

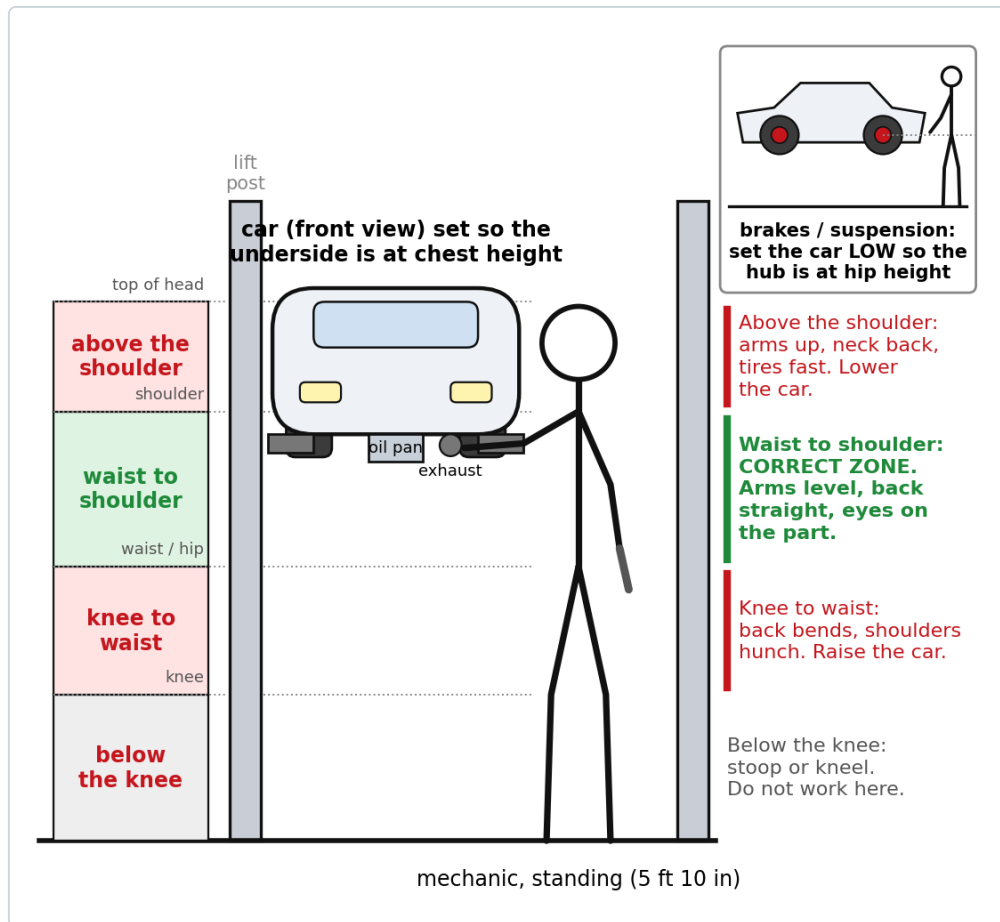
Saving the mechanic's back, body, and health

YES Electric • a plain-language course for shop helpers and car buyers

First edition (October 2026). Prices and hours in this course are rough numbers for a 2008–2016 sedan and will change by car and by year. Treat them as a guide for deciding, not a quote.

Most mechanics are worn out by 50. Knees, lower back, shoulders, hands, and hearing go first, and the damage comes from a few repeated things: working bent over or lying on concrete, lifting heavy parts wrong, fighting stuck bolts by hand, breathing fumes, and skipping eye and ear protection because it is a two-minute job. Here is what fixes each one, with what the plan already buys and what it should add.

Get the car to the mechanic, not the mechanic to the car. The two-post lift is the single biggest back-saver in the trade. Floor work means lying on concrete, lifting your head and arms against gravity for an hour, and crawling out and back in for every tool. On a lift the car comes to chest height and the tech stands up straight with his arms at a natural height. The rule shops use: set the lift so the work is between your waist and your shoulders. Brakes and suspension at hip height, exhaust and oil pan at chest height. Never work with your hands above your head for long; raise or lower the car instead. The plan's Tier 1 and Tier 2 are floor work, and that is tolerable for a few months, but one lift should be the first thing bought once the garage exists, before the second bay or the third compressor.



