



Royal Rangers Merit Requirements – Silver AUTO MECHANICS MERIT

Safety Notice

Safety is a must! Working on an automobile must require the permission of the owner. Adult supervision is a requirement for safety sake. Use safety stands that are the proper ton rating to correctly support a raised vehicle before removing any wheels. Be sure the stands are the vehicles frame (not under the "A" frame). Be sure the legs of the stands are resting on solid, level ground—not on asphalt or dirt that could cause the stand to collapse

1. Describe in writing, the parts and functions of the following major systems of a vehicle: Chassis System, Drive System, Power Plant, Control System, Running Gear, and Electrical System.
2. Draw a diagram on paper explaining the function and operation of a four-cycle, internal combustion engine. Explain the difference between four-stroke gasoline and diesel engines.
3. Explain in writing, the mechanical differences and similarities of three makes of automobiles or trucks. List the vehicle that you would prefer to own and explain why.
4. Apply for a driver's permit from your state's licensing agency. Demonstrate your ability to drive carefully after receiving your permit. Take care of an auto properly for two months.
5. Create a table similar to the following to track maintenance on a vehicle under your care.

Make of Vehicle (Ford, Mazda, etc.) _____

Year of Vehicle _____

Model of Vehicle (Sedan, Pickup) _____

Make of Vehicle (Ford, Mazda, etc.)	Year of Vehicle	Model of Vehicle (Sedan, Pick-up)	
Description of Service of Duty	Service Performed (if any)	Specs Needed	Date Completed
Inspect fluid levels of the following: Brake fluid, engine oil, coolant, power steering fluid, windshield washer fluid, automatic and standard transmission fluid, battery fluid (unless –maintenance free)			
Show the location of fuse boxes and the size of fuses. Demonstrate how to recognize and to properly replace burned-out fuses.			

Check all lights and warning devices: Headlights, taillights, turn signals, hazard signals, clearance lights, dome light, dash lights, charging system indicator, lubrication system indicator, brake warning light (including ABS).			
Inspect vehicle exhaust system for leaks or faulty parts.			
Change the motor oil and oil filter; (Be sure you know how much oil to put into a vehicle's crankcase)			
Remove and change the air filter			
Replace the spark plugs - checking the spark gap of each plug and set them according to manufacturer's specifications (sometimes recorded on a decal by the radiator).			
Change a flat tire - check the tire air pressure (where are specifications for tire pressure found?)			

6. Explain what the symbols molded into the tire mean. Explain how if a tire needs to be replaced due to wear.
7. Explain how a computer operates the fuel-injection system in a car. Describe the differences between a carbureted system and a fuel-injection system.
8. Complete the following:

- a. Explain why a vehicle needs a fuel filter and an air filter. Locate these filters on a vehicle and point them out for your commander.
 - b. Describe the antilock braking system and its purpose.
 - c. Explain the purpose, importance, and limitations of the passive restraint system on a vehicle.
 - d. Describe the safety items to be checked for good working order when purchasing a used vehicle.
 - e. Describe the operation of three types of ignition systems: point-type, breaker less type, and distributor less type.
 - f. Define *viscosity*. Describe the difference in viscosity between 10W/30 and SAE30 weight oils.
9. Create a chart similar to the one below. Maintain a record of a vehicle's performance over two thousand miles. Include things such as fuel consumption, lubrication, oil consumption, and repairs.

Make of Vehicle (Ford, Mazda, etc.) _____
 Year of Vehicle _____
 Model of Vehicle (Sedan, Pickup) _____
 Indicate mileage of vehicle at the start of this report _____

Date	Mileage on Odometer	Maintenance or Repair Needed	Cost to Make Repair
		Oil/filer change	
		Add coolant	
		Inflate tires	
Date	Mileage on Odometer	Amount of Fuel (in gallons)	Total cost of fuel