

BILLINGS PUBLIC SCHOOLS
AUTO CARE
Adoption Date April 12, 2004

MISSION STATEMENT

The Career Center is providing Billings area student with an education that explores and enhances vocational and academic skills to promote critical thinking, self-discipline and responsible citizenship.

BELIEF STATEMENTS

1. We believe in an environment that fosters mutual respect and dignity.
2. We believe that students and faculty should maintain pride in their work to improve their performance.
3. We believe that academic skills lay the foundation for critical thinking, problem solving, mathematical and communication skills.
4. We believe in the integration of academic and career areas.
5. We believe in the importance of current technology and its impact on the future.
6. We believe that students who are encouraged to set goals will gain confidence in their potential and ability to contribute to society.
7. We believe mutual support between school and community is an integral part of a students learning experience.

PHILOSOPHY

The automotive technician is a person who works in an exciting, rapidly changing and growing industry. The automotive technology curriculum is designed to educate individuals to become competent auto technicians. The primary focus of the educating program is the diagnosis, service and repair of automobile systems and components. Students will perform service on modern automotive equipment using special test equipment and tools. Students in a program will learn how to plan and perform repairs according to the various manufacturers recommended procedures. Career and Vocational/Technical Education programs focus on career preparation, resource management, communication, technical skill development, applied academics, technological literacy; and personal skills and leadership.

LEARNING DOMAINS

- I. The learner will demonstrate an understanding of automotive literacy and safety.**
- II. The student will demonstrate an understanding of basic engines.**
- III. The student will apply basic skills appropriate to automotive systems.**
- IV. The student will demonstrate an understanding of basic engine performance.**
- V. The student will demonstrate an understanding of basic services and repairs.**

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Learner Objectives

I. The student will demonstrate an understanding of automotive literacy and safety.

1. Student will demonstrate an understanding of the automobile.

- a. **Identify and locate important parts. (E)**
- b. Describe fundamental automotive systems.
- c. Explain the interaction of automotive systems.

2. Student will demonstrate an understanding of automotive career and ASE certification. (I)

- a. List common automotive careers.
- b. Demonstrate skills needed to be an automotive technician.
- c. Summarize the ASE certification program.
- d. Explain the tasks for each type of technician.

3. Student will demonstrate an understanding of tools and equipment. (E)

- a. **Identify common automotive hand tools to include metric and specialized tools.**
- b. **List safety rules for hand tools.**
- c. **List commonly used power tools and equipment.**
- d. **Explain safety rules that pertain to power tools.**

4. Student will demonstrate an understanding of auto shop safety. (E)

- a. **List the types of accidents that can occur in an auto shop.**
- b. **Explain how to prevent auto shop accidents.**
- c. **Describe general safety rules for the auto shop.**
- d. **Demonstrate proper safety precautions for power tools and shop equipment.**

5. Student will demonstrate an understanding of automotive measurements and math. (I)

- a. Describe both customary and metric measuring systems.
- b. Identify basic measuring tools and describe how to use them safely.
- c. Use conversion charts and summarizing basic math facts.

6. Student will demonstrate an understanding of using service information. (I)

- a. Describe the different types of service manuals and know how to use them correctly.
- b. Explain the different kinds of information and illustrations used in a service manual.
- c. Describe the three basic types of troubleshooting charts found in service manuals.
- d. Explain how to use computer-based service information.

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I. The student will demonstrate an understanding of automotive literacy and safety. (cont.)

7. Student will demonstrate an understanding of basic electricity and electronics.

(E)

- a. Explain the principles of electricity.**
- b. Describe the action of basic electric circuits.**
- c. Compare voltage, current, and resistance.**
- d. Describe the principles of magnetism and magnetic fields.**
- e. Identify basic electric and electronic terms and components.**
- f. Explain different kinds of automotive wiring.**
- g. Perform fundamental electrical tests.**

8. Student will demonstrate an understanding of fasteners, gaskets, seals, and sealants. (I)

- a. Identify commonly used automotive fasteners.
- b. Select and use fasteners properly.
- c. Remove, select, and install gaskets, seals, and sealants correctly.
- d. Summarize safety rules relating to fasteners, gaskets, seal, and sealants.

