

Lesson 1: Introduction to Hand Tools (Portable Bench Tools)

Reading

A worker in any trade can do a better job with good tools. The tools help the worker do the job more quickly and more easily. Without tools, some jobs are impossible.

A machinist is often cutting and drilling hard materials, like metal. Without tools, the machinist's job would be impossible. Some of the machinist's tools are large and are powered by electric motors; some of the tools are small and can be held in the hand. If the machinist can hold the tool with his/her hand, it is called a hand tool.

Part of your job now is to learn about the hand tools that you will use when you go to the Machine Shop Classes. It is necessary to learn the names of the common hand tools. It is also necessary to learn each tool's purpose. what it is for. You will not learn how to use the tool in the VESL class, but you will be able to talk about it and know what it is for. Knowing these words will be a big help when you go to the Machine Shop Classes. When the teacher talks about a tool or tells you to get one, you will know what he is saying.



In the pictures above, only two of the tools are hand tools. the screwdriver and the hammer. The other tool is a lathe; it is a large machine, bigger than the worker; it is used for cutting rough stock to make finished parts. The lathe is powered by a large electric motor.

Often the machinist does his/her work at a work table which is called a bench. The bench can be made of metal, wood, or other strong material. Sometimes hand tools are called portable bench tools. The word portable means that you can pick up the thing and carry it. In the pictures, the screwdriver and hammer are portable; the lathe is not portable.

INTRODUCTION TO HAND TOOLS (PORTABLE BENCH TOOLS)

Exercise 1:

Fill in the blank spaces with these words:

name	quicker	lathe	screwdriver	easier
hammer	hand tools	purpose	portable	portable
			bench tools	

1. With tools, the machinist's job is _____ and _____.
2. Small tools that can be held are called _____ or _____
_____.
3. You will want to learn the _____ and _____ of each tool.
4. Two examples of hand tools are _____ and _____.
5. An example of a larger machine used in the machine shop is a _____.
6. When you are able to pick up something and carry it around, the
thing can be called _____.

(Check your answers)

READING:

A Machinist's Tools

1. Without good tools, a machinist's job is impossible. With the right tools, a machinist can make almost anything: all the metal and plastic parts that go into an automobile; all the screw, bolts, and nuts that hold machines together; all the machines that we have at home and at work.
2. Without the machinist's tools help him/her to make accurate parts, parts that are the correct size and shape so that they fit together well.
3. Later, we will study the large, power-driven machines that cut and drill. For now, we want to learn about different kinds (types) of hand tools. First, there are holding tools: the workpiece must be held tightly when the machinist is working on it. Second, there are small cutting tools, any tools that are used to remove material from the workpiece. Third, there are non-cutting tools that the machinist uses for a variety of purposes.

Activity: Reading Technique: READING FOR DETAILS

The main idea of the reading is that tools are important for a machinist's work. The story gives some **details** that support and explain the main idea. **Can you find the details?**

Paragraph 1: Write down any three things a machinist can make:

Paragraph 2: What is the word that means a part has been made the correct size and shape? _____

Paragraph 3: List three kinds of hand tools:

Match the correct meanings with the words:

Match the correct meanings with the words:

- | | | |
|-----|------------------|--|
| ___ | 1. bench | a. The machinist uses these to hold the workpiece. |
| ___ | 2. portable | b. These support and explain the main idea. |
| ___ | 3. purpose | c. A table where the machinist works. |
| ___ | 4. holding tools | d. The machinist uses these to remove material from the workpiece. |
| ___ | 5. cutting tools | e. Can be carried. |
| ___ | 6. accurate | f. The reason why something is made. |
| ___ | 7. details | g. The correct size and shape. |

Lesson 2: Bench Vise

WORD LIST

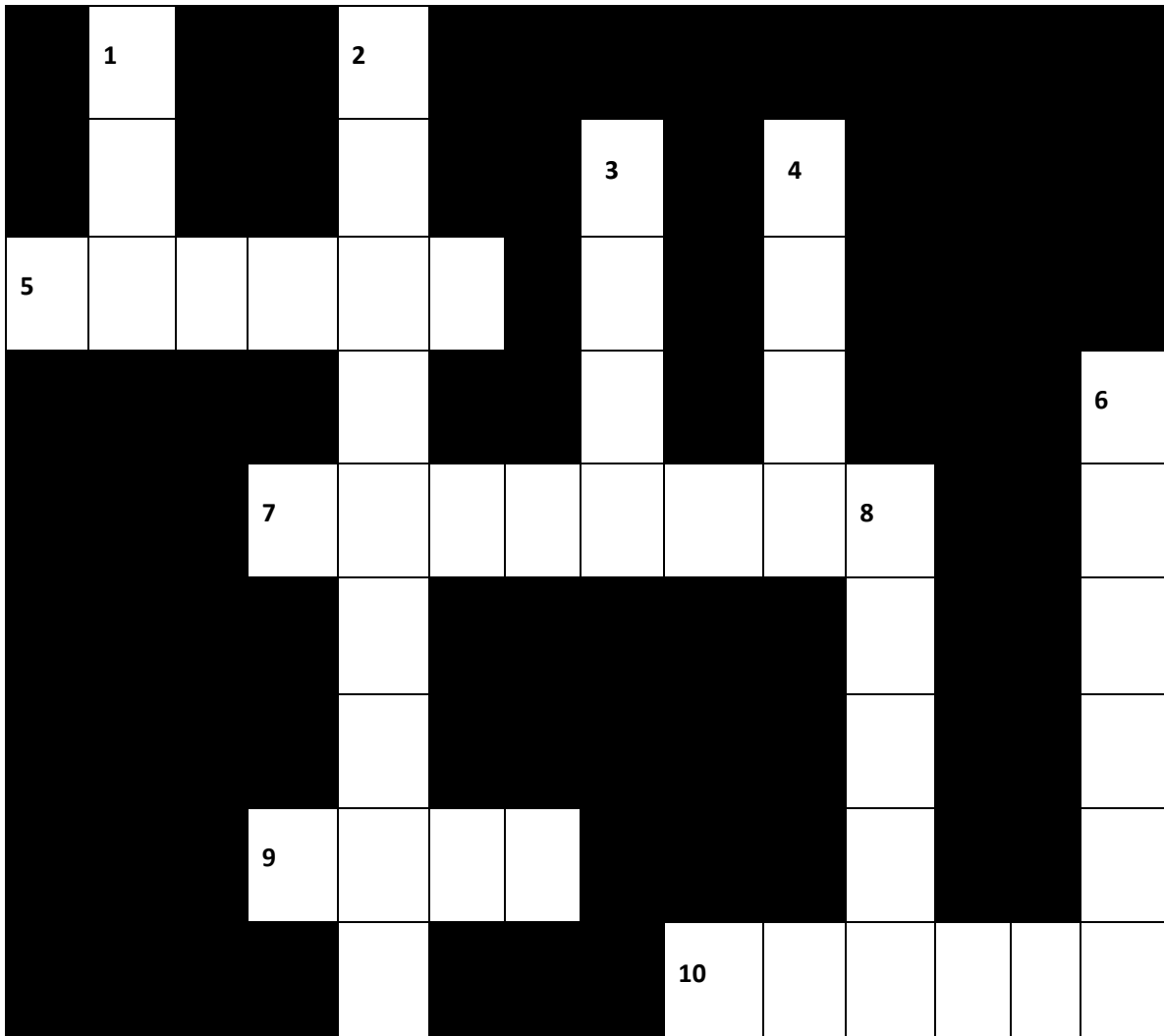
1. **drill** = to make a hole with a drill, to bore a hole. Example: Maria drilled a hole in the center of the gear.
2. **saw** = to cut with a saw. A saw is cutting tool that uses a blade with cutting teeth. Example: Paco, saw off a one-foot piece from that rough stock.
3. **file** = to smooth or grind a rough surface with a file. A file is a steel tool with rough surfaces for grinding and smoothing. Example: The robber filed the number off the engine.
4. **polish** = to smooth and make bright by rubbing. Example: Adolfo polishes the aluminum part until it shines.
5. **operation** = an act or method of doing something to make a finished part. Example: Cutting, drilling, and polishing are machine shop operations.
6. **lock** = a part that fastens something shut and prevents it from being opened. Example: Juana put a lock on the garage door.
7. **swivel** = a part that joins two other parts, but allows them to turn freely. Example: The swivel on the bench vise allows the machinist to turn the jaws of the vise in any direction.
8. **edge** = the line where something begins or ends; the border; the part farthest from the center. Example: Don't put that can of paint near the edge of the table; it could get knocked over.
9. **attach** = to join, to fasten, to connect. Example: Clara attached the gear to the end of the shaft.
10. **hardened** = made harder than usual. Example: Steel can be hardened by heat and chemicals.

Write the letter of the correct meaning or definition in front of the number of the vocabulary word.

- ___ 1. drill a. a part that fastens something shut and prevents it from being opened.
- ___ 2. saw b. to smooth or grind a rough surface with a steel tool which has rough surfaces.
- ___ 3. file c. to join, to fasten, to connect.
- ___ 4. polish d. to bore a hole.
- ___ 5. operation e. the line where something begins or ends.
- ___ 6. lock f. made harder than usual.
- ___ 7. swivel g. to cut material using a tool with a blade that has teeth.
- ___ 8. edge h. to smooth and make bright by rubbing.
- ___ 9. attach i. a part that joins two parts, but lets them turn freely.
- ___ 10. hardened j. an act or method of doing something to make a finished part.

CROSSWORD PUZZLE

Student, please write the words for the clues or definitions in the boxes below. Use the numbers (across or down) to locate where you will start the words.



Words ACROSS:

5. It joins two parts, but lets them turn.
7. Steel becomes this through heat & chemicals
9. A fastener.
10. Rub it until it shines.

Words DOWN:

1. This blade has teeth.
2. Cutting, drilling and polishing are examples.
3. The line where the bench begins.
4. A steel tool with rough surfaces for grinding.
6. To join, to put together or fasten.
8. A boring activity.

BENCH VISE

Before we begin studying bench tools, let's look at a tool that is not portable, the **bench vise**. It's not portable because it's attached to the bench. The **purpose** of the vise is to hold a workpiece tightly, while the machinist is working on it. The vise is usually fastened to the edge of the bench.

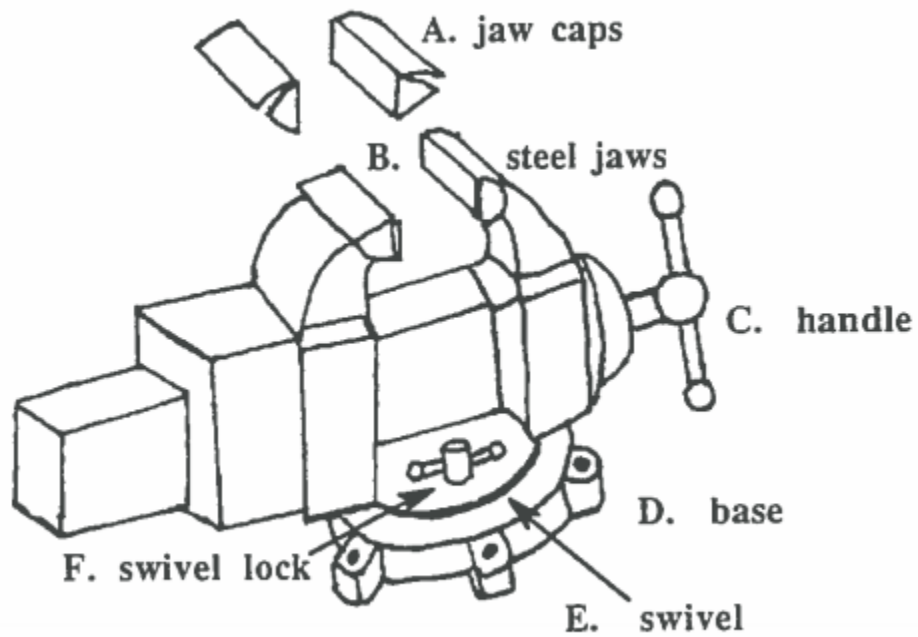
Often the vise has a **swivel** on the bottom. A swivel permits the vise to rotate (turn around) in any direction. When the machinist finds the correct position, they can lock the vise with the **swivel lock**.

The vise has hardened **steel jaws** to hold the workpiece. The vise **handle** is often used to tighten the jaws around the workpiece. Vise **jaw caps** fit over the jaws, when needed. The caps are made of softer metal like copper, brass, or aluminum. With the caps the vise will hold finished parts or soft materials without cutting into them or making marks.

When a workpiece is held tightly in the vise, a machinist can drill, saw, file, polish and do other operations to the workpiece. An **operation** is any work the machinist does to the workpiece, like drilling, cutting, polishing and sawing.

(TURN TO THE NEXT PAGE AND STUDY THE PARTS OF THE BENCH VISE).

BENCH VISE



Exercise 1:

Practice writing the names of parts. Write each word 3 times:

A. jaw caps _____

B. steel jaws _____

C. handle _____

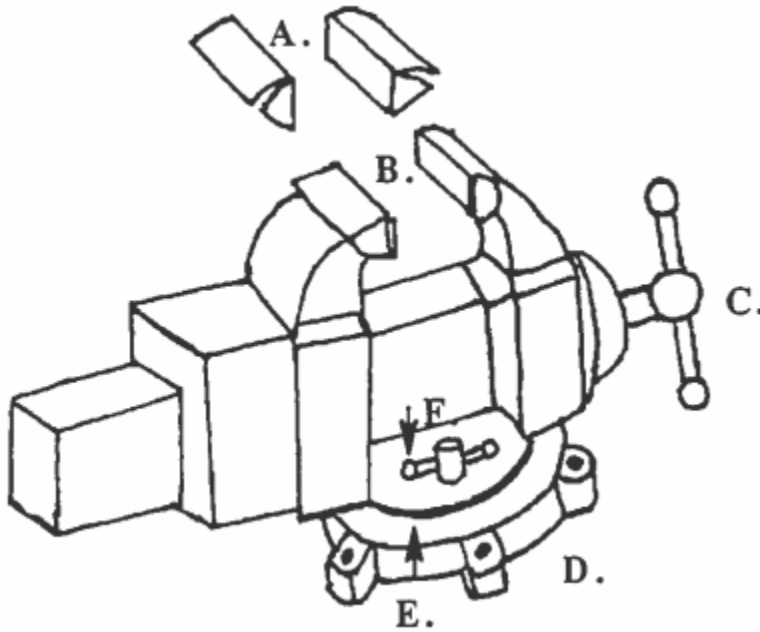
D. base _____

E. swivel _____

F. swivel lock _____

BENCH VISE

Exercise 2:

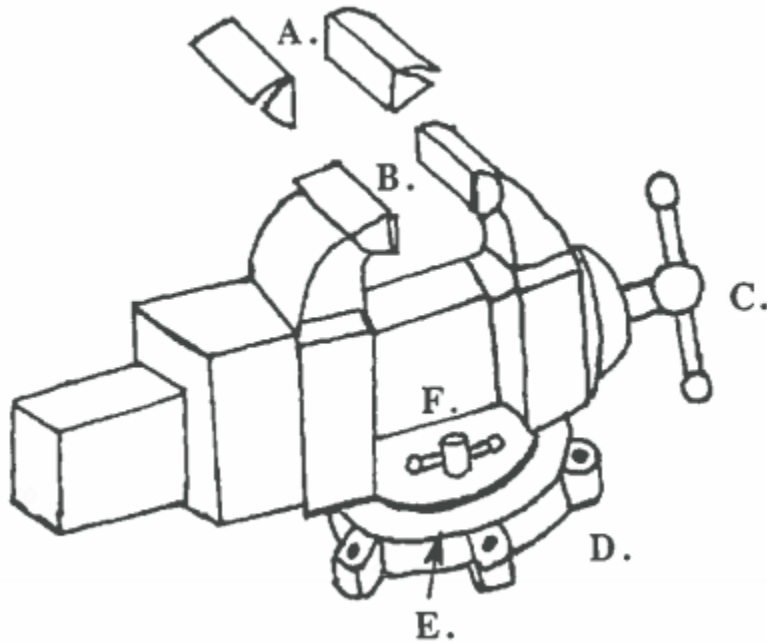


Write the letter of each part in front of its name:

- | | | | |
|-----|---------------|-----|----------------|
| ___ | 1. base | ___ | 4. jaw caps |
| ___ | 2. swivel | ___ | 5. handle |
| ___ | 3. steel jaws | ___ | 6. swivel lock |

BENCH VISE

Exercise 3:



Look at the pictures. Write the correct letters in the spaces.

A. j__w c__p__

B. st__l j__w__

C. h__nd__e.

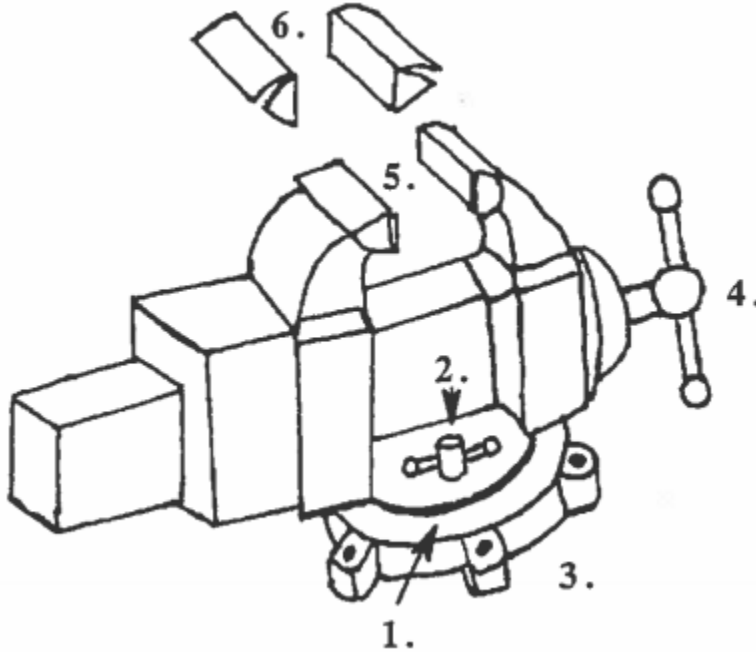
D. b__s__

E. sw__v__l.

F. s__v__l l__ck.

BENCH VISE

Exercise 4:



Look at the picture. Write the names of the parts.

1. _____.

2. _____.

3. _____.

4. _____.

5. _____.

6. _____.

THE PURPOSE OF THE BENCH VISE

Exercise 5:

Match the purpose with the name by writing the correct letter in the spaces.

- | | |
|------------------|---|
| — 1. bench vise | A. this prevents the swivel from turning. |
| — 2. steel jaws | B. this allows the vise to turn in any direction. |
| — 3. jaw caps | C. these hold the workpiece together. |
| — 4. swivel lock | D. turn this to tighten the jaws. |
| — 5. handle | E. this non-portable tool sits near the edge of the bench. |
| — 6. base | F. this means “able to be carried”. |
| — 7. swivel | G. these fit over the jaws for a more gentle hold on the workpiece. |
| — 8. portable | H. the bottom of the vise that screws into the bench. |
-

Exercise 6

Write the words for these definitions.

1. ABLE TO BE CARRIED: _____.
2. A BENCH TOOL FOR HOLDING A WORKPIECE: _____.
3. THE BOTTOM PART THAT TURNS: _____.
4. THE PARTS OF THE VISE THAT HOLD THE WORKPIECE: _____.
5. THE BOTTOM OF THE VISE: _____.

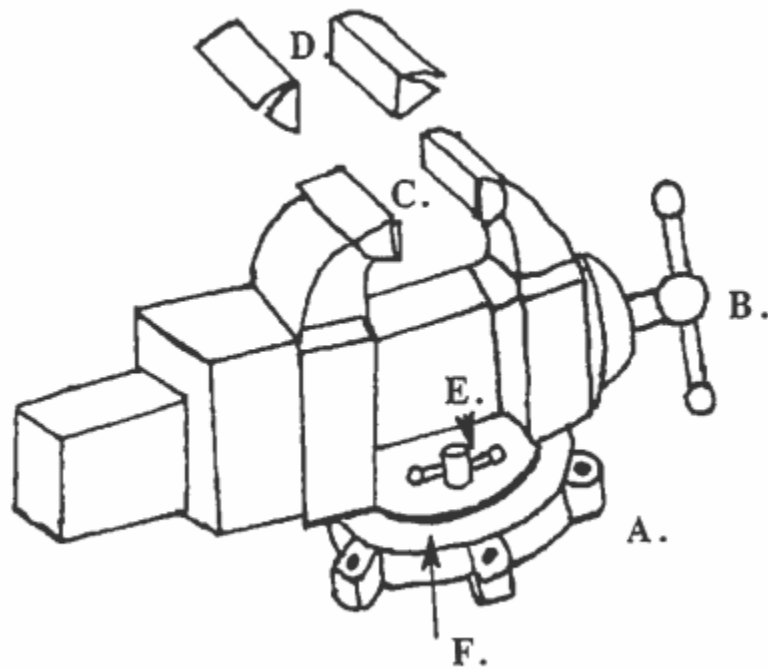
Part A: Read the sentence. Decide if it's true or false. Circle T or F.

- T F 1. A bench vise is a portable tool.
- T F 2. The jaw caps are used on a vise to prevent marking the workpiece.
- T F 3. The vise is screwed to the bench near the edge.
- T F 4. The jaws are tightened around the workpiece by turning the swivel lock.
- T F 5. The handle of the vise is used to pick up the vise.

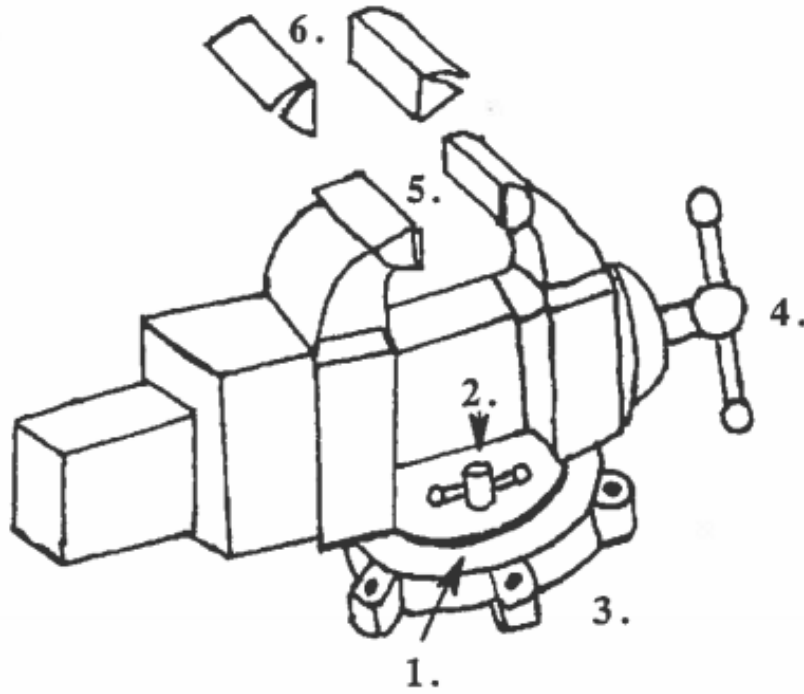
Part B: Get the tape and play the side that says *Listening Test, Module 3, Lesson 2*. Look at the picture. Listen to the words on the tape. Write the letters in the space below.

Listening Test

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____



Writing Test



Look at the picture. Write the names of the parts.

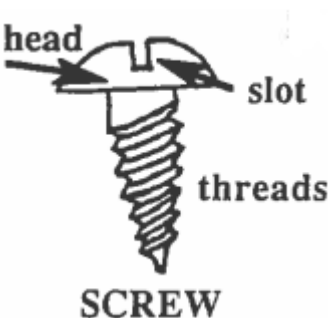
1. _____ 4. _____

2. _____ 5. _____

3. _____ 6. _____

Lesson 3: Clamps and Screwdrivers

Word List

- 1. parallel =** Going in the same direction and at the same distance from each other, as with two parallel lines. Example: the jaws in the parallel clamp are parallel to each other.
 - 2. clamp =** a part with jaws for holding two things together. Example: a clamp has jaws that can be tightened.
 - 3. fastener =** any small metal object that holds two pieces together. Example: some common fasteners are nails, screws, nuts and bolts.
 - 4. tighten =** to fasten something strongly, to make the hold stronger. Example: Pedro, use the screwdriver to tighten that screw.
 - 5. loosen =** to make less tight, to unfasten. Example: to remove the screw you must first loosen it.
 - 6. screw =** a metal fastener with threads in the sides and a slot in the head. Example: a standard screw has a straight slot in its head.
- 
- The diagram shows a top-down view of a screw head with a straight slot. Labels with arrows point to the 'head', 'slot', and 'threads'. The word 'SCREW' is written in bold capital letters below the diagram.
- 7. slot =** a narrow opening cut into the head (top) of the screw. Example: the slot in a standard screw is like a minus sign (-); the slot in a Phillips screw is like a plus sign (+).
 - 8. narrow =** not wide; having little space to work in. Example: he could not put the screwdriver into the slot, because the space was too narrow.
 - 9. offset =** the end of the screwdriver is bent at an angle. Example: this offset screwdriver permits me to tighten a screw in a narrow place.
 - 10. bent =** not straight; turned at an angle. Example: the standard screwdriver has a straight blade; the offset screwdriver has a bent blade.

Write the letter of the correct meaning or definition in front of the number of the vocabulary word.

- 1. fastener a. has jaws for holding two things together.
- 2. tighten b. the bent end of a screwdriver.
- 3. loosen c. any small metal object that holds two things together.
- 4. clamp d. going in the same direction and at the same distance from each other.
- 5. screw e. not straight.
- 6. slot f. having very little space to work in.
- 7. offset g. to unfasten.
- 8. bent h. a metal fastener with threads cut in the sides and a slot cut in the head.
- 9. narrow i. to fasten strongly.
- 10. parallel j. a narrow cut in the head of a screw.

The Purpose of These Tools

The **parallel clamp** and the **C-clamp** are both used for holding workpieces, like the vise that we saw in the last lesson. The parallel clamp is used by machinists to hold small parts. The C-clamp is used to hold parts together and to hold a workpiece on a large machine.

Screwdrivers are used to **tighten** and **loosen** screws. **Screws** are kind of fasteners. A **fastener** holds two or more parts together. In the picture, there are two kinds of screws – the **standard screw** and the **Phillips screw**. Each screw has threads cut into its sides and a **slot** cut into its head. The end of each screwdriver is made to fit the slot. The **standard screwdriver** fits into the standard screw and the **Phillips screwdriver** fits into the Phillips screw. The slot of the Phillips screw is shaped like a star.

