

Aviation Maintenance Technology
Diesel Equipment Technology
Power Equipment Technology
Career Role CIP Code – 47.0604
O-NET 49-3023.XX

Laboratory Activities

Special Notes

Career and Technical Student Organization (CTSO)
SkillsUSA

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**Arkansas Department of Career Education
Electrical Systems Student Performance Standards**

Course Title: Electrical Systems

Course Code: 494190

Credit: 1

At the completion of this course, the student will be able to:

- 1.0 Identify and Demonstrate Workplace Safety
 - 1.1 Students will be able to identify and demonstrate safe work practices
 - 1.2 Students will be able to practice personal safety
- 2.0 Demonstrate proper usage of Tools and Equipment
 - 2.1 Student will demonstrate knowledge of shop tools and equipment
- 3.0 Develop Employability/Leadership Skills
 - 3.1 Student will demonstrate employability skills
 - 3.2 Student will demonstrate leadership skills
- 4.0 Diagnose and Repair General Electrical System
 - 4.1 Student will demonstrate initial electrical system diagnostic procedures
 - 4.2 Student will demonstrate initial electrical system repair procedures
- 5.0 Diagnose and Repair Battery Service
 - 5.1 Student will demonstrate diagnostic and repair procedures for battery service
- 6.0 Diagnose and Repair Starting System
 - 6.1 Student will demonstrate initial diagnostic procedures
- 7.0 Diagnose and Repair Charging System
 - 7.1 Student will demonstrate initial diagnostic procedures
- 8.0 Diagnose and Repair Lighting Systems
 - 8.1 Student will demonstrate initial diagnostic procedures
- 9.0 Service Gauges and Electrical Accessories
 - 9.1 Student will demonstrate initial diagnostic procedures
- 10.0 Perform Diagnostics on Refrigeration System Components
 - 10.1 Student will demonstrate initial diagnostic procedures
 - 10.2 Student will demonstrate initial diagnostic procedures of Heating, Ventilation, and Engine Cooling Systems
 - 10.3 Student will demonstrate initial diagnostic procedures of Operating Systems and Related Controls

11.0 Preparing Vehicle for Service

11.1 Student will be able to prepare vehicle for service

11.2 Student will be able to prepare vehicle for customer

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Standard 1.0 Identify and Demonstrate Workplace Safety			
Performance Indicator 1.1 Students will be able to identify and demonstrate safe work practices.	• Recommended Application/Activity	CCSS Standards	CCTC Standards
1.1.1 Identify general shop safety rules and procedures.	<ul style="list-style-type: none"> Review and assess understanding of posted shop regulations. (Teacher will post standard expectations of safe shop practices) 	L11-12.4	CRP1
1.1.2 Utilize safe procedures for handling of tools and equipment.	<ul style="list-style-type: none"> Have students demonstrate proficiency with tools and equipment before performing tasks with them. 	L11-12.4	CRP2
1.1.3 Identify and use proper placement of floor jacks and jack stands.	<ul style="list-style-type: none"> Research service information for proper procedure. Demonstrate proficiency in using floor jacks and jack stands before lifting vehicle. 	R11-12.1	CRP11
1.1.4 Identify and use proper procedures for safe lift operation.	<ul style="list-style-type: none"> Locate and understand lift manufacturer safety information on lift tag. Refer to service manual for proper lifting points. Demonstrate proficiency operating lift. 	L11-12.4	CRP11
1.1.5 Utilize proper ventilation procedures for working within the lab/shop area.	<ul style="list-style-type: none"> Locate and identify ventilation system for shop. Identify and demonstrate proper use of ventilation procedure. Have students write paragraph on dangers of asphyxiation. 	W11-12.2	CRP3
1.1.6 Identify marked safety areas.	<ul style="list-style-type: none"> Locate and identify different marked areas in shop. Demonstrate understanding of purpose of marked areas. Have students draw diagram of marked areas in the shop. 	SI11-12.5	CRP2 CRP3
1.1.7 Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.	<ul style="list-style-type: none"> Have student identify and locate fire extinguishers in shop. Pass a fire safety test. Have students review evacuation plan and where it is located in the building. 	SL11-12.2	CRP3
Performance Indicator 1.2 Students will be able to practice personal safety.	• Recommended Application/Activity	CCSS Standards	CCTC Standards
1.2.1 Identify the location and use of eye wash stations.	<ul style="list-style-type: none"> Pass a safety procedure test. Have students label eye station on diagram of shop. 	SL11-12.2	CRP3
1.2.2 Identify the location of the posted evacuation routes.	<ul style="list-style-type: none"> Pass a safety procedure test. Have students label location of evacuation route on diagram of shop. 	SL11-12.2	CRP3

