Achievable

ASVAB DUMP SHEET

Cooling, chassis, and electrical systems

Cooling system

- A combustion engine is a **heat engine**: only about 25% of its heat becomes work; the rest goes to the cooling system and the exhaust
- Keeps the engine from overheating, holds a steady temperature, warms it up quickly, and keeps the coolant from freezing
- **Water pump** (belt-driven or electric) pushes coolant through the **cooling jackets** around the cylinders
- **Thermostat:** opens when the engine is hot, sending coolant to the radiator; closed when cold, it sends it back to the pump
- **Radiator:** hot coolant runs through thin tubes and fins while the **fan** pulls air through
- **Radiator cap:** its pressure valve lets expanding coolant into the **recovery bottle**; its vacuum valve draws it back as it cools

Lubrication

- Oil cuts friction, carries heat away, holds dirt for the filter, and seals the piston rings
- **Oil pan** (below the crankshaft) → **pickup screen** → **oil pump** → **oil filter** → **oil galleries** to the moving parts → back to the pan
- **Pressure relief valve:** sends oil back to the pan when the pressure is too high
- Change the oil and filter regularly

Electrical system

- **Battery:** chemical energy into electrical; starts the engine and powers the car when it is off; lasts about 3—5 years
- **Ignition switch:** signals the **starter solenoid**, which closes the circuit from the battery to the **starter motor**; the motor turns the crankshaft until the engine runs, then disengages
- **Alternator:** turns the running engine's motion into electricity, recharging the battery and powering the car
- A car left unused drains its battery, since the alternator cannot recharge it

Drivetrain

- Carries power from the engine to the wheels: transmission, driveshafts, axles, and a clutch or torque converter
- **2WD:** front or rear wheels; **4WD:** all four, usually switched on by hand, for off-road traction; **AWD:** all four automatically, for the road

Transmission

- Gear ratios keep the engine in an efficient RPM range
- **Manual:** the **clutch** pedal disconnects the engine from the transmission so the driver can shift; the engine keeps running
- **Automatic:** planetary gears and internal clutches shift on their own; the **torque converter** passes power through fluid, so the engine idles in gear at a stop

Suspension

- Supports the weight, keeps the tires on the road, and absorbs shock
- **Springs** (coil, leaf or air) absorb bumps
- **Shock absorbers** turn the springs' bouncing into heat; a **strut** is a spring and shock in one
- **Sway (anti-roll) bars** cut body roll in turns

Steering and brakes

- **Steering:** the wheel turns the shaft and its **pinion**, which moves the **rack** left or right, then the **tie rods** turn the wheels
- **Brakes:** the pedal pushes a piston in the **master cylinder**, sending brake fluid through the brake lines
- At each wheel, that pressure squeezes the **pads** against the **rotor**, and the friction slows it