**1. Battery**

Behaviors:

* Car won’t start (silent or clicks): Corroded terminals → Clean terminals.
* Dim headlights/electronics: Age-related deterioration → Replace battery.
* Battery drains overnight: Parasitic drain → Fix electrical shorts.

**2. Alternator**

Behaviors:

* Dashboard battery light on: Faulty voltage regulator → Replace regulator.
* Headlights dim at idle: Worn bearings → Replace alternator.
* Dead battery while driving: Broken belt → Install new serpentine belt.

**3. Starter Motor**

Behaviors:

* Single loud click, no crank: Worn solenoid → Replace starter motor.
* Grinding noise on startup: Damaged flywheel → Repair flywheel.
* Intermittent starting: Loose/corroded wires → Clean/tighten connections.

**4. Fuel Pump**

Behaviors:

* Engine sputters at high speed: Clogged filter → Replace fuel filter.
* Whining from fuel tank: Worn pump motor → Replace fuel pump.
* Car stalls suddenly: Electrical failure → Check pump wiring/relays.

**5. Brake System**

Behaviors:

* Squealing when braking: Worn pads → Replace brake pads.
* Steering wheel shakes: Warped rotors → Resurface/replace rotors.
* Soft brake pedal: Leaking lines → Repair lines and bleed system.

**6. Timing Belt**

Behaviors:

* Engine misfires: Belt slipping → Adjust tension.
* Engine won’t start (no compression): Snapped belt → Replace belt.
* Ticking noise from engine: Oil contamination → Fix leaks + replace belt.

**7. Radiator**

Behaviors:

* Overheating at idle: Clogged fins → Clean radiator.
* Coolant puddles under car: Corrosion/leaks → Replace radiator.
* Heater blows cold air: Faulty thermostat → Replace thermostat.

**8. Spark Plugs**

Behaviors:

* Rough idling: Worn electrodes → Replace plugs.
* Poor fuel efficiency: Carbon buildup → Clean/replace plugs.
* Engine hesitation: Incorrect gap → Adjust gap with feeler gauge.

**9. Tires**

Behaviors:

* Steering wheel vibration: Uneven wear → Rotate tires.
* Slow air loss: Puncture → Patch/plug tire.
* Sidewall cracks: Aged rubber → Replace tires.

**10. Suspension System**

Behaviors:

* Bouncy ride: Worn shocks → Replace shocks.
* Clunking over bumps: Damaged ball joints → Replace joints.
* Car leans to one side: Broken springs → Install new springs.

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1. Battery

The battery provides the electrical power needed to start the car and run accessories.

Breakdown reasons:

* Corrosion on terminals: Acid buildup can block electrical flow.
* Age-related deterioration: Batteries typically last 3–5 years before losing efficiency.
* Electrical system drain: Faulty wiring or leaving lights on can drain the battery.

Possible fixes:

* Clean terminals with a baking soda solution and a wire brush.
* Replace the battery with a new one if it no longer holds charge.
* Inspect and repair electrical systems to prevent unnecessary drains.

2. Alternator

The alternator charges the battery and powers the car’s electrical systems while driving.

Breakdown reasons:

* Worn bearings: Bearings inside the alternator wear out over time, causing noise or failure.
* Faulty voltage regulator: The regulator may fail, leading to overcharging or undercharging.
* Broken belt: A snapped serpentine belt stops the alternator from functioning.

Possible fixes:

* Replace the alternator if bearings are damaged beyond repair.
* Replace the voltage regulator if it’s not controlling voltage properly.
* Install a new serpentine belt if it’s broken or worn.

3. Starter Motor

The starter motor is responsible for cranking the engine during startup.

Breakdown reasons:

* Worn starter solenoid: The solenoid may fail to transmit power to the motor.
* Damaged flywheel gear: Teeth on the flywheel may break, preventing engagement with the starter gear.
* Electrical connection issues: Loose or corroded wires can disrupt power flow to the starter motor.

Possible fixes:

* Replace the solenoid or starter motor if it fails to engage properly.
* Repair or replace the flywheel if teeth are damaged.
* Tighten or clean electrical connections to restore power flow.