1.2.3 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.	<ul style="list-style-type: none"> • Demonstrate the proper usage of personal protective equipment (PPE). (Teacher will post rules posted including consequences of noncompliance). • https://www.osha.gov/OshDoc/data_General_Facts/ppe-factsheet.pdf 	SL11-12.2 R11-12.7	CRP3 TD5
1.2.4 Identify and wear appropriate clothing for lab/shop activities.	<ul style="list-style-type: none"> • Students will demonstrate appropriate dress before working in shop. (Teacher will post rules posted and logical consequences for noncompliance). 	SL11-12.2 R11-12.7	CRP3
1.2.5 Secure hair and jewelry for lab/shop activities.	<ul style="list-style-type: none"> • Identify hair and jewelry hazards. Have students find safety violation with other students. 	SL11-12.2 R11-12.7	CRP3 CRP4
1.2.6 Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.	<ul style="list-style-type: none"> • Identify areas of possible danger, show video or demonstrate air bag deployment. (Teacher will emphasize the importance of correctly identifying the yellow and orange circuits). 	SL11-12.2 R11-12.7 R11-12.6	CRP3 CRP5 CRP11
1.2.7 Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).	<ul style="list-style-type: none"> • Identify areas of possible danger. • Have a live demonstration of a volunteer being tazed by security office so they will understand the shock hazard. 	SL11-121d	CRP1 CRP12
1.2.8 Locate and demonstrate knowledge of material safety data sheets (MSDS).	<ul style="list-style-type: none"> • Location of MSDS included in safety test. Have students identify chemicals and pull up and print MSDS sheets on chemicals in the lab area. • http://www.msds.com/ 	R11-12.3	CRP11 CRP7

Standard 2.0 Demonstrate proper usage of Tools and Equipment

Performance Indicator 2.1 Student will demonstrate knowledge of shop tools and equipment.	Recommended Application/Activity	CCSS Standards	CCTC Standards
2.1.1 Identify tools and their usage in automotive applications.	<ul style="list-style-type: none"> • Tool identification exercises, including hand outs and spot quizzes. 	R11-12.4	TD2
2.1.2 Identify standard and metric designation.	<ul style="list-style-type: none"> • Review and identify common tool sizes utilizing textbook, handouts and enrichment exercises. • http://www.cdxetextbook.com/toolsEquip/hpt/common/title.html 	R11-12.4 L11-12.6	TD2

2.1.3 Demonstrate safe handling and use of appropriate tools.	<ul style="list-style-type: none"> Demonstrate proficiency. Have students identify the proper application of tools by setting up a scenario for students to describe which tool is used where. 	R11-12.4 L11-12.6	CRP1 CRP3
2.1.4 Demonstrate proper cleaning, storage, and maintenance of tools and equipment.	<ul style="list-style-type: none"> Demonstrate proficiency. (Teacher review policies regarding tool disbursement and storage). Have students clean and store tools according to school policy. 	R11-12.4 L11-12.6	CRP12
2.1.5 Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).	<ul style="list-style-type: none"> Demonstrate proficiency in measuring brake rotors, drums, thickness, parallelism, and run-out. Have students' measure items with different types of tools. 	R11-12.4 L11-12.6	CRP2 CRP4