Another way to remember the different slots of the two screws: The Phillips is shaped like a **plus sign (+)** and the standard is shaped like a **minus sign (-)**.

The **offset screwdriver** has one or two ends that are **bent**. The ends are bent so that the screwdriver can fit into narrow places where a straight screwdriver will not fit.

It is important to learn the names of these tools, so that you will understand the directions the instructor gives you. In the next few practice sheets let's learn the names and purposes of these tools.

CLAMS AND SCREWDRIVERS

A. parallel clamp



B. C-clamp

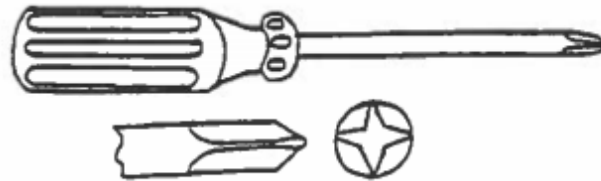


C. standard screwdriver



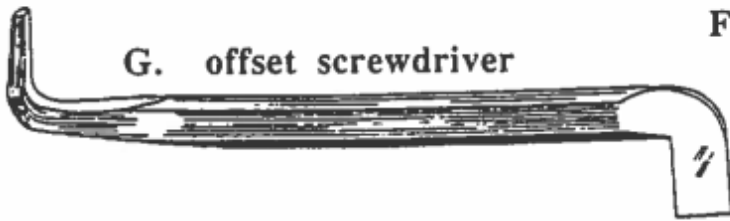
D. standard screw

E. Phillips screwdriver



F. Phillips screw

G. offset screwdriver



Exercise 1: Copy the words three times in the spaces.

A. parallel clamp _____

B. C-clamp _____

C. standard screwdriver _____

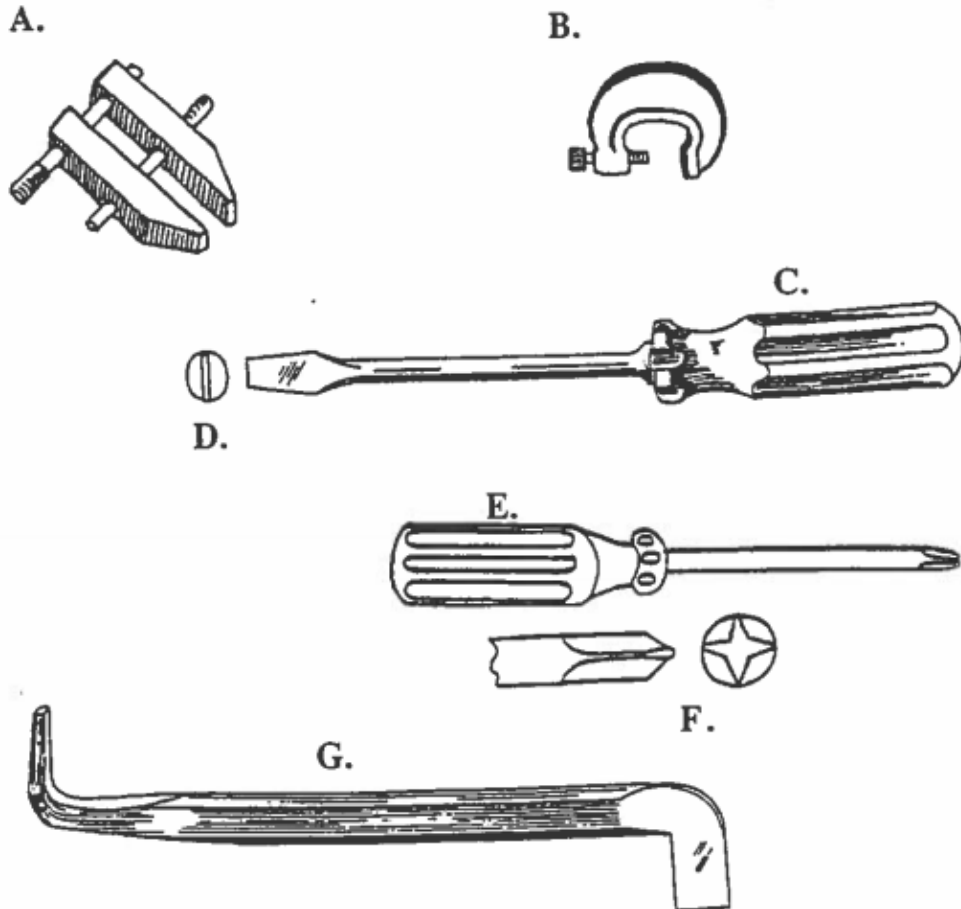
D. Phillips screwdriver _____

E. Phillips screw _____

F. offset screwdriver _____

OTHER BENCH TOOLS

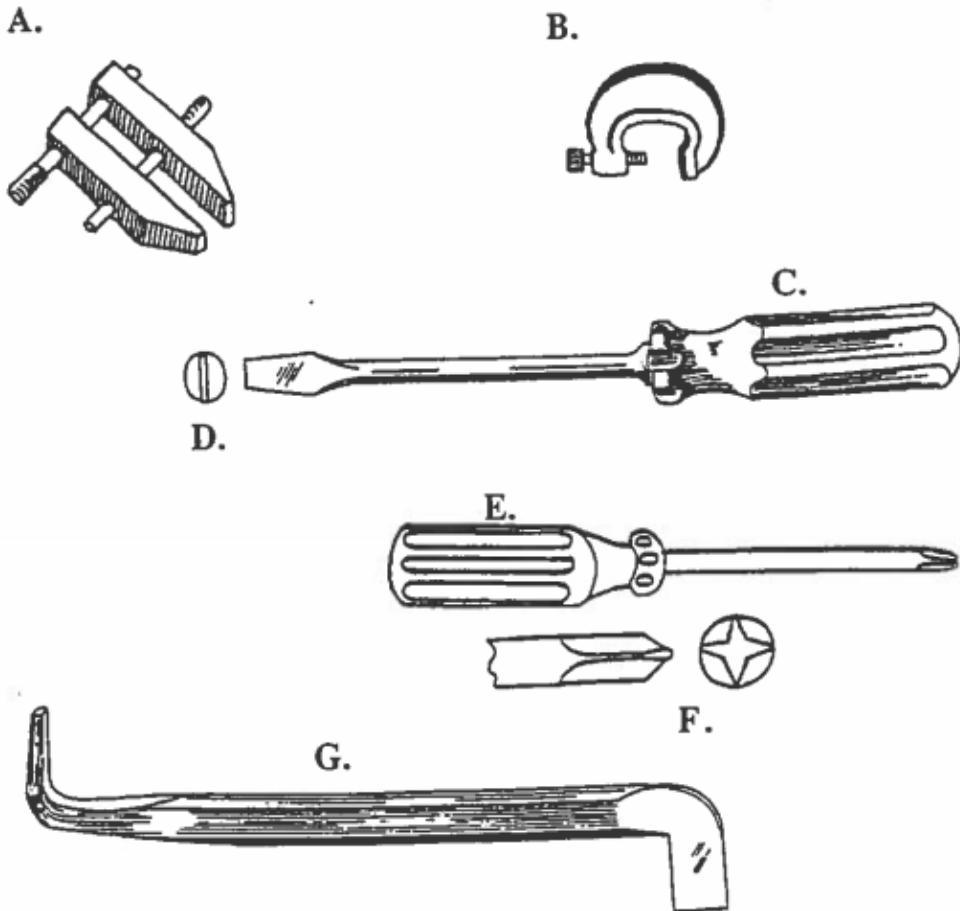
Exercise 2:



Write the letter of each part in front of its name.

- | | |
|-----------------------------|---------------------------|
| ___ 1. Phillips screw | ___ 5. offset screwdriver |
| ___ 2. parallel clamp | ___ 6. standard screw |
| ___ 3. Phillips screwdriver | ___ 7. C-clamp |
| ___ 4. standard screwdriver | |

Exercise 3:



Look at the pictures. Write the correct letter in the spaces.

A. p_r__ll__l__ c_a__p

E. Ph_ll_p s_r_wdr_v_r

B. C-c__m__

F. Ph__ip__ s_re__

C. s__nd__r__ sc__wd__ve__

D. st__ar__ cr__

G. o_f_et s_r_w_river

A.



B.

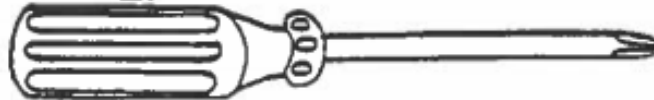


C.



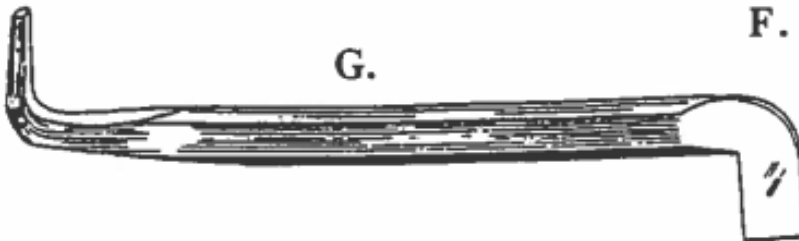
D.

E.



F.

G.



Exercise 4:

Look at the picture. Write the names of the tools.

A. _____

E. _____

B. _____

F. _____

C. _____

G. _____

D. _____

“What Tool Should I Use?”

Follow these directions: (1) Listen to the following conversations on the tape marked *Module 3, Lesson 3, Conversations*, (2) continue to listen to the tape and say the parts after you hear them, (3) practice the conversations with another student.

Conversation #1:

Jorge: I need to hold these two pieces of metal together while I drill a hole through them. What tool should I use?

Pedro: Use a clamp. There's a parallel clamp in the box under the bench.

Jorge: I have a C-clamp already. Can I use that?

Pedro: Sure! Go ahead!

Conversation #2:

Jorge: I need to loosen this screw on the machine. What tool should I use?

Pedro: That looks like a Phillips screw. Use a Phillips screwdriver. The end of the screwdriver will fit into that star-shaped slot.

Jorge: Yes, it's a Phillip screw. I'll get a Phillips screwdriver from my tool box.

Pedro: Here, you can have mine. But please give it back.

Conversation #3:

Jorge: I need to tighten a screw on this lathe, but it's in a narrow place. What should I do, Pedro?

Pedro: Use an offset screwdriver. You will be able to reach it.

Jorge: Yes, you're right. The offset will go inside that narrow place and fit into the slot.

Pedro: Jorge, if you don't have an offset screwdriver, you can make one by bending the end of any screwdriver that has a straight blade.

Exercise 5

Read again the Student Information Sheet, *The Purpose of These Tools*. Match the purpose of the tool with the name of the tool by writing the correct letters in front of the numbers.

- | | |
|-----------------------------|---|
| ___ 1. Phillips screwdriver | a. is used to hold parts together. |
| ___ 2. C-clamp | b. has a slot shaped like a star. |
| ___ 3. standard screw | c. is used to untighten a screw in tight places. |
| ___ 4. standard screwdriver | d. fits into the star-shaped slot |
| ___ 5. Phillips screw | e. is used to hold small parts. |
| ___ 6. parallel clamp | f. has a straight slot. |
| ___ 7. offset screwdriver | g. has a straight end that fits in a straight slot. |

.....

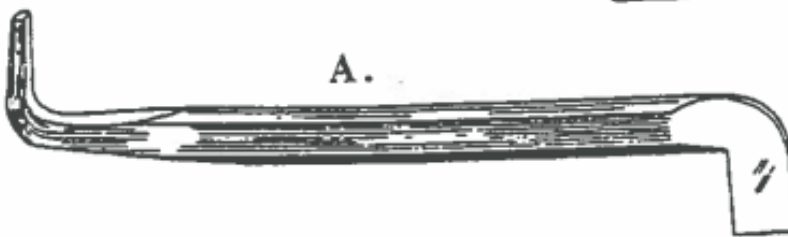
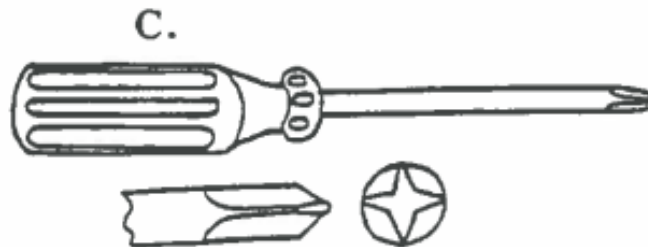
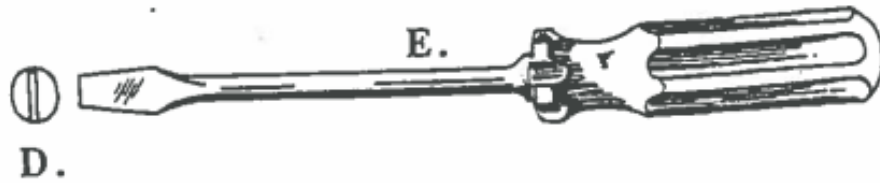
Exercise 6: Write words from this lesson in the blanks below. Choose your answers from these words: FASTENER, TIGHTEN, PHILLIPS, WORKPIECES, C-CLAMPS, STANDARD, PARALLEL CLAMPS, LOOSEN, OFFSET SCREWDRIVER.

Clamps are used to hold workpieces. Two kinds of clamps that we are studying are called (1) _____ and (2) _____.

Screwdrivers are used to _____ and to _____ screws. A screw is kind of _____. A special screwdriver is used to get into tight places; it's called an _____. The other two kind of screwdrivers are _____ and _____.

Part A: Get the tape and play the side that say *Listening Test, Module 3, Lesson 2*. Look at the pictures. Listen to the words on the tape. Write the letters in the spaces below.

Listening Test



1. _____

2. _____

3. _____

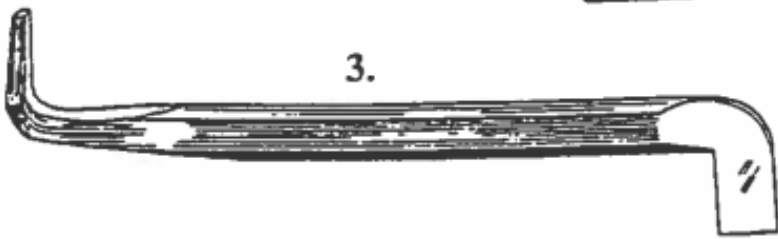
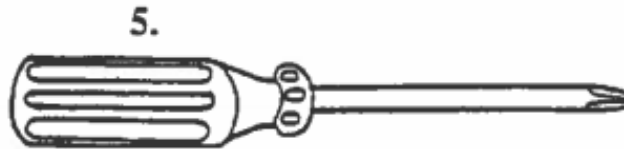
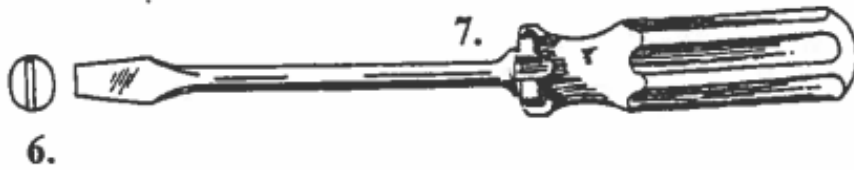
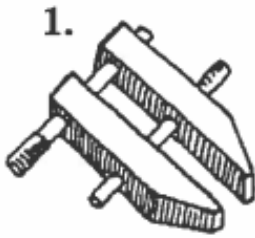
4. _____

5. _____

6. _____

7. _____

Part B: Writing Test



Look at the pictures. Write the names in the spaces below.

1. _____ 5. _____

2. _____ 6. _____

3. _____ 7. _____

4. _____

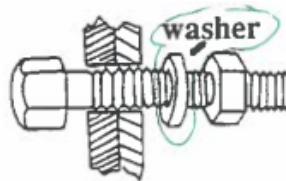
Lesson 4: Pliers and Wrenches

1. **kind** = a group of things that have common characteristics. Like the word *type*. Example: what kind of tool should I use?
2. **type** = a class or group that has common characteristics. Like the word *kind*. Example: Dykes are a type of pliers.
3. **grip** = to hold firmly (tightly and strongly). Example: Martin gripped the wrench tightly.
4. **needle** = a small, thin piece of steel with a sharp point and a hole for thread. Example: she sewed socks with a needle and thread.
5. **set** = a group of things that are used together. Example: a set of wrenches all look similar, but are of different sizes.
6. **size** = how long, or how big something is; something's dimensions. Example: this wrench is too small; get a bigger size.
7. **pound** = to hit something repeatedly using something heavy. Example: Pablo is pounding the pipe with a hammer.
8. **hex** = six; a short word for hexagonal (having six angles and six sides). Example: a hex nut has six equal sides and six equal angles.



(This hex nut has six sides.)

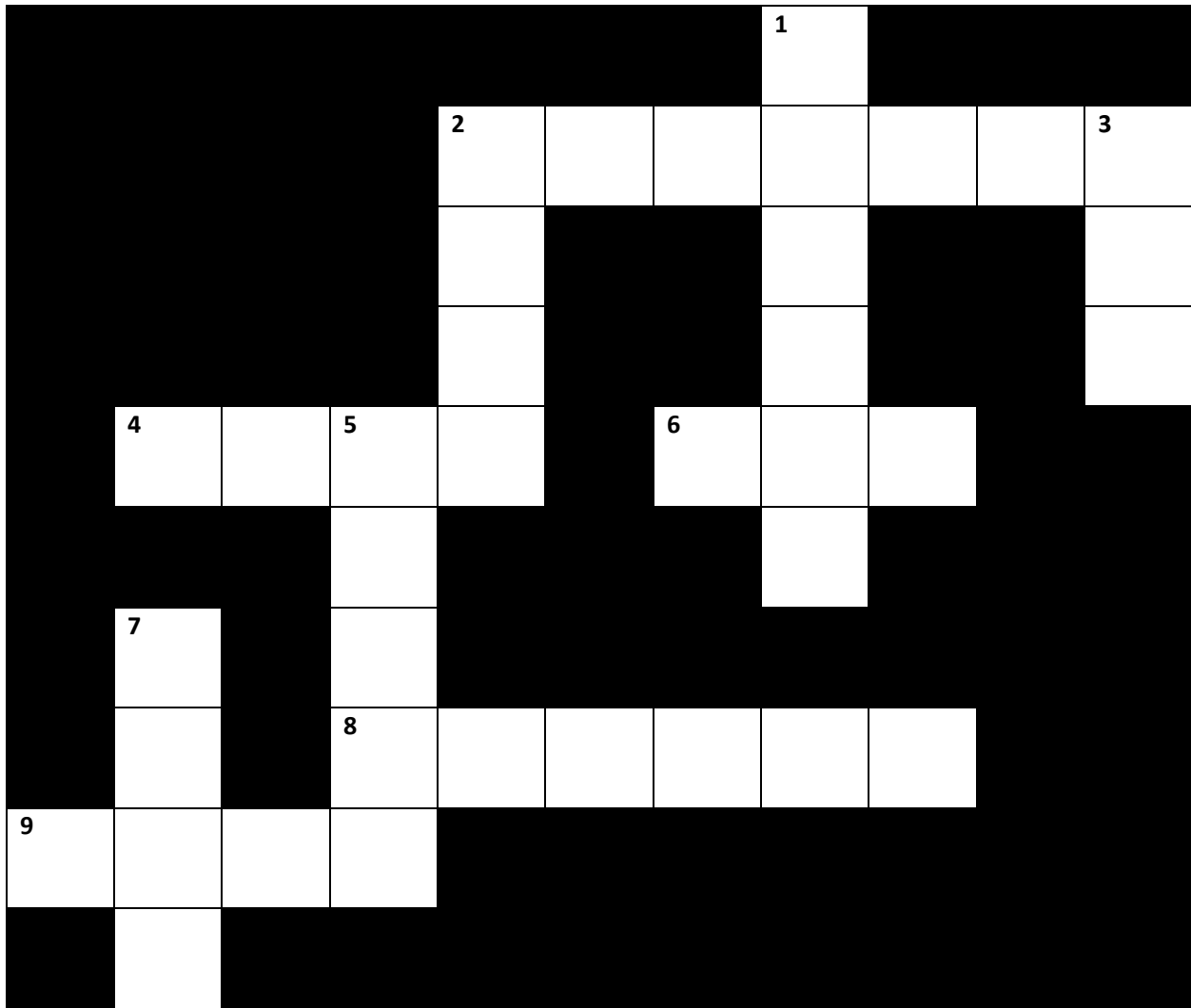
9. **washer** = a flat ring of metal or rubber that seals and protects in a joint. Example: put a washer on the bolt before you put on the nut.



10. **scratch** = to mark or cut a surface with something sharp. Example: using pliers to untighten a bolt will scratch the bolt.

CROSSWORD PUZZLE

Student, please write the words for the clues or definitions or missing words in the spaces below. Use the numbers (across or down) to locate where you will start the words.



Words ACROSS:

Words DOWN:

2. Cut the surface with something sharp

1. a flat metal ring.

4. A class with common characteristics.

2. speak

6. "Don't buy only one; get the whole

3. _____ nut.

8. Steel object for sewing

5. to hit many times with a hammer.

9. Mean the same as number 4 across.

7. to hold tightly.

The Use of Pliers and Wrenches

In this lesson you will learn the names of four kinds of pliers and four types of wrenches. You will also learn for what they are used, their purposes.

Pliers is a plural word, so when you speak about them, you should say “the pliers are...” or “the pair of pliers is...”. In this last phrase the word pair is singular.

Pliers are holding tools, usually made from two pieces of strong metal, fastened in the middle, with jaws at one end, and handles at the other. There are several kinds of pliers:

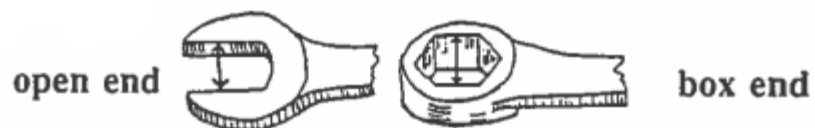
1. **Slip-joint pliers**: These pliers have two positions for the handles. In one position the jaws can be opened wider than in the other position. These pliers can be used to grip metal parts or other things.

2. **Vise-grip pliers**: This pair of pliers is like a vise or a clamp, because a machinist can tighten them around something and then lock them in place like a vise.

3. **Needle-nose pliers**: They are used to hold small objects or to reach into narrow places. These pliers get the name “needle-nose” because the jaws (nose) are long and thin, like a needle.

4. **Diagonal pliers** (sometimes called “**dykes**”): They have two sharp cutting edges instead of two holding jaws. They are good for cutting wire or small, light pieces of metal, or for stripping insulations away from wire.

Wrenches are tools for tightening and loosening nuts and bolts. They can be brought one at a time, but are usually sold as a set of wrenches with a variety of sizes, from small to large. The size of a wrench is measured by how wide the gripping end of the wrench is.



The units of measuring wrench sizes are either in U.S. standard units (inches) or in metric units (millimeters). There are several types of wrenches which we will read about on the next page.

Exercise 1:

Look at the pictures and write the words three times each in the spaces below.

A. slip-joint pliers _____

B. vise-grip pliers _____

C. needle-nose pliers _____

D. diagonal pliers _____

or dykes _____

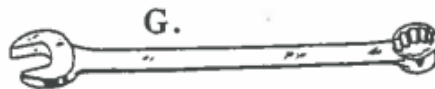
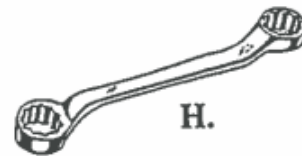
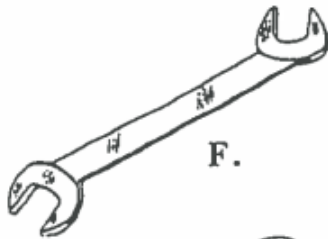
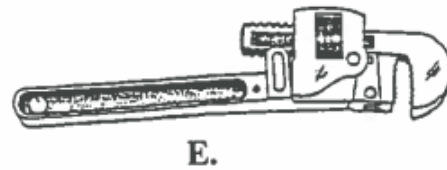
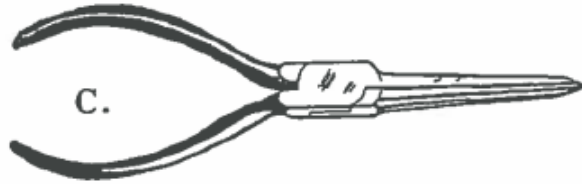
E. pipe wrench _____

F. open-end wrench _____

G. box-end wrench _____

H. combination wrench _____

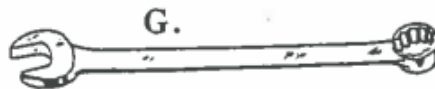
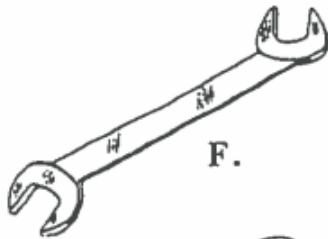
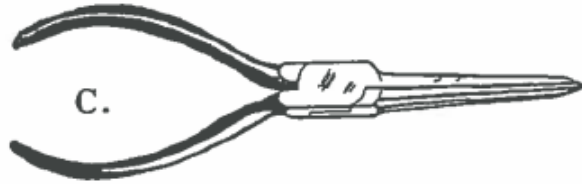
Exercise 2:



Write the letter of each tool in front of its name.

- | | |
|--|--|
| <input type="checkbox"/> 1. box-end wrench | <input type="checkbox"/> 5. needle-nose pliers |
| <input type="checkbox"/> 2. diagonal pliers | <input type="checkbox"/> 6. pipe wrench |
| <input type="checkbox"/> 3. combination wrench | <input type="checkbox"/> 7. slip-joint pliers |
| <input type="checkbox"/> 4. vise-grip pliers | <input type="checkbox"/> 8. open-end wrench |

Exercise 3:



Look at the pictures. Write the correct letter in the spaces.

