution should be taken when removing food from the cheese melter?

4. Broiling steaks in the cheese melter is permissible if in a hurry. T F

5. The top of the cheese melter is a good place to keep food hot. T F

Gas Range

1. Wear an apron to keep clothes tight to your body, and sleeves rolled or tight.
2. Dry towels, oven mitts, and/or hot pads are a necessity.
3. Be careful not to allow towels, etc., to be ignited.
4. Check pilot light before turning on stove or oven.
5. Be sure gas knobs are turned off before relighting pilot light.
6. Be sure burners are off when not in use.
7. Pan handles should be kept inward.
8. Remove covers away from you to prevent steam burns.
9. Keep soda or salt on hand in case of grease fires.
10. Be sure floors are kept clean and grease free.
11. Never use water for a grease fire.



Safety Quiz – Gas Range

Student Name _____

Class _____

Date _____ Grade _____

1. Why should you wear your clothing snug and your sleeves rolled or snug?

2. What is the first thing you do after cleaning the range?

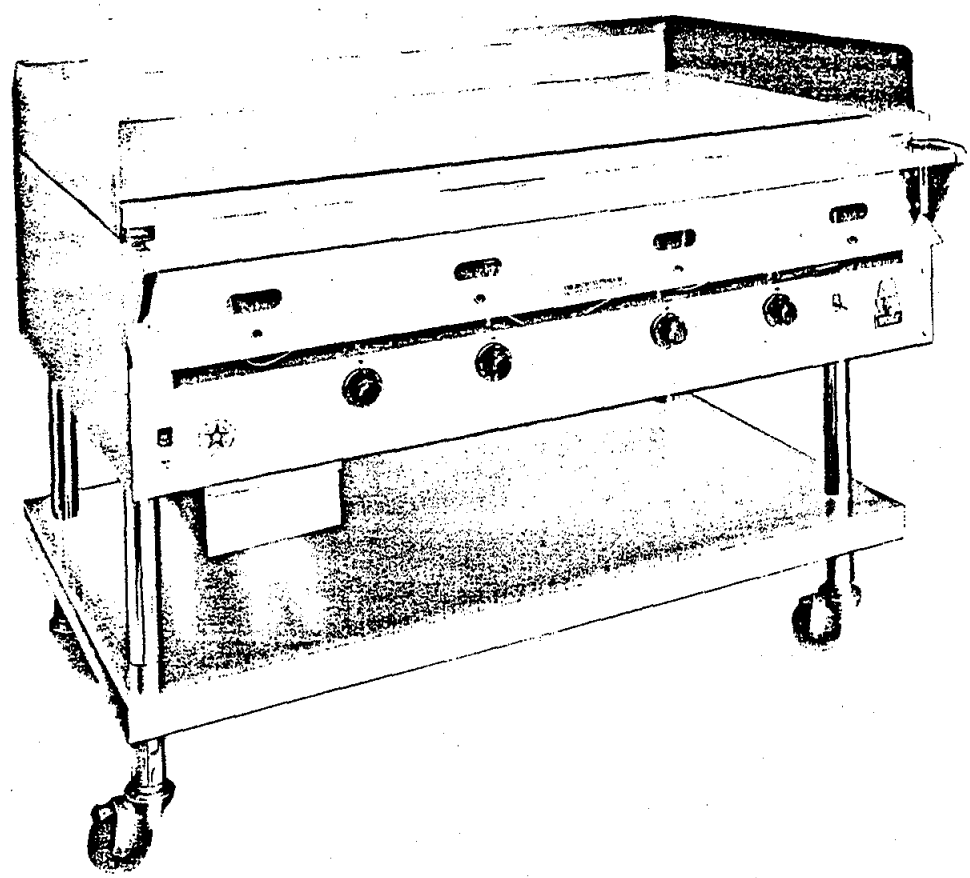
3. Why shouldn't you use water on a grease fire?

4. What should you watch for when deglazing pans?

5. What is the purpose of lighting back burners first?

Griddle

1. Always assume that the griddle is hot.
2. Pan handles and tools should always lie inward.
3. Make sure exhaust fans are on during cooking and cleaning time.
4. Salt and soda should always be on hand in case of fire.
5. Keep check on your temperature setting.
6. Be sure all catch pans are clean.
7. Floors should be kept clean and grease free.
8. Clothing should not be loose making it possilbe to drag in hot grease.
9. Wiring should be checked and kept in good condition.
10. When putting ice or water on griddle for cleaning, watch out for steam burns.
11. Be careful in case the grill brick rolls.
12. Be careful not to splash oil.



