

**Arkansas Department of Career Education
Model Framework**

Course Title: Suspension & Steering

Career Cluster: Transportation, Distribution & Logistics

Secondary – Skilled and Technical Sciences	
Course Number	494210
CIP Number	47.0604 (http://nces.ed.gov/ipeds/cipcode/Default.aspx?v=55)
Grade Level	9-12
Prerequisite	None
Course Type	Elective
Teacher Certification	
CTSO	SKILLS Support Course
Facility Requirements	http://arkansasfacilities.arkansas.gov/SchoolFacManual.aspx
Industry Certifications	www.NATEF.org

Course Description

This course covers principles of operation, types, and diagnosis/repair of suspension and steering systems to include steering geometry. Topics include manual and power steering systems and standard and electronically controlled suspension and steering systems. Upon completion, students should be able to service and repair steering and suspension components, check and adjust alignment angles, repair tires, and balance wheels.

Program Purpose/Structure

The curriculum content framework Automotive Service Technology supports the course that prepares students for the following career roles, which in turn correspond to the CIP (Classification of Instructional Programs) codes listed above. The courses may be sequenced with

a variety of career and technical courses to form a specialization to prepare students for careers and support additional education and training in the protective services industry.

The Transportation cluster of programs prepares students for careers in automotive service and repair, aviation maintenance, diesel equipment maintenance and repair, and small engine repair. Programs within the Transportation cluster are listed as follows:

- Automotive Body Technology — Certified
- Automotive Service Technology — Certified
- Aviation Maintenance Technology
- Diesel Equipment Technology
- Power Equipment Technology
- Career Role CIP Code – 47.0604
- O-NET 49-3023.XX

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Laboratory Activities
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Special Notes
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Career and Technical Student Organization (CTSO)
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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.	<ul style="list-style-type: none"> 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. 	S11-12.5	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.	<ul style="list-style-type: none"> 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.cdtextbook.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 (i.e., write a resume, search for a job, arrange references, and apply interview techniques)	<ul style="list-style-type: none"> • Prepare resume. Perform mock interview. • Have career coach assist in resume building. • Complete a job application. 	W11-12.5 W11-12.6	CRP10
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. 	SL11-12.3	CRP3

	<ul style="list-style-type: none">• Invite industry representatives to discuss standards.		
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

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Standard 4.0 Diagnose and Repair Suspension and Steering System			
Performance Indicator 4.1 Student will demonstrate initial Suspension and Steering System repair and 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 manuals or websites to research. • Search web forums and blogs. 	SL11-12.1a SL11-12.5	CRP11
4.1.2 Disable and enable supplemental restraint system (SRS).	<ul style="list-style-type: none"> • Refer to service manual for precautions. • Follow manufacturer's steps for service. 	SL11-12.1a	CRP7
Performance Indicator 4.2 Student will demonstrate ability to repair Steering systems.	Recommended Application/Activity	CCSS Standards	CCTC Standards
4.2.1 Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.	<ul style="list-style-type: none"> • Perform visual inspection. • Check for leaks and worn components. • Check for cracks in boots. 	Click here to enter text.	CRP2
4.2.2 Determine proper power steering fluid type; inspect fluid level and condition.	<ul style="list-style-type: none"> • Perform visual inspection. • Refer to service manual for proper fluid type and fill level. 	R11-12.1	CRP2 CRP11
4.2.3 Flush, fill, and bleed power steering system.	<ul style="list-style-type: none"> • Refer to service manual for proper service procedure. • Perform flush and fill. 	R11-12.1	CRP2 CRP11
4.2.4 Inspect for power steering fluid leakage; determine necessary action.	<ul style="list-style-type: none"> • Perform visual inspection. • Refer to service manual for service procedure. 	R11-12.1	CRP2 CRP11
4.2.5 Remove, inspect, replace, and adjust power steering pump drive belt.	<ul style="list-style-type: none"> • Refer to service manual for proper service procedure. • Perform visual inspection. • Remove and reinstall drive belt. 	R11-12.1	CRP2 CRP11
4.2.6 Inspect and replace power steering hoses and fittings.	<ul style="list-style-type: none"> • Refer to service manual for proper service procedure. • Perform visual inspection. • Remove and reinstall components. 	R11-12.1	CRP2 CRP11
4.2.7 Replace power steering pump filter(s).	<ul style="list-style-type: none"> • Perform visual inspection. • Refer to service manual for specifications. 	R11-12.1 SL11-12.2	CRP2 CRP11