Tools:

<http://www.onguardsafetytraining.com/samples/2Automotive%20Hand%20tools.pdf>

SAE/Metric:

<http://www.sosmath.com/tables/sae/sae.html>

http://www.hondachopper.com/garage/sae_to_metric/SAE-Metric_Conversion_Chart.pdf

http://www.engineeringtoolbox.com/wrenches-inches-metric-us-conversion-comparison-d_1607.html

Standard 3.0 Develop Employability/Leadership Skills			
Performance Indicator 3.1 Student will demonstrate employability skills.	Recommended Application/Activity	CCSS Standards	CCTC Standards
3.1.1 Demonstrate a good work ethic (i.e., relations with other, dependability, attitude, and personal hygiene).	<ul style="list-style-type: none"> Use guest speakers from industry. Utilize career coaches to model appropriate behavior and attitude. 	SL11-12.1	TD1 CRP1
3.1.2 Demonstrate teamwork.	<ul style="list-style-type: none"> Utilize team building activities. Assign paired work. Place students in work groups with rotating roles. 	SL11-12.1b	CRP1 CRP12
3.1.3 Demonstrate job-seeking techniques	<ul style="list-style-type: none"> Prepare resume. Perform mock interview. 	W11-12.5	CRP10

(i.e., write a resume, search for a job, arrange references, and apply interview techniques)	<ul style="list-style-type: none"> • Have career coach assist in resume building. • Complete a job application. 	W11-12.6	
3.1.4 Describe legal issues of sexual harassment in the workplace.	<ul style="list-style-type: none"> • Sexual harassment seminar. • Invite guest speakers. 	SL11-12.3	CRP5
3.1.5 Identify employment eligibility requirements (e.g. valid driver's license, background check etc.)	<ul style="list-style-type: none"> • Guest speaker for job requirements. • Review job opening requirements. 	SL11-12.3	TD5
Performance Indicator 3.2 Student will demonstrate leadership skills.	Recommended Application/Activity	CCSS Standards	CCTC Standards
3.2.1 Perform basic parliamentary procedures in a group meeting.	<ul style="list-style-type: none"> • Have class meetings. Following Robert Rules of Order. 	SL11-12.1b	CRP9
3.2.2 Demonstrate an understanding of one's personal values, interpersonal skills, etiquette, effectiveness in oral and written communication and courtesy. Develop and maintain a code of professional ethics.	<ul style="list-style-type: none"> • Perform self-evaluation. • Use a professional development manual. • Practice communication exercises. • Practice writing examples, role-play conflict resolution scenarios. • Utilize appropriate CTSO resources. 	SL11-12.1b	CRP4 CRP9
3.2.3 Maintain a good professional appearance.	<ul style="list-style-type: none"> • Teacher will counsel students on importance of maintaining a positive image. • Invite industry representatives to discuss standards. 	SL11-12.3	CRP3
3.2.4 Perform basic tasks related to securing and terminating employees.	<ul style="list-style-type: none"> • Perform mock interviews. • Evaluate employee performance and simulate terminations. 	SL11-12.3	CRP9 TD5
Standard 4.0 Diagnose and Repair General Electrical System			
Performance Indicator 4.1 Student will demonstrate initial electrical system diagnostic procedures.	Recommended Application/Activity	CCSS Standards	CCTC Standards
4.1.1 Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	<ul style="list-style-type: none"> • Use online service information to research vehicle information and technical service bulletins. • Use online or digital storage system for vehicle service history. Use service manual to identify service precautions. 	SL11-12.1a SL11-12.5	CRP11 TD-MTN1
4.1.2 Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of	<ul style="list-style-type: none"> • Identify and label electrical diagrams. • Discuss and differentiate between the types of circuits. Calculate missing values when you have known or 	SL11-12.1a	CRP7

