Auto Mechanics

Merit Badge Workbook

This workbook can help you but you still need to read the merit badge pamphlet (book). No one can add or subtract from the Boy Scout Requirements #33215. Merit Badge Workbooks and much more are below: Online Resources.
Workbook developer: craig@craiglincoln.com. Requirements revised: 2000, Workbook updated: April 2008.

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, _____

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_____

tools, _____

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_____

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 _____

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_____

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_____

_____

and the differences between gasoline _____

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_____

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. _____

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e. 1. Choose a car cleaner and wax product for the vehicle. Explain clear-coat paint and the precautions necessary for care.

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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. _____

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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. _____

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b. Explain how a carburetor works _____

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and how a fuel- injection system works. _____

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

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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. _____

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

_____

and the fuel injection systems. _____

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

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

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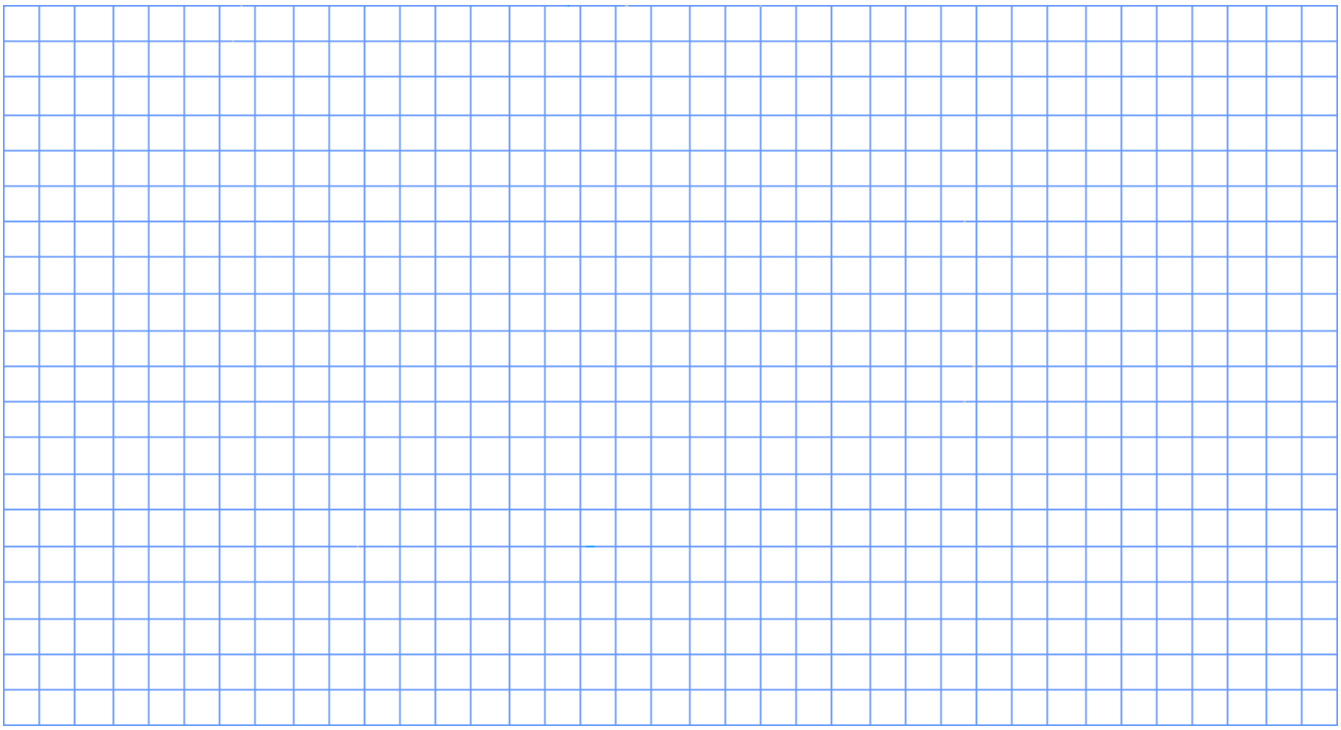

b. Explain the cylinder engine sequence. _____

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_____

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.) _____

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_____

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

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_____

e. Explain the difference between electronic _____

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and point ignition systems. _____

