

LIFTING VEHICLES

Description

This Activity Plan is designed as one among many through which students will rotate in small groups. Students will learn how to safely lift and support a vehicle using a floor jack, safety stands and wheel chocks. This skill is fundamental for automotive mechanics. The safe procedure for lifting a vehicle on a hoist will also be demonstrated.

Lesson Outcomes

The student will be able to:

- Prevent a vehicle from moving or rolling
- Place a floor jack underneath a vehicle
- Place a safety stand
- Operate a floor jack
- Describe the correct operation of a vehicle hoist
- Operate a vehicle hoist

Assumptions

Before doing so themselves, students will have been given some theory and the instructor will have demonstrated the proper procedure for lifting a vehicle using both a floor jack and a vehicle hoist.

Terminology

Automatic transmission “park”: the “P” or park position as indicated on the gear shift lever.

Body on frame: an older style of vehicle in which the vehicle body is separate from the frame.

Cross member: a strong structural member of a vehicle that supports other vehicle components.

Emergency brake: a secondary brake in a vehicle that is designed to be used in an emergency situation. Often called a park or parking brake.

Floor jack: a device used to raise the axle of a vehicle off the ground to inspect the underside of the vehicle or change a tire.

Floor jack lift plate: a small plate at the end of a floor jack that supports the lift point of the floor jack.

Manual transmission “neutral”: the neutral position on a standard or manual transmission.

Hoist: apparatus used to lift a vehicle.

Hoist arms: the arms of the machine that go under the vehicle to support it as it is lifted into the air.

Rear wheel drive: a vehicle that has the engine power driving (or powering) the rear wheels. Often found on pickup trucks, larger vehicles and older cars

Rocker panel sill: a very strong lip of a vehicle that the manufacturer designs to support the vehicle if it has to be lifted into the air (e.g., when removing a flat tire).

Safety stand: a stand used to support a vehicle after it has been lifted with a floor jack.

Unibody: a newer style of vehicle construction that incorporates the body and frame into one unit.

Wheel chock: a wedge or block placed next to a wheel to stop the vehicle from moving.

Estimated Time

30 minutes

Recommended Number of Students

20, based on the *BC Technology Educators' Best Practice Guide*, 2–3 students at one time

Facilities

Automotive shop

Tools

- Floor jack
- Safety stand
- Vehicle hoist
- Wheel chocks



Figure 1—Trolley jack



Figure 2—Jack stand

Materials

Small- to mid-size vehicle

Resources

Automotive Lift Institute

Use Automotive Lift Institute (ALI) materials as supplementary resources for safety instruction.
www.autolift.org/

Automotive Lift Safety Awareness

www.youtube.com/watch?v=N3R_8889p3g

ACTIVITY 1: PLACING A CAR ON SAFETY STANDS

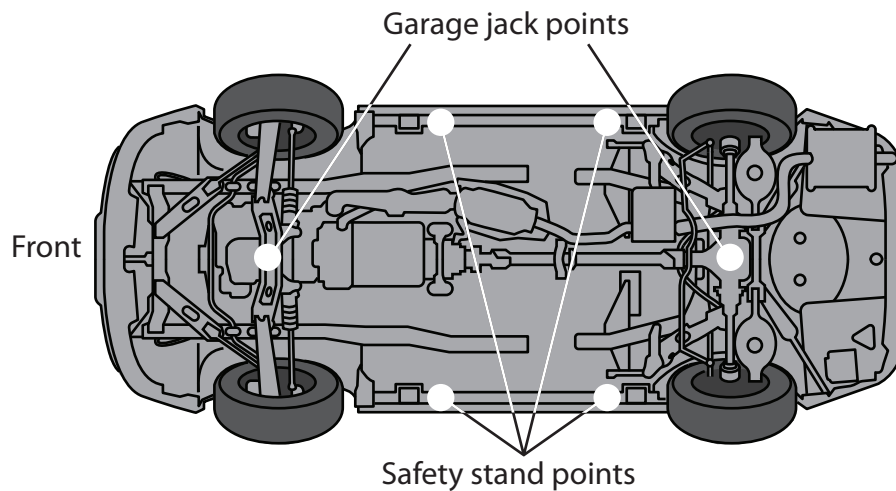


Figure 3—Garage jack points and safety stand points

Part 1: Prevent the Vehicle from Moving or Rolling

Warning

Choose a clean, flat and level spot. Little stones, rocks and debris can prevent the floor jack from rolling properly while lifting, which can cause extensive damage to the vehicle. Jacking is only permitted on concrete or pavement, never on asphalt (the stands or jack can sink into the soft asphalt).

1. Apply the parking or emergency brake.
2. Place the vehicle in the "Park" setting if the vehicle is equipped with an automatic transmission.
3. Place the vehicle in the "Neutral" setting if the vehicle is equipped with a manual, floorboard transmission.
4. Place wheel chocks at one of the wheels that will stay on the ground.

Part 2: Place the Floor Jack

1. Raise the vehicle with the floor jack so that the safety stands have enough room to be placed underneath the vehicle.

Warning

Never place the floor jack underneath an oil pan, muffler, floor pan or any other vulnerable section of the vehicle.

Part 3: Place the Safety Stands

1. On unibody vehicles, place the safety stands underneath the rocker panel sill lips or a solid cross-member.
2. On body-on-frame vehicles, it is best to place the safety stands underneath the frame.
3. On rear wheel drive vehicles, when jacking up the rear, place the safety stands under the rear axle tubes.
4. Lower the floor jack slowly and carefully so the safety stands fully support the vehicle.
5. Shake the car once it is on the safety stands to make sure nothing will shift. Readjust as necessary. Shake in both directions (side to side and fore and aft). Have the instructor check the security of the vehicle before doing any work on it.

Part 4: Lower the Vehicle to the Floor

1. Place the floor jack underneath the vehicle in the same spot that was used during the lift.
2. Slowly raise the vehicle only far enough so that both safety stands can be removed.
3. Remove the safety stands, one at a time, from underneath the vehicle. It is not necessary to go right underneath the vehicle to remove the safety stands; instead, extend one arm in order to retrieve the stand.
4. Slowly lower the vehicle and remove the floor jack.
5. Remove the wheel chocks.

ACTIVITY 2: PLACING A CAR ON A HOIST

1. Students will be shown how to safely lift a vehicle on the hoist that exists in the shop. Refer to the manufacturer's operational instructions, as every hoist is different.
2. Students could then be asked to demonstrate their competency on the hoist.

Warning

This does not mean that a student be trusted to lift a vehicle unsupervised. Always supervise closely!

Evaluation Guidelines

Lifting Vehicles Rubric (see next page)

Name: _____

Lifting Vehicles Rubric

Criteria	Poor	Below Standard	Satisfactory	Good	Excellent
Is the emergency brake applied?	1	2	3	4	5
For automatic transmissions, is the vehicle in Park? For manual transmissions, is the vehicle in Neutral?	1	2	3	4	5
Are wheel chocks placed beside the wheels that will stay on the ground?	1	2	3	4	5
Is the floor jack properly positioned under a cross-member?	1	2	3	4	5
Are safety stands placed in the correct locations?	1	2	3	4	5
Are the safety stands safely removed and the floor jack correctly used when lowering the vehicle back to the floor?	1	2	3	4	5
Total:					/30