

# HAND TOOLS AND POWER TOOLS

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## Lesson Outcomes

The student will be able to:

- Identify a variety of hand tools and power tools and describe their purpose, application and how they are operated in a safe and proper manner.
- A wide variety of tools should be introduced at this time. The more exposure and the sooner students get to experience new tools, the more interest students will develop.
- Most tools taught in this Activity Plan will be determined by the teacher, based on previous teacher experience and relevant courses taken by the students.

## Assumptions

- Students will have little or no previous knowledge or experience with any of the tools being introduced to them.
- The teacher is proficient in the safe and proper operation of all of the tools being taught.

## Terminology

Any terminology related to the tools being introduced will be taught to the students as it is required during the lesson.

## Estimated Time

30–60 minutes

## Recommended Number of Students

20, based on the *BC Technology Educators' Best Practice Guide*

## Facilities

It is recommended that this activity be taught in a facility where there is sufficient room for all the tools and for the students to move around freely.

Students are generally unaware of the dangers in handling some tools for the first time, especially air- or electrically-operated tools. Therefore adequate space is a primary concern for safety.

## Tools

This may be a review lesson for some students, and may include new information for others. A wide variety of tools should be introduced at this time:

- Hammers of different types and styles: ball peen, brass, rubber and plastic
- Screwdrivers, punches, files, chisels, wrenches (including adjustable and pipe wrenches)
- Electric drills, angle grinders, rotary drills (Dremel), metal shears
- Air tools including impact wrenches, air drills, air hammers
- Sockets: deep, standard and impact
- Ratchets with different-sized drives:  $\frac{1}{4}$ ",  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{3}{4}$ "
- Hacksaw
- Safety glasses

## Materials

Handouts of tool descriptions and images with most common names are attached.

## Resources

Most manuals and shop textbooks have sections on tools with images and explanations of use.

### **Adjustable Wrenches**

#### **Information on adjustable wrenches**

[http://navyaviation.tpub.com/14310/css/14310\\_35.htm](http://navyaviation.tpub.com/14310/css/14310_35.htm)

#### **Toolmanship: Your Complete Guide to Wrenches (The Art of Manliness)**

[www.artofmanliness.com/2013/03/05/toolmanship-your-complete-guide-to-wrenches/](http://www.artofmanliness.com/2013/03/05/toolmanship-your-complete-guide-to-wrenches/)

## ACTIVITY

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1. Workstations should be set up with a variety of similar tools grouped together. Have students identify them by name and then explain how they are used.
2. Handouts should be given for students to make notes and connect the names as they see the tools.
3. Power tools can also be identified the same way if specific stations are set up for power tools.
4. During this activity, additional reinforcement should be given on the use of safety glasses when operating power tools or when striking two metal objects together—such as hammer and a punch.
5. Specific tasks can be given at a station that is related to a tool. [Marking out a scribe line when introducing a scribe, for making a centre punch mark at an intersection of a piece of metal.]
6. Cutting a small piece of metal with a hacksaw, and then filing the edges smooth would add a practical component to a hacksaw lesson and introducing a file.

### Evaluation Guidelines

- Evaluation of a skill can be connected to marking a handout filled out by a student.
- Handout sheets with tool names deleted can be reworked into tests.
- Cards with tool names written on them can be used for students to select the tools and describe or demonstrate how to use them.
- Accuracy of layout marks with a scribe and centre punch mark.

### Notes on Tools

**Torx screwdriver:** found on newer cars (1990 and above). Do not confuse a torx screw with the Phillips screw, as you will strip the screw head.

**Brass, rubber and plastic hammers:** often called *soft face hammers*. Use only when you don't want to damage the surface of something. A steel ball-peen hammer will damage, dent or chip soft metals like aluminum, tin and sheet metal.

- A brass hammer is often used when removing an aluminum cylinder head.
- A rubber or plastic hammer is used when installing a hubcap.

**Wrenches (all types):** whenever possible, pull on a wrench—rather than push—for more control in case the wrench slips or the bolt breaks. It's easier to recover body position in a pull situation.

**Crescent (adjustable) wrenches:** the solid jaw should be on the pull side of the nut rather than the loose adjustable jaw, to prevent slippage.

**Oil filter wrenches:** there is a large variety of oil filter wrenches because oil filters come in three basic diameters but can be awkwardly placed.

**Files:** do not tap files together or against other hard objects as they are brittle and will break.

**Sockets:** only use impact sockets when using an impact gun. They are stronger than regular sockets and will not crack.

**Electric tools and extension cords:** always think about where these are placed. Water dripping from cars can create pools, leading to electrical shock.