4. Fuel Pump

The fuel pump delivers fuel from the tank to the engine at the correct pressure.

Breakdown reasons:

* Clogged fuel filter: A dirty filter restricts fuel flow, causing engine performance issues.
* Worn pump motor: Over time, the pump motor may fail due to wear and tear.
* Electrical failure: Faulty wiring or relays can disrupt power to the fuel pump.

Possible fixes:

* Replace a clogged fuel filter to restore proper fuel flow.
* Install a new fuel pump if it has failed completely.
* Inspect and repair wiring or relays for electrical issues.

5. Brake System

Brakes ensure safe stopping by converting kinetic energy into heat via friction.

Breakdown reasons:

* Worn brake pads: Pads wear down over time, reducing braking efficiency and causing squealing sounds.
* Warped rotors: Excessive heat can warp rotors, leading to vibrations during braking.
* Leaking brake lines: Fluid leaks reduce hydraulic pressure, compromising braking performance.

Possible fixes:

* Replace worn brake pads with new ones to restore braking power.
* Resurface or replace warped rotors for smooth braking action.
* Repair or replace leaking brake lines and bleed the system.

6. Timing Belt

The timing belt synchronizes engine components like the crankshaft and camshaft.

Breakdown reasons:

* Age-related wear: Rubber belts degrade over time, leading to cracks or snapping.
* Improper tension: Loose belts may slip, while overtightened belts can snap prematurely.
* Oil contamination: Oil leaks can weaken and degrade rubber belts quickly.

Possible fixes:

* Replace timing belts every 60,000–100,000 miles as per manufacturer recommendations.
* Adjust belt tension using a tensioner tool for proper alignment and function.
* Fix oil leaks before replacing a contaminated belt.

7. Radiator

The radiator cools engine coolant by dissipating heat into the air.

Breakdown reasons:

* Corrosion and leaks: Over time, rust can eat away at radiator materials, causing leaks.
* Clogged radiator fins: Dirt and debris block airflow through fins, reducing cooling efficiency.
* Faulty thermostat: A stuck thermostat can prevent coolant from circulating properly through the radiator.

Possible fixes:

* Repair small leaks with sealant or replace severely damaged radiators entirely.
* Clean clogged fins using compressed air or water spray for better airflow.
* Replace a faulty thermostat with a new one to restore proper coolant flow.

8. Spark Plugs

Spark plugs ignite the air-fuel mixture in your engine cylinders for combustion.

Breakdown reasons:

* Normal wear: Over time, electrodes erode, reducing spark efficiency and causing misfires.
* Carbon buildup: Excessive carbon fouling can insulate electrodes and prevent sparking.
* Incorrect gap: A gap that’s too wide or narrow affects ignition timing and performance.

Possible fixes:

* Replace spark plugs every 30,000–50,000 miles (or as recommended).
* Clean fouled spark plugs with specialized cleaners if reusable; otherwise, replace them.
* Adjust spark plug gaps using a feeler gauge for optimal performance.

9. Tires

Tires provide traction and support for your vehicle's weight while driving.

Breakdown reasons:

* Uneven wear: Misalignment or improper inflation causes uneven tread wear.
* Punctures: Nails or sharp objects can puncture tires, leading to air loss.
* Age-related deterioration: Tires lose flexibility and crack after years of use.

Possible fixes:

* Rotate tires regularly (every 5,000–7,500 miles) to ensure even wear.
* Patch small punctures using tire repair kits; replace tires for larger damage.
* Replace old tires (typically after 6–10 years) regardless of tread depth.

10. Suspension System

The suspension ensures smooth handling by absorbing shocks from road irregularities.

Breakdown reasons:

* Worn shock absorbers/struts: Worn shocks reduce ride comfort and handling stability.
* Damaged ball joints: Ball joints wear out over time, causing clunking noises and poor steering response.
* Broken springs: Coil springs can snap under heavy loads or due to corrosion.

Possible fixes:

* Replace worn shock absorbers/struts for improved ride quality.
* Replace damaged ball joints to restore proper steering function.
* Install new coil springs if they are broken or sagging.