



Auto Mechanics

Merit Badge Workbook

This workbook is not required but is designed to help you with this merit badge. No one can add or subtract from the Boy Scout Requirements #33215. Use page backs & add pages as needed. Please send comments to: craig@craiglincoln.com. Requirements revised: 2000, Workbook updated: January 2004.

Scout's Name: _____ Unit: _____

Counselor's Name: _____ Counselor's Ph #: _____

NOTE: Access to an automobile or truck (with owners manual) is needed to meet some of the requirements for this merit badge.

1) Discuss with your counselor the safety equipment, _____

tools, _____

and clothing used while checking or repairing a motor vehicle. _____

Use this equipment, tools, and/or clothing (when needed or called for) in meeting the requirements for this merit badge.

2) Explain how an internal combustion engine operates _____

and the differences between gasoline _____

and diesel engines. _____

3) Demonstrate your knowledge of general maintenance. Do the following:

a) Demonstrate how to check the fluid level of the following:

Brake Fluid _____

Engine Oil _____

Coolant _____

Power steering fluid _____

Windshield washer fluid _____

- Transmission fluid (automatic and standard) _____
- b)** Check battery fluid, if possible, and the condition of battery terminals. _____
- c)** Show the location of fuse boxes and the size of fuses, and demonstrate the proper replacement of burned-out fuses.
- d)** Review the maintenance chart in the owner's manual. Explain the requirements and time limits. _____

e) 1) Choose a car cleaner and wax product for the vehicle. _____
 Explain clear-coat paint _____

and the precautions necessary for care. Clean and wax the vehicle, both inside and out. _____

2) Use a vinyl and rubber protectant (on vinyl tops, rubber door seals, sidewalls, etc.) and explain the importance of this protectant. _____

f) Demonstrate how to check the condition and tension of belts and hoses.

g) Demonstrate the following:

- 1) Check the lighting in the vehicle, including instrument, warning, and exterior bulbs.
- 2) Check headlight alignment

h) Demonstrate how to check the vehicle exhaust system.

4) Demonstrate your knowledge of the following:

a) 1) Explain the difference between tire and vehicle manufacturer's information specifications and demonstrate where to find these specifications. _____

2) Demonstrate how to check pressure and properly inflate a tire.

3) Using the manufacturer's jack supplied with the vehicle:

- Demonstrate how to engage the jack correctly on the vehicle.
- Demonstrate how to change a tire correctly .

b) 1) Explain the difference between bias-belted tires and radial-belted tires. _____

2) Diagram and explain in writing how to rotate bias-belted and radial-belted tires.

3) Using the manufacturer's guidelines, rotate the tires on the vehicle.

c) 1) Explain the camber, _____
 caster, _____
 and toe-in adjustments on wheel alignment. _____

2) Explain why wheel alignment is important to the life of a tire. _____

d) Explain the purpose of the lateral-wear bar indicator. _____

e) Explain how to dispose of old tires properly. _____

5) Demonstrate your knowledge of engine lubrication. Do the following:

a) Explain the purpose of motor oil. _____

b) Explain where to find the recommended type and amount of oil to be used in the vehicle engine. _____

c) Explain the difference in viscosity (10W/30 versus SAE 30). _____

d) Perform an oil change and oil filter change on a vehicle. _____

e) Explain how to dispose of the used oil and filter properly. _____

6) Cooling system Do the following:

a) Explain the need for coolant in the cooling system. _____

b) Flush and change the engine coolant in the vehicle according to the manufacturer's instructions. _____

c) Explain how to dispose of used coolant properly. _____

7) Demonstrate your knowledge of a fuel system. Do the following:

a) Explain how the air and fuel system work together. _____

b) Explain how a carburetor works _____

and how a fuel- injection system works. _____

c) Explain how an on-board computer works with the fuel injection system. Show where the computer is located. _____

d) Explain why it is necessary to have an air filter and a fuel filter. Locate them and change them according to the manufacturer's recommendations. _____

e) Explain what fuel additives are, for both the carburetor _____

and the fuel injection systems. _____

8) Demonstrate your knowledge of ignition and electrical systems. Do the following:

a) Diagram and explain the parts of the electrical system.

explain the parts of the electrical system _____

b) Explain the cylinder engine sequence. _____

c) Explain the spark plug gap and if practical, change the spark plug. (Use an engine with spark plugs that can be reached without tilting the engine.) _____

d) Demonstrate how to connect jumper cables on your battery properly. Explain how to jump-start a vehicle. _____

e) Explain the difference between electronic _____

and point ignition systems. _____

9) Demonstrate your knowledge of a drive train. Do the following:

a) Diagram the drive train and explain the different parts.

Explain the different parts. _____

b) Explain the difference between automatic _____

and standard transmissions. _____

c) Explain the types of automatic transmission fluid. _____

d) Explain the types of lubricants used in a standard transmission and in the differential. _____

e) Explain the difference between front-wheel, _____

rear-wheel, _____

and four-wheel drive. _____

f) Explain the gear ratio of the differential.

10) Demonstrate your knowledge of a brake system. Do the following:

a) Explain the brake system (including anti-lock systems) and how it operates. _____

b) Explain the differences between disc _____

and drum systems. _____

c) Demonstrate checking conditions on a vehicle brake system. After checking make recommendations for repairs (if necessary).

11) Explain the purpose, _____

importance, _____

and limitations of passive restraints. _____