electricity (Ohm's Law).	measurable values.		
4.1.3 Use wiring diagrams to trace electrical/electronic circuits.	<ul style="list-style-type: none"> • Use service information to identify electrical circuit. • Locate components in circuit. • Discuss relationship between diagram and physical location. 	R11-12.1 SL11-121a	CRP2 CRP7
4.1.4 Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance.	<ul style="list-style-type: none"> • Define source voltage and voltage drop. • Use a circuit simulation board or live circuit. • Emphasize using proper measurement range. 	R11-12.1	CRP8
4.1.5 Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.	<ul style="list-style-type: none"> • Define possible faults in an electrical circuit. • Differentiate between the different symptoms and possible causes. • Explain repair procedures for each. 	R11-12.1 R11-12.3	CRP4 CRP8
4.1.6 Check operation of electrical circuits with a test light.	<ul style="list-style-type: none"> • Use service information to establish proper test procedures. • Use a known good ground when checking for voltage. • Use constant source voltage when checking for ground. 	R11-12.1	CRP2
4.1.7 Check operation of electrical circuits with fused jumper wires.	<ul style="list-style-type: none"> • Disconnect circuit. • Complete circuit with fused jumper. • Check for proper operation. 	R11-12.9	CRP2
4.1.8 Measure key-off battery drain (parasitic draw).	<ul style="list-style-type: none"> • Use a battery-draw tester to measure current flow after vehicle enters sleep mode. • Use manufacturer recommended procedure to measure current by other methods when a tester is not available. 	R11-12.1	CRP11 CRP2
Performance Indicator 4.2 Student will demonstrate initial electrical system repair procedures	Recommended Application/Activity	CCSS Standards	CCTC Standards
4.2.1 Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.	<ul style="list-style-type: none"> • Perform visual inspection. • Look for signs of overheated or burnt insulation. • Check continuity. 	R11-12.9	CRP2
4.2.2 Perform solder repair of electrical wiring.	<ul style="list-style-type: none"> • Clean wires to be soldered. • Heat wire and allow solder to flow into junction. • Allow to set. • Test for physical structure and electrical function. 	R11-12.3	CRP2
4.2.3 Replace electrical connectors and terminal ends.	<ul style="list-style-type: none"> • Remove existing connector. • Clean wire and strip insulation to recommended length. • Install connector and crimp with tool. 	R11-12.9	CRP2

	<ul style="list-style-type: none"> • Test for physical structure and electrical function. 		
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Standard 5.0 Diagnose and Repair Battery Service			
Performance Indicator 5.1 Student will demonstrate diagnostic and repair procedures for battery service.	Recommended Application/Activity	CCSS Standards	CCTC Standards
5.1.1 Perform battery state-of-charge test; determine necessary action.	<ul style="list-style-type: none"> • Remove surface charge. • Measure voltage or perform specific gravity test with hydrometer. 	R11-12.3	CRP2
5.1.2 Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.	<ul style="list-style-type: none"> • Use service information. • Verify proper battery is in vehicle. • Connect voltage meter. • Apply load equal to one half of battery's cold cranking amps. Maintain load for 15 seconds. • Compare voltage reading to manufacturer specification. 	SL11-12.1a SL11-12.5	CRP11 TD-MTN1
5.1.3 Maintain or restore electronic memory functions.	<ul style="list-style-type: none"> • Demonstrate memory functions lost when battery is disconnected. • Discuss methods of saving information and research tools designed for task. 	SL11-12.1c	CRP6
5.1.4 Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.	<ul style="list-style-type: none"> • Perform visual inspection. • Use media source to demonstrate proper electrolyte level and fill procedures. • Inspect cables, clamps, and hold-downs for corrosion and proper installation. 	L11-12.4c	CRP11
5.1.5 Perform slow/fast battery charge according to manufacturer's recommendations.	<ul style="list-style-type: none"> • Use service information and battery charger operation manual. • View social media on proper procedure. 	R11-12.1	CRP11
5.1.6 Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.	<ul style="list-style-type: none"> • Discuss safety risks associated with each procedure. • Use media source to demonstrate proper procedure and possible consequences. 	SL11-12.1c L11-12.4c	CRP11
5.1.7 Identify high-voltage circuits of electric or hybrid electric vehicle and related safety precautions.	<ul style="list-style-type: none"> • Identify or illustrate wiring diagram of high-voltage circuit. • Invite technician from dealership to demonstrate manufacture and vehicle specific procedure as an example. 	SL11-12.1	CRP11 CRP7