	<ul style="list-style-type: none"> • Check for worn or broken components. 		
4.2.8 Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.	<ul style="list-style-type: none"> • Refer to service manual for service procedure. • Remove and replace filter. • Have students research and find vehicle that has a power steering filter. 	R11-12.1	CRP2 CRP11
4.2.9 Inspect electric power-assisted steering.	<ul style="list-style-type: none"> • Perform visual inspection. • Use scan tool to check for Diagnostic Trouble Code (DTC). 	R11-12.5	CRP2 CRP11
4.2.10 Identify hybrid vehicle power steering system electrical circuits and safety precautions.	<ul style="list-style-type: none"> • Refer to service manual for service precautions. • Refer to service manual for service procedures. • Use media source for videos on servicing of components. 	R11-12.1 SL11-12.5	CRP2 CRP11
4.2.11 Describe the operation of the power steering pressure switch.	<ul style="list-style-type: none"> • Use service manual to describe the operation of component. Trace power flow thru wiring diagram. • Have students write short paragraph about operation. 	R11-12.1 R11-12.3 W11-12.3	CRP2 CRP11 CRP4

Standard 5.0 Diagnose and Repair Front Suspension System			
Performance Indicator 5.1 Student will demonstrate initial diagnostic and repair of Front Suspension System.	Recommended Application/Activity	CCSS Standards	CCTC Standards
5.1.1 Inspect tie rod ends (sockets), tie rod sleeves, and clamps.	<ul style="list-style-type: none"> • Perform visual inspection. • Research vehicle tolerance specs. • Have students draw internal components of tie rod socket 	R11-12.1 SL11-12.2	CRP2 CRP11
5.1.2 Inspect upper and lower control arms, bushings, and shafts.	<ul style="list-style-type: none"> • Perform visual inspection. • Research vehicle tolerance specs. • Have students discuss effects of lift or lowering kits on bushing pivot points. 	R11-12.1 SL11-12.2 SL11-12.1	CRP2
5.1.3 Inspect and replace rebound and jounce bumpers.	<ul style="list-style-type: none"> • Perform visual inspection. • Remove and replace components. • (Teacher will discuss the benefits of jounce bumpers). 	R11-12.1 SL11-12.2 SL11-12.1	CRP2
5.1.4 Inspect track bar, strut rods/radius arms, and related mounts and bushings.	<ul style="list-style-type: none"> • Perform visual inspection. • Refer to service manual for specs. • Have students draw diagram of how track bar or strut rod secure components. • Have students discuss what would happen without the components. 	R11-12.1 SL11-12.2 SL11-12.1	CRP2
5.1.5 Inspect upper and lower ball joints (with or without wear indicators).	<ul style="list-style-type: none"> • Perform visual inspection. • Refer to service information for tolerance specs. • Have student draw internal components of a ball joint. • (Teacher will use media source and show videos of failed components). 	R11-12.1 SL11-12.5 SL11-12.1	CRP2 CRP11
5.1.6 Inspect suspension system coil springs and spring insulators (silencers).	<ul style="list-style-type: none"> • Perform visual inspection. • Have students write short paragraph about what coil spring does. 	R11-12.1 W11-12.3	CRP2 CRP7
5.1.7 Inspect suspension system torsion bars and mounts.	<ul style="list-style-type: none"> • Perform visual inspection. 	SL11-12.2	CRP8

	<ul style="list-style-type: none"> • Check ride height. 		
5.1.8 Inspect and replace front stabilizer bar (sway bar) bushings, brackets, and links.	<ul style="list-style-type: none"> • Perform visual inspection. • Refer to service manual for proper service procedure. • Have students write about the benefits of sway control. 	R11-12.1 W11-12.3	CRP2 CRP11
5.1.9 Inspect strut cartridge or assembly.	<ul style="list-style-type: none"> • Perform visual inspection. • (Teacher will use media source to show replacement of faulty components). 	SL11-12.5	CRP2 CRP11
5.1.10 Inspect front strut bearing and mount.	<ul style="list-style-type: none"> • Perform visual inspection. • (Teacher will use online media and have students watch videos on replacing strut bearing and mounts). 	SL11-12.5	CRP2 CRP11

