MPCAT
HIGH SCHOOL
SKILLS
CHALLENGE

2024 Event Schedule

9:00am	**Registration and Sign-in**
9:45am	**Kickoff**
9:55am – 10:35 am	**Main Event Round 1**
10:40am-11:20am	**Main Event Round 2**
11:25am – 12:05pm	**Main Event Round 3**
12:05pm-1:05pm	**Lunch and Careers Panel**
1:15 pm	**Individual Head-to –Head Competition** Wrench race Bolt size identification
1:30pm	**Awards Presentation**
1:45 pm	**Automotive Skills Challenge Ends**

The Main Event

The main event consists of three rounds of competition: Parts A, B and C. Students will compete in teams of two. Prizes (Snap-on Tools) will be awarded to the top three teams. A trophy will also be awarded to the two schools that have the highest overall score.

	Description
Part A	**ASE STYLE TECHNICIAN CERTIFICATION EXAM.** Students will complete a 40 question multiple choice exam. Exam questions are based on the MLR (G1) ASE Exam. English and Spanish versions of the exam will be available.
Part B	**COMPONENT ID, BOLT SIZING AND ELECTRICAL TESTING**. Students will identify underhood components, size fasteners and perform some electrical tests using a voltmeter.
Part C	**VEHICLE INSPECTION** Each team will be assigned a service bay where a vehicle will be on the lift with the wheels removed. The students will inspect fluid level, exterior lights, brakes, tires, etc…Following the inspection, the students will complete a short multiple choice test based on their inspection.

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Part A – TECHNICIAN CERTIFICATION EXAM

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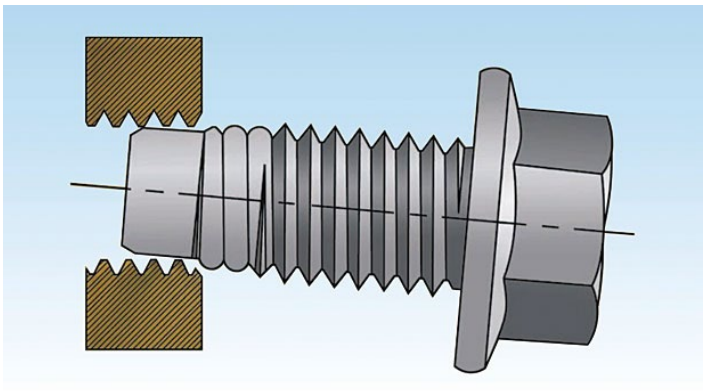
Example Questions

1. Technician A says a nut may become cross threaded if it is not started by hand on a fastener. Technician B says a brake rotor may be distorted by over tightening the wheel nuts with an impact wrench. Who is correct?
    a. Technician A
    b. Technician B
    c. Both A and B
    d. Neither A nor B

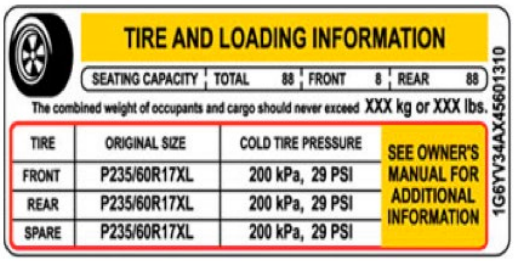


2. A lead acid battery may be explosive when exposed to sparks or flame because:
    a. Petroleum products are used in the manufacture of the battery case
    b. Sulfuric acid is vented from the battery during the discharge process
    c. Hydrogen gas is vented from the battery during the charging process
    d. Lead peroxide gas slowly escapes from the battery when the engine is not running

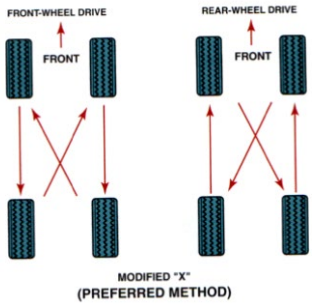
3. While performing a tire inspection and wheel rotation, a technician notices one of the tires is worn so that the wear bars are flush with the tread. The other tires have 5/32” wear remaining. Technician A says the technician should complete the rotation and recommend replacement of one tire. Technician B says the technician should complete the rotation and make a note of it on the Repair Order (RO). Who is correct?
    a. Technician A
    b. Technician B
    c. Both A and B
    d. Neither A nor B

4. Tire inflation is very important to the safe and economical operation of any vehicle. Technician A says that the cold inflation pressure should never exceed the maximum pressure imprinted on the sidewall of the tire. Technician B says to inflate the tires to the pressures recommended on the tire information decal or placard on the driver's door. Who is correct?
   a. Technician A
   b. Technician B
   c. Both A and B
   d. Neither A nor B