5.1.8 Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.	<ul style="list-style-type: none"> • Use service information to determine affected components. • Research re-initialization procedures and discuss ramifications of failing to follow procedure. 	R11-12.1	CRP7
5.1.9 Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.	<ul style="list-style-type: none"> • Discuss difference between high-voltage and (12v) system. • Use service information for recommended procedure. 	R11-12.1	CRP2

Resources:

<https://autoteacher.net/>

https://autoteacher.net/Lesson_Plans.html Basic Skills and Service Tasks

Standard 6.0 Diagnose and Repair Starting System

Performance Indicator 6.1 Student will demonstrate initial diagnostic procedures.	Recommended Application/Activity	CCSS Standards	CCTC Standards
6.1.1 Perform starter current draw test; determine necessary action.	<ul style="list-style-type: none"> • Refer to service information for proper service procedure and allowable current draw. • Compare results with specifications. 	SL11-12.1a SL11-12.5	CRP11 TD-MTN1
6.1.2 Perform starter circuit voltage drop tests; determine necessary action.	<ul style="list-style-type: none"> • Use service information for proper procedure. • Compare results with published procedure. 	R11-12.1	CRP2
6.1.3 Inspect and test starter relays and solenoids; determine necessary action.	<ul style="list-style-type: none"> • Use service information to locate components. • Perform individual tests per service information. 	R11-12.1	CRP2
6.1.4 Remove and install starter in a vehicle.	<ul style="list-style-type: none"> • Follow published service information. 	R11-12.1	CRP2
6.1.5 Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action.	<ul style="list-style-type: none"> • Refer to service information for proper power flow and allowable. • Compare results with specifications. 	R11-12.1	CRP2

Standard 7.0 Diagnose and Repair Charging System

Performance Indicator 7.1	Recommended Application/Activity	CCSS	CCTC
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Student will demonstrate initial diagnostic procedures.		Standards	Standards
7.1.1 Perform charging system output test; determine necessary action.	<ul style="list-style-type: none"> • Check charging system output voltage. • Use service manual to retrieve specs to determine if replacement needed. 	SL11-12.1a SL11-12.5	CRP11 TD-MTN1
7.1.2 Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.	<ul style="list-style-type: none"> • Remove and reinstall belt. • Teacher will show students examples of different wear patterns on pulleys. • Use alignment tool to check pulley alignment. 	R11-12.8	CRP2
7.1.3 Remove, inspect, and re-install generator (alternator).	<ul style="list-style-type: none"> • Remove and reinstall alternator. • Have student refer to service manual for proper procedure. Have student write estimate for replacement. • Perform visual inspection. 	R11-12.8 W11-12.3	CRP2
7.1.4 Perform charging circuit voltage drop tests; determine necessary action.	<ul style="list-style-type: none"> • Have students perform voltage drop test. • Have student's list possible sources of drop and repair needed. Set up areas for drop and have students find damaged area. 	R11-12.8 W11-12.3	CRP2

Resources:

<http://cms.gates.com/education>

Standard 8.0 Diagnose and Repair Lighting Systems

Performance Indicator 8.1 Student will demonstrate initial diagnostic procedures.	Recommended Application/Activity	CCSS Standards	CCTC Standards
8.1.1 Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed	<ul style="list-style-type: none"> • Show students examples of good and bad light sockets. • Have students draw power flow on diagram. • Have students replace bulbs and sockets. • Use media source and show videos of bulb and light replacement. 	SI11-12.2	CRP2 CRP11
8.1.2 Aim headlights.	<ul style="list-style-type: none"> • Use service manual for proper procedure. • Aim headlights. 	R11-12.1	CRP2

