Figure 9.1: A forged wrench after it has been forged but before the flashing, extra material around the wrench, has been removed.

Figure 9.2: A typical open-end wrench. The size is different on each end and notice that the head is angled 15 degrees at each end.
FIGURE 9.3 A typical box-end wrench is able to grip the bolt or nut at points completely around the fastener. Each end is a different size.

FIGURE 9.4 The end of a box-end wrench is angled 15 degrees to allow clearance for nearby objects or other fasteners.

FIGURE 9.5 A combination wrench has an open end at one end and a box end at the other with the same size at each end.
FIGURE 9.6: An adjustable wrench. Adjustable wrenches are sized by the overall length of the wrench and not by how far the jaws open. Common sizes of adjustable wrenches include 8, 10, and 12 in.

FIGURE 9.7: The end of a typical line wrench, which shows that it is capable of grasping most of the head of the fitting.

FIGURE 9.8: A typical ratchet used to rotate a socket. A ratchet makes a ratcheting noise when it is being rotated in the opposite direction from loosening or tightening. A knob or lever on the ratchet allows the user to switch directions.
A typical flex handle used to rotate a socket, also called a breaker bar because it usually has a longer handle than a ratchet and, therefore, can be used to apply more torque to a fastener than a ratchet.

The most commonly used socket drive sizes include 1/4 in., 3/8 in., and 1/2 in. drive.

A 6-point socket fits the head of the bolt or nut on all sides. A 12-point socket can round off the head of a bolt or nut if a lot of force is applied.
FIGURE 9.12  A crowfoot socket is designed to reach fasteners using a ratchet or breaker bar with an extension.

FIGURE 9.13  Using a torque wrench to tighten connecting rod nuts on an engine.

FIGURE 9.14  A beam-type torque wrench that displays the torque reading on the face of the dial. The beam display is read as the beam deflects, which is in proportion to the amount of torque applied to the fastener.
FIGURE 9.15 Torque wrench calibration checker.

FIGURE 9.16 Deep sockets allow access to the nut that has a stud plus other locations needing great depth, such as spark plugs.

FIGURE 9.17 A flat-tip (straight blade) screwdriver. The width of the blade should match the width of the slot in the fastener being loosened or tightened.
FIGURE 9.18 Two stubby screwdrivers that are used to access screws that have limited space above. A straight blade is on top and a #2 Phillips screwdriver is on the bottom.

FIGURE 9.19 An offset screwdriver is used to install or remove fasteners that do not have enough space above to use a conventional screwdriver.

FIGURE 9.20 An impact screwdriver used to remove slotted or Phillips head fasteners that cannot be broken loose using a standard screwdriver.
**FIGURE 9.21** A typical ball-peen hammer.

**FIGURE 9.22** A rubber mallet used to deliver a force to an object without harming the surface.

**FIGURE 9.23** A dead-blow hammer that was left outside in freezing weather. The plastic covering was damaged, which destroyed this hammer. The lead shot is encased in the metal housing and then covered.
FIGURE 9.24 Typical slip-joint pliers, which are also common household pliers. The slip joint allows the jaws to be opened to two different settings.

FIGURE 9.25 Multigroove adjustable pliers are known by many names, including the trade name Channel Locks.

FIGURE 9.26 A linesman’s pliers are very useful because they can help perform many automotive service jobs.
FIGURE 9.27 Diagonal-cut pliers are another common tool that has many names.

FIGURE 9.28 Needle-nose pliers are used where there is limited access to a wire or pin that needs to be installed or removed.

FIGURE 9.29 Locking pliers are best known by their trade name Vise-Grip®.
FIGURE 9.30 Snap-ring pliers are also called lock-ring pliers and are designed to remove internal and external snap rings (lock rings).

FIGURE 9.31 Files come in many different shapes and sizes. Never use a file without a handle.

FIGURE 9.32 Tin snips are used to cut thin sheets of metal or carpet.
FIGURE 9.33 A utility knife uses replaceable blades and is used to cut carpet and other materials.

FIGURE 9.34 A punch used to drive pins from assembled components. This type of punch is also called a pin punch.

FIGURE 9.35 Warning stamped in the side of a punch warning that goggles should be worn when using the tool. Always follow safety warnings.
FIGURE 9.36 Use a grinder or a file to remove the mushroom material on the end of a punch or chisel.

FIGURE 9.37 A stud remover uses an offset serrated wheel to grasp the stud so it will be rotated when a ratchet or breaker bar is used to rotate the assembly.

FIGURE 9.38 A nut splitter is used to split a nut that cannot be removed. After the nut has been split, a chisel is then used to remove the nut.
FIGURE 9.39 A set of bolt extractors, commonly called easy outs.

FIGURE 9.40 Removing plugs or bolts is easier if the plug is first heated to cherry red color, using a torch, and then applying wax. During cooling, the wax flows in between the threads, making it easier to remove.

FIGURE 9.41 A typical hacksaw that is used to cut metal. If cutting sheet metal or thin objects, a blade with more teeth should be used.
FIGURE 9.42 A typical beginning technician tool set that includes the basic tools to get started.

FIGURE 9.43 A typical large tool box, showing just one of many drawers.

FIGURE 9.44 A seal puller being used to remove a seal from a rear axle.
FIGURE 9.45 A seal (boot) driver or installer is usually plastic and is designed to seat the seal.

FIGURE 9.46 A typical 12 volt test light.

FIGURE 9.47 An electric soldering gun used to make electrical repairs. Soldering guns are sold by the wattage rating. The higher the wattage, the greater amount of heat created. Most solder guns used for automotive electrical work usually fall within the 60 to 160 watt range.
FIGURE 9.48 A binder clip being used to keep a fender cover from falling.