

# Tools and Equipment

Tire Tread:  
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## Chapter Review

The following activities have been designed to help you refresh your knowledge of this chapter. Your instructor may require you to complete some or all of these activities as a regular part of your training program. You are encouraged to complete any activity that your instructor does not assign as a way to enhance your learning.

## Matching

Match the following terms with the correct description or example.

- |                               |                             |
|-------------------------------|-----------------------------|
| <b>A.</b> Bottoming tap       | <b>J.</b> Parallax error    |
| <b>B.</b> Chassis dynamometer | <b>K.</b> Peening           |
| <b>C.</b> Cross-arm           | <b>L.</b> Pullers           |
| <b>D.</b> Dead blow hammer    | <b>M.</b> Solder            |
| <b>E.</b> Dial bore gauge     | <b>N.</b> Split ball gauge  |
| <b>F.</b> Die stock           | <b>O.</b> Telescoping gauge |
| <b>G.</b> Flashback arrestor  | <b>P.</b> Tensile strength  |
| <b>H.</b> Intermediate tap    | <b>Q.</b> Vernier calipers  |
| <b>I.</b> Micrometer          | <b>R.</b> Wad punch         |

- \_\_\_\_\_ 1. A spring-loaded valve installed on oxyacetylene torches as a safety device to prevent flame from entering the torch hoses.
- \_\_\_\_\_ 2. A mixture of lead and tin with a low melting point for connecting wires.
- \_\_\_\_\_ 3. An accurate measuring device for inside bores, usually made with a dial indicator attached to it.
- \_\_\_\_\_ 4. An accurate measuring device for internal, external, and depth measurements that incorporates fixed and adjustable jaws.
- \_\_\_\_\_ 5. A thread-cutting tap designed to cut threads to the bottom of a blind hole.
- \_\_\_\_\_ 6. A gauge that expands and locks to the internal diameter of bores; a caliper or outside micrometer is used to measure its size.
- \_\_\_\_\_ 7. A type of hammer that has a cushioned head to reduce the amount of head bounce.
- \_\_\_\_\_ 8. An accurate measuring device for internal and external dimensions.
- \_\_\_\_\_ 9. In reference to fasteners, the amount of force it takes before a fastener breaks.
- \_\_\_\_\_ 10. A description for an arm that is set at right angles or 90 degrees to another component.
- \_\_\_\_\_ 11. A type of punch that is hollow for cutting circular shapes in soft materials such as gaskets.
- \_\_\_\_\_ 12. One of a series of taps designed to cut an internal thread. Also called a plug tap.
- \_\_\_\_\_ 13. A term used to describe the action of flattening a rivet through a hammering action.
- \_\_\_\_\_ 14. A machine with rollers that allows a vehicle to attain road speed and load while sitting still in the shop.
- \_\_\_\_\_ 15. A generic term to describe hand tools that mechanically assist the removal of bearings, gears, pulleys, and other parts.
- \_\_\_\_\_ 16. A handle for securely holding dies to cut threads.
- \_\_\_\_\_ 17. A measuring device used to accurately measure small holes.
- \_\_\_\_\_ 18. A visual error caused by viewing measurement markers at an incorrect angle.

## Multiple Choice

Read each item carefully, and then select the best response.

- \_\_\_\_\_ 1. What device is fitted to compressed air systems to remove the moisture or water from the compressed air that is condensed as a result of compressing air from the atmosphere?
- A. Spit filter
  - B. Air drier
  - C. Relief valve
  - D. Strainer
- \_\_\_\_\_ 2. Which of the following is a type of fastener?
- A. Bolt
  - B. Nut
  - C. Stud
  - D. All of the above
- \_\_\_\_\_ 3. In the metric system, which of the following is measured by the distance between the peaks of threads in millimeters?
- A. Thread pitch
  - B. Tensile strength
  - C. Torque
  - D. Thread count
- \_\_\_\_\_ 4. What type of wrench is also known as a tension wrench?
- A. Open-end wrench
  - B. Ratcheting box-end wrench
  - C. Torque wrench
  - D. Pipe wrench
- \_\_\_\_\_ 5. As long as a bolt is not tightened too much it will return to its original length when loosened; this is called?
- A. Torque
  - B. Elasticity
  - C. Yield
  - D. Play
- \_\_\_\_\_ 6. A(n) \_\_\_\_\_ is the fastest way to spin a fastener on or off a thread by hand, but it cannot apply much torque to the fastener.
- A. breaker bar
  - B. sliding T-handle
  - C. speed brace
  - D. lug wrench
- \_\_\_\_\_ 7. What type of pliers are used for cutting wire and cotter pins?
- A. Diagonal
  - B. Snap ring
  - C. Flat-nosed
  - D. Needle-nosed
- \_\_\_\_\_ 8. A screw or bolt with a cross-shaped recess requires a(n) \_\_\_\_\_?
- A. flat blade screwdriver
  - B. offset screwdriver
  - C. Phillips head screwdriver
  - D. Allen wrench
- \_\_\_\_\_ 9. What type of screwdriver fits into spaces where a straight screwdriver cannot and is useful where there is not much room to turn it?
- A. Ratcheting screwdriver
  - B. Impact driver
  - C. Phillips head screwdriver
  - D. Offset screwdriver