Standard 6.0 Diagnose and Repair Rear Suspension System			
Performance Indicator 6.1 Student will demonstrate initial diagnostic procedures for rear suspension.	Recommended Application/Activity	CCSS Standards	CCTC Standards
6.1.1 Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms.	<ul style="list-style-type: none"> • Perform visual inspection. • Have students discuss the job of each individual component. 	R11-12.1 SL11-12.2	CRP2
6.1.2 Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts.	<ul style="list-style-type: none"> • Perform visual inspection. • Have student write a short paragraph about the job of rear leaf springs and its components. • Have students label a diagram of components of rear leaf springs 	R11-12.1 W11-12.3	CRP2 CRP7 CRP4
6.1.3 Inspect, remove, and replace shock absorbers; inspect mounts and bushings.	<ul style="list-style-type: none"> • Perform visual inspection. • Refer to service information for proper service procedure. Remove and replace shocks. • (Teacher will use media source to show internal components of shocks). • Have students label diagram of internal parts. 	R11-12.1 SL11-12.2	CRP2 CRP11

Standard 7.0 Diagnose and Repair Tire and Wheel Assembly			
Performance Indicator 7.1 Student will demonstrate initial diagnostic and repair procedures for Tire and Wheel Assembly.	Recommended Application/Activity	CCSS Standards	CCTC Standards
7.1.1 Inspect tire condition; identify tire wear patterns; check for correct size and application (load and speed ratings) and adjust air pressure; determine necessary action.	<ul style="list-style-type: none"> • Perform visual inspection. • Have student's measure tread depth. • Have students read and understand door placard. • Have students look at different wear patterns and determine the cause. • Have students set proper tire pressure. 	R11-12.1 SL11-12.2 SL11-12.1	CRP2
7.1.2 Rotate tires according to manufacturer's recommendations.	<ul style="list-style-type: none"> • Refer to service manual for proper procedure. • Rotate tires. 	R11-12.1	CRP11
7.1.3 Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic).	<ul style="list-style-type: none"> • (Teacher will use media source to demonstrate). • Dismount and remount tire and balance. 	SL11-12.5	CRP2 CRP11
7.1.4 Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.	<ul style="list-style-type: none"> • (Teacher will use media source to show different style of sensors). • Follow manufactures guidelines for replacing tires. 	SL11-12.5	CRP2 CRP11
7.1.5 Inspect tire and wheel assembly for air loss; perform necessary action.	<ul style="list-style-type: none"> • Perform visual inspection. • (Teacher will use available methods for checking leaks (test tank, soapy water)). • Repair as needed plug or patch. 	R11-12.3	CRP2 CRP4
7.1.6 Repair tire using internal patch.	<ul style="list-style-type: none"> • (Teacher will use media source to demonstrate). • Repair tires with patch. • Discuss the benefits of using patch. 	SL11-12.5	CRP2 CRP11
7.1.7 Identify and test tire pressure monitoring systems (indirect and direct) for operation; verify operation of instrument panel lamps.	<ul style="list-style-type: none"> • (Teacher will use service information to show proper function). • (Teacher will use media source to demo different systems). Have students label diagram of system. • Have students discuss the benefits of the system. 	SL11-12.5 R11-12.1	CRP2 CRP11

<p>7.1.8 Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system.</p>	<ul style="list-style-type: none"> • Have student write paragraph about replacing sensors following manufactures procedures. • 	<p>R11-12.1 W11-12.3</p>	<p>CRP2 CRP4</p>
<p>Performance Indicator 7.2 Student will demonstrate initial diagnostic and repair procedures for Wheel Alignment.</p>	<p>Recommended Application/Activity</p>	<p>CCSS Standards</p>	<p>CCTC Standards</p>
<p>7.2.1 Perform prealignment inspection and measure vehicle ride height; determine necessary action.</p>	<ul style="list-style-type: none"> • Use service information for proper service procedure. • Use service information for proper specs. • Have students discuss effects of ride height on suspension geometry. 	<p>SL11-12.5 R11-12.9</p>	<p>CRP2 CRP11</p>

