



# AUTOMOTIVE MAINTENANCE MERIT BADGE WORK SHEET (BYU/UVU PowWow)

Scout's Name

Instructor's Name

Scout's Address

City

State

ZIP

## Instructions

- 1) The Scout is to read the merit badge book before the first week of PowWow.
- 2) Bring this work sheet, paper, and pencil or pen each week.

## Requirement Instructions\*

- 1) Requirement 1 will be covered during the two sessions of PowWow.
- 2) Requirement 2 should be completed as **homework** between the two sessions of PowWow.
- 3) Requirement 3 will be covered during the two sessions of PowWow.
- 4) Requirement 4 will be covered during the two sessions of PowWow.
- 5) Requirement 5 will be covered during the two sessions of PowWow.
- 6) Requirement 6 will be covered during the two sessions of PowWow.
- 7) Requirement 7 will be covered during the two sessions of PowWow.
- 8) Requirement 8 should be completed as **homework** between the two sessions of PowWow.
- 9) Requirement 9 will be covered during the two sessions of PowWow.
- 10) Requirement 10 should be completed as **homework** between the two sessions of PowWow.
- 11) Requirement 11 should be completed as **before** the first session of PowWow.
- 12) Requirement 12 should be completed as **homework** between the two sessions of PowWow.

\*All requirements may be subject to change by the merit badge counselor based on time constraints at the PowWow session. Please listen to all instructions given by the instructor to be aware of any changes.

## Requirement 1

**Initial**

What kind of safety equipment is used while checking or repairing a motor vehicle?

What kinds of tools are used while checking or repairing a motor vehicle?

What kind of clothing is used/worn while checking or repairing a motor vehicle?

Use this equipment, tools, and clothing when completing the other requirements for this merit badge.

## Requirement 2

**Initial**

a. Review the maintenance chart in the owner's manual. Explain the requirements and time limits.

Do the following with your counselor (or qualified adult) present. Have them initial each task when it has been properly completed.

b. Demonstrate how to check the following:

Brake fluid

Engine oil

Coolant

Power steering fluid

Windshield washer fluid

Transmission fluid

Battery fluid (if possible) and condition of the battery terminals

c. Locate the fuse boxes and determine the size of fuses.

Demonstrate the proper replacement of burned-out fuses.

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

e. Check the lighting in the vehicle, including instrument, warning, and exterior bulbs.

f. Locate and check the air filter.

g. Explain the purpose, importance, and limitations of safety belts and passive restraints.

h. Find out the requirements for the state inspection in your state, including how often a vehicle needs to be inspected.

i. Explain the importance of registering a vehicle, and find out the annual registration fee for renewing your family car's registration.

### **Requirement 3**

**Initial**

a. Explain the function of the following parts and be able to point out each one on the instrument cluster:

Fuel gauge –

Speedometer –

Tachometer –

Oil pressure –

Engine temperature gauge –

b. 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**

**Initial**

a. Explain the difference between tire manufacturer's and vehicle manufacturer's specifications.

Where do you find these specifications?

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

c. Explain the camber adjustment on wheel alignment.

Explain the caster adjustment on wheel alignment.

Explain the toe-in adjustment on wheel alignment.

Why is wheel alignment important to the life of a tire?

- d. What is the purpose of the lateral-wear bar indicator?
- e. Explain how to dispose of old tires properly.

**Requirement 5**

**Initial**

- a. How does an internal combustion engine operate?

What are the differences between gasoline and diesel engines?

How is a gasoline-electric hybrid vehicle powered?

- b. Explain the purpose of engine oil.

Explain the API service code.

Explain the SAE number.

Explain the viscosity rating.

- c. Explain where to find the recommended oil type and the amount of oil to be used in the vehicle's engine.

**Requirement 6**

**Initial**

- a. Why do you need coolant in the cooling system?
- b. Explain how to flush and change the engine coolant in the vehicle and how to properly dispose of the used coolant.

**Requirement 7**

**Initial**

- a. Explain how the air and fuel systems work together and why it is necessary to have an air filter and fuel filter.
- b. Explain how a fuel injection system works and how an on-board computer works with the fuel injection system.

**Requirement 8**

**Initial**

- a. Use the back of this page to diagram (with labels) and explain the parts of the electrical system.
- b. Explain the cylinder engine sequence.
- c. Explain the purpose of the spark gap.

Do the following with your counselor (or qualified adult) present. Have them initial each task when it has been properly completed.

- d. Demonstrate how to change the spark plugs in any internal combustion engine (lawn mower, dirt bike, motorcycle).
- e. Demonstrate how to safely connect jumper cables to your car battery.

### **Requirement 9**

**Initial**

- a. Use the back of this page to diagram (with labels) the drive train and explain the 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.

### **Requirement 10**

**Initial**

- a. Explain the brake system (including antilock systems) and how it operates.
- b. Explain the difference between disc and drum systems.

Do the following with your counselor (or qualified adult) present. Have them initial each task when it has been properly completed.

- c. Demonstrate how to check the condition of a vehicle's brake system.

After checking the brake system, make a recommendation for repairs (if necessary).

### **Requirement 11**

**Initial**

Do two of the following:

*Option 1:* 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 counselor's or parent'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 explain what you have learned on a separate sheet of paper.

*Option 2:* Choose a car cleaner and wax product for a vehicle you want to clean. Explain clear-coat paint and the precautions necessary for care on a separate sheet of paper. 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 the protectant on that same sheet of paper.

*Option 3:* Locate the manufacturer's jack. With the assistance of your counselor (or qualified adult), use the jack to demonstrate how to engage the jack correctly on the vehicle, then change a tire correctly.

*Option 4:* With the assistance of your counselor (or qualified adult), perform an oil filter and oil change on a vehicle. Explain how to properly dispose of the used oil and filter on a separate sheet of paper.

**Requirement 12**

**Initial**

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

**Merit badge work sheets will not be accepted at the Council Office in place of the official Merit Badge Application Card. Those who do not complete all the requirements should take their partially completed merit badge work sheet and their official application card to their local merit badge counselors for completion.**