A mechanic standing beside a car on a lift, with the body marked in height bands. Waist to shoulder is the green zone where the work should be. Knee to waist (bend) and above the shoulder (reach) are red. The car is set so the oil pan and exhaust sit at chest height; the inset shows the car set low so the brake hub is at hip height.

Drawing made for this course.

For the floor months, make the floor better. A padded creeper with a headrest, which the plan has, keeps the neck off the concrete. Anti-fatigue mats, the thick rubber kind, in front of the bench and anywhere the tech stands for hours; concrete is what wears out knees and heels. Knee pads or a kneeling pad for wheel work. A rolling stool, which the plan also has, so brake and wheel jobs are done sitting at wheel height instead of squatting. A low-profile transmission jack and engine hoist so the heavy things are never lifted by hand.

Never lift a heavy part by hand. Engine 300 to 500 pounds, transmission 150 to 250, a truck tire and wheel 80, a battery 40, a brake rotor 20. The hoist, the trans jack, and a wheel dolly carry the big ones. For the middle ones, a cheap hydraulic lift table (\$150 to \$300) rolls a transmission, a battery, or a tire to the car at the right height. For tires, use a tire dolly or roll them, never carry. Lifting rule for anything you do pick up: get it close to your body, bend the knees, and never twist while holding it. Twisting under load is how discs blow.

WRONG ✗

RIGHT ✓

What parts weigh

engine	300-500 lb
transmission	150-250 lb
truck wheel + tire	80 lb
battery	40 lb
brake rotor	20 lb

red = never by hand.
Use a hoist, jack,
or a second person.

Wrong and right ways to lift. On the left the back is bent, the legs are straight, the load is far out in front, and the body twists. On the right the knees are bent, the back is straight, the load is held close, and the feet point where the load is going. The table lists what common parts weigh; anything in red is never lifted by hand.

Drawing made for this course.

Let tools do the fighting. A stuck bolt fought by hand with a ratchet is the classic shoulder and wrist injury. The cordless impact in the plan takes the hits. A long breaker bar makes a hard bolt easy; the longer the bar, the less force from the arm. Penetrating oil and a few minutes of patience before pulling. Cordless ratchets for the hundred small bolts a day. Pullers and presses instead of hammers; hammering with your arm overhead at a ball joint is a rotator cuff waiting to tear. Anti-vibration gloves for impact and grinder work, because years of vibration kill the nerves in the fingers.

Protect the eyes, every time. Safety glasses on before the hood opens, not just for grinding. Rust falls in eyes under cars, brake fluid and battery acid splash, springs let go. Keep three pairs in the shop so there is never an excuse. A face shield over the glasses for grinding and cutting. Side shields on the glasses for under-car work.



Two pieces of protective gear a mechanic should wear: clear safety glasses and a half-mask respirator with filter cartridges. The glasses go on before any work under a car, where rust and fluid drop into your face; the respirator is for grinding, painting, or anything that makes dust or fumes.

Photo: File:2023 Okulary ochronne (1).jpg by Jacek Halicki, CC BY-SA 4.0; File:Half-Mask Respirators, 1.jpg by Kent Madsen, CC BY-SA 2.0.

Protect the ears. The impact wrench, the air compressor cycling, the grinder, and the Hackzall are all over the level that causes permanent loss in a few years. Foam plugs cost nothing; put a dispenser on the wall. Earmuffs hanging on the compressor. Hearing damage never comes back.

Protect the hands. Nitrile gloves for every fluids job. Used oil, brake fluid, and coolant soak through skin and are tied to cancer and kidney damage over a career; the gloves also keep the hands from drying and cracking. Cut-resistant gloves for anything with an edge. A good hand cleaner and lotion at the sink, because cracked hands get infected. Clean the cuts the same day.