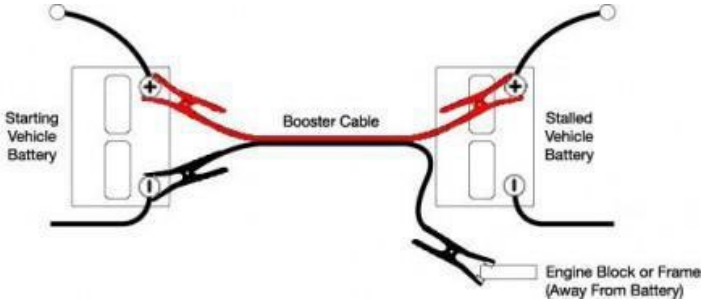
5. The tire placard can usually be found _____.
   a. On the driver's door or post
   b. Behind the fuel filler door
   c. In the glove box
   d. All of the above



6. ¿Cuál de las siguientes afirmaciones sobre la rotación de neumáticos es FALSA?
   a. La presión de los neumáticos debe ajustarse a la presión recomendada por el fabricante
   b. El patrón de rotación de neumáticos a la derecha es el más utilizado
   c. El patrón de la derecha se puede utilizar para todos los vehículos
   d. Los neumáticos deben inspeccionarse de cerca antes de rotarlos.



7. Al arrancar, _____.
   a. La última conexión debe ser el poste positivo de la batería descargada
   b. La última conexión debe ser el bloque motor del vehículo muerto
   c. El generador (alternador) debe estar desconectado en ambos vehículos
   d. Tanto a como c son correctas



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Part B – COMPONENT ID, BOLT SIZING AND ELECTRICAL TESTING

Component ID

Refer to the Mazda Miata to answer the following questions. Shade the letter on the answer sheet.

1. Air filter housing
2. Oil filler cap
3. Fuse box
4. Alternator
5. OBD connector
6. PCV hose
7. Tire placard
8. Battery
9. Fan shroud
10. PS reservoir
11. Valve cover
12. Brake booster
13. A/C hose
14. Washer fluid reservoir
15. Coolant reservoir
16. Exhaust manifold
17. Radiator hose
18. Heater hose
19. Intake manifold
20. Thermostat housing
21. Radiator
22. Brake master cylinder
23. Clutch master cylinder

Fastener Identification

Bolt #1

24. The bolt size is:

    a. 5/32”
    b. 1/2"
    c. 8mm
    d. 13mm

25. The bolt length is:

    a. 1 ¼”
    b. 1 ½”
    c. 30mm
    d. 35mm

26. The thread pitch is:

    a. 18 TPI
    b. 20 TPI
    c. 1.5mm
    d. 1.25mm

27. The bolt grade is:

    a. 5
    b. 8
    c. 9
    d. 10

Bolt #2

28. The bolt size is:

    a. 7/16”
    b. 5/8"
    c. 11mm
    d. 15mm

29. The bolt length is:

    a. 1 ¼”
    b. 1 ½”
    c. 30mm
    d. 35mm

30. The thread pitch is:

    a. 14 TPI
    b. 18 TPI
    c. 1.5mm
    d. 1.25mm

31. The bolt grade is:

    a. 5
    b. 8
    c. 9
    d. 10

Electrical Testing and Diagnosis

Using only a voltmeter, inspect each circuit and determine why it's not working.

Do not disconnect wires or modify the circuit in any way

Electrical Trainer #1

32. The source voltage is:

    a. 6V
    b. 12V
    c. 13.8V
    d. 15.5V

33. What type of circuit is this?

    a. Complex
    b. Series
    c. Parallel
    d. Simple

34. The cause of the problem is:

    a. There is an open in a bulb
    b. The circuit has a short
    c. There is an open in a ground wire
    d. There is an open in the fuse

Electrical Trainer #2

35. The source voltage is:
    a. 6V
    b. 12V
    c. 13.8V
    d. 15.5V
36. What type of circuit is this?
    a. Complex
    b. Series
    c. Parallel
    d. Simple
37. The cause of the problem is:
    a. There is an open in a bulb
    b. The circuit has a short
    c. There is an open in a ground wire
    d. There is an open in the fuse

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Part C – VEHICLE INSPECTION

School _____ Team # _____ Names _____ ____

Instructions

A vehicle "Maintenance Service and Inspection" is a routine service that is performed on modern automobiles about every 10,000 miles. It typically includes an oil change, tire rotation and vehicle inspection. Your task is to do one of these services (without actually doing the oil change or rotation). **HINT: Fill out the inspection form as if you were doing the oil change and rotation.**

- ✓ Inspect vehicle and fill out provided form completely (both sides)
- ✓ Make list of recommendations based on your inspection
- ✓ Review the *Maintenance Schedule* and provide a list of recommended services. Assume no service history is known(DO NOT LIST "INSPECT" ITEMS)

Do not change or adjust anything. Please leave vehicle exactly how you found it

IMPORTANT NOTE: DO NOT STEP ON BRAKE PEDAL WITH BRAKE DRUMS REMOVED

Your team will have 30 minutes to complete the inspection. Once complete, you will use your inspection sheet (and nothing else) to answer 11 multiple choice questions. You will have an additional 10 minutes to record the multiple choice answers.