A. s _ p - j _ _ nt pl _ _ rs

B. v _ s _ - g _ ip p _ er _

C. n _ _ d _ _ - no _ _ pl _ ers

D. di _ g _ n _ l pl _ _ s
or d _ k _ s

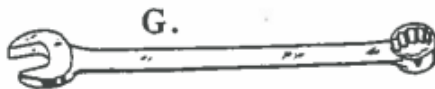
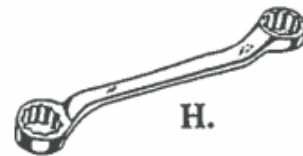
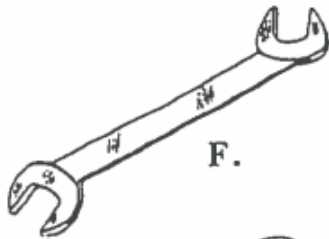
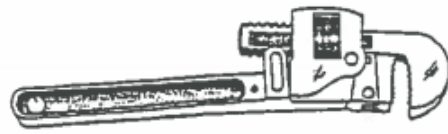
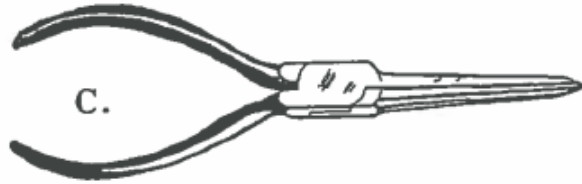
E. p _ p _ w _ en _ _

F. o _ e _ - e _ d wr _ _ ch

G. co _ _ b _ n _ tion _ _ rench

H. b _ x - _ _ d _ _ e _ ch

Exercise 4:



Look at the pictures. Write the names of the tools.

A. _____ E. _____

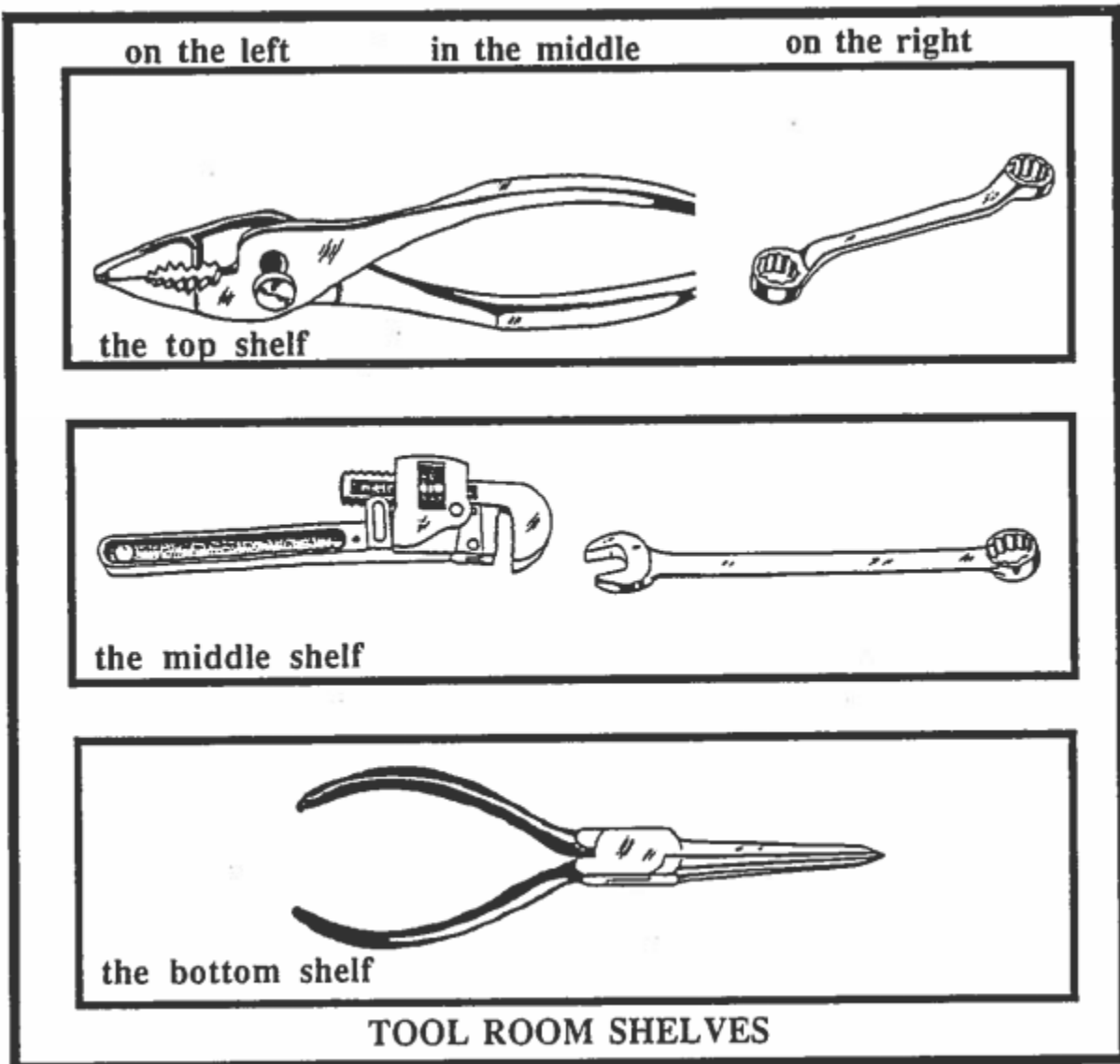
B. _____ F. _____

C. _____ G. _____

D. _____ H. _____

WHERE ARE THE TOOLS?

Below is a picture of some shelves in a tool room. Learn the words that help to locate things – words like “on the top shelf, in the middle”. Practice with another student. Both of you look at this picture; the other student will ask you questions about where the tools are. Tell the student, using the location words from this page.



WHERE ARE THE TOOLS?

With the picture of the shelves in front of both of you, practice the questions and answers with another student; that person holds this sheet, asks you the questions, listens to you answers, and tells you if your answer is correct.

1. Q: Where's the combination wrench?

A: It's on the middle shelf, on the right.

OR: It's on the right of the middle shelf.

OR: It's on the right-hand side of the middle shelf.

2. Q: Where are the needle-nose pliers:

A: They're on the bottom shelf, in the middle.

OR: They're in the middle of the bottom shelf.

3. Q: Where are the slip joint pliers?

A: They're on the top shelf, on the left.

OR: They're on the left of the top shelf.

OR: They're on the left-hand side of the top shelf.

4. Q: Where is the pipe wrench?

A: It's on the middle shelf, on the left.

OR: It's on the left of the middle shelf.

OR: It's on the left-hand side of the middle shelf.

5. Q: Where's the box-end wrench?

A: It's on the top shelf, on the right.

OR: It's on the right of the top shelf.

OR: It's on the right-hand side of the top shelf.

Exercise 5: FILL IN THE BLANKS

Re-read (read again) the Student Information Sheets. Then write the correct words in the blanks (spaces) below. Use these words:

vise-grip

Hex

combination

pipe

Inches

box

millimeters

open

diagonal

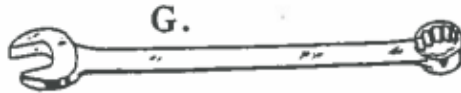
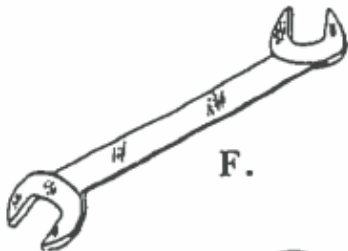
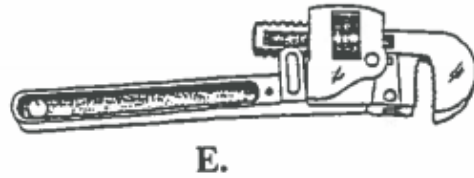
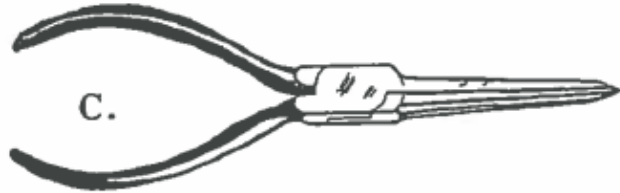
slip-joint

washer

set

1. A _____ wrench has adjustable jaws with teeth that hold more tightly with pressure.
2. The word _____ means _____.
3. Before a nut goes in a bolt, a _____ is put on to give a tighter fit.
4. A _____ wrench has two different ends.
5. One of the ends is an _____ end; the other is a _____ end.
6. Dykes are the same as _____ pliers.
7. _____ pliers are like a clamp, because they can be locked around a workpiece.
8. It's best to buy a complete _____ of wrenches with different sizes.
9. _____ pliers have two positions; in the second position, the jaws are wider.
10. Wrench sizes are measured in _____ (U.S. Customary units) or in _____ (metric units).

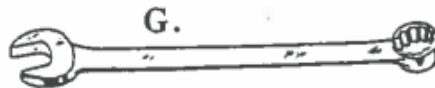
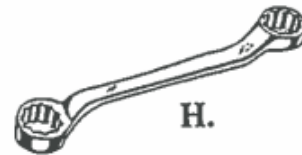
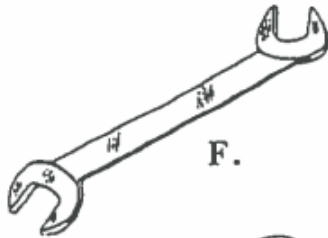
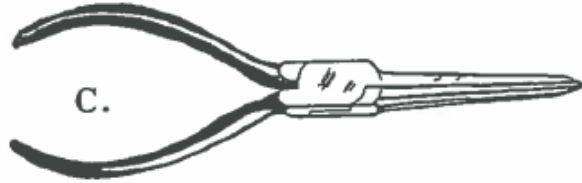
Part A: Listening Test



Get the tape and play the side that says *Listening Test, Module 3, Lesson 4*. Look at the pictures. Listen to the words on the tape. Write the letters in the spaces.

- | | |
|----------|----------|
| 1. _____ | 5. _____ |
| 2. _____ | 6. _____ |
| 3. _____ | 7. _____ |
| 4. _____ | 8. _____ |

Part B: Writing Test



Look at the pictures. Write the names of the tools.

A. _____ E. _____

B. _____ F. _____

C. _____ G. _____

D. _____ H. _____

Part C: True/False Questions. Circle “T” if the statement is true; circle “F” if the statement is false.

1. Slip-joint pliers are a good tool for tightening bolts, because they will fit any size bolt head. **T F**
2. An open-end wrench usually has the same size at each end. **T F**
3. A combination wrench usually has the same size at each end. **T F**
4. A set of wrenches can be either metric or U.S. Customary. **T F**
5. Washers can be made of metal and plastic. **T F**
6. When pipe-wrenches are big and heavy, they can be used for pounding. **T F**
7. A hex nut has six equal sides and six equal angles. **T F**
8. A box wrench has two closed ends that fit over bolts for a tighter fit. **T F**
9. The word grip means “to hold tightly” **T F**
10. A washer will help tighten a nut **T F**

1. **Open-end wrench:** This wrench has two ends which are open; these ends fit easily around a nut or a bolt. The two ends of an open-end wrench are usually of different sizes, so you have two tools in one.

2. **Box-end wrench:** This wrench has two ends which are closed, like a box. The end of this wrench must be fit over and down onto the nut or bolt. The advantage of this kind of wrench is that it gives a very tight grip.

3. **Combination wrench:** This wrench has one open end and one box end, a combination, like a combination plate at the restaurant – one taco, one enchilada, one serving of rice. The two different ends of the combination wrench are usually the same size.

4. **Pipe wrench:** This wrench has jaws that are adjustable to fit a variety of sizes; the jaws also have teeth that will grip tightly. When pressure is put on the handle, the teeth will hold more tightly.

NOTE 1: Pliers should **not** be used for gripping or turning nuts and bolts. Wrenched are for that. Also, pliers and wrenches should **not** be used like hammers for pounding things.

NOTE 2: Nuts, Bolts and Washers:

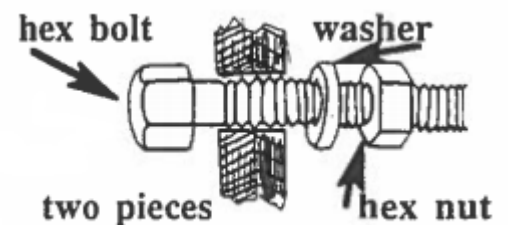
The most common kind of nut is a **hex nut**. “Hex” means “six” and tells you that there are six sides on this nut.



hex nut

The bolt shown below is a **hex bolt**, because it has a head with six sides. The wrenches we have been talking about fit over these hex nuts and hex bolts.

In the bottom picture, you can see two pieces of material that are held together by a hex bolt and a hex nut. There is also a **washer**, next to the nut; it gives a tight fit and prevents the piece from being scratched.



Module 3, Lesson 4

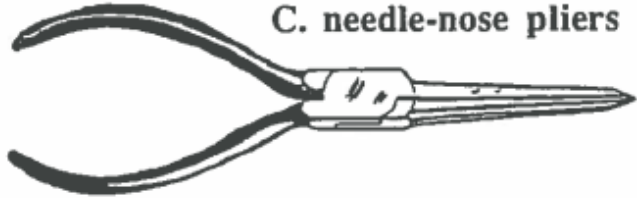
Pliers & Wrenches



B. vise-grip pliers



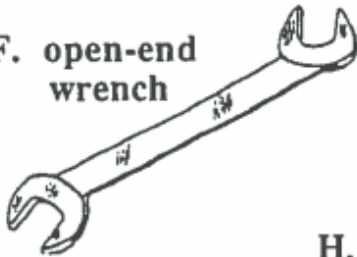
C. needle-nose pliers



E. pipe wrench



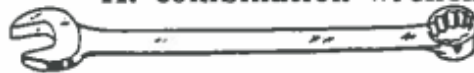
F. open-end wrench



G. box-end wrench



H. combination wrench



**Look at the pictures.
Write the names of the
tools on the next page.**

Lesson 5: Wrenches, Sockets, and Taps

- 1. cross-section** = what you see when you cut through the middle of something. Example: when you cut through a banana, the cross-section is round.
- 2. switch** = something used to change the direction or quality of another thing. Example: the light switch turns the light on and off.
- 3. bore** = to make a hole with a rotating tool. Example: Clara bored three holes in the metal plate.
- 4. internal** = on the inside; the opposite of external. Example: a bolt has external threads cut into its sides; the hole for the bolt has internal threads cut into the sides of the hole.
- 5. sharp** = having a thin edge able to cut or a fine point able to pierce. Example: this knife is very sharp; it will cut anything.
- 6. tap** = a tool used to cut threads on the inside of the hole. Example: Damaso used a set of taps to cut the internal threads in this hole.
- 7. ratchet** = a part which only allows motion in one direction. Example: this ratchet wrench is good for removing nuts and bolts in narrow places.
- 8. drive** = a square end on a wrench which fits into the drive-end of a socket. Example: this ratchet wrench has a drive at one end.
- 9. drive-end** = a square hole at the end of a socket, into which the drive will go. Example: Carlos found a $\frac{3}{4}$ inch drive to fit into the drive-end.
- 10. socket** = a hollow piece that fits tightly around hex-shaped nuts and bolts; in general, a hollow part into which something fits. Example: Conchita bought a complete set of metric sockets.

Write the correct word in each of the blank spaces:

A. Use these words for No's. 1 to 5: CROSS-SECTION, BORE, DRIVE, SHARP, SOCKET.

1. Alfredo, use this drill to _____ three holes in that shaft.
2. This knife has been used many time; the blade is no longer _____.
3. Pablo did not buy just one _____ for his ratchet wrench; he bought a whole set of them.
4. When you cut through an Allen wrench, the _____ is hex-shaped.
5. A _____ is the square end on a wrench which fits into the drive-end of the socket.

B. Use these words for No's. 6 to 10: SWITCH, RATCHET, INTERNAL, DRIVE-END, TAP.

6. A bolt will easily screw into these _____ threads inside this hole.
7. Use a _____ to cut the threads on this nut.
8. Because it has a _____, this wrench can only be turned in one direction.
9. This square hole in the end of the socket is called a _____.
10. The ratchet wrench has a _____ to change direction for turning bolts and nuts.

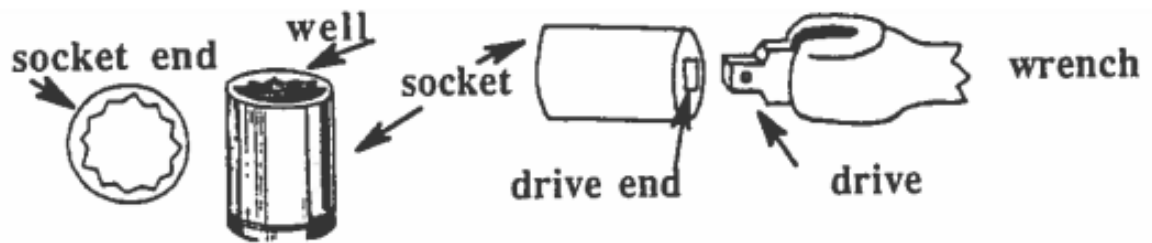
More Tools and Their Purposes

There are some other wrenches that you need to learn; you will also study the sockets and taps in this lesson.

a. **adjustable wrench:** This wrench has a screw which can be turned to open or close the jaws of the wrench. This wrench is sometimes called a Crescent wrench, because one popular maker of this wrench was the Crescent Company.

b. **Allen wrench:** It has a long arm and a short arm; both ends of the wrench have a hex-shaped cross-section. The ends fit into the hex-shaped slots in special screws.

c. **socket wrench:** This wrench fits into a socket; the wrench is used to turn the socket. The connection between the wrench and the socket is made by fitting a drive on the end of the wrench into the drive-end of the end of the socket.



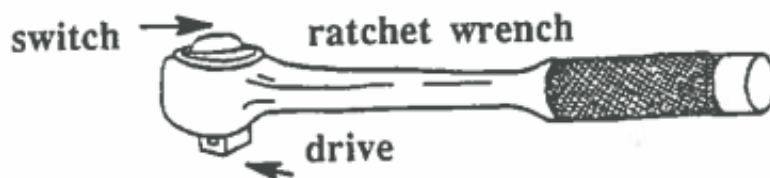
d. A **socket** has a well (hex-shaped hole) which fits tightly over a hex nut or a hex bolt. Sockets come in various sizes, using both U.S. Customary and metric units. Workers usually buy a set of sockets of different sizes to go with their socket wrenches.

(continued on next page)

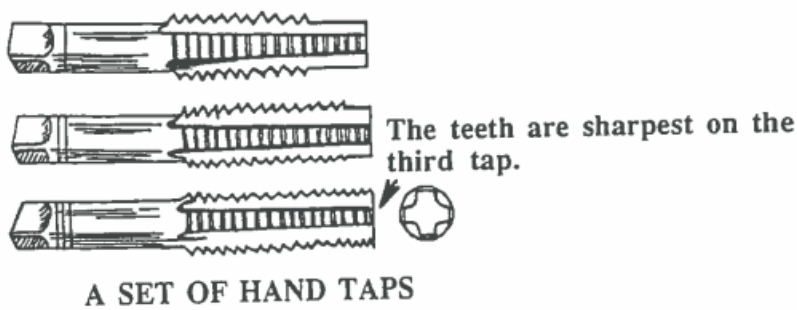
MORE TOOLS AND THEIR USES

(continued)

e. **ratchet wrench**: This is a special kind of socket wrench; like all socket wrenches, it has a drive which fits into the drive-end on sockets. This wrench is special because it has a ratchet; a ratchet permits the wrench to turn in only one direction at a time, and then lets the wrench return to its original position without taking the socket off the nut. A ratchet wrench usually has a switch which allows the worker to change the direction in which the wrench turns. Therefore, it is possible to loosen and to tighten a nut without taking the wrench off the nut.

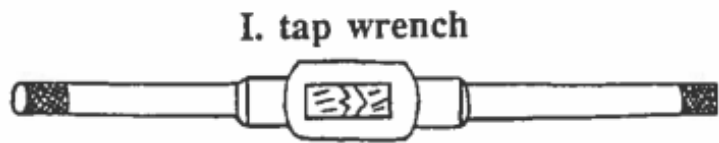
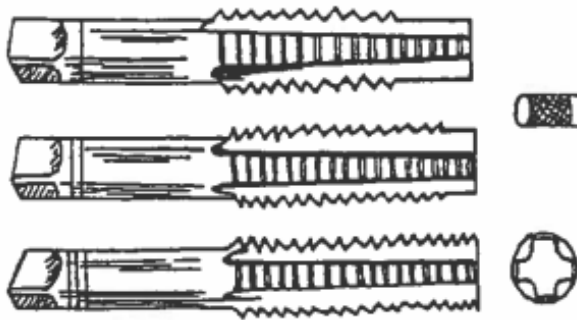
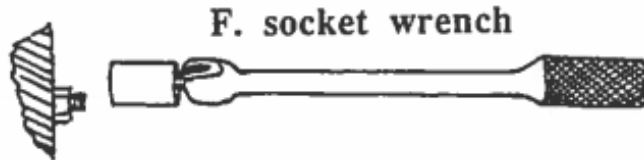
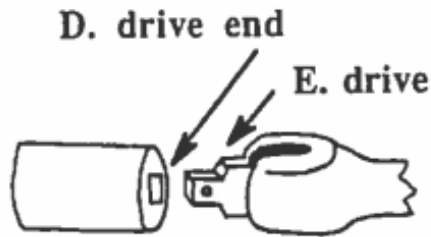
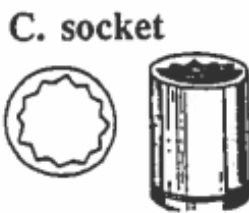
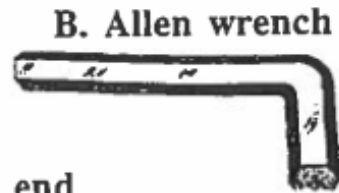
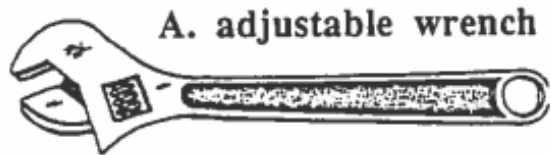


f. **tap wrench**: This kind of wrench is used to hold a tap to turn the tap as it bores into a hole. A tap is a cutting tool used to cut internal threads into a hole – these are the threads into which a bolt or screw can be turned. Taps come in a **set of hand taps**, usually three in a set. The first tap is used to start cutting the thread; the second cuts the thread deeper; and the third tap finishes the job.



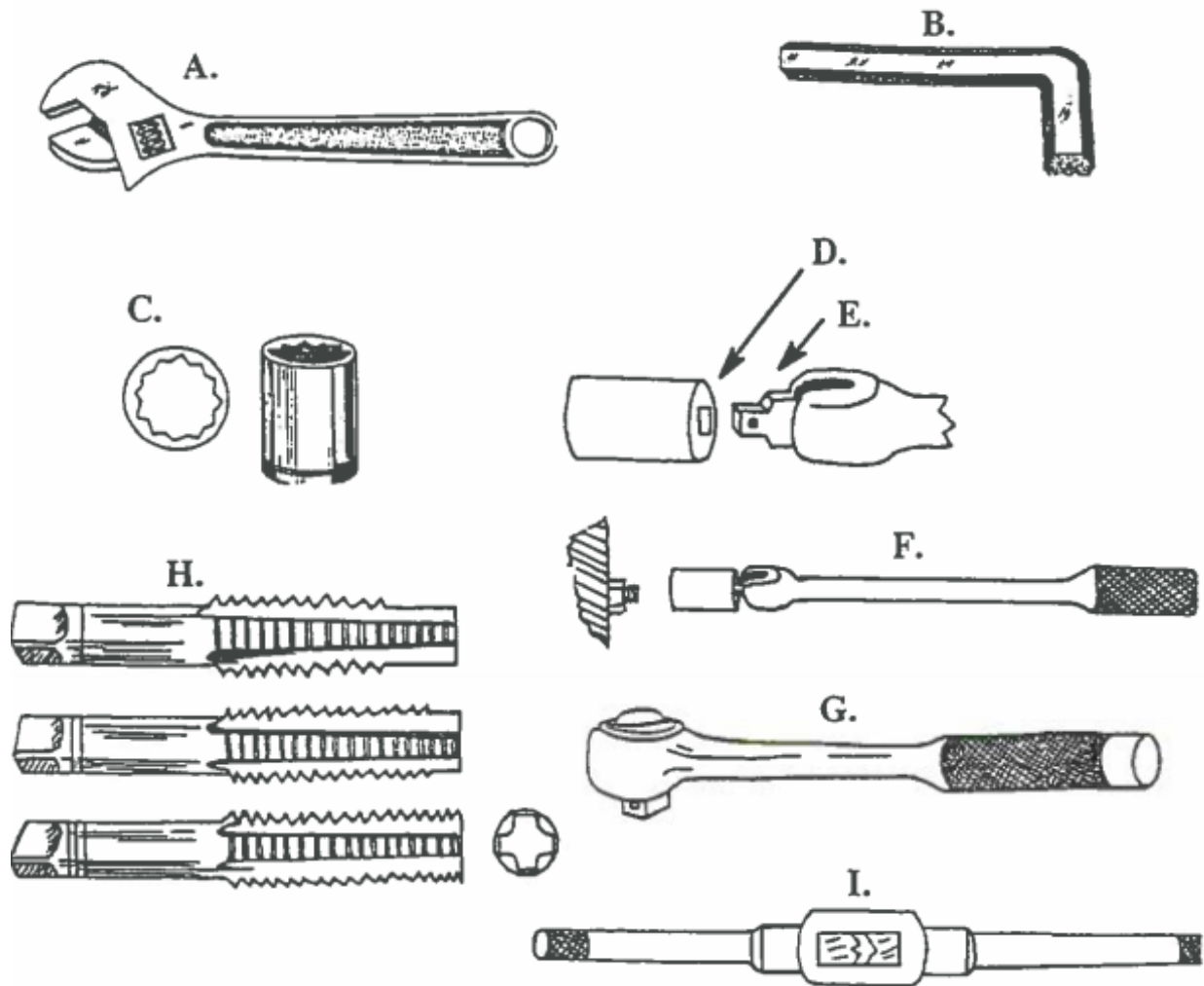
Module 3, Lesson 5

WRENCHES, SOCKETS & TAPS



Look at the pictures.
Write the words on
the next page.