Protect the lungs. Exhaust fumes are the one that sneaks up. Never run a car in a closed bay; the plan's carport phase is fine, but the garage needs an exhaust hose that clamps to the tailpipe and runs outside, or a big door that stays open while anything idles. A carbon monoxide detector on the wall, \$25. Brake dust: spray the brake assembly with brake cleaner or water before pulling it apart instead of blowing it off with the air gun, because that dust goes straight into the lungs. A dust mask for grinding and a real respirator for anything that smells like solvent. Weld and cut outside or with the door open.



The rubber nozzle on the end of a shop exhaust extraction hose. The nozzle slips over the vehicle's tailpipe, and a fan pulls the exhaust out of the building so nobody breathes carbon monoxide while the engine is running indoors.

Photo: Vehicle exhaust removal system - Fire Station 3 by Arlington County, CC BY-SA 2.0.

Protect against fire and chemicals. The plan has the extinguishers. Add a spill kit and a covered metal can for oily rags, which can catch fire on their own in a pile. Gas in a red can only, stored away from the compressor and grinder. Battery charging with the hood open and no sparks nearby; a charging battery makes hydrogen. Eyewash station or at least a bottle on the wall for battery acid and brake cleaner.

Protect against the car itself. The rules in the plan's skills test exist because they are the ones that kill. Lift locks set before going under. Jack stands under every car on a jack. Wheel chocks before jacking. Disconnect the battery before any starter, alternator, or airbag work, and wait a minute on airbags. Hybrid orange cables are not touched without the insulated gloves and training. Hot cooling systems are not opened until they are cool; a radiator cap pulled on a hot engine throws boiling coolant in the face. Springs on struts are compressed under hundreds of pounds; buy the complete strut assembly instead of a spring compressor, which is what the plan already does.



Left: a strut with a coil spring compressor clamped on. The two threaded hooks squeeze the spring down so the top nut can be removed; the spring stores enough energy to seriously injure someone if a compressor slips. Right: a complete strut and spring assembly as it comes out of the car, next to the hub and brake rotor.

Photo: Compressed spring by drewgstephens, CC BY-SA 2.0; File:Federbein.JPG by Bukk, Public domain.

Heat. A Bessemer carport in July is a heat-stroke job. Fans, shade, water on ice, and the heavy work early in the day. The garage needs a big fan on the wall and, once there is a sales office, a cool room to get into for ten minutes. Heat is the reason an open-air Tier 2 shop should move indoors before the second summer.

The body outside work. The techs who last stretch hamstrings and hips at the start of the day, because tight hips pull on the lower back. Core strength protects the back more than anything else; even ten minutes of planks and bridges a few nights a week. Switching sides on repetitive work. Taking the fifteen-minute break instead of eating lunch under the car. Good boots with real soles replaced yearly, because the arches go before the knees. And a schedule that is 40 hours, which the plan already guarantees, instead of the 55-hour flat-rate grind that burns out dealership techs.

What this costs on top of the plan.

Item	Rough cost	Buys
Anti-fatigue mats, 3	\$100-200	Knees and feet
Knee pads and kneeling pad	\$30-50	Knees
Hydraulic lift table	\$150-300	Back, for parts under 500 lb
Tire dolly	\$50-100	Back, for wheels
Exhaust hose and reel, or CO detector plus open door	\$25-400	Lungs
Safety glasses x3, face shield, earplug dispenser, earmuffs	\$60-100	Eyes and ears
Nitrile gloves, cut gloves, anti-vibration gloves	\$60-100	Hands and nerves
Respirator and dust masks	\$40-80	Lungs
Eyewash bottle, spill kit, rag can	\$80-150	Burns and fire
Wall fan and ice water cooler	\$100-250	Heat

About \$700 to \$1,700 total, less than a third of the first lift. The lift itself is the item that changes the mechanic's career length, and the rest keeps him working the days in between. Workers' comp, which the plan already lists as required before the first working interview, is what pays when any of this fails, and a shop with the safety gear in place gets the lower rate.

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