- \_\_\_\_\_ 10. What kind of tools are composed of a strong metal and used as a lever to move, adjust, or pry?
- A. Cold chisels
  - B. Pry bars
  - C. Drift punches
  - D. Speed brace
- \_\_\_\_\_ 11. What type of file is thinner than other files, comes to a point, and is used for working in narrow slots?
- A. Warding file
  - B. Triangular file
  - C. Thread file
  - D. Square file
- \_\_\_\_\_ 12. What type of file cleans clogged or distorted threads on bolts and studs?
- A. Triangular file
  - B. Warding file
  - C. Thread file
  - D. Square file
- \_\_\_\_\_ 13. The name for this type of clamp comes from its shape, it can hold parts together while they are being assembled, drilled, or welded.
- A. J-clamp
  - B. C-clamp
  - C. D-clamp
  - D. K-clamp
- \_\_\_\_\_ 14. What type of tap narrows at the tip to give it a good start in the hole where the thread is to be cut?
- A. Intermediate tap
  - B. Taper tap
  - C. Plug tap
  - D. Bottoming tap
- \_\_\_\_\_ 15. What type of tool consists of three main parts: jaws, a cross-arm, and a forcing screw?
- A. Tap and die set
  - B. Bench vice
  - C. Flaring tool
  - D. Gear puller
- \_\_\_\_\_ 16. What tool is used to measure the gap between a straight edge and the surface being checked for flatness?
- A. Steel rule
  - B. Caliper
  - C. Feeler gauge
  - D. Split ball gauge
- \_\_\_\_\_ 17. What type of grinder uses discs rather than wheels?
- A. Bench grinder
  - B. Angle grinder
  - C. Straight grinder
  - D. Pedestal grinder
- \_\_\_\_\_ 18. What tool uses high-pressure to blast small abrasive particles to clean the surface of parts?
- A. Power washer
  - B. Angle grinder
  - C. Sand blaster
  - D. Solvent tank
- \_\_\_\_\_ 19. What type of torch is occasionally used by technicians to heat, braze, weld, and cut metal?
- A. Ultrasonic
  - B. Magnesium
  - C. Plasma
  - D. Oxyacetylene
- \_\_\_\_\_ 20. What type of welder has a filler rod that automatically feeds into the welding joint via the hand piece?
- A. Plasma welder
  - B. Wire feed welders
  - C. Arc welder
  - D. Oxyacetylene welder

## True/False

If you believe the statement to be more true than false, write the letter "T" in the space provided. If you believe the statement to be more false than true, write the letter "F."