## PHOTOS OF HAND TOOLS AND POWER TOOLS

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### Tools

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### Hammers



Figure 1—Ball-peen hammer



Figure 2—Brass hammer



Figure 3—Rubber hammer



Figure 4—Plastic hammer



Figure 5—Dead blow hammer

## Screwdrivers

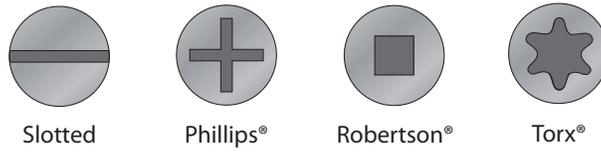


Figure 6—Types of screwdrivers

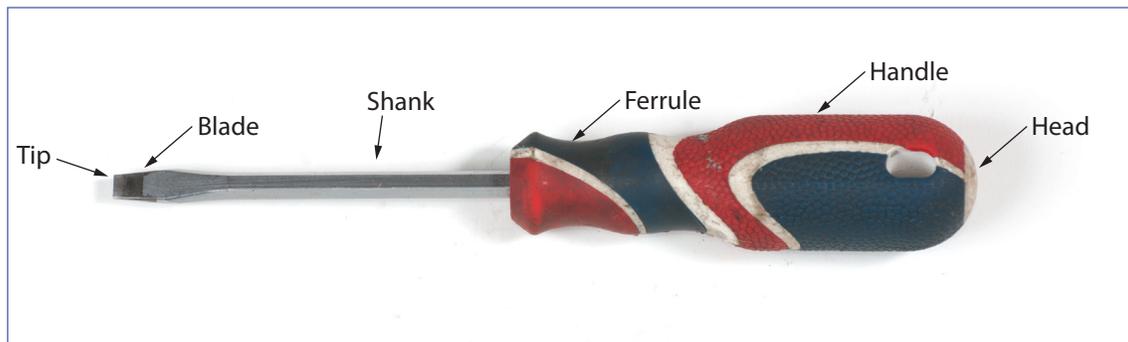


Figure 7—Parts of a screwdriver



Figure 8—Stubby screwdriver



Figure 9—Assorted screwdrivers



Figure 10—Centre punch



Figure 11—Brass punch



Figure 12—Drift punches



Figure 13—Taper alignment punch

## Files

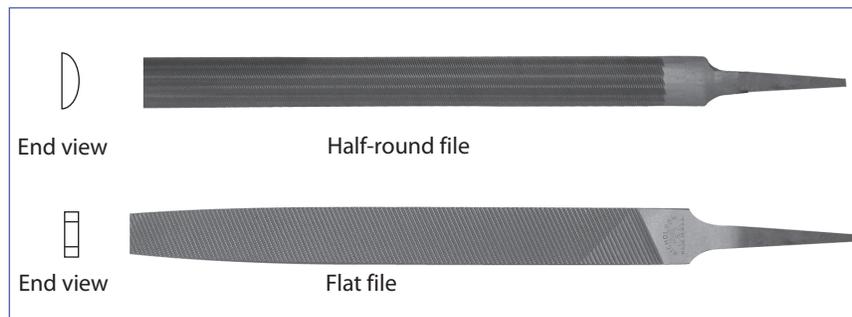


Figure 14—File types

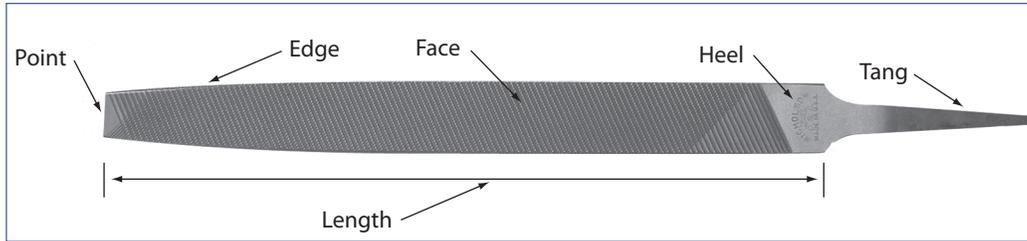


Figure 15—Parts of a file



Figure 16—Files with tapered and blunt end

### Teeth of a File

The teeth of a file are cut before the file has been tempered and hardened. There are three types of cuts: single, double and curved. As well, there are various grades of coarseness including rough, bastard and smooth. Figure 13 shows the cuts and file grades.