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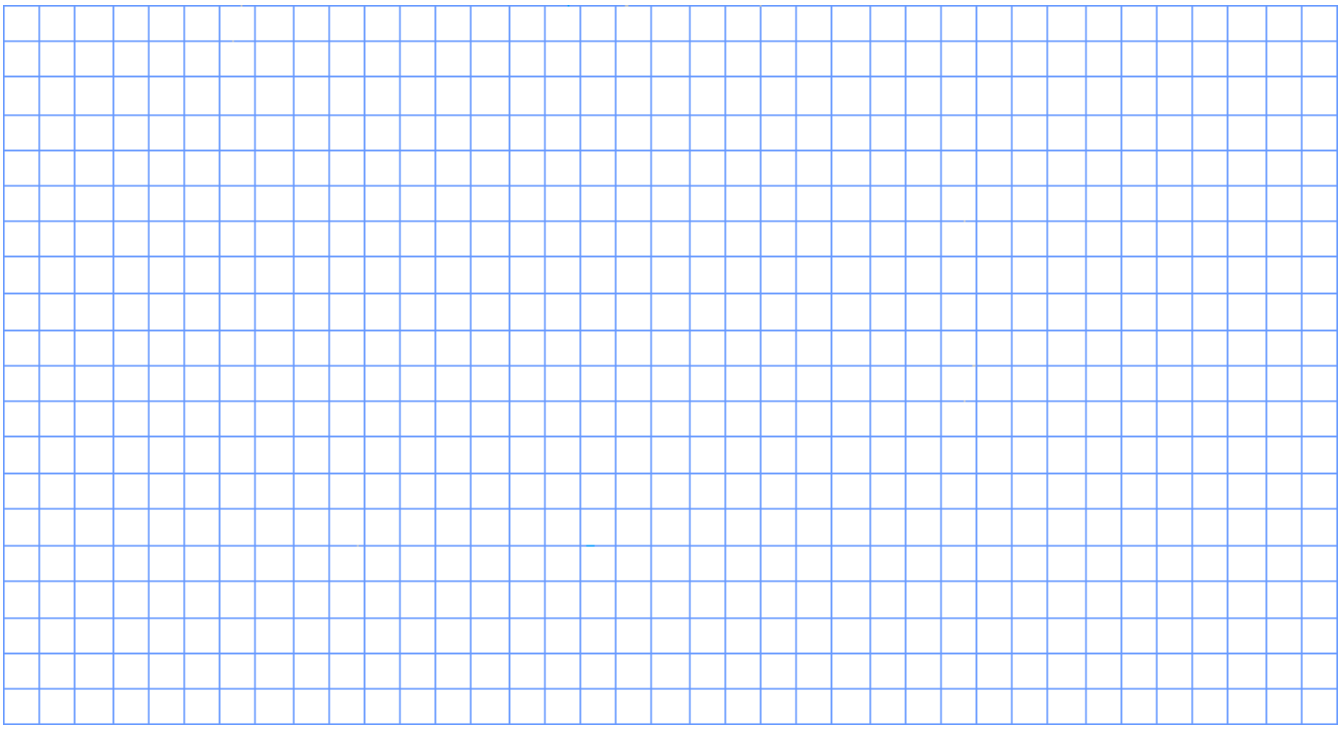
9. Demonstrate your knowledge of a drive train. Do the following:

a. Diagram the drive train



and explain the different parts. _____

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b. Explain the difference between automatic _____

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and standard transmissions. _____

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c. Explain the types of automatic transmission fluid. _____

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

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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. _____

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b. Explain the differences between disc _____

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and drum systems. _____

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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. _____

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Online Resources *(Use any Internet resource with caution and only with your parent's or guardian's permission.)*

Boy Scouts of America: ► scouting.org ► Guide to Safe Scouting ► Age-Appropriate Guidelines ► Safe Swim Defense
► Scout ► Tenderfoot ► Second Class ► First Class Rank Videos ► Safety Afloat

Boy Scout Merit Badge Workbooks: usscouts.org -or- meritbadge.org **Merit Badge Books:** www.scoutstuff.org

Online Videos: http://www.expertvillage.com/

Car Inspection Videos: Tire Pressure Tread Wear Transmission Fluid Wiper Blades Lights other fluids...

Car Maintenance Videos: Check Oil Change Oil Inspect Belts Air Filter Detailing more…