	<ul style="list-style-type: none"> • Discuss different methods 		
8.1.3 Identify system voltage and safety precautions associated with high-intensity discharge headlights.	<ul style="list-style-type: none"> • Use service information for proper service precautions. • Use media source to show videos of hid light repair. 	SL11-12.1a SL11-12.5	CRP11 TD-MTN1

Standard 9.0 Service Gauges and Electrical Accessories

Performance Indicator 9.1 Student will demonstrate initial diagnostic procedures.	Recommended Application/Activity	CCSS Standards	CCTC Standards
9.1.1 Disable and enable airbag system for vehicle service; verify indicator lamp operation.	<ul style="list-style-type: none"> • Refer to service manual for proper service procedure. • Have student disable and enable airbag system. • Have student use scanner and retrieve Diagnostic Trouble Code (DTC). 	SL11-12.1a SL11-12.5	CRP11 TD-MTN1
9.1.2 Remove and reinstall door panel.	<ul style="list-style-type: none"> • Refer to service manual for procedure. • Have students remove and reinstall door panel. • Use media source to show videos of door panel removal. • Have students identify panel tools 	R11-12.1	CRP2 TD-MTN2
9.1.3. Describe the operation of keyless entry/remote-start systems.	<ul style="list-style-type: none"> • Refer to service manual for theory and operation. • Use media source to show vehicle operation. • Have students draw simple diagram and label parts 	R11-12.6	CRP2 TD-MTN2
9.1.4 Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators.	<ul style="list-style-type: none"> • Perform visual inspection. • Have student refer to service manual for proper procedure. • Have student check light function. 	R11-12.6	CRP2
9.1.5 Verify windshield wiper and washer operation; replace wiper blades.	<ul style="list-style-type: none"> • Replace wiper blades. • Check wiper washer function. • Have students draw power flow thru diagram. • Have students label parts on diagram 	W11-12.3	CRP2

Standard 10.0 Perform Diagnostics on Refrigeration System Components

Performance Indicator 10.1	Recommended Application/Activity	CCSS	CCTC
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Student will demonstrate initial diagnostic procedures.		Standards	Standards
10.1.1 Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.	<ul style="list-style-type: none"> • Perform visual inspection. • Remove and replace belts. • Discuss different belt wear patterns. • Have students make diagrams of belt routing. 	W11-12.3	CRP2
10.1.2 Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions.	<ul style="list-style-type: none"> • Use media source to describe service and safety precautions. • Have students write paragraph about hazards involved with servicing hybrid vehicles. 	W11-12.3	CRP2 CRP11
10.1.3 Inspect A/C condenser for airflow restrictions; determine necessary action. P-1	<ul style="list-style-type: none"> • Perform visual inspection. • Have students list some possible causes of restrictions. • Show students methods of straightening fins. 	L11-12.6	CRP2
Performance Indicator 10.2 Student will demonstrate initial diagnostic procedures of Heating, Ventilation, and Engine Cooling Systems.	Recommended Application/Activity	CCSS Standards	CCTC Standards
10.2.1 Inspect engine cooling and heater systems hoses; perform necessary action.	<ul style="list-style-type: none"> • Perform visual inspection. • Replace hoses. • Check for leaks. • Check antifreeze protection level. 	L11-12.6	CRP2
Performance Indicator 10.3 Student will demonstrate initial diagnostic procedures of Operating Systems and Related Controls.	Recommended Application/Activity	CCSS Standards	CCTC Standards
10.3.1 Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; perform necessary action.	<ul style="list-style-type: none"> • Perform visual inspection. • Replace cabin filters. • Have students draw diagram of air flow thru system. 	W11-12.3	CRP2
10.3.2 Identify the source of A/C system odors.	<ul style="list-style-type: none"> • Use media source to show student places where mold and mildew grow. • Show students dirty cabin filters. • Show students methods of preventing odors. 	SI11-12.5	CRP2