Standard 8.0 Diagnose and Repair Automatic Transmission and Transaxle			
Performance Indicator 8.1 Student will demonstrate initial diagnostic and repair procedures for Automatic Transmission and Transaxle.	Recommended Application/Activity	CCSS Standards	CCTC Standards
8.1.1 Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins	<ul style="list-style-type: none"> Refer to service information for procedures. (Teacher will use media source show service precautions). Research forums and blogs to find relevant information. 	SL11-12.5	CRP2 CRP11
8.1.2 Check fluid level in a transmission or a transaxle equipped with a dip-stick.	<ul style="list-style-type: none"> Perform visual inspection. Refer to service manual for proper procedures. Have student's research properties of different types of fluid. 	R11-12.1 L11-12.6	CRP2 CRP11
8.1.3 Check fluid level in a transmission or a transaxle not equipped with a dip-stick.	<ul style="list-style-type: none"> Refer to service information for proper procedure. Have students check fluid. Have student write pros and cons of not having dipstick. 	R11-12.1 W11-12.1	CRP2 CRP11
8.1.4 Check transmission fluid condition; check for leaks.	<ul style="list-style-type: none"> Perform visual inspection. Check fluid smell and color to check condition. 	R11-12.1	CRP2
Performance Indicator 8.2 Student will demonstrate initial diagnostic and repair procedures for In-Vehicle Transmission/Transaxle.	Recommended Application/Activity	CCSS Standards	CCTC Standards
8.2.1 Inspect, adjust, and replace external manual valve shift linkage, transmission rangesensor/switch, and park/neutral position switch.	<ul style="list-style-type: none"> Refer to service information for proper procedure. Have student label parts on a diagram. Have students label power flow in electrical diagram. 	R11-12.4	CRP2 CRP11
8.2.2 Inspect for leakage at external seals, gaskets, and bushings.	<ul style="list-style-type: none"> Perform visual inspection. Clean with approved cleaner. Have students work up estimates on repairing leaks. 	R11-12.1 W11-12.3	CRP2 CRP7
8.2.3 Inspect power train mounts.	<ul style="list-style-type: none"> Refer and service information for proper procedure. Have students drain and replace filters. Have students write short paragraph about benefits of servicing 	R11-12.9	CRP2

	transmission.		
8.2.4 Drain and replace fluid and filter(s).	<ul style="list-style-type: none"> • Perform visual inspection. • Have students figure estimate on replacing mounts. 	R11-12.1 W11-12.3	CRP2 CRP4
Performance Indicator 8.3 Student will demonstrate initial diagnostic and repair procedures for Off-Vehicle Transmission/Transaxle.	Recommended Application/Activity	CCSS Standards	CCTC Standards
8.3.1 Describe the operational characteristics of a continuously variable transmission (CVT).	<ul style="list-style-type: none"> • (Teacher will use media source to show video on operation). • Have students discuss vehicles that have continuously variable transmission (CVT). 	SL11-12.5	CRP2 CRP11
8.3.2 Describe the operational characteristics of a hybrid vehicle drive train.	<ul style="list-style-type: none"> • (Teacher will use media source to show video on characteristics of hybrid vehicle). • Have student label parts on a diagram. • Have students discuss pros and cons. 	SL11-12.5	CRP2 CRP11

Standard 9.0 Prepare Vehicle for Service			
Performance Indicator 9.1 Student will be able to prepare vehicle for service.	Recommended Application/Activity	CCSS Standards	CCTC Standards
9.1.1 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
9.1.2 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
9.1.3 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
9.1.4 Review vehicle service history.	<ul style="list-style-type: none"> • Review available service records. • (Teacher led discussion on previous repairs and effect on current problem). 	SL11-12.5	CRP2
9.1.5 Complete work order to include customer information, vehicle identifying information, customer concern, 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 9.2 Student will be able to prepare vehicle for customer.	Recommended Application/Activity	CCSS Standards	CCTC Standards
9.2.1 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"> • (Teacher to have established policy of what is done to a vehicle before it is returned to customer). • Clean of grease marks or stains etc. • Car is fixed according to work order. 	R11-12.2 R11-12.9	CRP11 CRP2

Glossary

To be inserted

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)

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Act as a responsible and contributing citizen and employee. CRP1 2. Apply appropriate academic and technical skills. CRP2 | <ol style="list-style-type: none"> 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**