- \_\_\_\_\_ 1. Serious, sometimes fatal, injuries can be caused by compressed air being injected into the body through the skin or into a body opening, such as your mouth or ear.
- \_\_\_\_\_ 2. Thread pitch is a way of defining how much a fastener should be tightened.
- \_\_\_\_\_ 3. The higher the grade number of a fastener, the higher the tensile strength.
- \_\_\_\_\_ 4. Torque wrenches come in various types: beam style, clicker, dial, and electronic.
- \_\_\_\_\_ 5. The open-end wrench fits fully around the head of the bolt or nut and grips each of the six points at the corners just like a socket.
- \_\_\_\_\_ 6. Six- and 12-point sockets fit the heads of hexagonal shaped fasteners.
- \_\_\_\_\_ 7. Arc joint pliers, also called vice grips, are general-purpose pliers used to clamp and hold one or more objects.
- \_\_\_\_\_ 8. Allen wrenches are sometimes called hex keys.
- \_\_\_\_\_ 9. When a large chisel needs a really strong blow, it is time to use a dead blow hammer.
- \_\_\_\_\_ 10. When marks need to be drawn on an object like a steel plate to help locate a hole to be drilled, a drift punch can be used to mark the points so they will not rub off.
- \_\_\_\_\_ 11. A cold chisel gets its name from the fact it is used to cut cold metals, rather than heated metals.
- \_\_\_\_\_ 12. A bottoming tap is used to tap a thread into a hole that does not come out the other side of the material.
- \_\_\_\_\_ 13. Always use a single flare if the tubing is to be used for higher pressures such as in a brake system.
- \_\_\_\_\_ 14. A tubing cutter is more convenient and neater than a saw when cutting pipes and metal tubing.
- \_\_\_\_\_ 15. When soldering, always apply flux to the joint if cored solder is used.
- \_\_\_\_\_ 16. Depth micrometers are used to measure inside dimensions.
- \_\_\_\_\_ 17. Morse taper is a system for securing drill bits to drills.
- \_\_\_\_\_ 18. A solvent tank is a cleaning tank that is filled with a suitable solvent to clean parts by removing oil, grease, dirt, and grime.
- \_\_\_\_\_ 19. Thread repair is used in situations where it is not possible to replace a damaged component.
- \_\_\_\_\_ 20. Batteries are filled with sulphuric acid, so if the hydrogen explodes, the battery case can then rupture and spray everything and everyone nearby with this dangerous and corrosive liquid.

## Fill in the Blank

Read each item carefully, and then complete the statement by filling in the missing word(s).

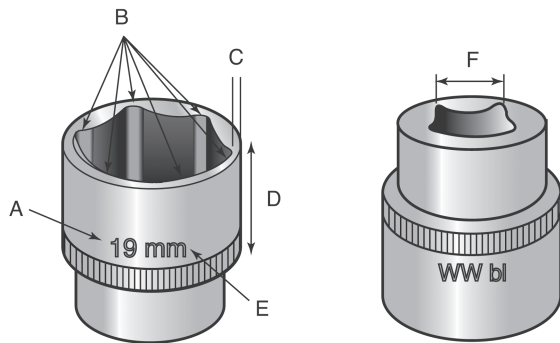
1. \_\_\_\_\_ / \_\_\_\_\_ is an umbrella term that describes a set of safety practices and procedures that are intended to reduce the risk of technicians inadvertently using tools, equipment, or materials that have been determined to be unsafe.
2. A(n) \_\_\_\_\_ is designed to regularly oil an air tool or air equipment so it does not have to be done manually, before or during its use.
3. A(n) \_\_\_\_\_ is a cylindrical piece of metal with a hexagonal head on one end and a thread cut into the shaft at the other end.
4. Each bolt diameter in the standard system can have one of two thread pitches, \_\_\_\_\_ or \_\_\_\_\_.
5. \_\_\_\_\_-to-\_\_\_\_\_ means that a fastener is torqued to, or just beyond, its yield point.
6. A(n) \_\_\_\_\_ wrench has an open-end head on one end and a box-end head on the other end.
7. \_\_\_\_\_ is a hand tool designed to hold, cut, or compress materials.
8. End cutting pliers, also called \_\_\_\_\_, have a cutting edge at right angles to their length.
9. A(n) \_\_\_\_\_ is used when a screw or a bolt is rusted/corroded in place or overtightened and needs a tool that can apply more force.
10. A(n) \_\_\_\_\_ hammer is designed not to bounce back when it hits something.
11. \_\_\_\_\_ are used when the head of the hammer is too large to strike the object being hit without causing damage to adjacent parts.

12. A(n) \_\_\_\_\_ has a hardened, sharpened blade and is designed to remove a gasket without damaging the sealing face of the component.
13. A screw \_\_\_\_\_ is a device designed to remove screws, studs, or bolts that have broken off in threaded holes.
14. To cut a brand new thread on a blank rod or shaft, a die held in a \_\_\_\_\_ is used.
15. A measuring \_\_\_\_\_ is a flexible type of ruler and a common measuring tool.
16. A(n) \_\_\_\_\_ can measure how round something is.
17. A(n) \_\_\_\_\_ is used to measure the width of gaps, such as the clearance between valves and rocker arms.
18. The most common air tool in an automotive shop is the air \_\_\_\_\_.
19. A(n) \_\_\_\_\_ works by applying a pressurized gas such as air, oxygen, nitrogen, or argon through a nozzle located in the center of a hand piece with an electrode.
20. A(n) \_\_\_\_\_ incorporates microprocessors to monitor and control the charge rate so a battery receives the correct amount of charge depending on its state of charge.