Standard 11.0 Preparing Vehicle for Service			
Performance Indicator 11.1 Student will be able to prepare vehicle for service.	Recommended Application/Activity	CCSS Standards	CCTC Standards
11.1.1 Identify information needed and the service requested on a repair order.	<ul style="list-style-type: none"> • Have students write and print repair orders. • Have students explain information on repair orders. • 	SL11-12.1a SL11-12.5 W11-12.8	CRP11
11.1.2 Identify purpose and demonstrate proper use of fender covers, mats.	<ul style="list-style-type: none"> • Have established policy of using covers and mats. • Have students rotate as service writer and have them install mats and covers. 	R11-12.2 W11-12.8	CRP2
11.1.3 Demonstrate use of the three C's (concern, cause, and correction).	<ul style="list-style-type: none"> • Have students list 3 c's on every work order. 	SL11-12.1b W11-12.8	CRP2
11.1.4 Review vehicle service history.	<ul style="list-style-type: none"> • Review available service records. • Discuss previous repairs and effect on current problem. 	SL11-12.5	CRP2
11.1.5 Complete work order to include customer information, vehicle identifying information, customer concerns, related service history, cause, and correction.	<ul style="list-style-type: none"> • Have students fill out work order on every vehicle. • Train student on writing and filling out repair orders. 	W11-12.2	CRP11 CRP4
Performance Indicator 11.2 Student will be able to prepare vehicle for customer.	Recommended Application/Activity	CCSS Standards	CCTC Standards
11.2.1 Ensure vehicle is prepared to return to customer per school or company policy (floor mats, steering wheel cover, etc.).	<ul style="list-style-type: none"> • Have established policy of what is done to a vehicle before it is returned to customer. • Clean off grease marks or stains etc. • Ensure car is fixed according to work order. 	R11-12.2 R11-12.9	CRP11 CRP2

Common Core State Standards Grades 9-12

ELA Speaking and Listening Standards Grades 9-10

1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively. **SL9-10.1**
 - a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. **SL9-10.1a**
 - b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. **SL9-10.1b**
 - c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. **SL9-10.1c**
 - d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented. **SL9-10.1d**
2. Integrate multiple sources of information presented in diverse media or format(e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. **SL9-10.2**
3. Evaluate a speaker’s point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence. **SL9-10.3**
4. Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. **SL9-10.4**
5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. **SL9-10.5**

ELA Speaking and Listening Standards Grades 11-12

1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively. **SL11-12.1**
 - a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. **SL11-12.1a**
 - b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. **SL11-12.1b**

- c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. **SL11-12.1c**
- d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. **SL11-12.1d**
- 2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. **SL11-12.2**
- 3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. **SL11-12.3**
- 4. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. **SL11-12.4**
- 5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. **SL11-12.5**

ELA Language Grades 9-10

- 4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies. **L9-10.4**
 - a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. **L9-10.4a**
 - b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy). **L9-10.4b**
 - c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology. **L9-10.4c**
 - d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary). **L9-10.4d**
- 6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. **L9-10.6**

ELA Language Grades 11-12

- 4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies. **L11-12.4**
 - a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. **L11-12.4a**

- b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., conceive, conception, conceivable). **L11-12.4b**
 - c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage. **L11-12.4c**
 - d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary) **L11-12.4d**
6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. **L11-12.6**

Reading Standards for Literacy in Science and Technical Subjects Grades 9-10

1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. **R9-10.1**
2. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. **R9-10.2**
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. **R9-10.3**
4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. **R9-10.4**
5. Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). **R9-10.5**
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. **R9-10.6**
7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. **R9-10.7**
8. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. **R9-10.8**
9. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. **R9-10.9**
10. By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently. **R9-10.10**