MPC | AUTOMOTIVE TECHNOLOGY
MONTEREY PENINSULA COLLEGE

Vehicle Inspection Report

Vehicle Year/Make/Model _____ Date_____

Mileage _____ VIN _____ School/Team _____

Engine Displacement _____ **FWD RWD 4WD/AWD** (circle one) **SOHC DOHC OHV DIESEL HYBRID** (circle one)

Checked and OK **May Require Future Attention** **Requires Immediate Attention**

Interior/Exterior

	If Attention Required, Provide Details
Head/tail/ brake/ signal/hazard/reverse/park lights	
Horn Operation	
Warning Lights	
Windshield Wiper and Washer Operation	
Wiper Blade Condition	
Heater Performance	
Air Conditioner Performance	

Under Hood

	If Attention Required, Provide Details
Engine Air Filter	
Battery Condition (cables/clamps/corrosion)	
Battery Rating CCA_____	
Accessory Drive Belts	
Cooling System Hoses	

Fluids

Level OK	Level Not OK		Recommended Fluid Type (be as specific as possible)		
		Engine Coolant			
		Power Steering Fluid			
		Brake Fluid			
		Transmission/Transaxle			
		Engine Oil	Viscosity	API	ILSAC/ ACEA

Engine oil and filter changed Oil Capacity _____ Drain Plug Torque: _____

Tires

Manufacturer's Specs (psi): Front _____ Rear _____ Spare _____

Tire pressure checked (psi):

LF _____ RF _____ LR _____ RR _____ Spare _____

Tread Depth:

LF _____/32" RF _____/32" LR _____/32" RR _____/32"

Tire Damage/Abnormal Wear Specify: LF RF LR RR

Tires Rotated Lug Nut Torque Spec: _____

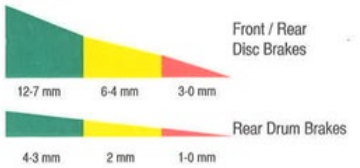
TPMS? (circle one) Yes No

Brakes

Front Brake Lining % Wear Remaining _____

Rear Brake Lining % Wear Remaining _____

Leaks



Tire Rotation Pattern	Maintenance Reminder
Front	
(Please indicate manufacturer recommended tire rotation pattern using arrows)	(Fill out window sticker above. Assume you just performed an oil change. Vehicle is driven mostly around Monterey (short trips))
Electronic Maintenance Reminder? (circle one) Yes No	

Notes/Comments

Recommendations	Manufacturer Recommended Maintenance Due (no service history is known)

PART C – Sample Multiple Choice Questions

Use you inspection sheet to answer the following questions (NOTE: you cannot refer back to the vehicle nor use any other resources)

1. What is the model year of the vehicle?
   a. 2005
   b. 2004
   c. 2003
   d. 2006
   e. 2007

2. Which exterior lights are out? (**Select all that apply**)
   a. Right Headlight (low beam)
   b. LF Signal Light
   c. LF side marker
   d. Right outer brake light
   e. Both high beams

3. What is the vehicle mileage?
   a. 91,720
   b. 97,129
   c. 89,210
   d. 102, 218

4. Which tire(s) were low (select all that apply)
   a. RF
   b. LF
   c. RR
   d. LR

5. Which warning lights were on? (select all that apply)
   a. SRS (air bag)
   b. Check Engine
   c. Brake
   d. ABS
   e. TPMS

School Scoring

Each school can field up to three teams. The School Score is based on the sum of the individual team scores PLUS “VIP Points”. VIP points are awarded to schools that have VIPs attend at least a portion of the event. VIPs can be parents, high school counselors, and high school administrators. Invite your VIPS!

Also, spectators can score points for their school by attending one of two technical presentations regarding the future of automotive technology. Following the presentation, there will be a short quiz on the presentation. The spectator’s score will be added to the overall school score.

Individual Head-to-Head Events

There will be two short individual competition events following lunch. Each school will select one competitor for each event. A prize will be awarded to the winner from each event.

Wrench Race

Using an open end combination wrench, students will race each other to see who can remove a bolt the fastest.

Bolt Head Size ID

In this “elimination style” event, students will look at a bolt head and then select the correct sized wrench or socket. If correct, the students move on to the next round. Any student who selects the incorrect size will be eliminated.