## Labeling

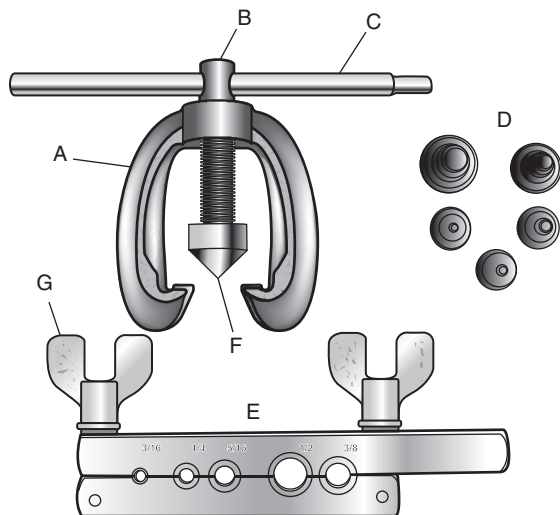
Label the following diagrams with the correct terms.

1. Anatomy of a socket:



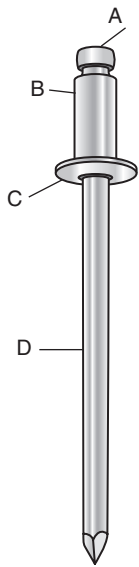
- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. \_\_\_\_\_
- F. \_\_\_\_\_

2. Components of a flare tool:



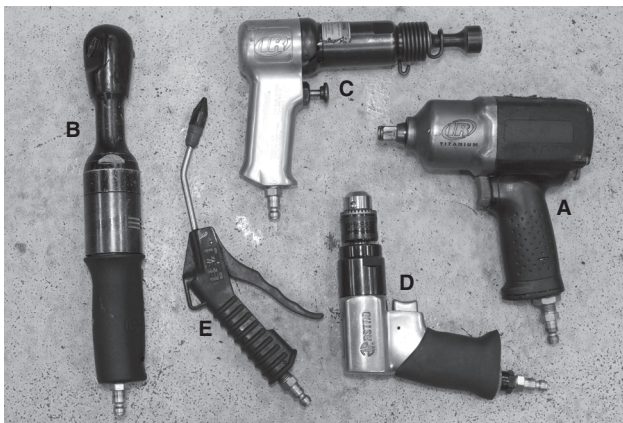
- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. \_\_\_\_\_
- F. \_\_\_\_\_
- G. \_\_\_\_\_

3. Anatomy of a rivet:



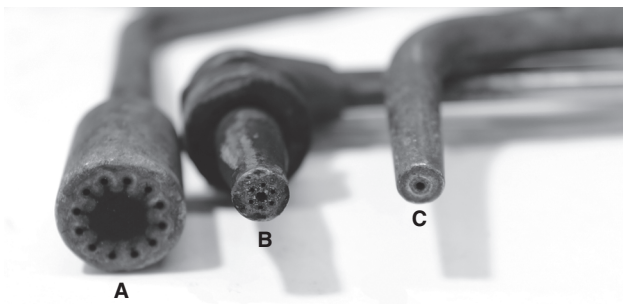
- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_

4. Air tools:



- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. \_\_\_\_\_

5. Oxyacetylene tips:

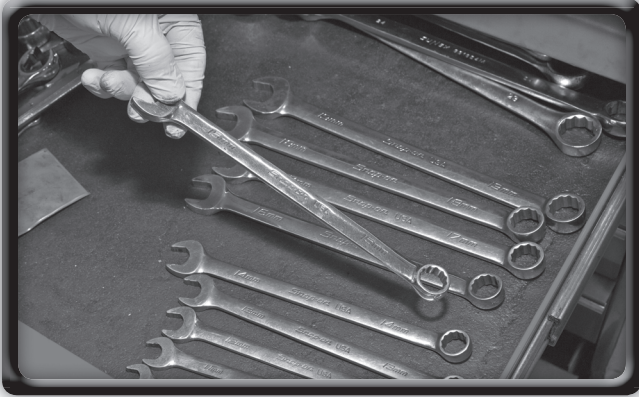


- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_

## Skill Drills

Place the skill drill steps in the correct order.

### 1. Safe Handling and Use of Tools:



\_\_\_\_\_ **A.** Return tools to correct storage locations.



\_\_\_\_\_ **B.** Clean tools prior to use if necessary.