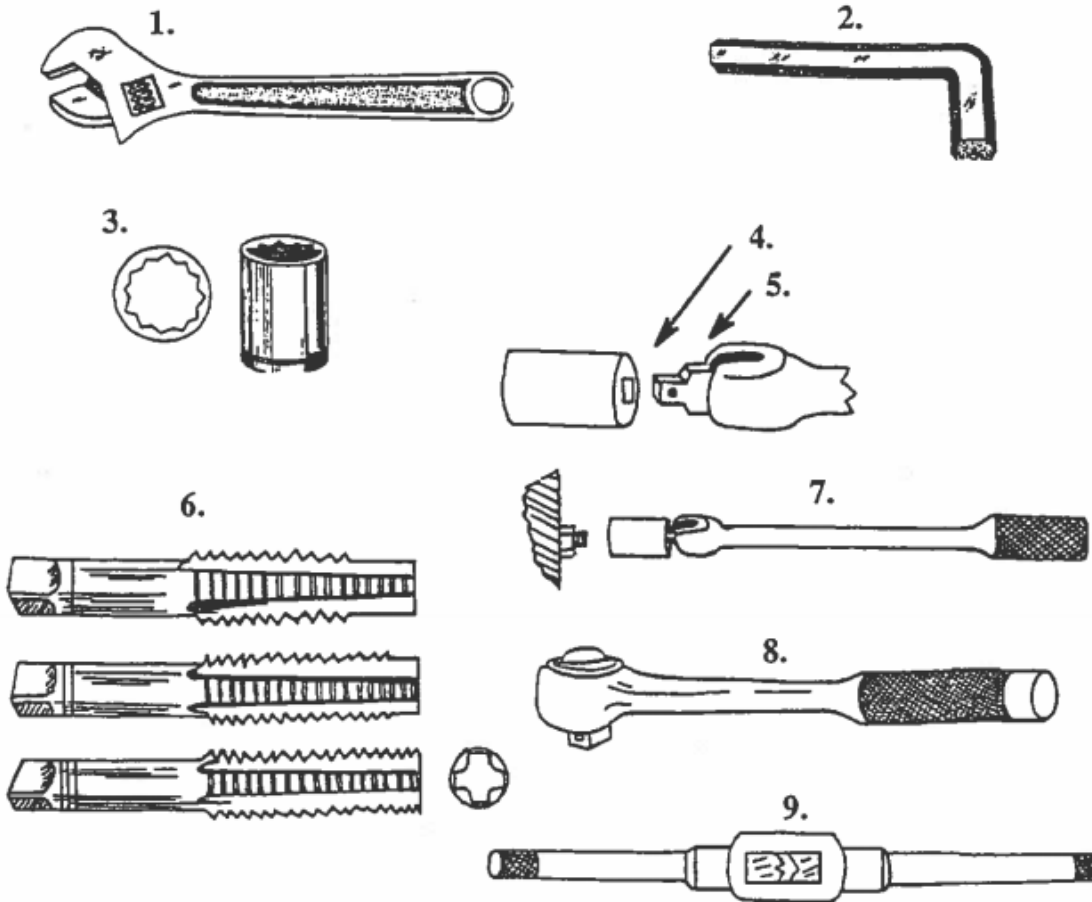
Exercise 2:



Write the letter of each part in front of its name.

- | | | |
|-----------------------|------------------|--------------------------|
| ___ 1. socket wrench | ___ 4. drive end | ___ 7. tap wrench |
| ___ 2. Allen wrench | ___ 5. socket | ___ 8. adjustable wrench |
| ___ 3. ratchet wrench | ___ 6. drive | ___ 9. set of hand taps |

Exercise 3:



Write the letter of each part in front of its name.

1. a _ j u s _ a b l e w r e _ c h

2. _ l _ e n w _ _ n _ _

3. _ o _ k _ t

4. d _ i _ e e _ _

5. d _ i _ _

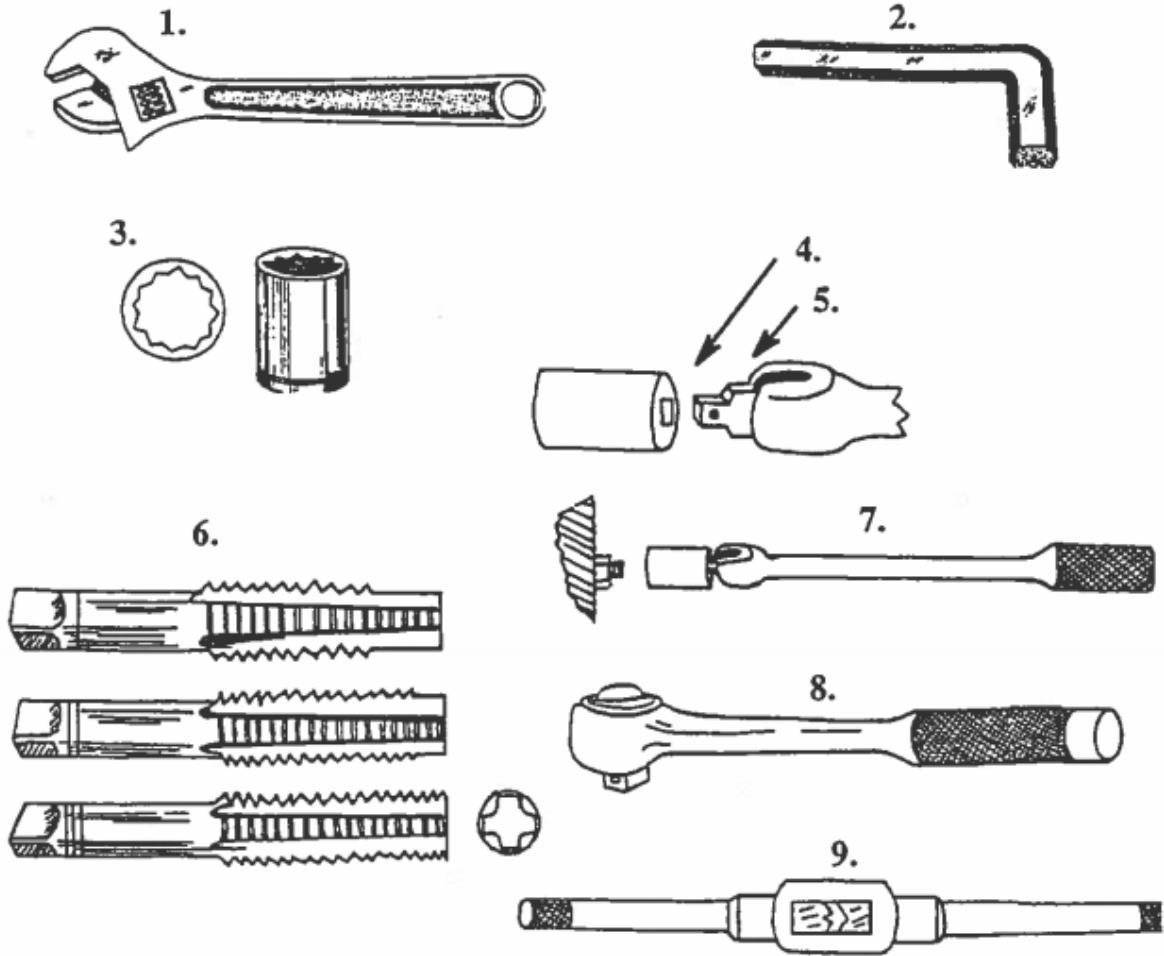
6. s _ t o _ h _ _ d t a _ _

7. s _ c _ e _ _ r e n _ _

8. r _ t _ h e _ w _ _ _ c _ _

9. t _ _ w _ _ _ c _ _

Exercise 4:



Look at the pictures. Write the names of the tools.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

A Friend at Work

Directions: (1) Listen to this conversation on the tape *Module 3, Lesson 5, Conversation*; (2) Listen to the tape and repeat the parts; (3) Practice the conversation with another student.

This is the first day of work for Luis at the Acme Machine Shop. He has just met Marta; she has worked at the shop for the last five years.

Marta: Welcome to the Machine shop, Luis. I understand this is your first day on the job.

Luis: Yes. I'm glad to be here. Before I start, I have a couple of questions I'd like to ask you.

Marta: Sure. Go ahead.

Luis: Well, I brought my tools with me, and I wonder if I'll need any of these on the job.

Marta: Let's have a look. (Luis opens his tool box.) Oh, I see you have a nice set of Snap-On wrenches and sockets.

Luis: Yes, I have them in both metric and U. S. customary sizes.

Marta: Do you have any taps and dies in there?

Luis: Yes, I have both.

Marta: Well, you've got some beautiful tools, but you don't have to bring them, unless you want – we have a lot of tools here you can use.

Luis: I'd like to use some of my own from time to time.

Marta: If you're going to use them here, I'd suggest you engrave your name on them. You don't want to lose them.

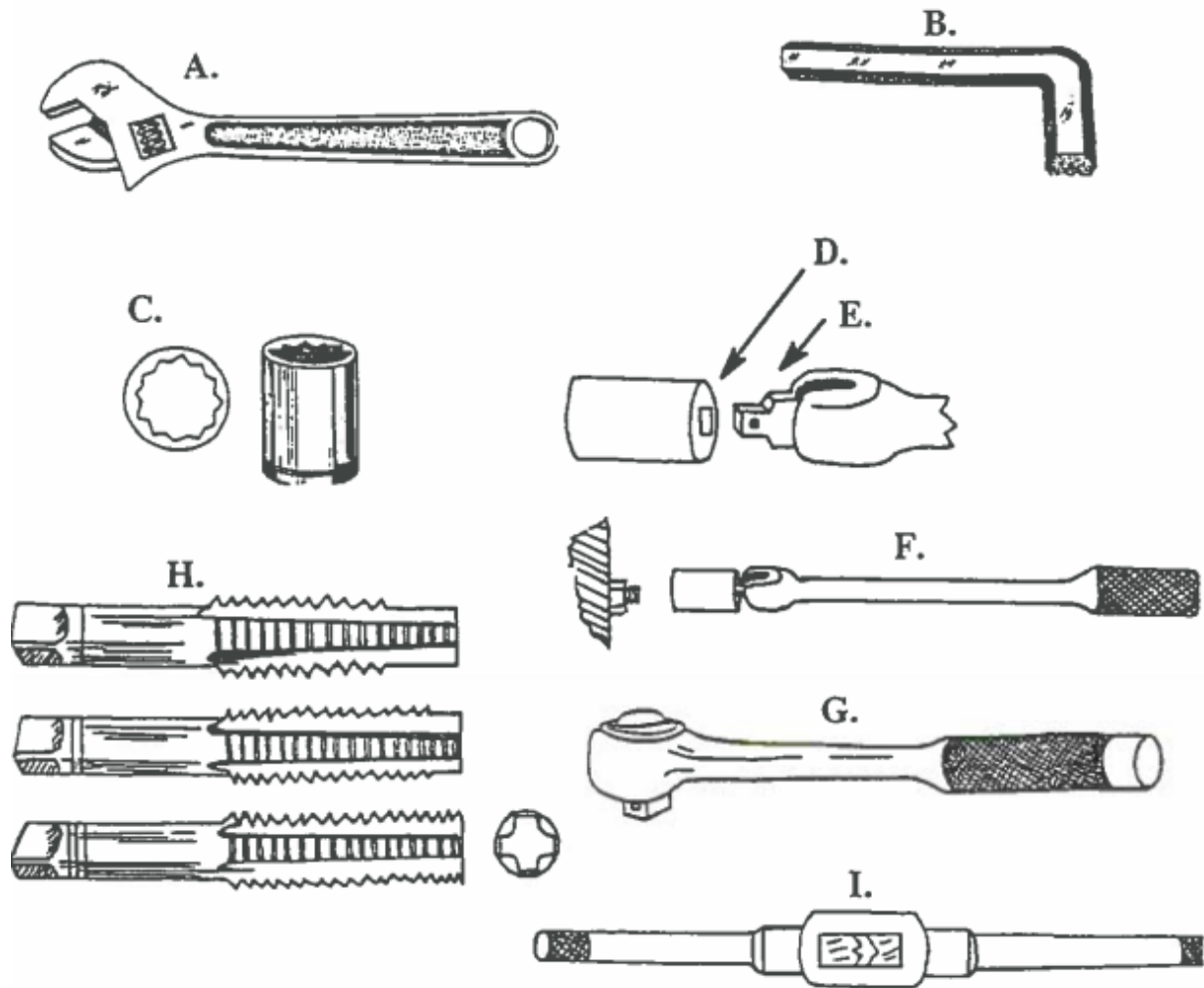
Luis: Thanks, Marta. I've enjoyed talking with you. Maybe I'll see you at lunch.

Exercise 5:

Reread the Student Information Sheet called *More Tools and Their Uses*. Match the letters with the numbers.

- | | | |
|-----|----------------------|--|
| ___ | 1. adjustable wrench | a. This tool part has a well which fits over nuts and bolts; it also has a drive-end. |
| ___ | 2. Allen wrench | b. This tool holds a tap as it cuts threads. |
| ___ | 3. drive | c. It is used to change the direction of turning on a ratchet wrench. |
| ___ | 4. socket | d. This is what you see when you cut through a part. |
| ___ | 5. ratchet | e. This wrench has a long arm and a short arm with hex-shaped ends that fit into special screws. |
| ___ | 6. switch | f. A set of these is used to cut threads on the inside of a hole. |
| ___ | 7. taps | g. This part of a wrench fits into the drive-end of a socket. |
| ___ | 8. tap wrench | h. This is the opposite of external. |
| ___ | 9. internal | i. This is also called a Crescent wrench. |
| ___ | 10. cross-section | j. This part of a wrench allows the wrench to turn in only one direction. |

Listening Test



Get the tape and play the side that says Listening Test, Module 3, Lesson 5. Look at the pictures. Listen to the words on the tape. Write the letters in the spaces.

1. _____

4. _____

7. _____

2. _____

5. _____

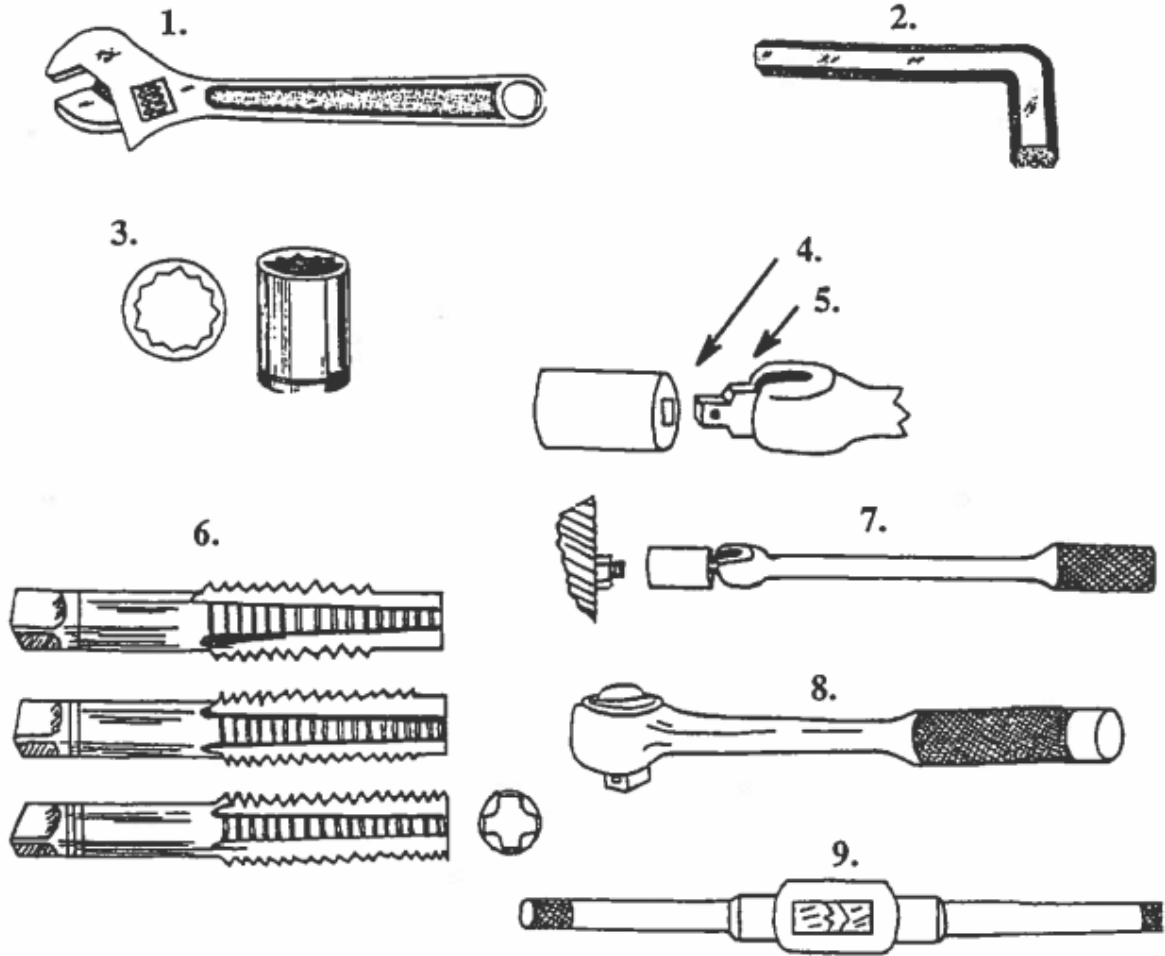
8. _____

3. _____

6. _____

9. _____

Writing Test



Look at the pictures. Write the names of the tools.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

Lesson 6: Dies and Reamers

1. **shaft** = the long, thin part of something like the wood in an arrow. Example: The flag is usually hung at the end of a shaft.
2. **cylinder** = a solid piece with two round ends and straight sides. Example: A soda pop can is shaped like a cylinder.
3. **surround** = to flow around or be all around something. Example: The old man was surrounded by his children at the party.
4. **damage** = to cut, break, scratch, mark or injure in any way. Example: Sometimes the threads on threaded pieces are damaged when a machinist uses a wrong tool.
5. **split** = to cut something into two pieces. Example: My sister and I split the money; she got \$20 and I got \$20.
6. **halves** = more than one half; one of two equal parts. Example: A split die had two halves that fit around the round workpiece.
7. **smooth** = very even: having no bumps or raised parts. Example: A baby's skin is very smooth.
8. **exact** = correct, accurate, not differing from what is required. Example: She paid the exact amount of the bill, \$12.38.
9. **diameter** = the length of a line drawn from one side of a circle to the other and passing through the center. Example: the diameter of the gear is exactly 12.015 inches.
10. **guide** = a person or thing which leads, directs, shows which way to go. Example: A map is good guide for finding new places.
11. **fine** = thin, not wide. Example: He drew a fine line with his pencil.
12. **friction** = the resistance of two objects to moving across each other when they are touching. Example: When you rub your hands together, the friction from the rubbing will cause that.

Match the correct letter with each number:

Part A:

- | | | |
|-----|-------------|---|
| ___ | 1. shaft | a. two equal pieces that add up to a whole. |
| ___ | 2. surround | b. to break and cut the threads on a bolt. |
| ___ | 3. damage | c. some metal is rough; some metal is this. |
| ___ | 4. split | d. to be all around something. |
| ___ | 5. halves | e. to cut into two pieces. |
| ___ | 6. smooth | f. for example, a flag pole. |

Part B:

- | | | |
|-----|-------------|--|
| ___ | 1. cylinder | a. same meaning as accurate |
| ___ | 2. exact | b. the distance across a circle at the widest point. |
| ___ | 3. fine | c. has straight sides and two round ends. |
| ___ | 4. guide | d. a resistance to moving that happens when two things rub against each other. |
| ___ | 5. diameter | e. a map, a busdriver, and a bench block are all examples of this. |
| ___ | 6. friction | f. a line with this quality is thin. |

DIES AND REMAINS

In the last lesson, you studied taps which are used to cut threads inside a hole. Into this threaded hole goes a threaded bolt or threaded shaft. You will want to be able to cut external threads into a cylinder-shaped workpiece; you will use **dies** and a **die stock** to do that. The dies have teeth that surround the cylinder and cut into the metal as the die is turned. Dies come in many different sizes. The die stock is like a wrench – it holds the die and provides handles for turning. As with taps, **cutting fluid*** is used frequently to help the die to cut the metal.

There are two kinds of commonly used dies: (1) the **solid die** – it is not adjustable and is often used for repairing damaged threads by re-cutting them; (2) the **adjustable split die** – it is a pair of die halves that fit into a die stock. There is a screw which allows you to adjust the cutting depth; you can then cut threads that are over or under the standard depth. When you use a split die, make sure that the two halves are the same size. Both taps and dies are made of high-quality tool steel, hardened and ground.

Another tool is the **hard reamer**; it is used to finish the inside of a hole that has already been drilled. The reamer removes a small amount of material to make a very accurate, smooth hole, with exact diameter.

The **bench block** has several holes of different sizes drilled through it. This block can be a guide to keep hand taps straight when cutting threads.

The **scriber** is a drawing tool with a hardened steel point used to draw fine lines onto the rough stock. The lines will tell the machinists where to cut or drill or do other operations on the workpiece. On a double-end scriber, both ends have points; one of the ends is bent to enable reaching into narrow places.

*The cutting fluid helps (1) to reduce the temperature while cutting, (2) to reduce friction, and (3) to make the tool last longer by decreasing use.

Module 3, Lesson 6

DIES AND REAMERS

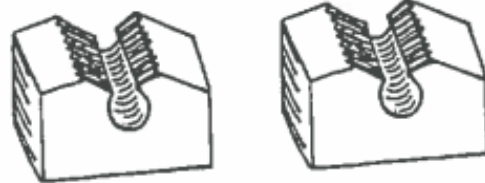
A. die stock



B. solid die



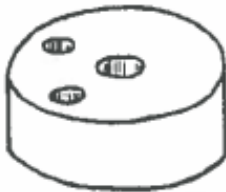
C. split die



D. reamer



E. bench block



F. scriber



Exercise 1: Look at the pictures. Copy the words three times.

A. die stock _____

B. solid die _____

C. split die _____

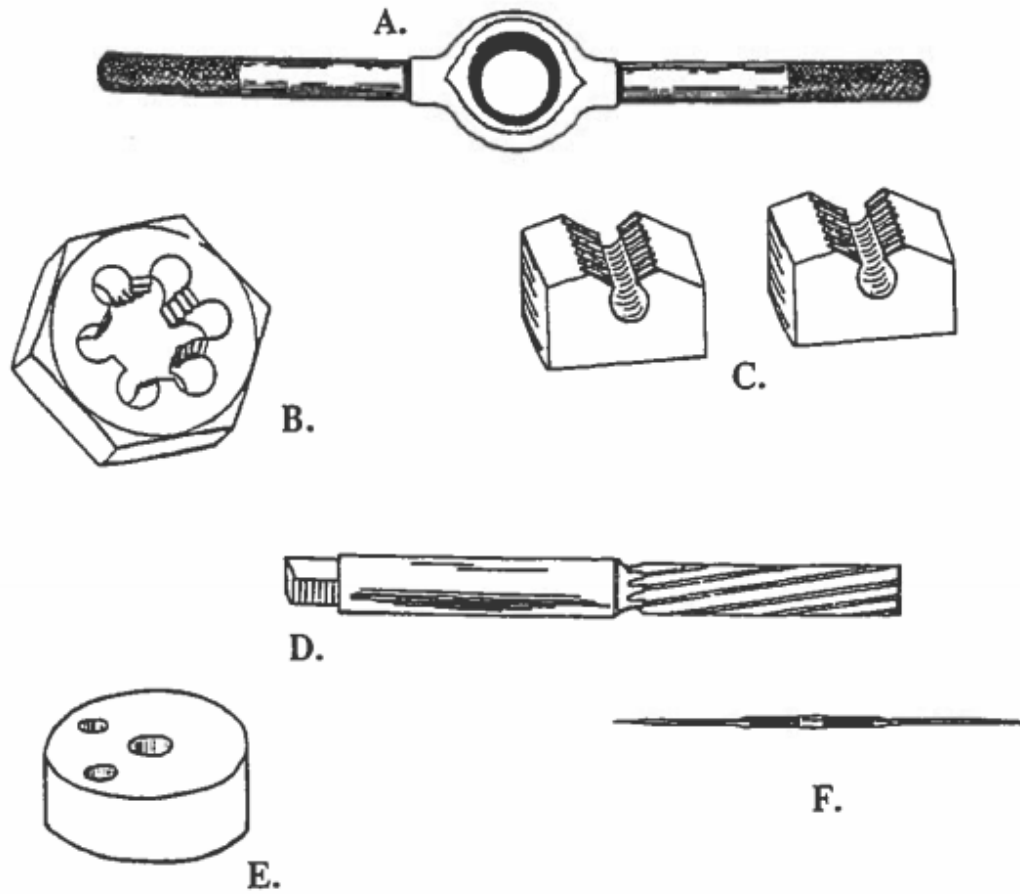
D. reamer _____

E. bench block _____

F. scriber _____

Module 3, Lesson 6

Exercise 2



Write the letters of each part in front of its name.

_____ 1. reamer

_____ 4. die stock

_____ 2. split die

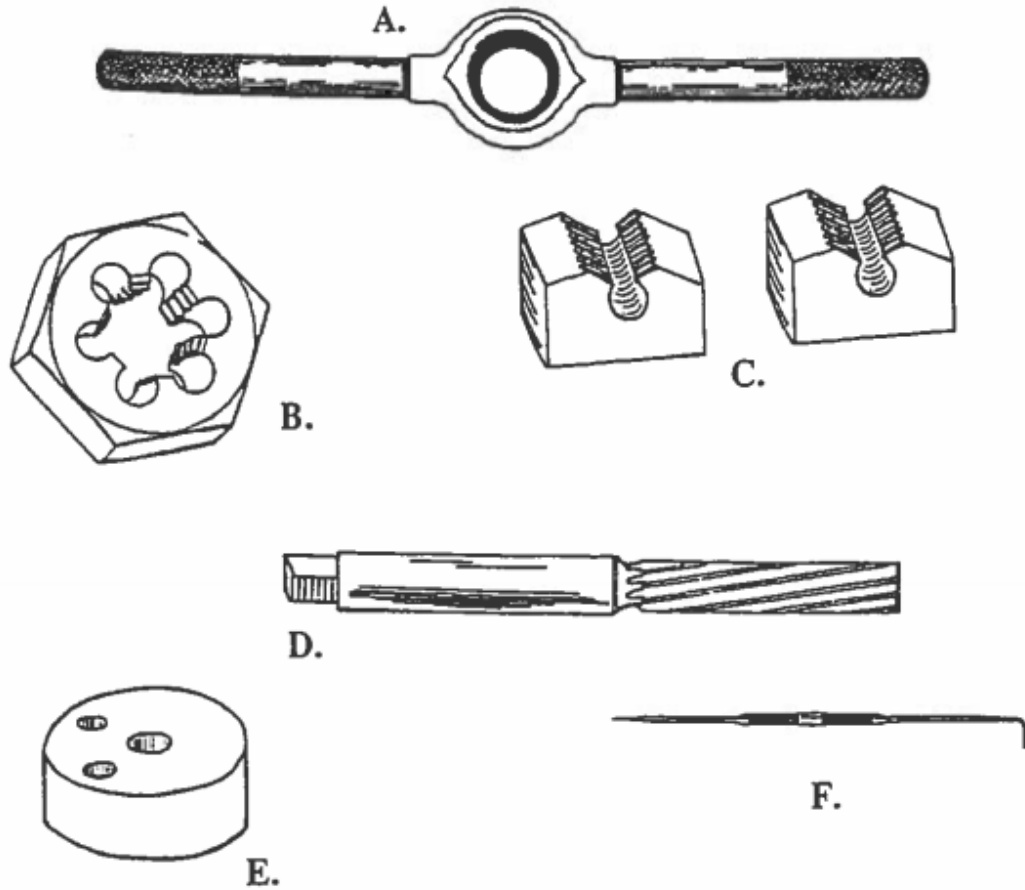
_____ 5. bench block

_____ 3. scriber

_____ 6. solid die

Module 3, Lesson 6

Exercise 3



Look at the pictures. Write the correct letters in the spaces.

