



5. Define the following terms: clamping force, tensile strength, yield strength, and shear strength.
6. Identify the different types of fasteners, and their grade or property class.
7. Calculate any conversions such as English to metric and fractions to decimals.
8. Make Celsius or Fahrenheit measurements for the base unit of degrees for temperature, read and apply a thermometer.
9. Identify the units of measurements in automotive repair and determine the measurement technique.
10. Use and read linear measuring devices, tape measure, ruler, and so on.
11. Know when to use measurement tools for distance, length, angle, mass, weight, pressure, volume, and/or temperature.
12. Outline the operating principles of a standard English and metric micrometer and name the components.
13. Read an English micrometer.
14. Read a Metric micrometer.
15. Demonstrate how to properly set up, preload, and read a dial indicator.
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19. Perform battery state-of-charge tests; determine needed service. (AT1)
20. Perform battery capacity (load, high-rate discharge) test; determine needed service. (AT1)
21. Performs charging system output test and determines necessary action. (AT1)
22. Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment. (AT2)
23. Perform starter current draw tests; determine necessary action. (AT1)
24. Perform starter circuit voltage drop tests; determine necessary action. (AT1)
25. Remove and replace/reinstall starter. (AT1)
26. Repair wiring harnesses and connectors. (AT1)
27. Perform solder repair of electrical wiring. (AT1)
28. Describe the different types of headlight systems.
29. Inspect, replace, and aim headlights and bulbs. (AT2)
30. Inspect and test sensors, connectors, and wires of electronic instrument circuits; determine necessary action. (AT2)
31. Remove and reinstall door panel and instrument panel (dash) panel. (AT1)

#### A7 - Heating/AC:

1. Remove and replace radiator. (AT2)
2. Inspect, test, remove, and replace water pump. (AT2)
3. Performance test A/C system; diagnose A/C system malfunctions using principles of refrigeration. (AT1)
4. Inspect A/C compressor drive belts; replace and adjust as needed. (AT2)
5. Inspect, test, and replace A/C compressor clutch components or assembly. (AT2)
6. Check operation of automatic and semi-automatic heating control valves; determine necessary action. (AT3)
7. Determine coolant condition, drain and recover, flush system and refill with recommended coolant, and bleed system. (AT1)

#### A8 - Engine Performance:

1. Recognize and identify the physical and chemical operating principles associated with automotive gasoline engines.
2. Explain and calculate engine compression ratio.
3. Explain the following performance factors: speed, work, torque, and horsepower.
4. Perform oil and filter change. (AT2)
5. Explain the operation of the primary fuel system including fuel tank, pumps, filters, fittings, and lines.
6. Inspect and test mechanical and electrical fuel pumps and pump control systems for pressure, regulation and volume; perform necessary action. (AT1)
7. Replace fuel filters. (AT1)
8. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air. (AT2)
9. Check idle speed and fuel mixture. (AT2)
10. Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action. (AT1)
11. Remove and replace thermostat. (AT2)
12. Explain the operation of the positive crankcase ventilation (PCV) system.
13. Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action. (AT2)
14. Retrieve and record active and stored OBD I and OBD II diagnostic trouble codes (DTC) and clear codes. (AT1)
15. Explain how distributor and distributorless ignition systems generate and time an ignition spark through the primary and secondary circuits.
16. Inspect and test ignition system secondary circuit wiring and components; replace as needed. (AT2)
17. Check and adjust (where applicable) ignition system timing and timing advance/retard. (AT3)
18. Explain the combustion of a hydrocarbon. (AT3)



58. Explain the function and basic operation of a microprocessor and identify the different types of automotive computer input and output signals. (AT3)
59. Explain the following terms: read only memory (ROM), programmable read only memory (PROM), keep alive memory (KAM), and random access memory (RAM). (AT3)
60. Differentiate between volatile and nonvolatile memory and explain the term adaptive strategy. (AT3)
61. Explain why an analog/digital (A/D) converter is necessary in an automotive fuel-management computer. (AT3)
62. Describe and identify the two types of voltage signals produced by engine load-sensing devices. (AT3)
63. Inspect and test power and ground circuits and connections; service or replace as needed. (AT3)
64. Identify the different types of input sensors used

88. Read and interpret engine oscilloscope patterns. (AT3)

89. Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action. (AT3)