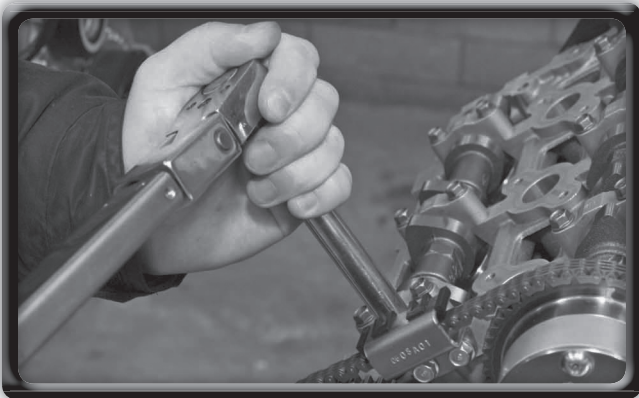


\_\_\_\_\_ **C.** Select the correct tool(s) to undertake tasks. Inspect tools prior to use to ensure they are in good working order. If tools are faulty, remove them from service according to shop procedures.



\_\_\_\_\_ **D.** Use tools to complete the task while ensuring manufacturer and shop procedures are followed. Always use tools safely to prevent injury and damage.

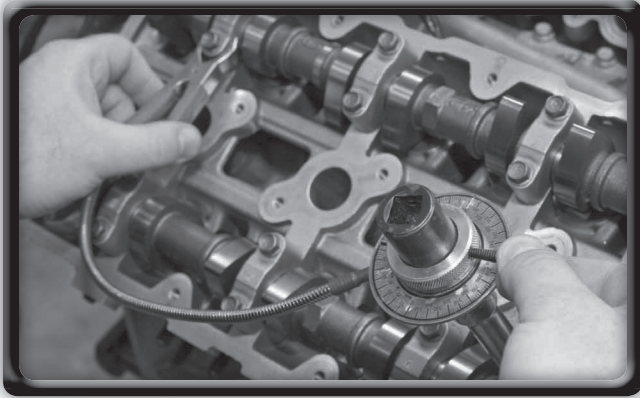
### 2. Using a Torque Wrench:



\_\_\_\_\_ **A.** Check the specifications for the bolt or fastener you are using. Tighten the bolt to the specified torque. If the component requires multiple bolts or fasteners, tighten them all to the same torque value in the sequence and steps that are specified by the manufacturer.



\_\_\_\_\_ **B.** Turn the torque wrench the specified number of degrees as indicated on the angle gauge. If the component requires multiple bolts or fasteners, make sure to tighten them all to the same torque angle in the sequence that is specified by the manufacturer. Some torquing procedures could call for four or more steps to complete the torquing process properly.



\_\_\_\_\_ **C.** Install the torque angle gauge over the head of the bolt, and then put the torque wrench on top of the gauge and zero it, if necessary.

### 3. Using Gear Pullers:



\_\_\_\_\_ **A.** Position the forcing screw. Use the appropriate wrench to run the forcing screw down to touch the shaft. Check that the point of the forcing screw is centered on the shaft. If not, adjust the jaws and cross-arms until the point is in the center of the shaft. If it is not, adjust the jaws and cross-arms until the point is in the center of the shaft.



\_\_\_\_\_ **B.** Examine the gear puller and ensure the jaws will fit the part you want to remove. Select the right size wrench to fit the nut on the end of the forcing screw. Adjust and fit the puller so that it fits tightly around the part to be removed. The arms of the jaws should be pulling against the component at close to right angles.



\_\_\_\_\_ **C.** Tighten the forcing screw slowly and carefully onto the shaft. Check that the puller is not going to slip off center or off the pulley. If the forcing screw and puller jaws remain in the correct position, tighten the forcing screw and pull the part off the shaft.



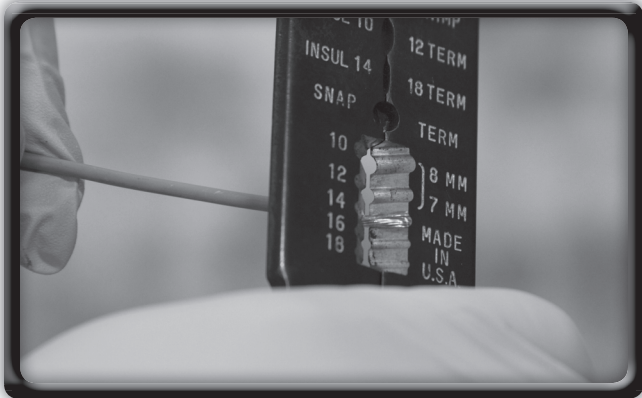
## 4. Using Soldering Tools:



\_\_\_\_\_ **A.** Clean any excess flux from the joint.