Safety Quiz – Griddle

Student Name _____

Class _____

Date _____ Grade _____

1. Why should you check the grease trap daily?

2. What two ingredients found in the kitchen should you always have near the griddle?

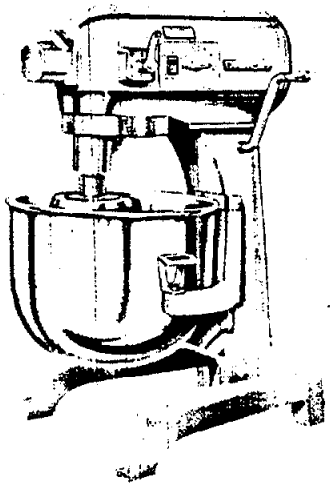
3. What precautions should you take when cleaning the griddle?

4. Why is loose clothing a hazard when working around the griddle?

5. Why should pan handles always be kept inward?

Large Food Mixer

1. Check the mixer bowl for cleanness.
2. When placing the mixer bowl on the mixer support arm, make sure all three securing points are correctly inserted. There are three points. Two points are at the side and one is located on the back of the mixer bowl.
3. Insert the proper mixing attachment onto the mixer shaft. **Caution:** Use care when whipping food products that are hard. The whip tines can be bent or broken.
4. Check the mixer speed before turning the machine on. Never change speeds while the mixer is operating. Raise the mixer bowl before starting the mixer. Operate the mixer at a safe and proper speed.
5. Never place your hand or cooking utensil into the mixer bowl while the mixer is operating. Wait until the machine is completely stopped.
6. Lower the mixer bowl to remove mixer attachment.
7. Do not attempt to lift a heavy mixer bowl. Ask for assistance or use the proper mixer bowl dolly.



Safety Quiz – Large Food Mixer

Student Name _____

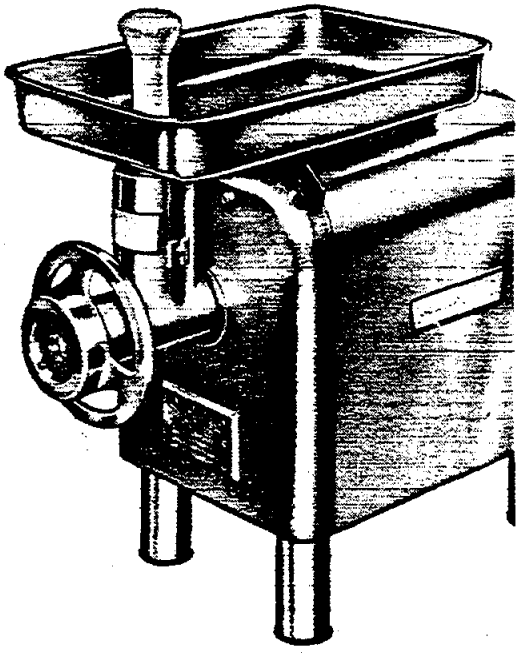
Class _____

Date _____ Grade _____

1. Hard food products should be started at a high mixer speed. T F
2. Under no condition should your hand be placed inside the bowl while the mixer is moving. T F
3. It is possible to change mixer speed when the mixer is operating. T F
4. Start the mixer with the bowl lowered, then slowly raise the bowl to the raised position. T F
5. Ask for help when lifting a heavy mixer bowl. T F
6. It is easiest to remove the mixer attachment while the mixer bowl is raised. T F

Meat Grinder

1. It is good practice to keep all the grinder parts in one drawer or shelf. This keeps parts from being misplaced.
2. When assembling the grinder, insert the grinder body into the hole at the top of any food mixer. You may have to remove the access plate to expose the hole. Tighten the thumb screw securely.
3. Insert the worm gear into the grinder body. Make sure the fiber washer is on the end with the large square shaft end. Rotate the worm until it slides all the way into the drive hole.
4. Place the cutter blade with the edges facing out.
5. Select the desired grinding plate and push up against the cutting blade. Rotate the plate until the notch fits into the small peg at the bottom of the grinder body.
6. Thread the hand nut onto the threads of the grinder body, snug the hand nut to the grinder plate and give a 1/4 turn to properly secure the parts together.
7. Place feed tray on top of feed tube on grinder body.
8. Set mixer speed to desired setting. (usually #3)
9. Place product to be ground in feed tray. Turn on machine. **Caution:** Always use stomper to push product down feed tube.
10. Cut pieces to be ground small enough to easily fit down feed tube.
11. Place a cart or stand below grinder plate and place bowl close to grinder end.
12. Food wrap should be draped over the end of the grinder. This will keep product from falling straight down into the bowl.