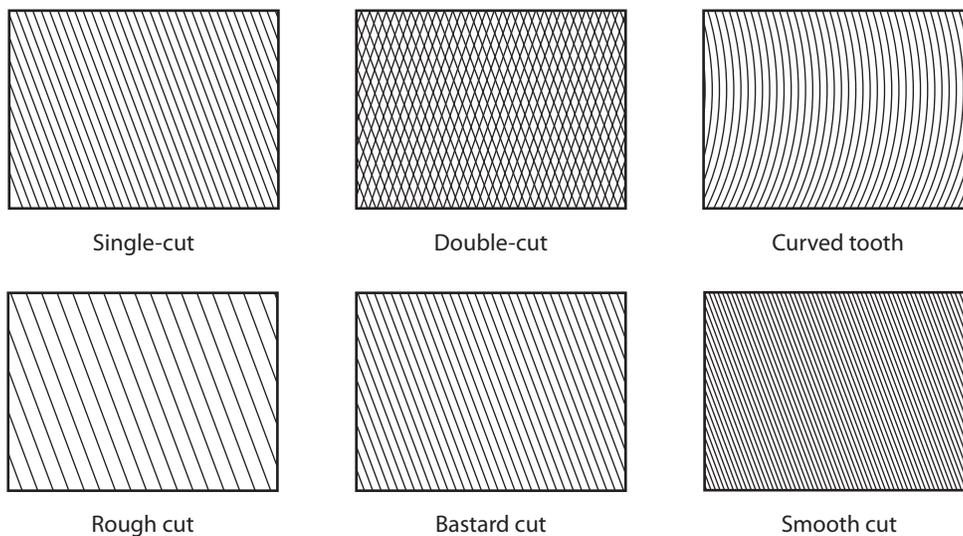


Figure 17—Types of file teeth and degrees of coarseness

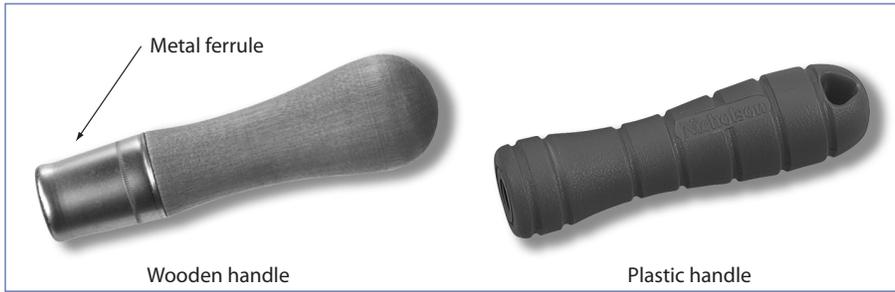


Figure 18—File handles

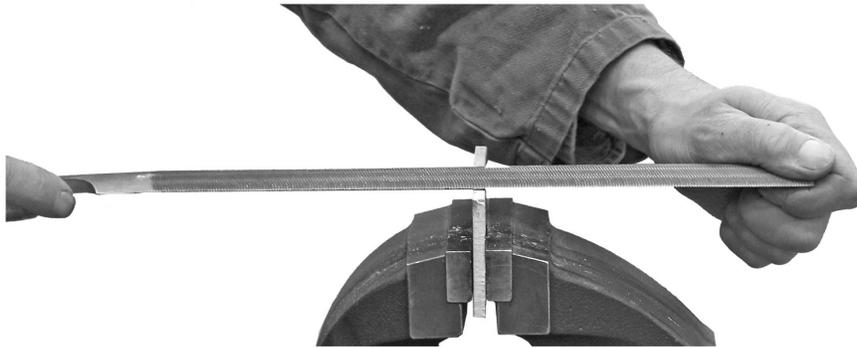


Figure 19—Proper filing technique

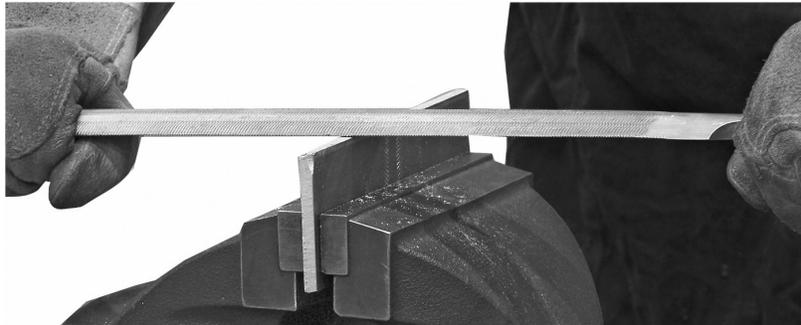


Figure 20—Draw filing

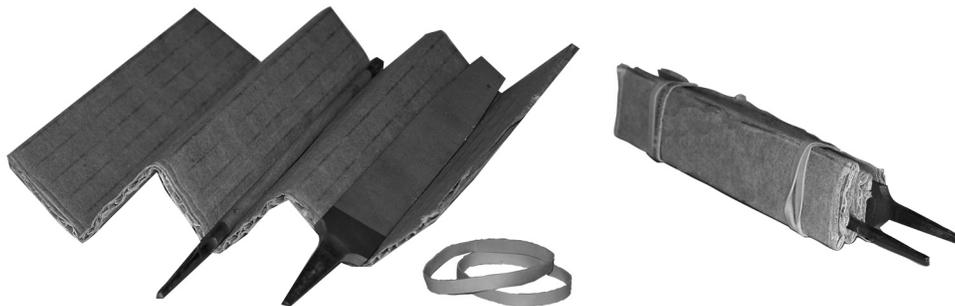


Figure 21—Storing files

# Chisels



Figure 22—Cold chisel



Flat chisels



Diamond-point chisel



Cape chisel

Figure 23—Types of chisels

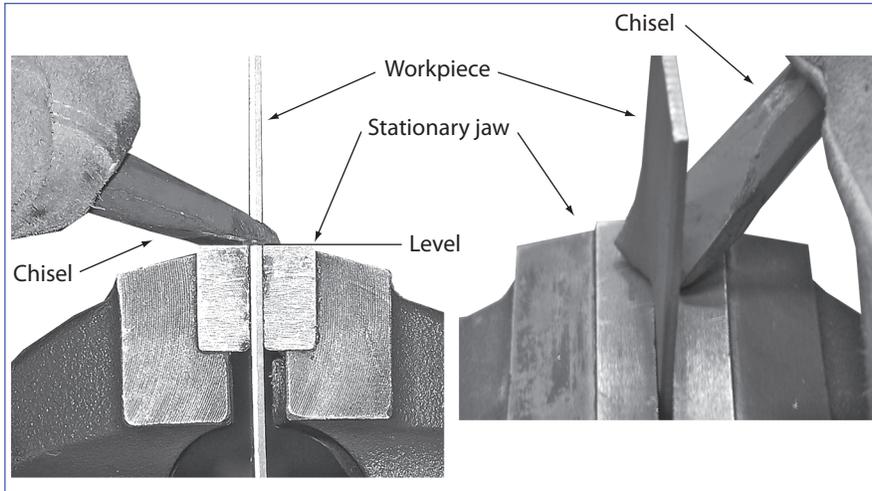


Figure 24—Correct use of chisel

## Wrenches



Figure 25—Strap wrench



Figure 26—Combination wrench



Figure 27—Adjustable wrench



Figure 28—Stillson pattern pipe wrench



Figure 29—Flare nut wrench



Figure 30—Oil filter wrenches