9. Student will demonstrate an understanding of vehicle maintenance, fluid service and recycling. (I)

- a. Check a car's fluid levels.
- b. Explain the importance of vehicle maintenance.
- c. Locate fluid leaks.
- d. Replace engine oil and filter.
- e. Change automatic transmission fluid and filter.
- f. Perform a grease job.
- g. Inspect for general problems with hoses, belts, and other components.
- h. Demonstrate safe practice while working with vehicle fluids.

II. The student will demonstrate an understanding of basic engines.

10. Student will demonstrate an understanding of engine fundamentals. (E)

- a. Identify the major parts of a typical automotive engine.**
- b. Describe the four-stroke cycle.**
- c. Define common engine terms.**
- d. Explain the basic function of the major parts of an automotive engine.**
- e. Citing and demonstrate safe working practices related to engines.**

11. Student will demonstrate an understanding of engine design classification and Construction. (E)

- a. Describe basic automotive engine classifications.**
- b. Compare gasoline and diesel engines.**
- c. Compare two and four stroke cycle engines.**

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II. The student will demonstrate an understanding of basic engines. (cont.)

12. Student will demonstrate an understanding of engine size and performance measurements. (I)
 - a. Describe engine size measurements based on bore, stroke, displacement, and number of cylinders.
 - b. Explain engine compression ratio and how it affects engine performance.
 - c. Explain engine torque and horsepower rating.
 - d. Describe the different methods used to measure and rate engine performance.
 - e. Explain volumetric efficiency, thermal efficiency, mechanical efficiency, and total engine efficiency.
 - f. Follow safe practices when making engine performance measurements.

III. The student will apply basic skills appropriate to automotive systems.

13. Student will demonstrate an understanding of computer system fundamentals. (I)
 - a. Compare computer systems to the human body's nervous system.
 - b. Describe the input, processing, and output sections of a basic computer system.
 - c. Explain input sensor and output device classifications and operations.
 - d. Sketch a block diagram for a computer system.
 - e. Summarize where computers, control modules, sensors, and actuators are typically located.
 - g. Explain how a computer uses sensor inputs to determine correct inputs.
14. Student will demonstrate an understanding of gasoline injection fundamentals. (I)
 - a. List some of the possible advantages of gasoline injections.
 - b. Describe the classifications of gasoline injection.
 - c. Explain the operation of electronic throttle body gasoline injections.
 - d. Explain the operation of electronic multipoint body gasoline injections.
 - e. Summarize the operation of electronic airflow using, hydraulic-mechanical (continuous), and manifold pressure-sensing gasoline injections systems.
 - e. Compare the various types of gasoline injections systems.
15. Student will demonstrate an understanding of carburetor fundamentals. (I)
 - a. Describe and identify the basic parts of a carburetor.
 - b. Compare carburetor design differences.
 - c. List and explain the fundamental carburetor systems.
16. Student will demonstrate an understanding of diesel injection fundamentals. (I)
 - a. Explain the operating principles of a diesel injection system.
 - b. Summarize the differences between gasoline and diesel engines.
 - c. Describe the major parts of a diesel injection system.

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III. The student will apply basic skills appropriate to automotive systems. (cont.)