Safety Quiz – Meat Grinder

Student Name _____

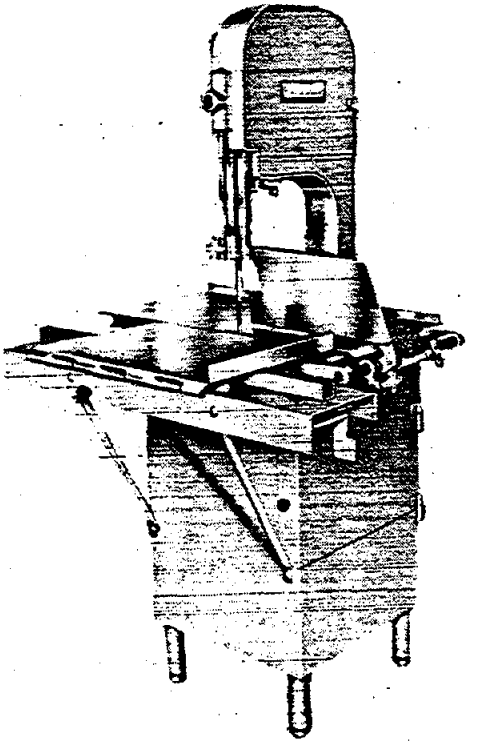
Class _____

Date _____ Grade _____

1. The cutting blade edges should face away from you when assembling the grinder. T F
2. It is not always necessary to use the stomper when pushing food down the feed tube. T F
3. Place the pan receiving the ground product on the floor in front of the grinder. T F
4. Keep all the grinder parts together to keep parts from being misplaced. T F
5. Never place fingers inside grinder feed tube. T F
6. Large pieces of meat can easily be pushed down the grinder feed tubes. T F

Power Meat Saw

1. Make sure saw is on level surface.
2. Check saw for proper set-up before turning on.
3. Turn saw on briefly and listen for proper set-up before adding meat.
4. Use all safety guards in operating.
5. Use truck to push meat through saw, not "free hand."
6. Keep mind on task while working on machine.
7. Shut saw off and disconnect power before cleaning.
8. Turn saw off if blade "binds" while cutting. Do not wiggle or force product through blade.
9. Do not open blade covers while power is connected.
10. Be careful not to get water in motor during cleaning.



Safety Quiz – Power Meat Saw

Student Name _____

Class _____

Date _____ Grade _____

1. What is the easiest way to check if the meat saw is properly set-up?

2. What should be used to push the meat through the saw blade?

3. Why is it important to shut off the saw before cleaning?

4. What hazard could occur if your mind is not on your task while oprating the meat saw?

5. If the blade binds during operation, force meat against the saw blade or wiggle it free. T F

6. Turning away from saw to talk while operating it is recommended. T F

7. How many guards are there on your meat saw?

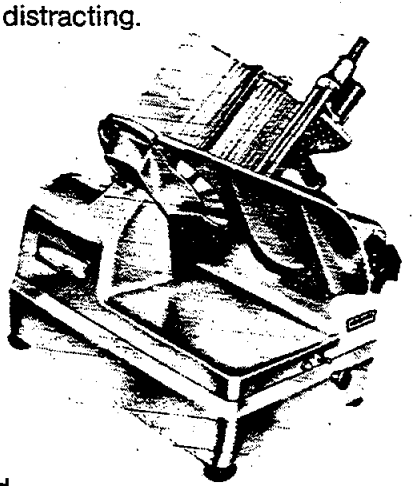
8. It is not important for saw to be level, since the blade will work anyway. T F

9. It is good practice to get the motor washed down with lots of water. T F

Slicer

OPERATING SLICER

1. Make sure slicer is put together properly and tightly.
2. Procedures for slicing:
   a. Plug slicer in.
   b. Adjust blade for desired thickness.
   c. Position food to be sliced.
   d. Secure food with end weight.
   e. Turn on.
   f. Slice using end weight and handle only for motion.
3. Do not force food.
4. People coming up behind slicer operator should use caution not to be distracting.
5. Think "caution" — be careful of quick movements.
6. Turn slicer off for loading and unloading of food.
7. Always be sure blade has stopped before going any further.
8. Close blade all the way when not in use.
9. Be sure all wiring is in good condition.
10. Keep floor area clean.



CLEANING SLICER

1. Procedure:
   a. Turn off — never attempt to clean until blade has completely stopped.
   b. Close blade all the way.
   c. Pull plug from socket.
2. Wash blade from side.
3. Be careful not to hit blade when removing food tray.

SHARPENING SLICER BLADE

1. The blade should always be kept sharp.
2. Do not use hand sharpener. Use the one on the machine which is designed for it.
3. Be careful to clean blade from the side after sharpening.
4. The chef or supervisor should be consulted for supervision when sharpening machine.