## Electric Drills



Figure 31—Cordless drill with rechargeable battery

## Angle Grinders



Figure 32—Electric angle grinders with grinding disks



Figure 33—Rotary drills (Dremel)



Figure 34—Metal shears



Figure 35—Aviation snips

## Air Tools



Figure 36—Pneumatic impact wrenches



Figure 37—Air-operated hammer/chisel



Figure 38—Air drill

## Sockets: Deep, Standard and Impact

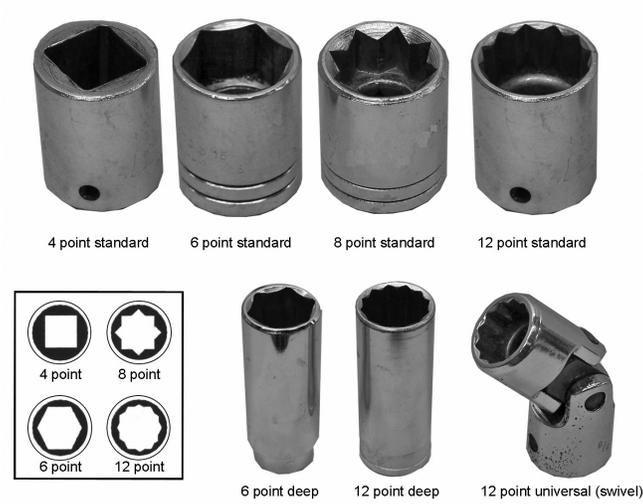


Figure 39—Various socket wrenches



Figure 40—Spark plug socket wrench



Figure 41—Spark plug socket with rubber insert



Figure 42—Socket driver set



Figure 43—Ratchets with different-sized drives:  $\frac{1}{4}$ " ,  $\frac{3}{8}$ " ,  $\frac{1}{2}$ " ,  $\frac{3}{4}$ "

## Hacksaw

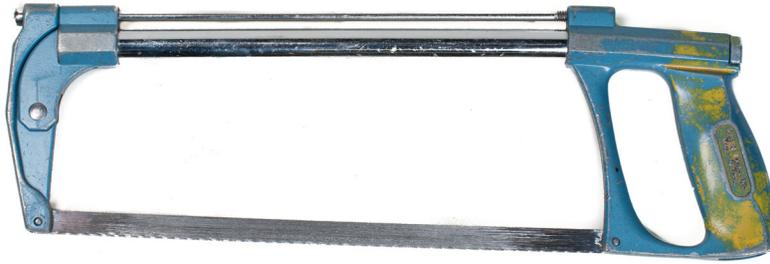


Figure 44—Hacksaw

## Safety Goggles



Figure 45—Safety goggles