\_\_\_\_\_ **B.** Apply flux to the wires or metal to be soldered. This may not be necessary if you are using cored solder.



\_\_\_\_\_ **C.** Prepare the materials to be soldered. Strip wires or clean metal parts before soldering.



\_\_\_\_\_ **D.** Apply the hot solder iron tip to heat the joint, then apply solder to the joint (not the iron). If the solder does not melt within a few seconds, remove it and allow the joint to heat further before reapplying.

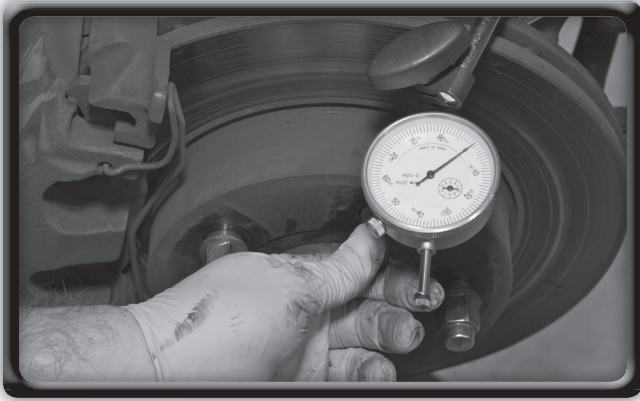


\_\_\_\_\_ **E.** Prepare the soldering iron by ensuring the correctly sized tip is fitted and is clean. Tin the soldering iron tip by melting some solder to it and wiping any excess from the tip.



\_\_\_\_\_ **F.** Once the solder has been applied, ensure the joint does not move until the solder has cooled sufficiently to set. Once cooled, inspect the joint; it should be shiny and firm.

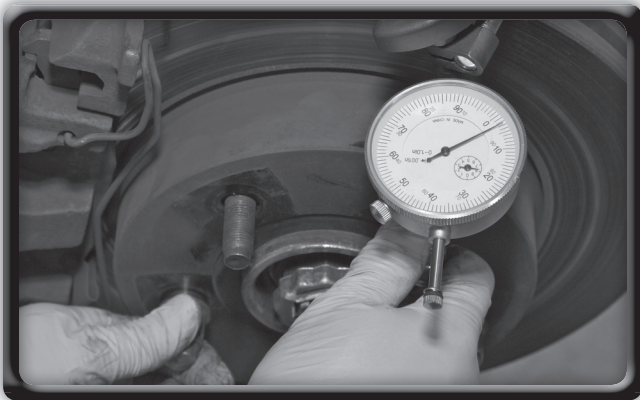
### 5. Using Dial Indicators:



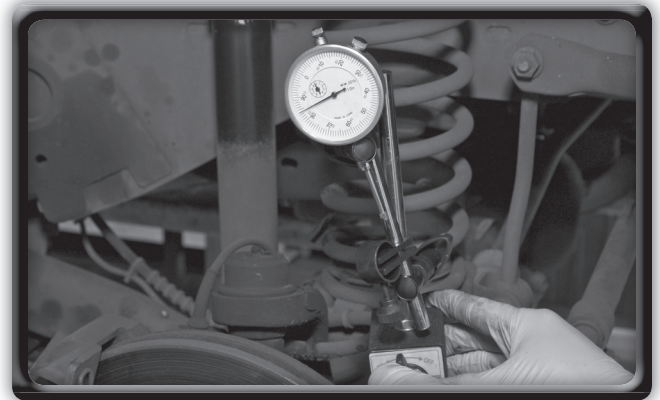
\_\_\_\_\_ **A.** Continue the rotation and make sure the needle does not go below zero. If it does, rezero the indicator and remeasure the point of maximum variation. Check your readings against the manufacturer's specifications. If the deviation is greater than the specifications allow, consult your supervisor.



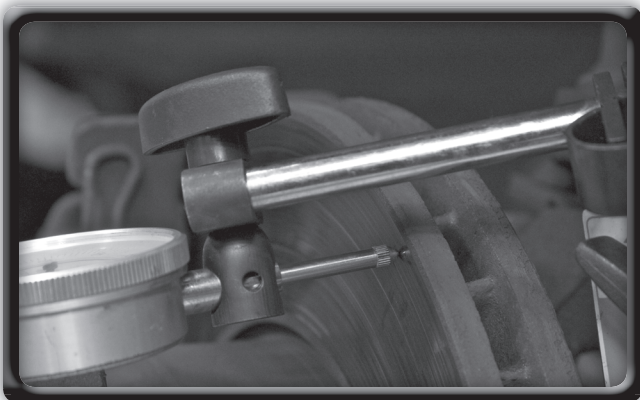
\_\_\_\_\_ **B.** Rotate the part one complete turn and locate the low spot. Zero the indicator.