A. d _ _ st _ c _

D. r _ _ m _ _

B. _ ol _ d d _ e

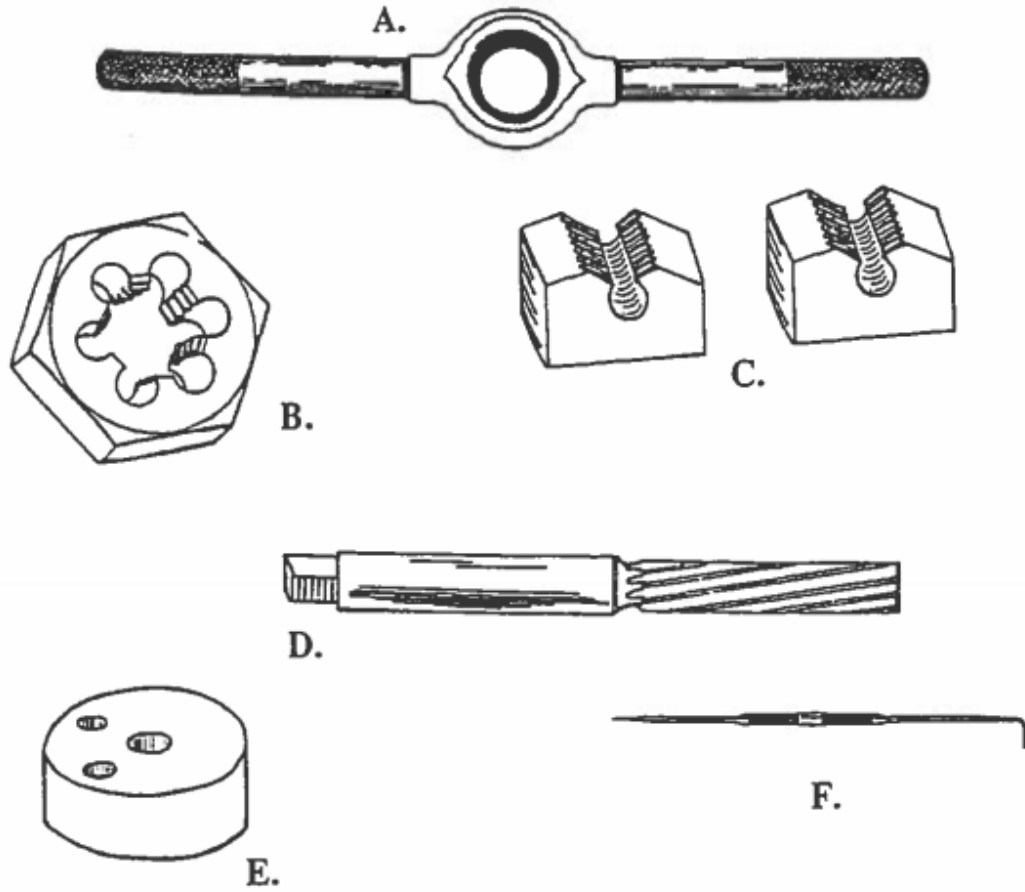
E. b _ n _ _ b _ _ ck

C. _ pl _ t _ _ ie

F. s _ r _ b _ _

Module 3, Lesson 6

Exercise 4:



Look at the pictures. Write the names of the tools.

A. _____ D. _____

B. _____ E. _____

C. _____ F. _____

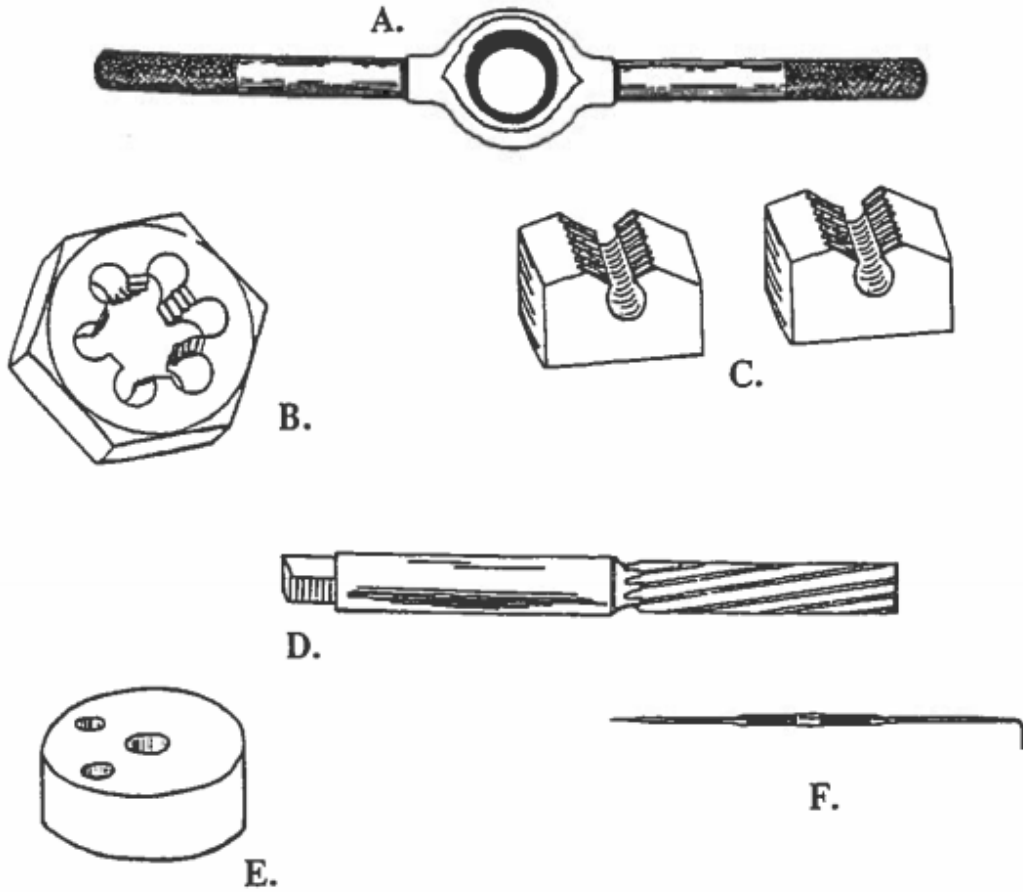
Exercise 5:

Reread the Student Information Sheet called *Dies and Reamers*. Read the following statements and circle "T" if the statement is true; circle "F" if the statement is false.

1. Cutting fluid reduces heat and friction when cutting threads. T F
2. Fine lines are thick lines. T F
3. A solid die is adjustable, but a split die is not. T F
4. Threads can be either internal or external. T F
5. The threads on a bolt are internal threads. T F
6. A bench block can be used to keep the tap straight while making internal threads. T F
7. A hand reamer is used to make internal threads. T F
8. A hand reamer does not use an existing hole; it is used to start holes in a new location. T F
9. Both taps and dies are made of hardened, polished aluminum. T F
10. A reamer produces smooth, finished holes that a drill started. T F
11. A split die uses two halves to cut threads into a shaft or bolt. T F
12. A tap is used to surround a metal cylinder and cut external threads into the sides. T F

Listening Test

Get the tape and play the side that says *Listening Test, Module 6, Lesson 6*. Look at the pictures. Listen to the words. Write the letters in the spaces below.



1. _____

4. _____

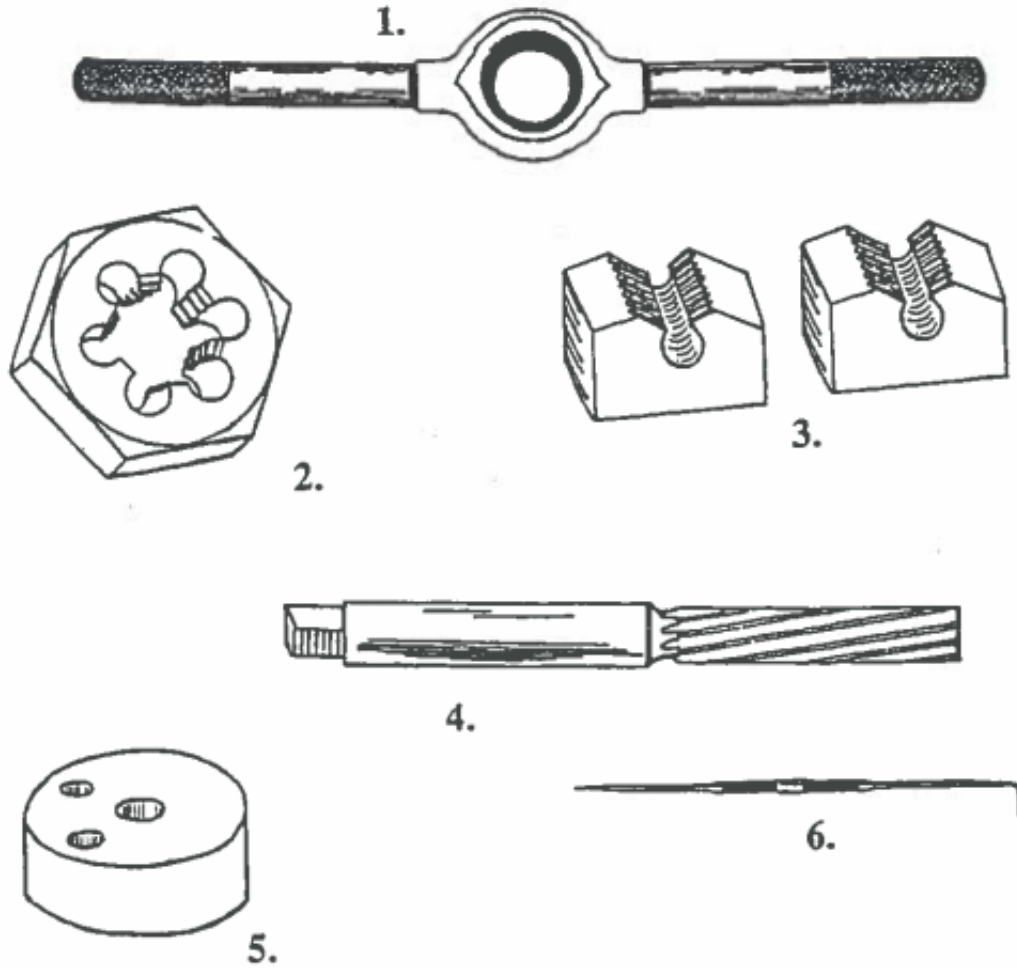
2. _____

5. _____

3. _____

6. _____

Writing Test



Look at the pictures. Write the names in the spaces below.

1. _____ 4. _____

2. _____ 5. _____

3. _____ 6. _____

Lesson 7: Hammers, Chisels, and Punches

- 1. mar =** to make look bad with scratches, dents, or holes. Example: The part was marred, because John dropped it.
- 2. durable =** lasting a long time even with hard or frequent use. Example: Steel is more durable metal than lead.
- 3. stud =** a threaded metal cylinder, with no head. Example: Faustino fastened the plate over the stud by screwing on a nut.
- 4. hold...in place =** to keep something in the place you put it. Example: A nut and a bolt will hold a part in place, if they are tight.
- 5. chamfer =** to cut the edge off a 45° angle. Example: Many times the machinist must chamfer the edges of his/her work.

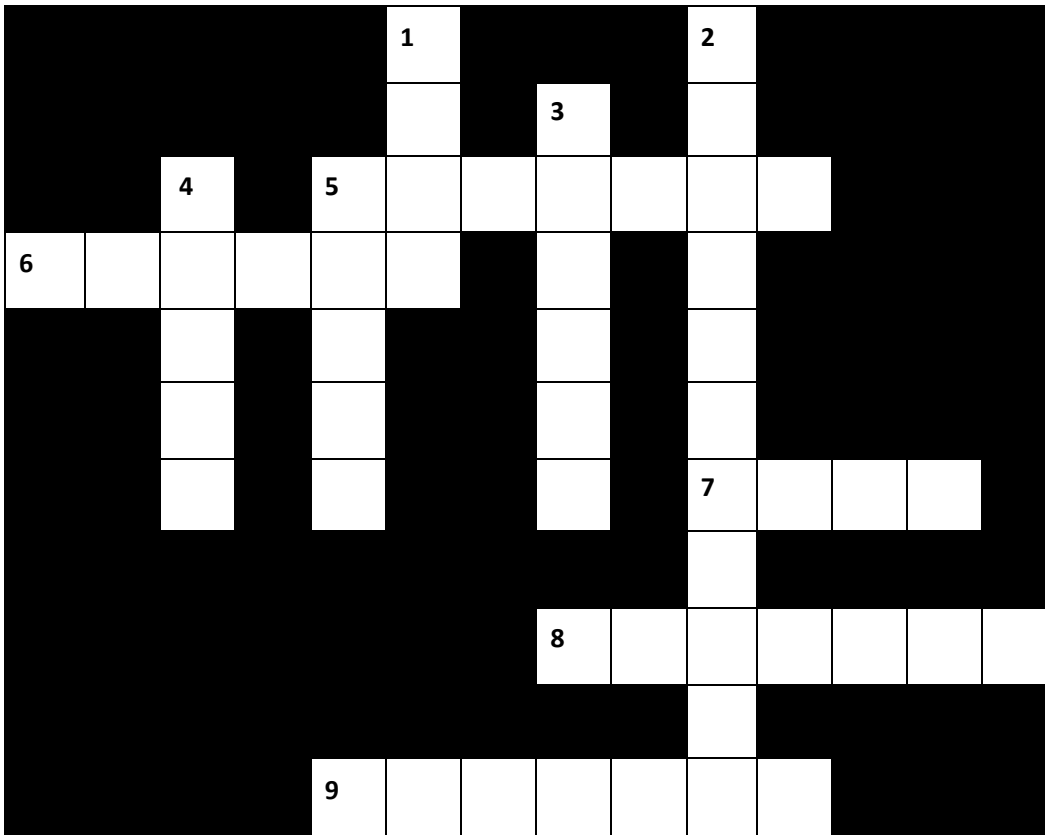
chamfer



- 6. sharpen =** to make sharp, to make a blade edge thinner, to make a point more pointed. Example: Punches must be sharpened from time to time.
- 7. dent =** a small depression (lower place) made in a surface by hitting or by pressing. Example: The old Chevrolet had at least a hundred dents in its body.
- 8. layout =** the drawing of lines on the workpiece to show the machinist where to cut and drill. Example: Juan looked at the layout before he made his first cuts in the metal.
- 9. prick =** a very small puncture or hole made by a sharp point. Example: To complete the layout, the machinist puts pricks along the lines using a prick punch.
- 10. peen =** the sharpened or rounded part of the hammer-head, opposite the face. Example: The peen on a ball-peen hammer is rounded.

CROSSWORD PUZZLE

Student, please write the words for the clues, definitions or missing words in the spaces below. Use the numbers (across or down) to locate where you will start the words. Use the words from the LM cards and summary sheet.



Words ACROSS:

5. Long lasting.
6. Scratched-looking.
7. Rounded hammer part.
8. Put a point on it.
9. 45° cut on the edge.

Words DOWN:

1. Threads, but no head.
2. Keep it there.
3. Lines scribed on the workplace.
4. A small puncture.
5. The Chevy has 100 _____.

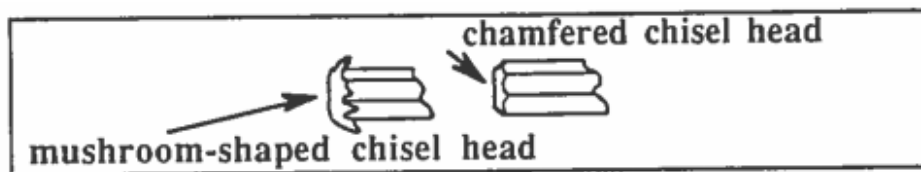
HAMMERS, CHISELS, & PUNCHES

HAMMERS: One variety of hammer, commonly used by machinists, is the **ball-peen hammer**. It has a flat **face** at one end of the hammer's head and a rounded part (called the **peen**) at the other end of the head. Ball-peen hammers can vary in weight from two ounces to 3 pounds.

A second kind of hammer is the **plastic hammer**; it is a "soft-face" hammer, a family of hammers used to pound things without scratching or marring the workpiece. Other **soft-face hammers** are made from material such as rawhide, copper, lead, and other "soft" materials. Plastic is more durable than some of the other materials and will last a long time.

CHISELS: Chisels are used mainly to cut off rusted or damaged bolts, nuts, and studs. (A **stud** is a threaded cylinder of metal like a bolt, but it does not have a head like a bolt does; it is screwed or welded into a larger piece of metal; other parts can be attached to it using a nut to hold the other piece in place.) **Cold chisels** are made of steel and have a variety of shapes at the end (**nose**); these noses are useful for a variety of purposes.

It is important to be safe while using chisels: (1) When pounding a chisel, it is a good idea to use a **chisel holder** – this allows the machinist to keep fingers out of the way; (2) keep the chisels sharp, so they cut well; (3) keep the top of the chisel chamfered – if the top is shaped like a mushroom, pieces of metal can fly off when you pound the chisel; (4) remember to wear your safety glasses.



PUNCHES: A punch is made of steel and has a sharpened point. The machinist uses a punch by putting the point on a workpiece and hitting the other end with a small ball-peen hammer. A small **dent** is made when the chisel is hit. The **prick punch** has a sharp point (**30°**) and is used to mark layout lines on a work-piece. (The layout lines tell the machinist where to cut the drill to make the part.) The **center punch** has a point with a wider angle (**90°**) and is used to mark where the centers of holes are. The center punch makes a wider dent than the prick punch; the point of a drill will fit more easily into a center punch dent.

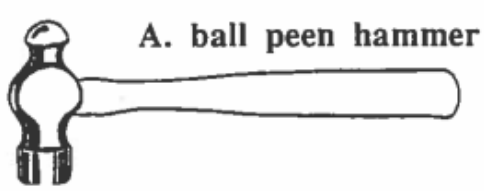
MULTIPLE-CHOICE QUESTIONS

Circle the one answer which best completes each statement.

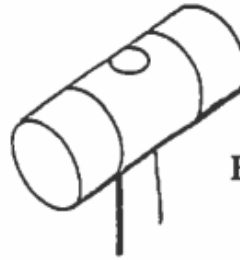
1. A stud:
 - a. is smooth without any threads.
 - b. had threads and a hex-shaped head.
 - c. has threads, but will not take a nut.
 - d. has threads, but no head.
2. A prick punch:
 - a. has a sharp point of 30° .
 - b. has a point with a wider angle of 90° .
 - c. is used to mark the location of hole centers.
 - d. makes dents used for starting a drill.
3. When using a chisel, the machinist should:
 - a. chamfer the chisel head if it is mushroom-shaped.
 - b. use a chisel holder to hold the chisel while pounding.
 - c. wear safety glasses.
 - d. all of the above.
4. A ball-peen hammer:
 - a. is a “soft-face” hammer.
 - b. cannot weigh more than two pounds.
 - c. has a rounded part (the peen) opposite the face.
 - d. had two flat hitting faces on its head.
5. Which of these statements is false:
 - a. Plastic makes a durable material for a hammer.
 - b. Plastic hammers will not mar the workpiece as easily as a steel hammer.
 - c. Cold chisels have only one shape, the rounded-nose chisel.
 - d. A center punch makes a wider dent than a prick punch.

Module 3, Lesson 7

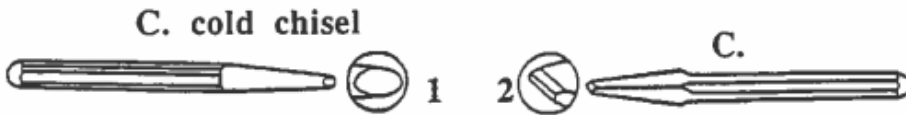
HAMMERS, CHISELS & PUNCHES



A. ball peen hammer



B. plastic hammer



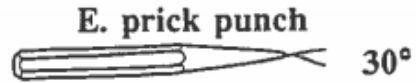
C. cold chisel

C.

- Chisel noses:
1. round
2. cape
3. diamond
4. half-round
5. flat

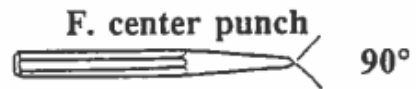


D. chisel noses



E. prick punch

30°



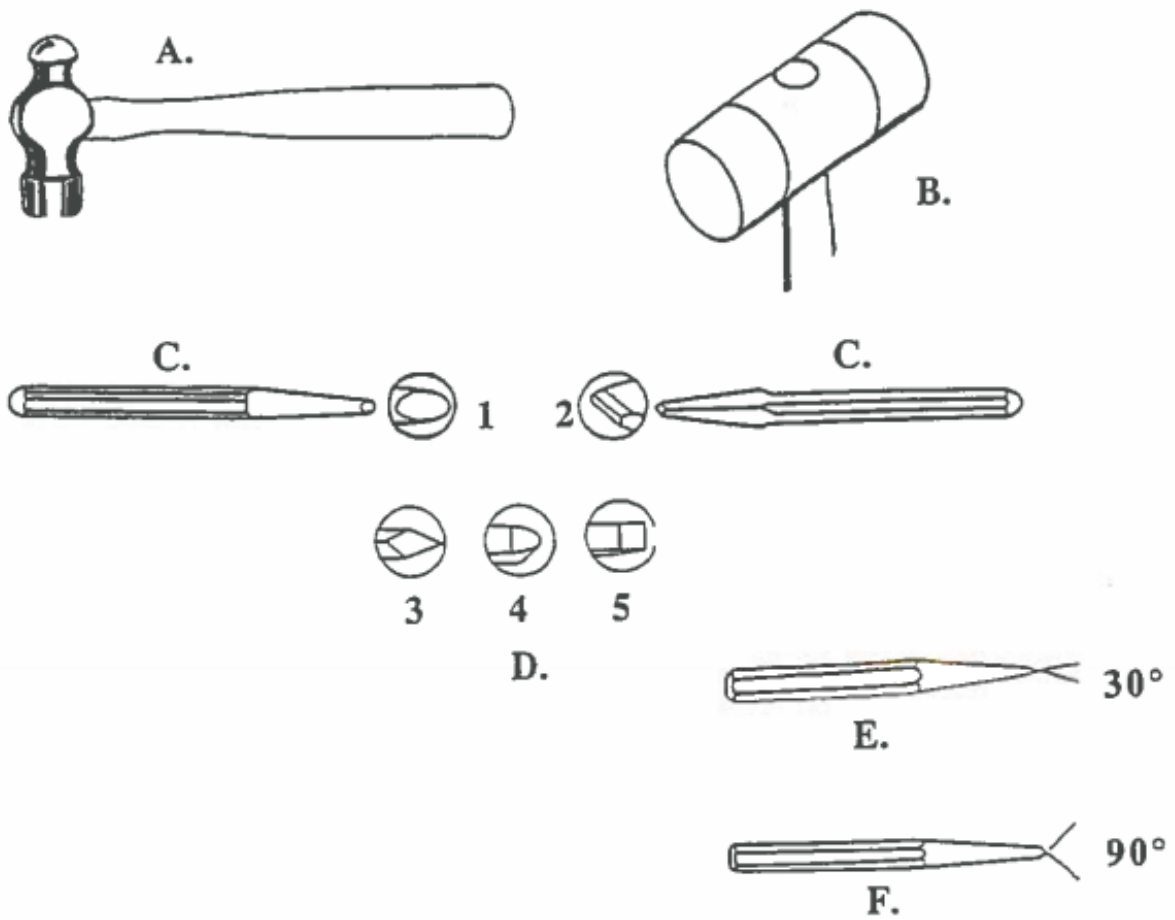
F. center punch

90°

Exercise 1: Look at the pictures.
Copy the words three times.