17. Student will demonstrate an understanding of exhaust systems, turbochargers and superchargers. (I)
 - a. Describe the basic parts of an exhaust system.
 - b. Compare exhaust system design differences.
 - c. Perform exhaust system repairs.
 - d. Explain the fundamental parts of a turbo charging system.
 - e. Describe the construction and operation of a supercharging system.
 - f. Summarize the construction and operation of a supercharging system.
 - g. Demonstrate an understanding of safety procedures for working on exhaust systems turbochargers, and superchargers.
18. Student will demonstrate an understanding of automotive batteries. (I)
 - a. Explain the operation principles of a lead-acid battery.
 - b. Describe the basic parts of an automotive battery.
 - c. Compare conventional and maintenance-free battery performance.
 - d. Describe safety practices that should be followed when working with batteries.
 - f. Correctly answer ASE certification test questions that require a basic knowledge of automotive batteries.
- 19. Student will demonstrate an understanding of battery testing and service. (E)**
 - a. Explain the operation principles of a lead-acid battery.**
 - b. Describe the basic parts of an automotive battery.**
 - c. Clean a battery case and terminals.**
 - d. Charge a battery.**
 - e. Jump starting a car using a second battery.**
 - f. Replace a defective battery.**
 - g. Describe safety practices to follow when testing and servicing batteries.**
20. Student will demonstrate an understanding of starting system fundamentals. (I)
 - a. Explain the principles of an electric motor.
 - b. Describe the construction and operation of starting a motor.
 - c. Sketch a simple starting system circuit.
 - d. Explain the operation of solenoids.
 - e. List the functions of the main starter drive parts.
 - f. Describe starting system safety features.
21. Student will demonstrate an understanding of charging system fundamentals. (I)
 - a. List the basic parts of a charging system.
 - b. Explain the charging system operation.
 - c. Describe the construction of major charging system components.
 - d. Compare alternator and voltage regulator design differences.
 - e. Explore charging system indicators.
 - f. Describe safety practices to follow when working with charging systems.

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III. The student will apply basic skills appropriate to automotive systems. (cont.)

22. Student will demonstrate an understanding of ignition system fundamentals. (I)
- a. Explain the operation principles of an automotive system.
 - b. Compare contact points, electronic and computer-controlled ignition systems.
 - c. Describe the function of major ignition system components.
 - d. Explain charging system indicators.
 - e. **Describe safety practices to follow when working with charging systems. (E)**
23. Student will demonstrate an understanding of cooling system fundamentals. (I)
- a. Summarize the functions of a cooling system.
 - b. Explain the operation and construction of major cooling system components.
 - c. Compare cooling system design variations.
 - d. Explain the importance of antifreeze.
 - e. Discuss safety procedures to follow when working with cooling systems.
24. Student will demonstrate an understanding of lubrication system fundamentals. (I)
- a. List the basic parts of a lubrication system.
 - b. Summarize the operation of a lubrication system.
 - c. Describe the construction of lubrication system parts.
 - d. Compare different lubrication system designs.
 - e. Explain the characteristics and rating of engine oil.
25. Student will demonstrate an understanding of emission control systems. (I)
- a. Define the fundamental terms relating to automotive emission control systems.
 - b. Explain the sources of air pollution.
 - c. Compare cooling system design variations.
 - d. Explain the importance of antifreeze.
 - e. Discuss safety procedures to follow when working with cooling systems.
 - f. Summarize how to **OBI II** Systems use multiple oxygen sensors to check air-fuel mixture and catalytic converter efficiency.

IV. The student will demonstrate an understanding of basic engine performance.

26. Student will demonstrate an understanding of engine performance and drivability. (I)
- a. List the most common engine performance problems.
 - b. Describe the symptoms for common engine performance problems.
 - c. Explain typical causes of engine performance problems.
 - d. Use a systematic approach when diagnosing engine performance problems.

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IV. The student will demonstrate an understanding of basic engine performance. (cont.)

27. Student will demonstrate an understanding of engine performance and drivability.

(I)

- a. Use advanced diagnostic techniques to troubleshoot difficult problems.
- b. Use a can tool to find problems not tripping trouble codes by using snapshot and data stream values.
- c. Use a breakout box to measure circuit values.
- d. Explain the principles of an oscilloscope.

V. The student will demonstrate an understanding of basic services and repairs. (I)

28. Student will demonstrate an understanding of engine mechanical problems.

- a. Explain why proper diagnostic methods are important to engine repair.
- b. List common symptoms of engine mechanical problems.
- c. Discuss how to find abnormal engine noises.
- d. Summarize procedures for gasoline and diesel engine compression testing.
- e. Explain when and how to do a wet compression test.
- f. Summarize common causes of engine mechanical problems.
- g. Discuss safety practices to follow while performing engine inspections.