\_\_\_\_\_ **C.** Find the point of maximum height and note the reading. This will indicate the runout value.



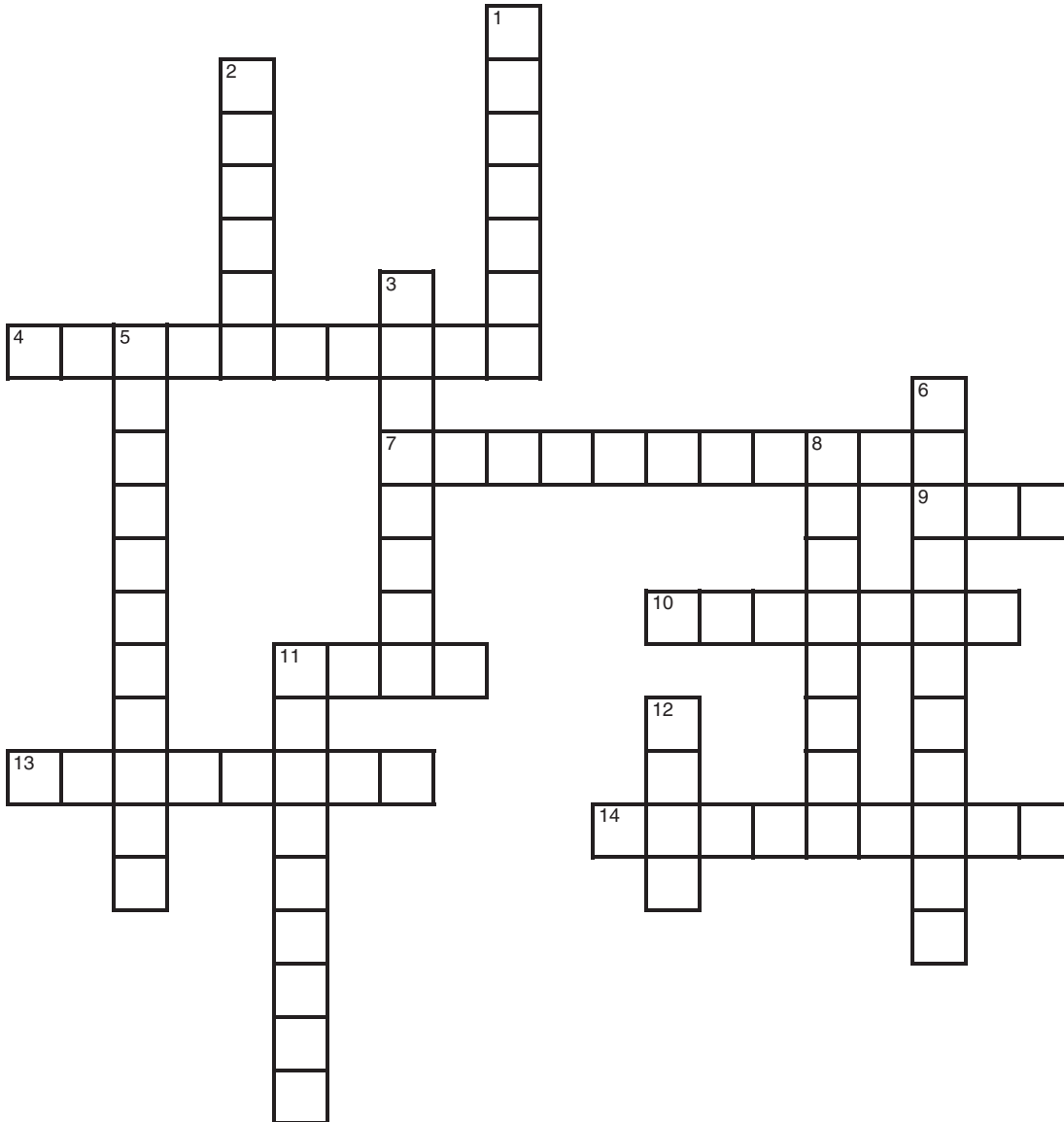
\_\_\_\_\_ **D.** Select the gauge type, size, attachment, and bracket that fit the part you are measuring. Mount the dial indicator firmly to keep it stationary.