- A. ball peen hammer _____
B. plastic hammer _____
C. cold chisel _____
D. chisel nose _____
 1. round _____
 2. cape _____
 3. diamond _____
 4. half round _____
 5. flat _____
E. prick punch _____
F. center punch _____

Exercise 2:



Write the letter of each tool and the number of each chisel nose:

___ 1. prick punch

___ 2. plastic hammer

___ 3. cold chisel

___ 4. ball peen hammer

___ 5. center punch

___ 6. chisel nose

___ A. half-round

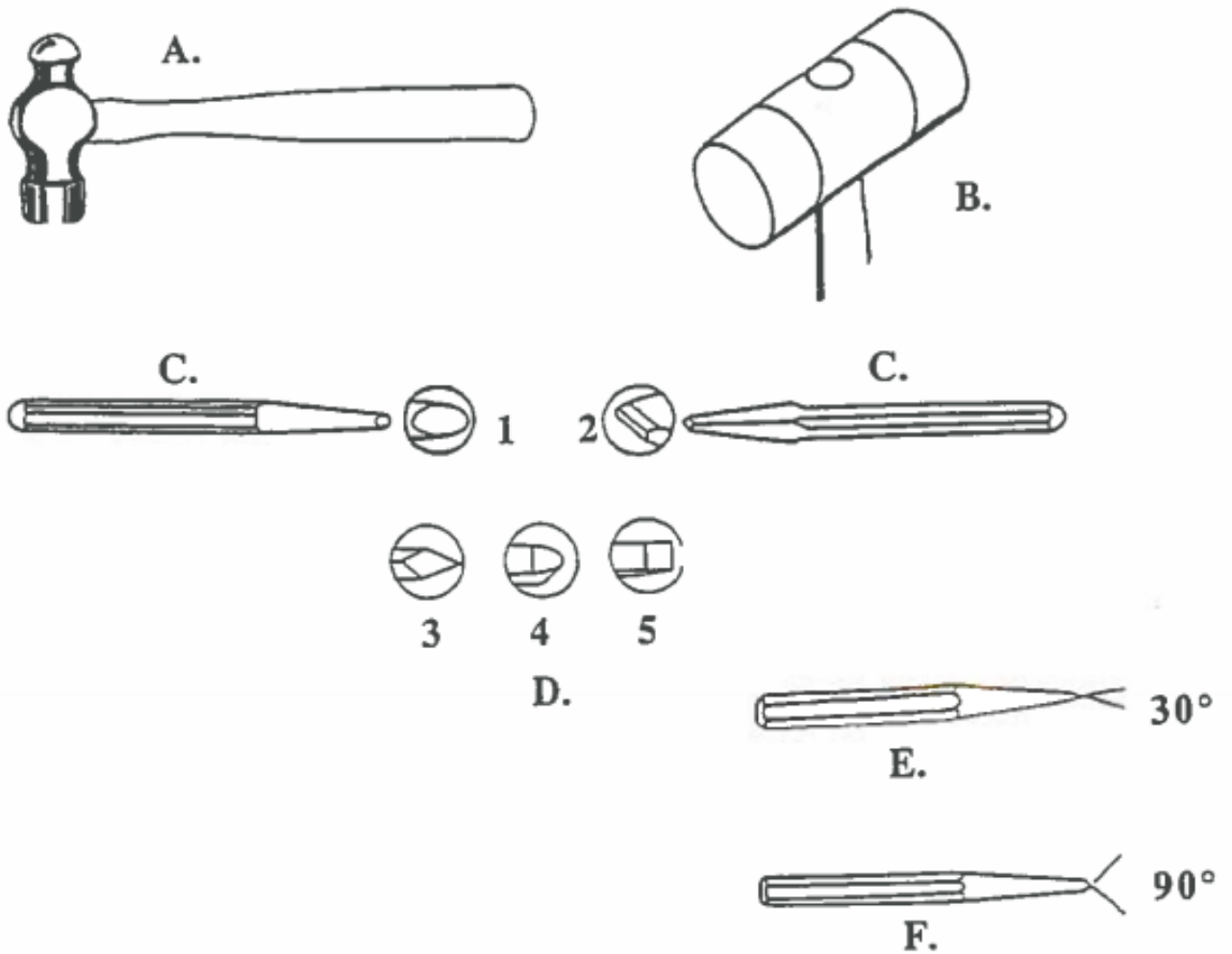
___ B. diamond

___ C. flat

___ D. round

___ E. cape

Exercise 3:



Look at the pictures. Write the correct letters in the spaces.

A. b _ l _ p _ _ n ha _ m _ r

1. r _ _ n _

B. _ la _ ti _ h _ mm _ _

2. _ ap _

C. c _ l _ c _ i _ e _

3. d _ m _ nd

D. c _ i _ e _ n _ se _

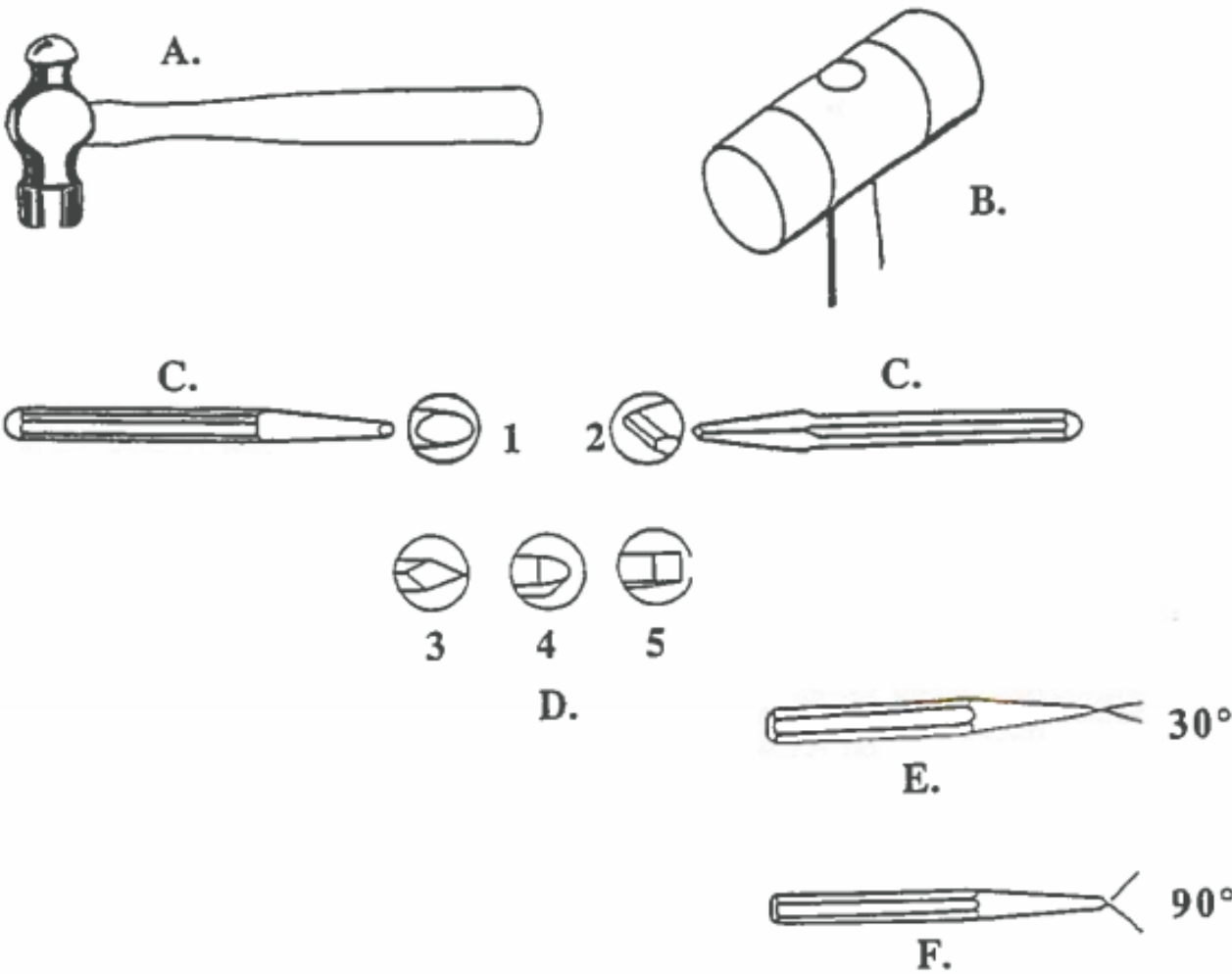
4. h _ l _ - r _ _ n _

E. _ ri _ _ pu _ c _

5. f _ a _

F. _ en _ er p _ n _ _

Exercise 4:

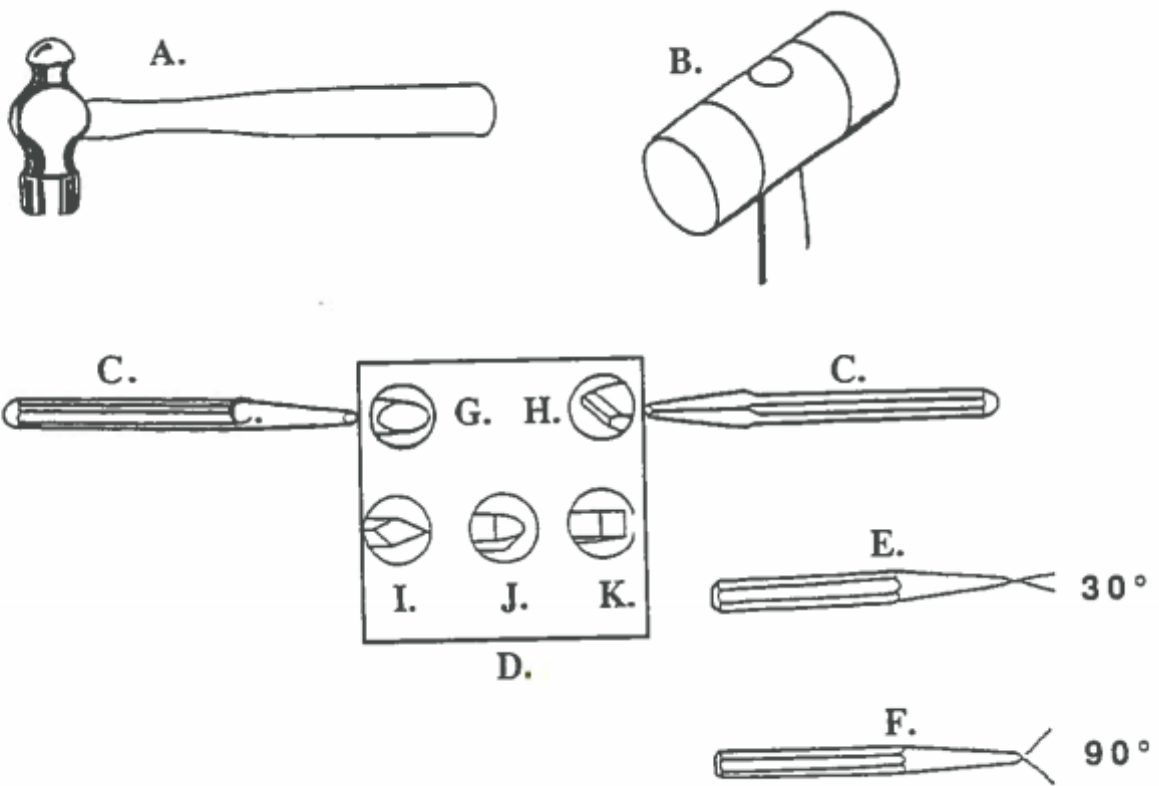


Look at the pictures. Write the names of the tools.

- | | |
|----------|----------|
| A. _____ | 1. _____ |
| B. _____ | 2. _____ |
| C. _____ | 3. _____ |
| D. _____ | 4. _____ |
| E. _____ | 5. _____ |
| F. _____ | |

Part A: Get the tape and play the side that says *Listening Test, Module 3, Lesson 7*. Look at the pictures. Listen to the words on the tape. Write the letters in the space below.

Listening Test



1. _____

4. _____

7. _____

10. _____

2. _____

5. _____

8. _____

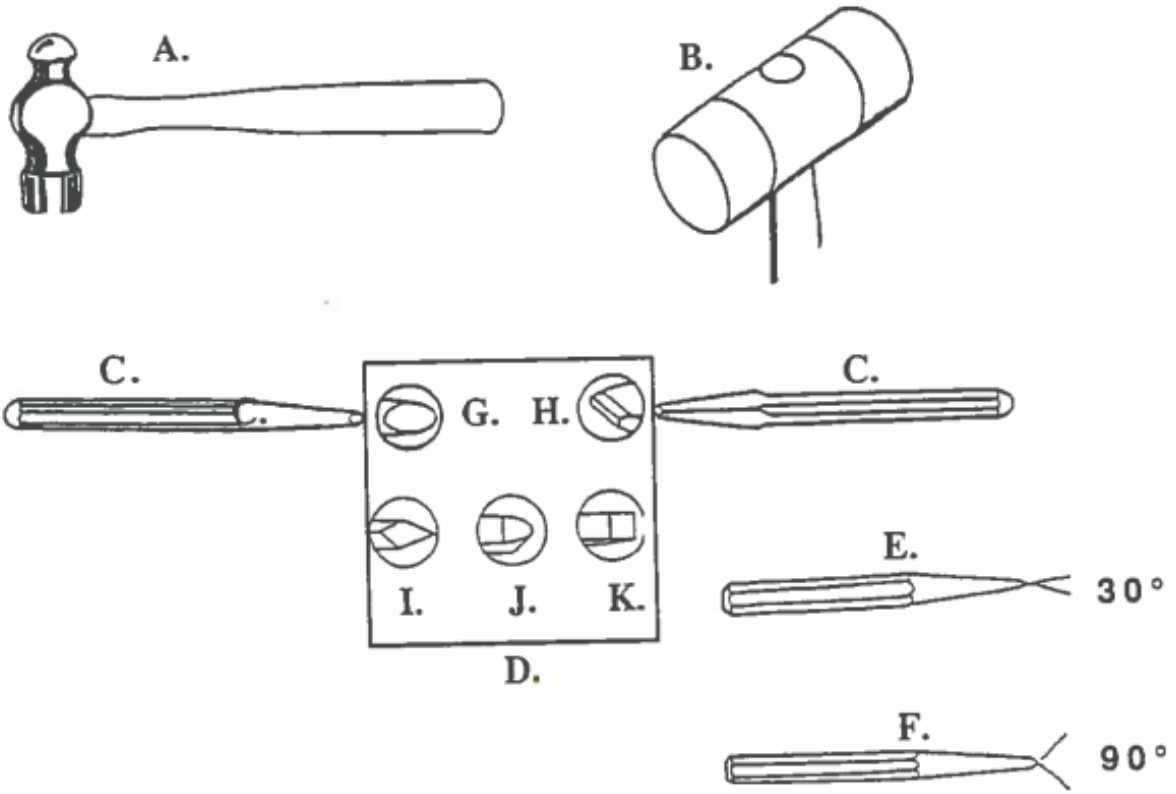
11. _____

3. _____

6. _____

9. _____

Part B: Writing Test



Look at the pictures. Write the names of the tools.

A. _____ G. _____

B. _____ H. _____

C. _____ I. _____

D. _____ J. _____

E. _____ K. _____

F. _____

Lesson 8: Files

1. **coarse** = heavy, opposite of fine; smaller number per inch. Example: A coarse file has less teeth per inch than a fine file.
2. **groove** = a continuous slot cut into a surface. Example: The teeth of a file are made by intersecting grooves.
3. **insert** = put into, push into a hole or other opening. Example: Never insert a screwdriver, or any other thing into your ear.
4. **intersect** = two lines or sets of lines cross each other. Example: There is a new street light at the place where the two streets intersect.
5. **number per inch** = how many of something are in an inch of length. Example: A fine-cut file has more teeth per inch than a coarse file.
6. **passage** = the sentences or paragraphs which the reader is reading. Example: Hugo read the passage several times before he was able to understand it.
7. **pins** = are little pieces of metal that get caught in a file's teeth. Example: Margarita used a wire brush to clean the pins out of the file.
8. **scan** = to look at something quickly hoping to see what you're looking for. Example: Nancy scanned the Sports Page, looking for score of the game.
9. **securely** = tightly, with no possibility of dropping it. Example: The part was securely held in the jaws of bench vise.
10. **stroke** = a motion which goes a fixed distance, returns, and then repeats the same motion. Example: The file gets pressure only during the forward stroke.

Below are the ten words you have practiced on the Language Master; the words have been scrambled (the order of the letters have been changed); your job is to unscramble the letters and write them correctly, with the help of the definitions.

1. **SNIP:** _____
(Metal pieces that can stick to a file's teeth.)

2. **TRENIS:** _____
(To push into an opening.)

3. **KOREST:** _____
(Motion repeated over the same distance.)

4. **SEPAGAS:** _____
(Sentences or paragraphs for reading.)

5. **ROSACE:** _____
(Smaller number per inch.)

6. **SCRENTEIT:** _____
(When two lines cross each other.)

7. **BURNEM PRE CHIN:** _____
(How many in a certain length.)

8. **CRESYLUE:** _____
(Tightly)

9. **NACS:** _____
(To look for something quickly.)

10. **VORGOE:** _____
(A continuous slot into a surface.)

Reading Technique: SCANNING

(Scanning is a reading technique in which the reader knows what he or she is looking for. The reader will not read every word of the passage, but will scan the titles and the paragraphs looking for just the information he/she needs.)

Try scanning the passage below, looking for answers to these three questions; (Write your answers on the next page.)

- 1) What is the name of the pointed end of the file that fits into the handle?
- 2) What is meant by the words "coarse file"?
- 3) What is the correct way to file a workpiece?

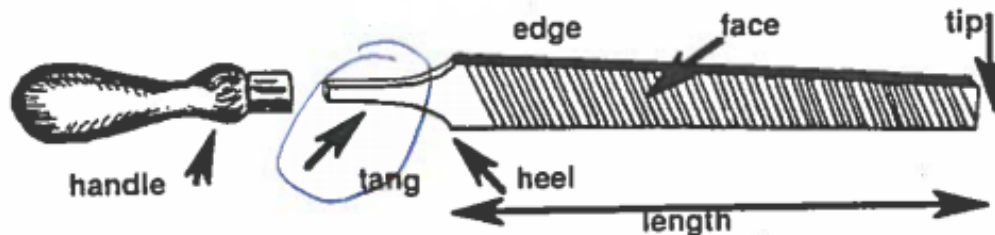
READING:

All About Files

The Purpose of Files:

Files are hand tools used to remove material and to smooth surfaces. A file can do this because it is made of high-carbon steel and because it has many teeth that cut into the metal.

The Parts of a File:



(Reading continued on next page)

Kinds of Files:

There are two kinds of files: (1) **single cut**, with grooves cut in one direction across the face of the file; and (2) **double cut**, with one set of grooves cut across the face and a second set that intersects the first to form many cutting teeth.

The sizes of the files and teeth vary from **coarse** to **fine**. Coarse-cut files have fewer teeth per can be used on harder metal because they will cut better with their greater number of teeth.

There are several shapes for files, including: round, half round, triangular, and flat. A rasp is a heavy file cut in several directions to make big, rough teeth.

The Use of Files:

The machinist should make sure that the workpiece is held securely in a bench vise, and that the tang of the file is inserted firmly into a handle. Then the machinist will have two hands free to file correctly.

In one **method of filing**, the handle of the file is gripped tightly in the right hand. The fingers of the left hand are used to hold the tip of the file. The forward stroke requires pressure to do the cutting. The machinist raises the file for the return stroke, so the cutting edges and teeth will not be damaged. To become skilled at filing, as in everything else, much practice is needed.

Files can get pieces of metal caught between the file teeth: this is called “pinning”. To remove the “pins” from between the teeth a brush is used. Remember to keep your files clean.

After scanning the passage, write your answers:

1. The name of the thin, pointed end of the file is: _____

2. A “coarse file” is _____

3. One correct method of filing is: _____

Module 3, Lesson 8

FILES



A. round file



B. half round file



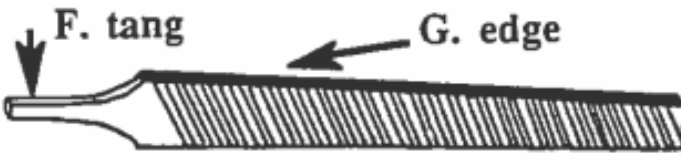
C. flat file



D. triangular file



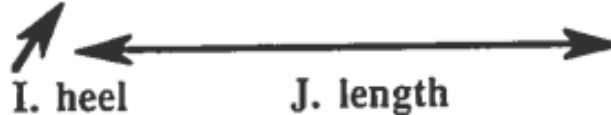
E. handle



F. tang

G. edge

H. tip



I. heel

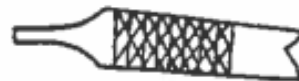
J. length



K. single cut



L. double cut



M. rasp

Look at the pictures.
Write the names of the
tools on the next page.

Exercise 1:

Look at the pictures on the previous page and write the words three times in each of the spaces below.

A. round file _____

B. half round file _____

C. flat file _____

D. triangular file _____

E. handle _____

F. tang _____

G. edge _____

H. tip _____

I. heel _____

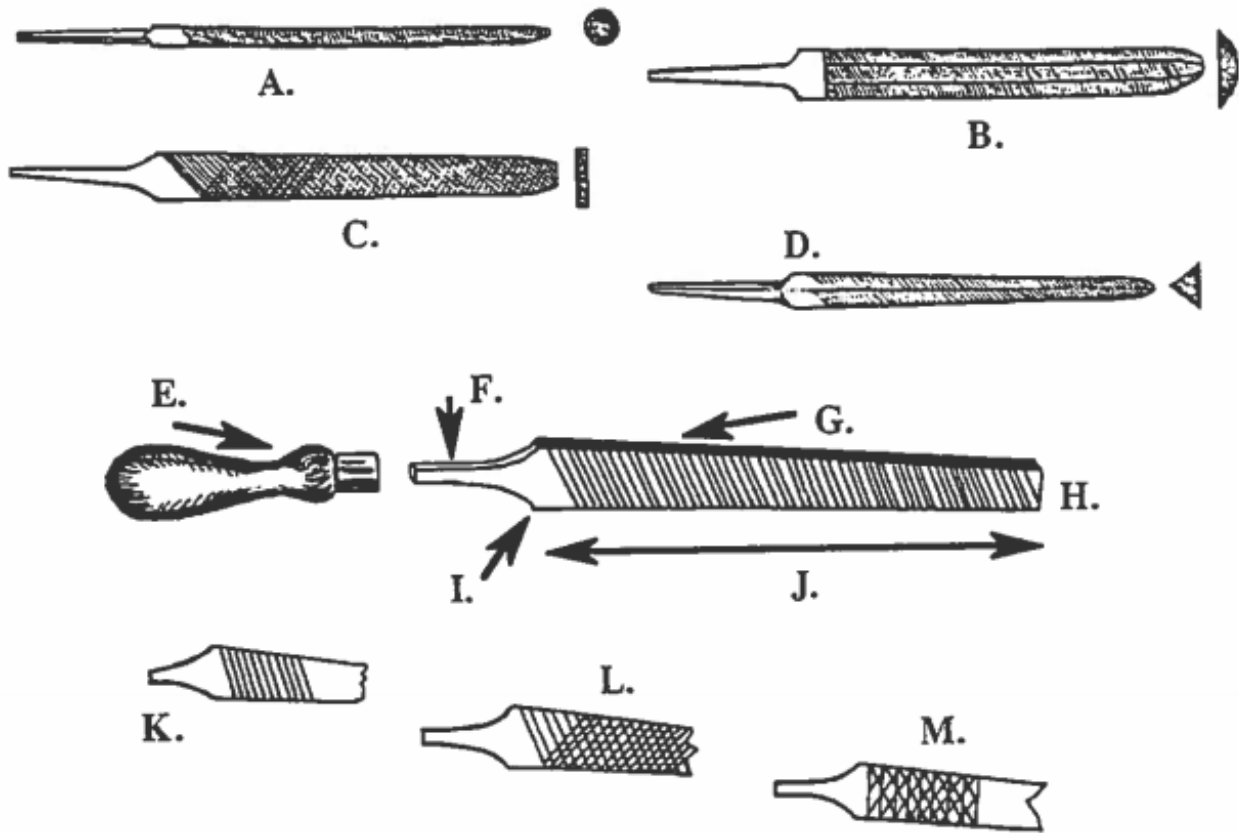
J. length _____

K. single cut _____

L. double cut _____

M. rasp _____

Exercise 2:



Write the letter of each part in front of its name.

___ 1. double cut

___ 5. tip

___ 9. handle

___ 2. triangular file

___ 6. tang

___ 10. flat file

___ 3. half-round file

___ 7. rasp

___ 11. length

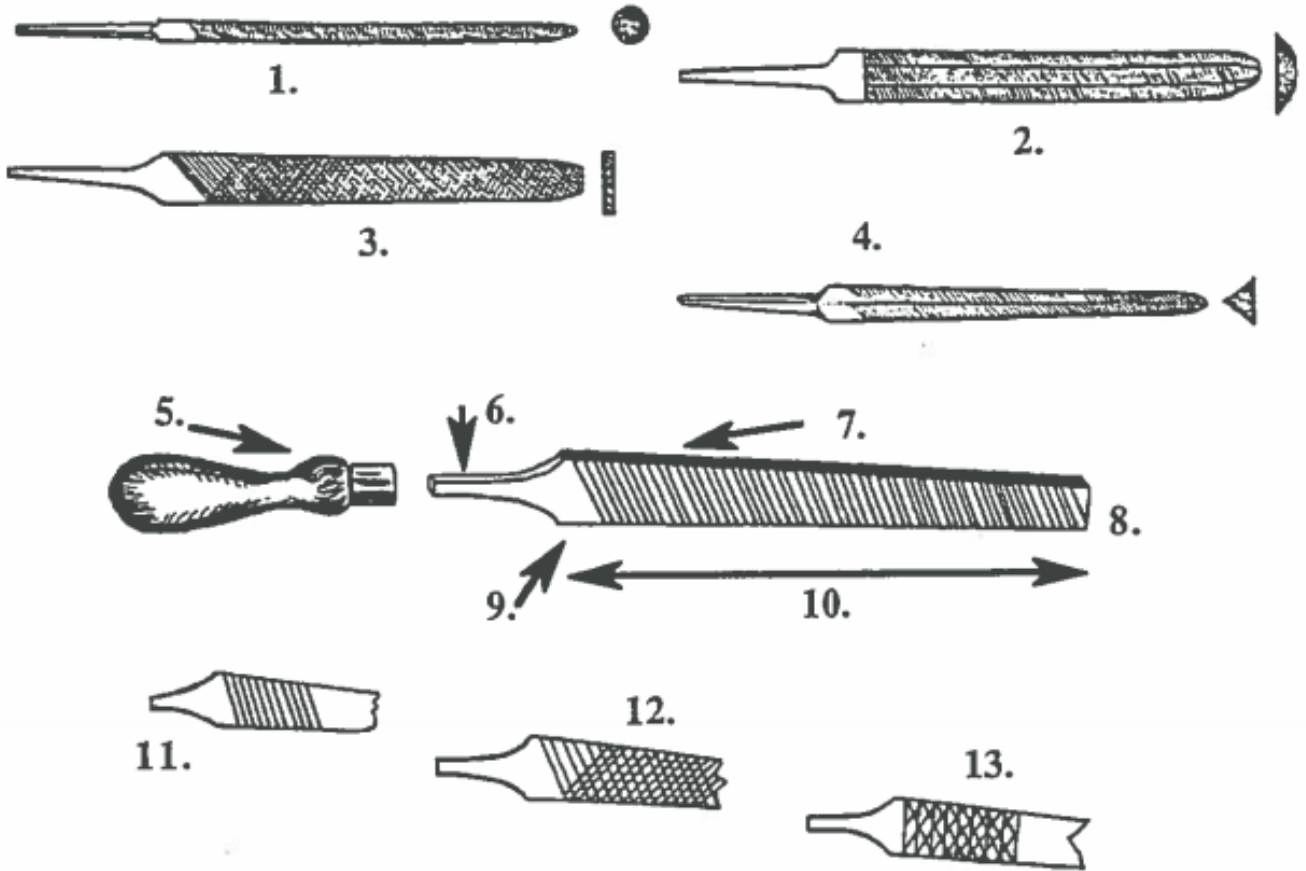
___ 4. single cut

___ 8. edge

___ 12. heel

___ 13. round file

Exercise 3:



Look at the pictures. Write the correct letters in the spaces.