Reading Standards for Literacy in Science and Technical Subjects Grades 11-12

1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **R11-12.1**
2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **R11-12.2**
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **R11-12.3**
4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. **R11-12.4**
5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. **R11-12.5**
6. Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. **R11-12.6**
7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **R11-12.7**
8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **R11-12.8**
9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **R11-12.9**
10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently. **R11-12.10**

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects Grades 9-10

1. Write arguments focused on discipline-specific content. **W9-10.1**
 - a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. **W9-10.1a**
 - b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience’s knowledge level and concerns. **W9-10.1b**
 - c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. **W9-10.1c**
 - d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. **W9-10.1d**
 - e. Provide a concluding statement or section that follows from or supports the argument presented. **W9-10.1e**
2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **W9-10.2**

- a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. **W9-10.2a**
 - b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. **W9-10.2b**
 - c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. **W9-10.2c**
 - d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. **W9-10.2d**
 - e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. **W9-10.2e**
 - f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic). **W9-10.2f**
3. Write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results. **W9-10.3**
 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **W9-10.4**
 5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. **W9-10.5**
 6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. **W9-10.6**
 7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **W9-10.7**
 8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. **W9-10.8**
 9. Draw evidence from informational texts to support analysis, reflection, and research. **W9-10.9**
 10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. **W9-10.10**

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects Grades 11-12

1. Write arguments focused on discipline-specific content. **W11-12.1**
 - a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. **W11-12.1a**

- b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. **W11-12.1b**
 - c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. **W11-12.1c**
 - d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. **W11-12.1d**
 - e. Provide a concluding statement or section that follows from or supports the argument presented. **W11-12.1e**
2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **W11-12.2**
- a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. **W11-12.2a**
 - b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. **W11-12.2b**
 - c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. **W11-12.2c**
 - d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. **W11-12.2d**
 - e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic). **W11-12.2e**
3. Write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results. **W11-12.3**
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **W11-12.4**
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. **W11-12.5**
6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. **W11-12.6**
7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **W11-12.7**
8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the

text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. **W11-12.8**

9. Draw evidence from informational texts to support analysis, reflection, and research. **W11-12.9**
10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. **W11-12.10**

Common Career and Technical Core Standards

Transportation, Distribution, & Logistics Career Cluster

Transportation, Distribution, & Logistics Career Cluster Standards (TD)

1. Describe the nature and scope of the Transportation, Distribution, and Logistics Career Cluster and the role of transportation, distribution and logistics in society and the economy. **TD1**
2. Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution, and logistics problems. **TD2**
3. Describe key operational activities required of successful transportation, distribution, and logistics facilities. **TD3**
4. Identify governmental policies and procedures for transportation, distribution, and logistics facilities. **TD4**
5. Describe transportation, distribution, and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health. **TD5**
6. Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution, and Logistics Career Pathways. **TD6**

Facility and Mobile Equipment Maintenance Career Pathway (TD-MTN)

1. Develop preventative maintenance plans and systems to keep facility and mobile equipment inventory in operation. **TD-MTN1**
2. Design ways to improve facility and equipment system performance. **TD-MTN2**

Common Career and Technical Core Career Ready Practices (CCTC CRP)

1. Act as a responsible and contributing citizen and employee. **CRP1**
2. Apply appropriate academic and technical skills. **CRP2**
3. Attend to personal health and financial well-being. **CRP3**
4. Communicate clearly, effectively, and with reason. **CRP4**
5. Consider the environmental, social and economic impacts of decisions. **CRP5**
6. Demonstrate creativity and innovation. **CRP6**
7. Employ valid and reliable research strategies. **CRP7**
8. Utilize critical thinking to make sense of problems and persevere in solving them. **CRP8**
9. Model integrity, ethical leadership, and effective management. **CRP9**

- 10. Plan education and career path aligned to personal goals. **CRP10**
- 11. Use technology to enhance productivity. **CRP11**

- 12. Work productively in teams while using cultural/global competence. **CRP12**

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