\_\_\_\_\_ **E.** Adjust the indicator so that the plunger is at 90 degrees to the part you are measuring and lock it in place.

## Crossword Puzzle

Use the clues to complete the puzzle.



### Across

4. The amount of stretch or give a material has.
7. A seal that is made at the end of metal tubing or pipe.
9. A fastener with a hexagonal head and internal threads for screwing on bolts.
10. The shaft of a pop rivet.
11. A type of threaded fastener with a thread on one end and a hexagonal head on the other.
13. A type of punch in various sizes with a straight or parallel shaft.
14. A tool designed to remove wheel lug nuts and commonly shaped like a cross.

### Down

1. A device that converts and stores electrical energy through chemical reactions.
2. An enclosed metal tube commonly with 6 or 12 points to remove and install bolts and nuts.
3. A compressed air-powered drill.

5. A type of hexagonal drive mechanism for fasteners.
6. Less sharp than a prick punch, this makes a bigger indentation that centers a drill bit at the point where a hole is required to be drilled.
8. A device fitted to compressed air lines to remove moisture.
11. A device that securely holds material in jaws while it is being worked on.
12. A liquid or paste that protects a soldering or welding joint from oxidization.

## ASE-Type Questions

Read each item carefully, and then select the best response.

- \_\_\_\_\_ 1. Tech A says that knowing how to use tools correctly creates a safe working environment. Tech B says that a flare nut wrench is used to loosen very tight bolts and nuts. Who is correct?
  - A. Tech A
  - B. Tech B
  - C. Both A and B
  - D. Neither A nor B
- \_\_\_\_\_ 2. Tech A says that lockout/tagout is a safety procedure for a safe working environment. Tech B says that a soldering iron is used to weld, cut, and braze steel components. Who is correct?
  - A. Tech A
  - B. Tech B
  - C. Both A and B
  - D. Neither A nor B
- \_\_\_\_\_ 3. Tech A says that torque wrenches need to be calibrated periodically to ensure proper torque values. Tech B says that when a bolt is torqued the bolt stretches beyond its yield point and the bolt has to be replaced when removed. Who is correct?
  - A. Tech A
  - B. Tech B
  - C. Both A and B
  - D. Neither A nor B
- \_\_\_\_\_ 4. Tech A says that head bolts are tightened past their yield point. Tech B says that head bolts are torqued then tightened to their yield point. Who is correct?
  - A. Tech A
  - B. Tech B
  - C. Both A and B
  - D. Neither A nor B
- \_\_\_\_\_ 5. Tech A says that a box-end wrench is more likely to round the head of a bolt than an open-end wrench. Tech B says that 6-point sockets and wrenches have more surface area on the bolt and will hold more firmly when removing and tightening. Who is correct?
  - A. Tech A
  - B. Tech B
  - C. Both A and B
  - D. Neither A nor B
- \_\_\_\_\_ 6. Tech A says that it is usually better to pull a wrench to tighten or loosen a bolt. Tech B says that pushing a wrench will protect your knuckles if the wrench slips. Who is correct?
  - A. Tech A
  - B. Tech B
  - C. Both A and B
  - D. Neither A nor B
- \_\_\_\_\_ 7. Tech A says that when jump starting a vehicle, a spark typically occurs when making the last jumper cable connection. Tech B says that all four of the jumper cable connections should be made at the battery terminals. Who is correct?
  - A. Tech A
  - B. Tech B
  - C. Both A and B
  - D. Neither A nor B

- \_\_\_\_\_ 8. Tech A says that a dead blow hammer reduces rebound of the hammer. Tech B says that a dead blow hammer should be used to cut the head of a bolt off with a chisel. Who is correct?
- A. Tech A
  - B. Tech B
  - C. Both A and B
  - D. Neither A nor B
- \_\_\_\_\_ 9. Tech A says that gaskets can be removed quickly and safely with a portable grinder as long as the grinding wheel isn't too coarse. Tech B says that extreme care must be used when removing a gasket on an aluminum surface. Who is correct?
- A. Tech A
  - B. Tech B
  - C. Both A and B
  - D. Neither A nor B
- \_\_\_\_\_ 10. Tech A says that when using a file, apply pressure to the file in the direction of the cut and no pressure when pulling the file back. Tech B says that file cards are used to file uneven surfaces. Who is correct?
- A. Tech A
  - B. Tech B
  - C. Both A and B
  - D. Neither A nor B