1. r _ u _ d f l _ _

6. t _ _ g

11. s _ n _ _ e c _ _

2. h _ _ f r o u _ d f i _ e

7. _ d _ e

12. _ o u b _ e _ _ t

3. f _ _ t _ _ l e

8. _ i _ _

13. r _ s _ _

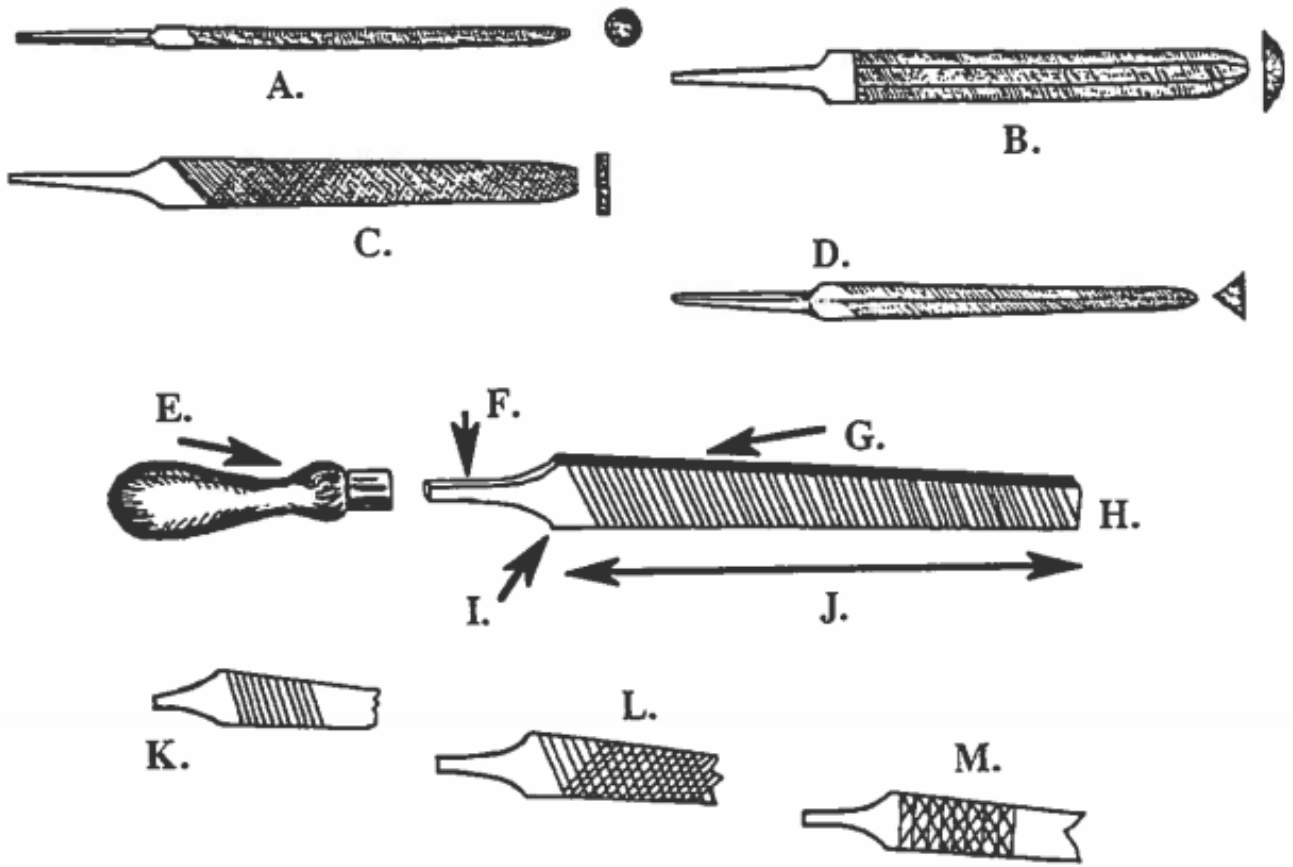
4. t _ _ a n _ u _ a r f _ l e

9. _ e _ l

5. _ a n _ _ e

10. l e _ _ _ h

Exercise 4:



Look at the pictures. Write the names of the things you see.

- | | |
|----------|----------|
| A. _____ | H. _____ |
| B. _____ | I. _____ |
| C. _____ | J. _____ |
| D. _____ | K. _____ |
| E. _____ | L. _____ |
| F. _____ | M. _____ |
| G. _____ | |

Exercise 5:

Re-read the reading passages in *All About Files*, and then fill in the blanks below, using the words provided.

PART A: For this part use the words: **single-cut, coarse, fine, smooth, double-cut, material, hard, files, high-carbon.**

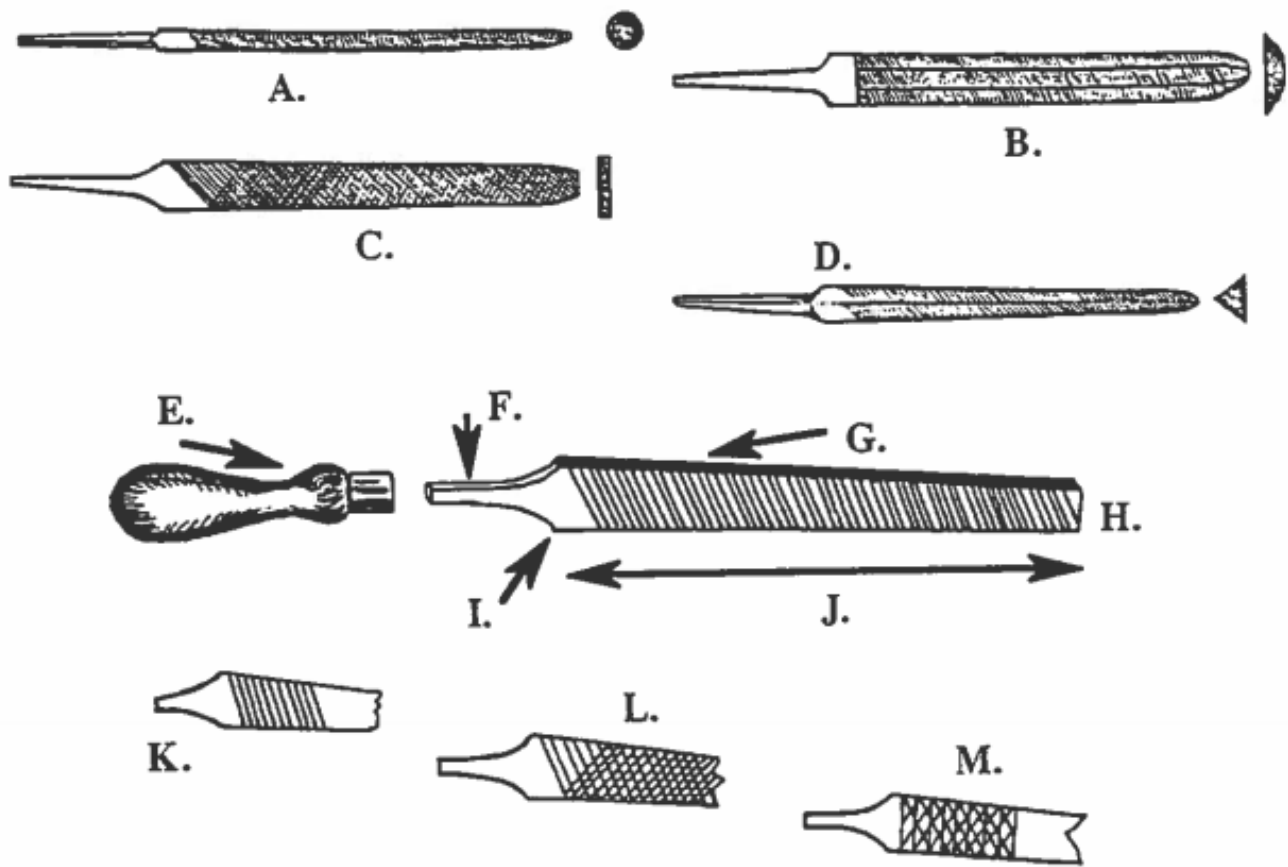
1. Files are used to remove _____ and to _____ surfaces.
2. Files are made of _____ steel.
3. There are two kinds of files: a) _____ (with one set of grooves), and b) _____ (with intersecting sets of grooves).
4. _____ files have fewer teeth per inch than _____ tiles.
5. Fine _____ are better for filing _____ metal.

.....

Part B: For this part use the words: **forward stroke, round, bench vise, rasp, half-round, pins, flat, tang, practice, triangular.**

6. Some files shapes are: (a) _____, (b) _____, (c) _____, and (d) _____.
7. A heavy file with big teeth is called a _____.
8. The workpiece should be held securely in a _____.
9. The _____ of the file should be inserted into a handle.
10. Pressure is put on the file during the _____.
11. Pieces of metal, stuck in the teeth of a file, are called _____.
12. To learn how to file better, it is necessary to _____.

Listening Test



Get the tape and play the side that says *Listening Test, Module 3, Lesson 8*. Look at the pictures. Listen to the words on the tape. Write the letters in the spaces.

1. ____

2. ____

3. ____

4. ____

5. ____

6. ____

7. ____

8. ____

9. ____

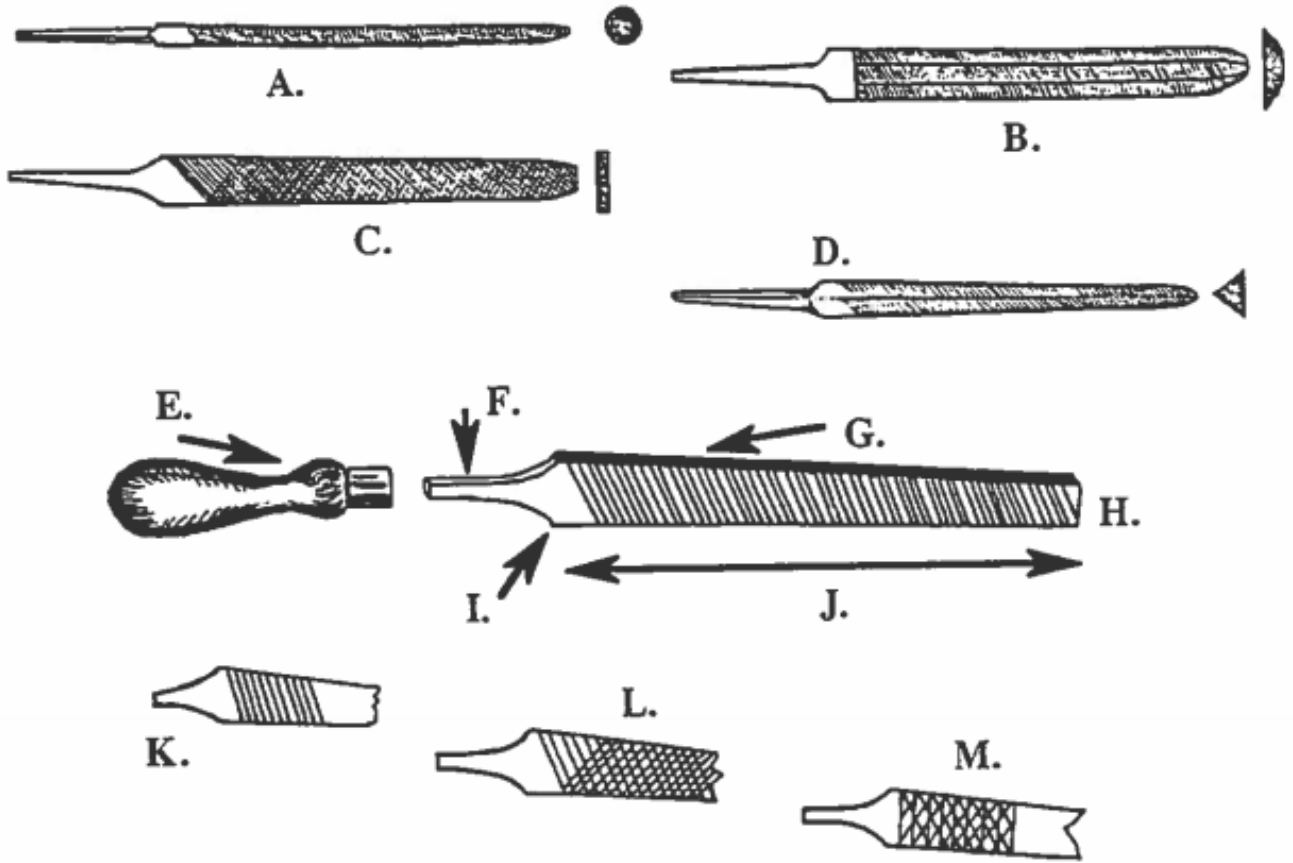
10. ____

11. ____

12. ____

13. ____

Writing Test

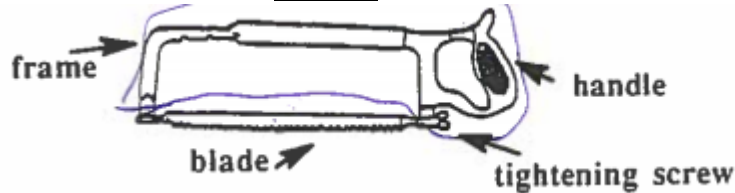


Look at the pictures. Write the names.

A. _____	H. _____
B. _____	I. _____
C. _____	J. _____
D. _____	K. _____
E. _____	L. _____
F. _____	M. _____
G. _____	

Lesson 9: Saws, Drills, and Grinders

- 1. replaceable =** when a part wears out, you can put in a new one. Example: The blade on a hacksaw is replaceable.
- 2. frame =** strong metal pieces for holding something in place. Example: A hacksaw has a metal frame to hold a saw's blade.



- 3. spray =** to send a cloud of small liquid particles (gotitas) onto a workpiece. Example: Tran Nuygen sprayed paint onto the chair he had just made.
- 4. coolant =** usually a liquid with chemicals, used to lessen or prevent a build-up of heat. Example: Mario bought a large bottle of coolant from the machinist's supply store.
- 5. pulley =** a round piece of metal with a continuous groove cut into the edge of a belt or band to run on. Example: The bandsaw blade runs around two pulleys inside a frame.
- 6. horizontal =** parallel to the ground, flat and even, going from side to side. Example: This saw cuts in a horizontal direction, from side to side of the workpiece.
- 7. vertical =** up and down, going straight up and coming straight down. Example: Line A is horizontal and line B is vertical.
- 8. continuous =** unbroken, in one piece, with no end. Example: A circle is a continuous line, because it has no end point.
- 9. band =** a continuous belt which goes around two pulleys. Example: The blade of a bandsaw is one continuous band for cutting.
- 10. flexible =** able to bend without breaking. Example: A bandsaw blade is made of flexible steel.


Write the letter of the correct meaning or definition in front of the number of vocabulary word.

- ___ 1. replaceable a. A chemical liquid used to cool machining tools and work pieces during an operation where heat could build.
- ___ 2. frame b. A continuous belt which goes around two pulleys.
- ___ 3. spray c. A round piece of metal with a continuous groove cut into the edge for a belt or band to run on.
- ___ 4. coolant d. Able to bend without breaking.
- ___ 5. pulley e. When a part wears out, you can put in a new one.
- ___ 6. horizontal f. Unbroken, in one piece, with no end.
- ___ 7. vertical g. To send a cloud of small liquid particles onto a workpiece.
- ___ 8. continuous h. Parallel to the ground, flat and even.
- ___ 9. band i. Strong metal pieces for holding something in place.
- ___ 10. flexible j.



This line is a _____.

WORD LIST FOR LANGUAGE MASTER CARDS

1. **cart** = a small vehicle with wheels, which can be pushed around by hand. Example: In Tijuana I have seen vendors pushing food carts filled with fruit, ice cream, and other foods.
2. **mounted** = fastened in the proper place. Example: The fire extinguisher was mounted on the wall in the classroom.
3. **notch** = a piece cut out of an edge or surface. Example: The wooden bench had many notches cut into it by citizens of the town.
4. **roller** = a cylinder of metal, wood, rubber, etc. over which something is rolled for easy movement. Example: The Mail Service uses a line of rollers to move big packages around the post office.
5. **contour** = the outside lines that form the shape of something. Example: The contour of this gear is a circle with notches cut into the edge.
6. **irregular** = not going in a straight line, but turning in different directions. Example: A vertical band saw can cut irregular shapes from a piece of metal.
7. **angular** = adjective form of the word **angle** (a shape made by two straight lines that meet at a point). Example: A band saw will do angular cutting.
A diagram showing an angle formed by two straight lines meeting at a vertex. The vertex is labeled "point" and the angle is labeled "an angle".
8. **feed** = to run forward in a continuous way, like rough stock running smoothly through a bandsaw. Example: Alonzo feeds the rough stock into the bandsaw blade.
9. **bind** = to get stuck so that there is little or no movement. Example: When a saw blade heats up the metal expands and the blade will bind in the workplace.
10. **coat** = a covering of liquid over something. Example: Manuel put another coat of paint on the outside of his house.

Use the words from Set B to fill in the blanks in the sentences below:

Part I: irregular, mounted, notch, roller, contour.

1. Guillermo adjusted the _____ guides on the horizontal bandsaw, so that the blade moved in a straight line.
2. There is a smoke alarm _____ on the ceiling to warn us about a fire.
3. Joanne was able to cut _____ shapes from the metal by using a vertical bandsaw.
4. The _____ of this chair fits my back perfectly.
5. Jake cut a _____ into the piece of metal.

Part II: cart, angular, feed, bind, eat

6. To cut from one corner of a piece of metal to an opposite corner is an example of _____ sawing.
7. Artemio put a new _____ of coolant onto his saw blade.
8. When the metal saw blade and the metal workpiece get hot, the blade can _____ in the cut.
9. Linda was able to push the power hacksaw into the next room because it was mounted on a _____.
10. With the help of the coolant, he was easily able to _____ the metal workpiece through the saw.

SAWS, DRILLS AND GRINDERS

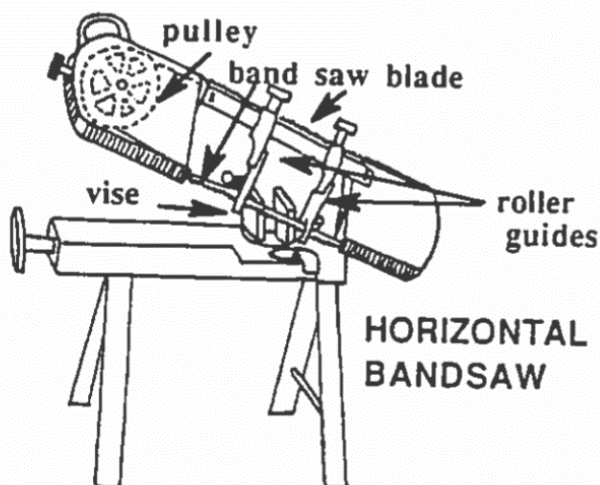
1. Kind of Saws:

Many times the machinist will want to saw material from rough stock or from a workpiece. For example, it may be easier and quicker to cut a piece out with a saw, instead of cutting or drilling it out one chip at a time. In that case the machinist will use a saw. There are many kinds of saws used by machinists.

a. The portable hand hacksaw: This saw has a replaceable blade held in a frame; it also had a handle. The teeth of the blade point forward, and the saw only cuts during the forward stroke (like a file) when pressure is applied.

b. The power hacksaw: This saw also has a frame and a replaceable blade, but is powered by a motor and can be spray coolant on the blade and workpiece during the cutting. This saw is usually too heavy to carry, but it sits on a cart with wheels and can be moved around on the shop floor.

c. The horizontal bandsaw: It is a power saw (uses a motor) that cuts in one direction using a blade which is a continuous band (circle) of flexible steel. The band is like a belt around someone's pants; it is fitted around the pulleys, one at each end of the frame. The blade is kept running true (straight) by a pair of roller guides. It is called a horizontal bandsaw, because the saw blade band usually runs in a horizontal position (parallel to the floor). Below, we have one of the pulleys inside the frame; there is another one at the saw. The bandsaw blade circles both and moves in a continuous path.



There is also a vertical band saws which have blades running continuously in a vertical direction (up or down). The horizontal and vertical saws are usually mounted on heavy bases and are usually mounted on heavy bases and are not portable. These saws can be seen as an introduction to the non-portable, heavy machine tools we will study in later chapters.

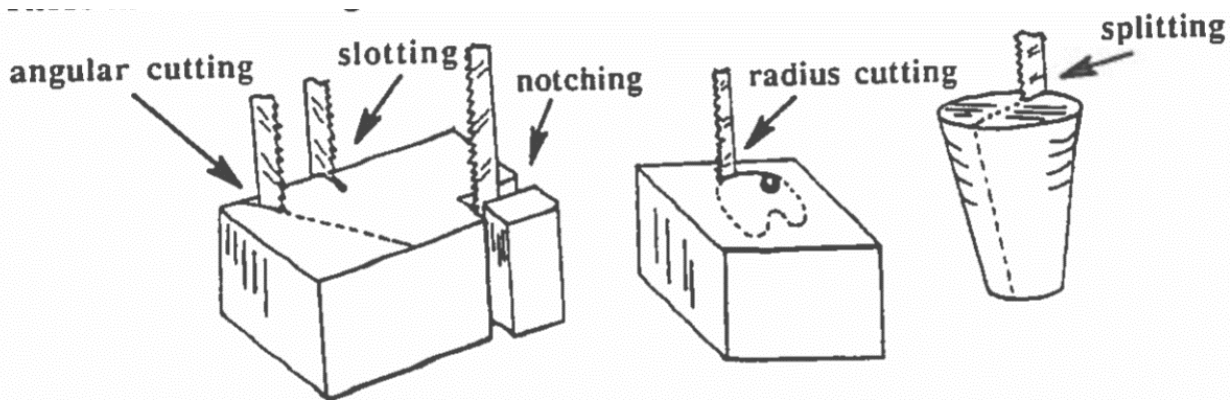
More “Saws, Drills, and Grinders”

2. Kinds of Sawing:

There are many different kinds of sawing that can be done with these saws:

- a. **Notching:** To cut a part of the material away from a workpiece in one larger piece, instead of one chip at a time.
- b. **Slotting:** To cut a slot in a workpiece with a saw.
- c. **Splitting:** To cut something into two or more pieces.
- d. **Radius Cutting:** To cut out some irregular shape by cutting along contour lines (shape lines) on the layout.
- e. **Angular Cutting:** To cut a workpiece by clamping it and feeding it through a power saw at an angle.

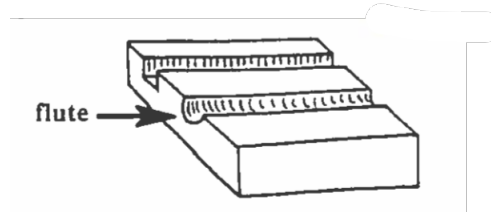
These kinds of sawing are shown in the pictures below:



When sawing in any of these ways, the job will be easier, if the machinist uses **coolant** to keep the saw blade and the workpiece from heating up and the saw-blade from binding (getting stuck) in the work. Some of the power saws spray coolant on the work and the blade. When using a hand hacksaw or a saw without the spray, the blade can be coated with coolant before the job begins.

WORD LIST FOR LANGUAGE MASTER CARDS

- 1. chuck =** a clamp with jaws which can be tightened with a key.
Example: A drill chuck holds the drill bit; a lathe chuck holds a piece of rotating round stock.
- 2. shank =** the long, narrow shaft between the holding part (the chuck) and the cutting part (the tip and the flutes). Example: The shank of the drill fits into the chuck.
- 3. flute =** a rounded groove cut into the surface of something. Example: It is possible to have more than one flute on a drill bit.



- 4. twist =** to move in a curved or irregular path, especially around something. Example: Mona twisted the wrench until the bolt head broke off.
- 5. spiral =** something moving in a curved path around a central axis.
Example: The flutes of a drill bit are a spiral cut into the sides of that drill bit.
- 6. chart =** a group of facts about something, arranged in an orderly manner, often showing quantities. Example: Pedro looked at a chart of abrasives and decided use No. 400 for polishing.
- 7. grain =** a very small piece of something, like sand or wheat. Example: Gina looked at the small grains in the grinding wheel.
- 8. abrasive =** rough material made from grains that can be used to grind into, or to polish, the surface of a workpiece. Example: Grinding wheels are made from abrasives, especially aluminum oxide.

(Continued next page)

9. bond = any liquid material that holds many smaller things together by surrounding them and then hardening. Example: The manufacturers of grinding wheels use various materials to make a bond that will hold grains of abrasive in place.

10. vitrified = like glass; turned into glass; once melted and now hardened like glass. Example: When certain melted materials harden, they form a vitrified bond which is like glass.

11. taper = to gradually decrease in thickness from one end to the other. Example: If a part becomes too hot while you're machining it, you can get an unwanted to taper in the part.



12. cone = a shape that is like a because it is round with straight sides, but it tapers from one end to the other. Example: Can you think of something that is shaped like a cone besides an ice-cream cone?

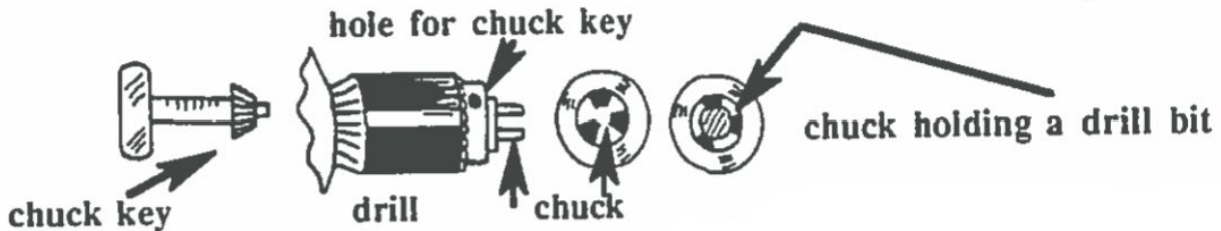
Write the letter of the correct meaning or definition in front of the number of the vocabulary word.

