



AUTOMOTIVE MAINTENANCE MERIT BADGE WORKBOOK

This Scoutmaster Bucky Merit Badge Workbook is based off the *2020 Scouts BSA Requirements*.

Consider also using the Automotive Maintenance merit badge class preparation page for clarification and expectations when participating in a Scoutmaster Bucky merit badge opportunity (online or in-person).

<https://scoutmasterbucky.com/merit-badges/automotive-maintenance/>

Scout's Name:

You will need access to a car or truck and its owner's manual to meet some requirements for this merit badge. If you do not have your own vehicle, you should work with your merit badge counselor or other trusted adult to obtain access to a vehicle and the owner's manual for that vehicle.

REQUIREMENT 1: Do the following:

REQUIREMENT 1A: Explain to your counselor the hazards you are most likely to encounter during automotive maintenance activities, and what you should do to anticipate, help prevent, mitigate, or lessen these hazards.

REQUIREMENT 1B: 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.



REQUIREMENT 2: ****General Maintenance, Safety, and Registration.**** Do the following:

REQUIREMENT 2A: Review the maintenance chart in the owner's manual. Explain the requirements and time limits.

REQUIREMENT 2B: Demonstrate how to check the following:

REQUIREMENT 2B1: Brake fluid



REQUIREMENT 2B2: Engine oil

REQUIREMENT 2B3: Coolant

REQUIREMENT 2B4: Power steering fluid

REQUIREMENT 2B5: Windshield washer fluid



REQUIREMENT 2B6: Transmission fluid

REQUIREMENT 2B7: Battery fluid (if possible) and condition of the battery terminals

REQUIREMENT 2C: Locate the fuse boxes; determine the type and size of fuses. Demonstrate the proper replacement of burned-out fuses.

REQUIREMENT 2D: Demonstrate how to check the condition and tension of belts and hoses.



REQUIREMENT 2E: Check the vehicle for proper operation of its lights, including the interior overhead lights, instrument lights, warning lights, and exterior bulbs.

REQUIREMENT 2F: Locate and check the air filter(s).

REQUIREMENT 2G: Explain the purpose, importance, and limitations of safety belts and passive restraints.

REQUIREMENT 2H: Find out the requirements for your state's emissions and safety inspections (as applicable), including how often a vehicle needs to be inspected.



REQUIREMENT 2I: Explain the importance of registering a vehicle and find out the annual registration fee for renewing your family car's registration.

REQUIREMENT 3: ****Dashboard.**** Do the following:

REQUIREMENT 3A: Explain the function of the fuel gauge, speedometer, tachometer, oil pressure, and engine temperature gauge. Point each one out on the instrument cluster.

REQUIREMENT 3B: Explain the symbols that light up on the dashboard and the difference between the yellow and red symbols. Explain each of the indicators on the dashboard, using the owner's manual if necessary.



REQUIREMENT 4: ****Tires.**** Do the following:

REQUIREMENT 4A: Explain the difference between tire manufacturer's and vehicle manufacturer's specifications and show where to find them.

REQUIREMENT 4B: Demonstrate how to check tire pressure and properly inflate a tire. Check the spare tire and make sure it is ready for use.

REQUIREMENT 4C: Explain why wheel alignment is important to the life of a tire. Explain caster, camber, and toe-in adjustments on wheel alignment.



REQUIREMENT 4D: Explain the purpose of the lateral-wear bar indicator.

REQUIREMENT 4E: Explain how to dispose of old tires in accordance with local laws and regulations.

REQUIREMENT 5: ****Engine.**** Do the following:

REQUIREMENT 5A: Explain how an internal combustion engine operates. Tell the differences between gasoline and diesel engines. Explain how a gasoline-electric hybrid vehicle is powered.



REQUIREMENT 5B: Discuss the purpose of engine oil. Explain the API service code, the SAE number, and the viscosity rating.

REQUIREMENT 5C: Explain where to find the recommended oil type and the amount of oil to be used in the vehicle engine.

REQUIREMENT 6: ****Cooling System.**** Do the following:

REQUIREMENT 6A: Explain the need for coolant in the cooling system, and the importance of selecting the correct coolant type for a given vehicle.



REQUIREMENT 6B: Explain how to flush and change the engine coolant in the vehicle, and how to properly dispose of the used coolant.

REQUIREMENT 7: **Fuel System.** Do the following:

REQUIREMENT 7A: Explain how the air and fuel systems work together and why it is necessary to have an air filter and fuel filter.

REQUIREMENT 7B: Explain how a how a fuel injection system works and how an onboard computer works with the fuel injection system.



REQUIREMENT 8: **Ignition and Electrical Systems. Do the following:**

REQUIREMENT 8A: Diagram and explain the parts of the electrical system.

REQUIREMENT 8B: Explain the engine's firing order.

REQUIREMENT 8C: Explain the purpose of the spark gap.



REQUIREMENT 8D: Demonstrate how to safely connect jumper cables to your car battery.

REQUIREMENT 9: ****Drive Train.**** Do the following:

REQUIREMENT 9A: Diagram the drive train and explain the different parts.

REQUIREMENT 9B: Explain the difference between automatic and standard transmissions.



REQUIREMENT 9C: Explain the types of automatic transmission fluid.

REQUIREMENT 9D: Explain the types of lubricants used in a standard transmission, and in the differential and transfer case.

REQUIREMENT 9E: Explain the difference between front-wheel, rear-wheel, and four-wheel drive.

REQUIREMENT 10: **Brake System. (Do the following:



REQUIREMENT 10A: Explain the brake system (including antilock systems) and how it operates.

REQUIREMENT 10B: Explain the differences between disc and drum systems.

REQUIREMENT 10C: Demonstrate how to check the condition of a vehicle's brake system. After checking, make recommendations for repairs (if necessary).

REQUIREMENT 11: Do TWO of the following:



REQUIREMENT 11A: Determine the value of three different vehicles you are interested in purchasing. One must be new and one must be used; the third vehicle can be new or used. For each vehicle, find out the requirements and cost of automobile insurance to include basic liability and options for collision, comprehensive, towing, and rental car. Using the three vehicles you chose and with your merit badge counselor's assistance, complete the operation/maintenance chart provided in the merit badge pamphlet. Use this information to determine the operating cost per mile for each vehicle, and discuss what you learn with your counselor.

REQUIREMENT 11B: Choose a car cleaner and wax product for a vehicle you want to clean. Explain clear-coat paint and the precautions necessary for care. Clean the vehicle, both inside and out, and wax the exterior. Use a vinyl and rubber protectant (on vinyl tops, rubber door seals, sidewalls, etc.) and explain the importance of this protectant.

REQUIREMENT 11C: Locate the manufacturer's jack. Use the jack to demonstrate how to engage the jack correctly on the vehicle, then change a tire correctly.

REQUIREMENT 11D: Perform an oil filter and oil change on a vehicle. Explain how to properly dispose of the used oil and filter.



REQUIREMENT 12: Find out about three career opportunities in the automotive industry. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.