- ___ 1. chuck a. something moving in a curved path around an axis.
- ___ 2. shank b. rough material made from grains that will grind and polish.
- ___ 3. flute c. like glass; once melted, no hard like glass.
- ___ 4. twist d. a shape with a round base and tapered, straight sides that meet at a point.
- ___ 5. spiral e. a liquid that holds things together when it hardens.
- ___ 6. chart f. a clamp with jaws which can be tightened with a key.
- ___ 7. grain g. the part of a drill bit that fits into the chuck.
- ___ 8. abrasive h. to gradually decrease in thickness from one to the other.
- ___ 9. bond i. a very small piece of something, like sand or rice.
- ___ 10. vitrified j. a rounded groove cut in the surface.
- ___ 11. taper k. a group of facts, arranged in an orderly manner.
- ___ 12. cone l. to move in a curved or irregular path.

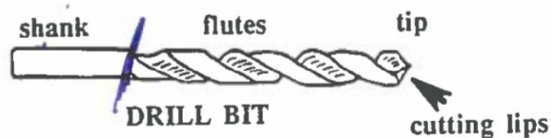
SAWS, DRILLS AND GRINDERS

3. Drills:

The **electric drill** is one of the portable power tools. It can be held in the hand and turned on by pulling a **trigger** with the finger, like a gun. On the front of the drill is a **chuck** for holding drill bits.



The chuck has jaws that open and close around the **shank** (the non-cutting end of the drill bit); the drill bit is the boring tool itself. The drill has a **tip** (at the opposite end from the shank) with **cutting lips**. The drill bit can also have one or more rounded grooves that spiral around the sides of the drill bit – these grooves are called **flutes**. A drill bit with flutes can also be called a **"twist drill,"** because of its twisted, spiraling shape.



The drill bits come in a variety of sizes, and with different numbers of flutes. The chuck can be opened to receive larger sizes or tightened to hold smaller sizes. The chuck is tightened or loosened with a **chuck key**.

We will learn more about drills, drill bits, and drilling when we study the module about larger power drills, like the **drill press**.

4. Portable Grinders:

A grinder uses a **grinding wheel** (made of a rough material called an **abrasive**) which spins around and (with pressure) cuts small chips out of the surface of the workpiece. **(Continued next page)**

More “Saws, Drills and Grinders”

There are various abrasives used to make grinding wheels: About 75% of grinding wheels are made from **aluminum oxide**; this material is used in the form of little, gray or white-colored **grains** with tough, sharp edges that cut into the work material.

Other materials used for abrasives include **silicon carbide** and **diamond**. The size of the abrasive grains vary from fine to coarse. The **grain size** used will depend on the job and the material being ground. On a **chart** of grain size the most coarse grains will have small numbers and the fine grains will have large numbers.

CHART OF GRAIN SIZE OF ABRASIVES

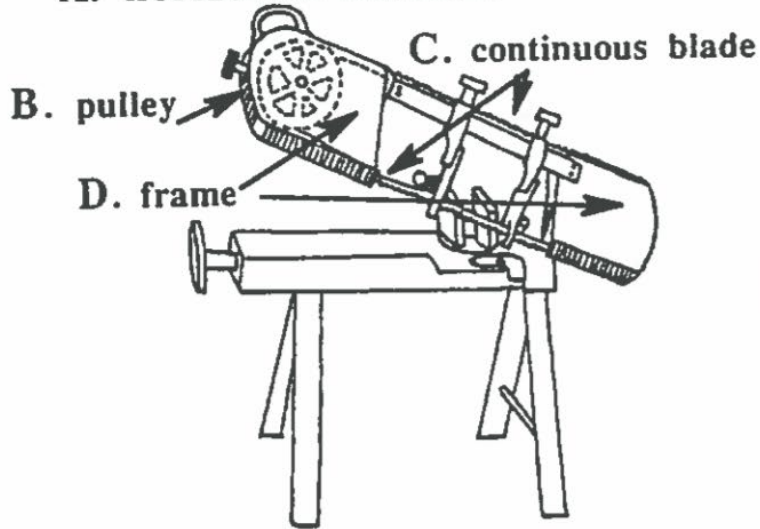
Very Coarse	Coarse	Medium	Fine	Very Fine	Flour Size
6	14	30	70	150	280
8	16	36	80	180	320
10	20	46	90	220	400
12	24	54	100	240	500
		60	120		600

The grains are held together in the shape of a wheel by a material called **bond**. A common material used for bonding the grains together is clay or feldspar; these materials, when heated to a high temperature, melt and form a glass-like layer around the grains, holding them together. This is called a **vitriified bond**. Other bonds use materials like resin, rubber, shellac, silicate, or metal.

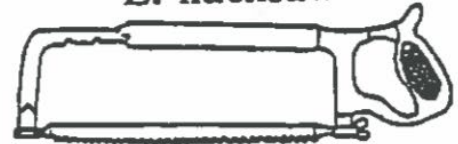
Grinding wheels come in a variety of sizes and shapes. They can be small enough to fit into the chuck of an electric hand drill or big enough to fit into a larger grinding machine. The shapes can be round and flat, or cone-shaped with tapered sides, or many other forms. You will learn with practice what shapes work in particular jobs you have to do.

SAWS, DRILLS AND GRINDERS

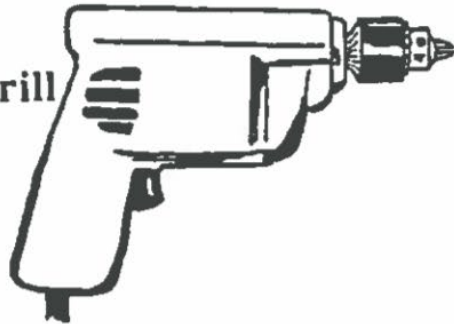
A. horizontal bandsaw



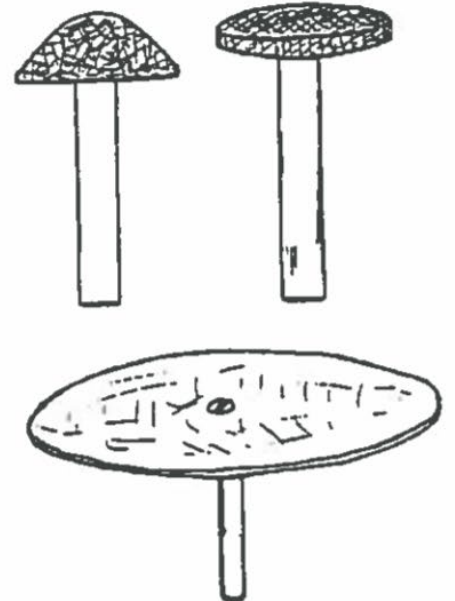
E. hacksaw



F. electric drill



G. mounted grinding wheels



H. twist drill or drill bit



EXERCISE 1: Copy the words three times in the spaces, on the next page.

Exercise 1, Continued

A. horizontal bandsaw _____

B. pulley _____

C. continuous blade _____

D. frame _____

E. hacksaw _____

F. electric drill _____

G. mounted grinding wheels _____

H. twist drill _____

or

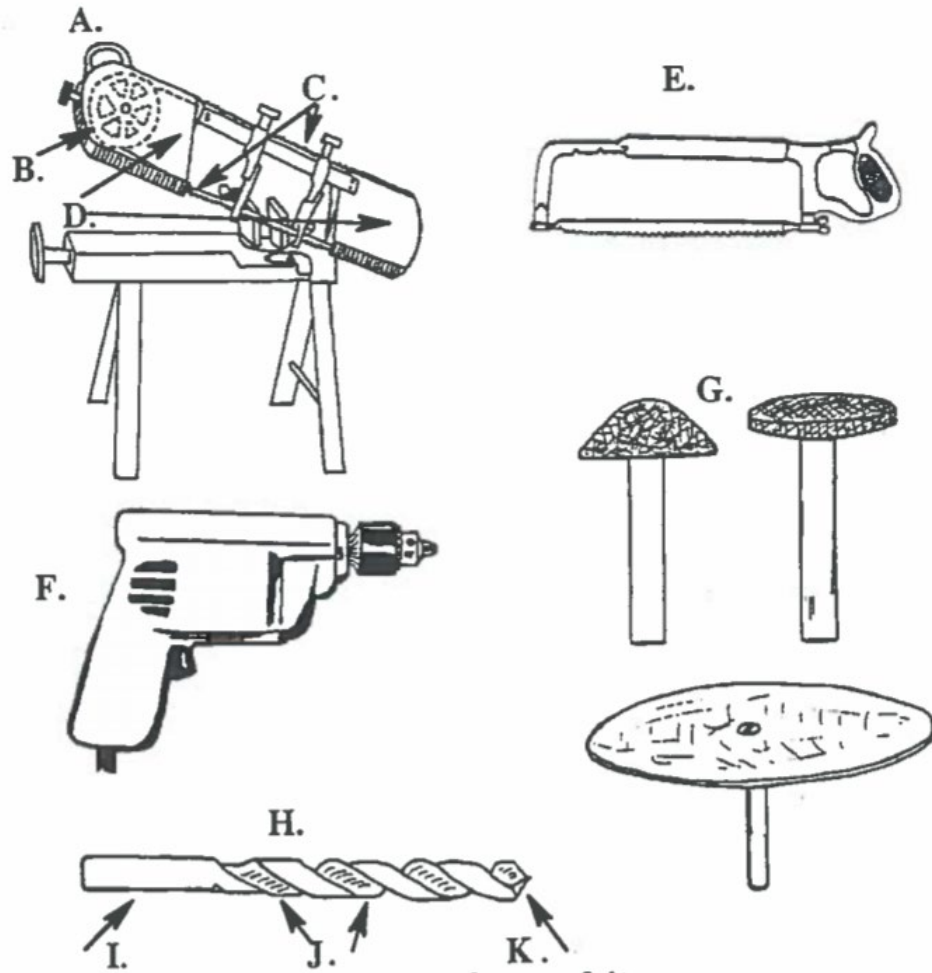
drill bit _____

I. shank _____

J. flute _____

K. tip _____

Exercise 2:



Write the letter of each tool or part in front of its name.

___ 1. mounted grinding wheels

___ 7. shank

___ 2. continuous blade

___ 8. frame

___ 3. electric drill

___ 9. pulley

___ 4. twist drill or drill bit

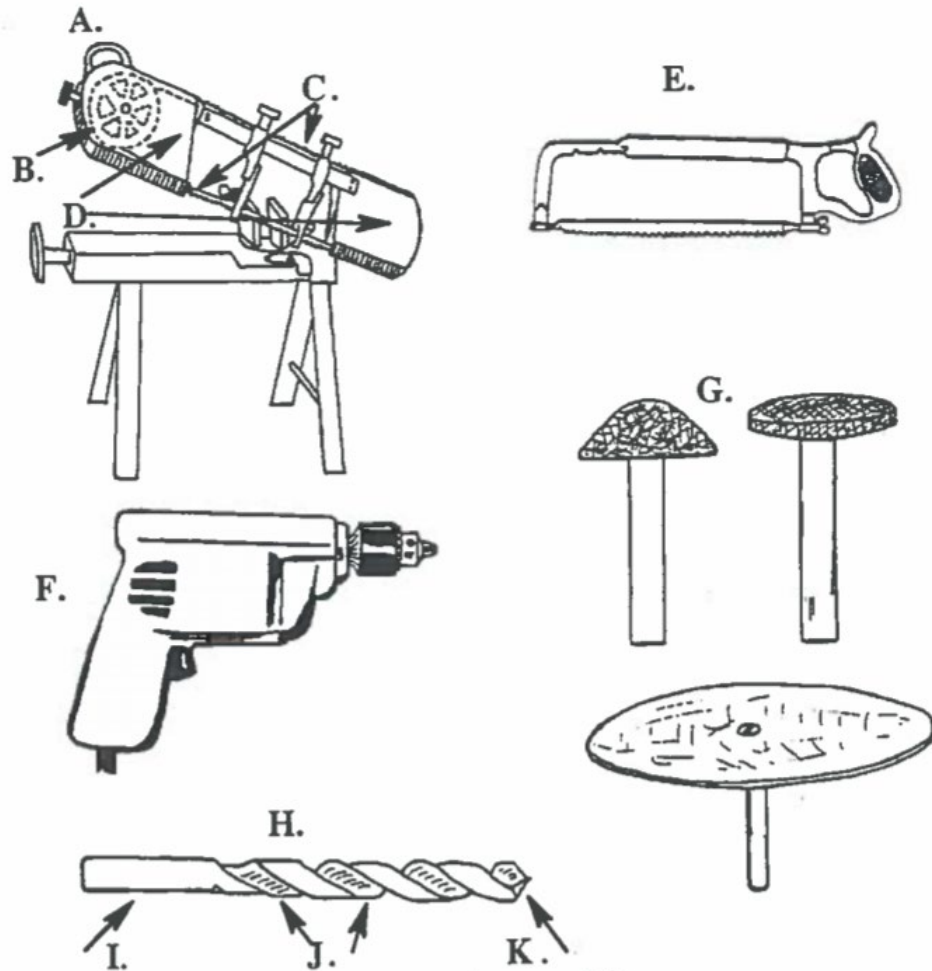
___ 10. flute

___ 5. horizontal bandsaw

___ 11. hacksaw

___ 6. tip

Exercise 3:



Look at the pictures. Write the correct letters in the spaces.

A. h _ r i _ o n _ a l b _ _ _ d s a _ _ _

G. m _ _ _ n _ e d g _ i _ d _ n g

_ h _ e _ _ _

B. p _ l _ e _ _

H. t _ _ _ s t d _ _ _ l l

C. c _ n _ i _ u _ u s b _ _ _ d _ _

I. s _ _ _ n _ _

D. f _ a _ e _ _

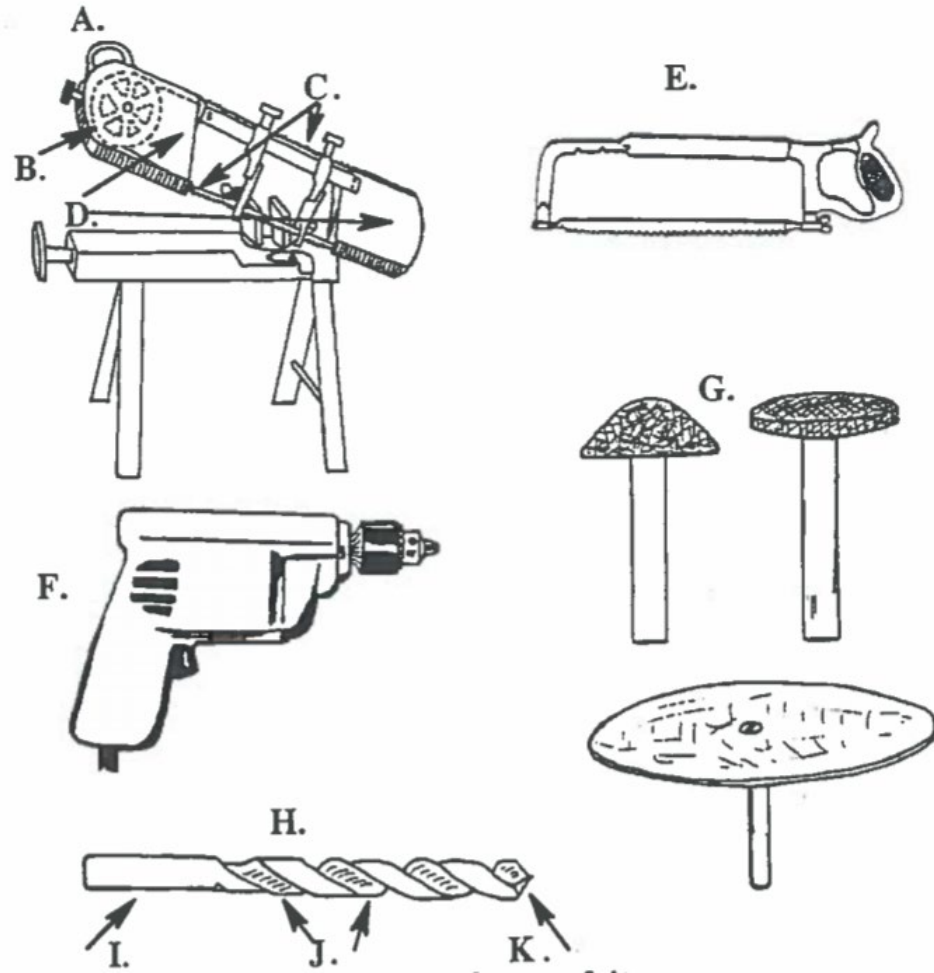
J. f _ u t _ _

E. _ a c _ s _ w _ _

K. _ i _ _ _

F. _ l _ c _ r _ c _ d _ i _ _ _

Exercise 4:



Look at the pictures. Write the names.

- | | |
|----------|----------|
| A. _____ | G. _____ |
| B. _____ | H. _____ |
| C. _____ | I. _____ |
| D. _____ | J. _____ |
| E. _____ | K. _____ |
| F. _____ | |

It's Okay to Ask Questions

Conversation No. 1:

Supervisor: Jose, I'd like you to work on a "hot job" this afternoon.

Jose: What do you mean when you say "hot job"?

Supervisor: A "hot job" is an important job that needs to be done right away.

Jose: Do you want me to stop doing what I was working on?

Supervisor: Yes, drop everything. A "hot job" has to be done immediately; in this case, we have a customer waiting for special parts in San Francisco.

Jose: Okay, I'll get right on it.

.....

Conversation 2:

Jose: Well, what do you want me to do?

Supervisor: Take some 6-inch aluminum round stock over the horizontal bandsaw and cut off ten two-foot pieces. Then I want you to split the pieces down the middle, the long way.

Jose: So you want me to cut off some two-foot pieces from the 6-inch aluminum round stock. I've got that. Then what do I do? Can you repeat what you want?

Supervisor: You need ten pieces. Then you need to split each piece in the middle.

Jose: The long way? Not across the cross section?

Supervisor: Yes, you've got it. I'll be back in half an hour to check.

True or False? Saws, Drills, and Grinders

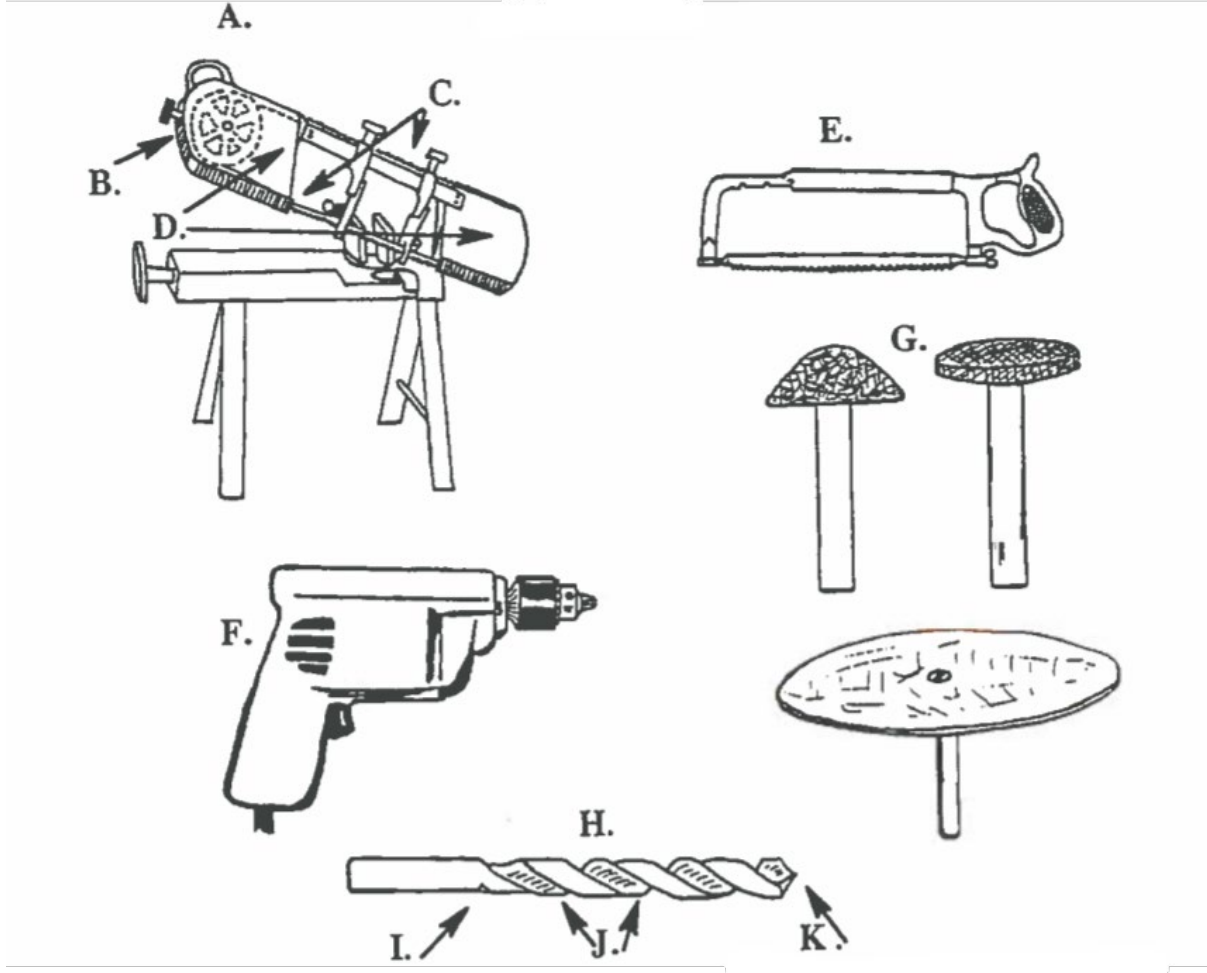
Re-read the Student Information Sheets about Saws, Drills and Grinders; then do these true or false questions. Below are 20 statements on the vocabulary and reading; circle T or F.

- T F 1. A hand hacksaw, a power hacksaw, and a horizontal bandsaw all have frames for holding the cutting blades.
- T F 2. Without coolant, a saw blade may bind in the workpiece.
- T F 3. A hacksaw cuts in two directions.
- T F 4. A bandsaw cuts in one direction only.
- T F 5. The teeth on a bandsaw point forward; on a hacksaw the teeth point backward.
- T F 6. The blade of a vertical saw runs parallel to the floor.
- T F 7. The blade on a horizontal bandsaw is held straight by two roller guides.
- T F 8. Cutting a large piece from some stock can be called notching.
- T F 9. The hand hacksaw can be used anywhere, but a power hacksaw cannot be moves from a single place.
- T F 10. Cutting out an irregular piece from stock is called radius cutting.
- T F 11. The tip of a twist drill is inserted into the drill chuck and tight-ened with a chuck key.
- T F 12. The words "spiral" and "twist" are similar in meaning.
- T F 13. The smaller numbers in a grain-size chart refer to the fine abrasives.
- T F 14. A cone is a tapered shape.

(TO NEXT PAGE)

- T F** 15. A common kind of grinding wheel uses aluminum oxide as an abrasive, held together by a vitrified bond.
- T F** 16. A drill bit can have three flutes twisted around it.
- T F** 17. A chuck key is used to tighten the chuck jaws around a drill shank.
- T F** 18. Seventy-five percent of grinding wheels are made of silicon carbide.
- T F** 19. Some grinding wheels are small enough to be used in an electric drill.
- T F** 20. Bonding materials for grinding wheels include rubber, shellac, clay, feldspar, and resin.

Listening Test:



Get the tape and play the side that say *Listening Test, Module 3, Lesson 9*. Listen to the words on the tape. Write the letters in the spaces.

1. _____

5. _____

9. _____

2. _____

6. _____

10. _____

3. _____

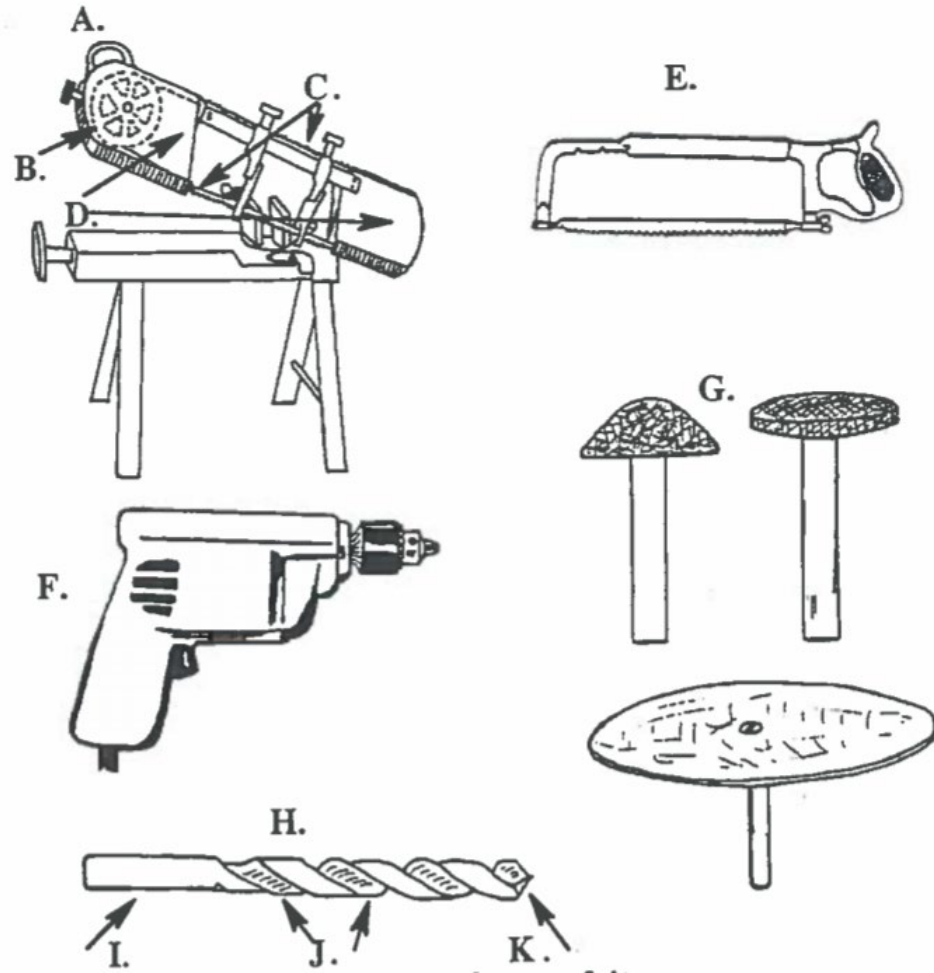
7. _____

11. _____

4. _____

8. _____

Writing Test:



Look at the pictures. Write the names.

A. _____

G. _____

B. _____

H. _____

C. _____

I. _____

D. _____

J. _____

E. _____

K. _____

F. _____