Steel Center CTE
Course Name: Medium/Heavy TRUCK

Unit Name: PA100 ORIENTATION AND SAFETY
Unit Number: PA100

Dates: Fall 2019 **Hours:** 29

Unit Description/Objectives:

Student will know and be able to complete all required forms, tool safety requirements, classroom rules, and use the proper procedures for shop tools, equipment, chemicals, and paints.

Tasks:

PA101 - Demonstrate safe conduct in diesel shop

PA102 - Identify and explain diesel occupations and certification programs

PA103 - Identify truck classifications and configurations

PA104 - Demonstrate use of service manuals and on line service information

PA105 - Demonstrate safety procedures and safe equipment operation

PA106 - Understand OSHA regulation

PA107 - Follow EPA standards for cleaning and disposal of waste and fluids

Standards / Assessment Anchors

Focus Standard/Anchor #1

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Standards/Anchors

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
3.4.10.E7 Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.
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Focus Standard/Anchor #2

- CC.3.5.11-12.C. 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.

Supporting Standards/Anchors

CC.3.5.9-10.D. 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.
CC.3.5.11-12.D. 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..

Connecting Standard/Anchor

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Standards/Anchors

CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.

Instructional Activities:

Knowledge:

Complete assignments related to the textbook
Participate in lecture and discussion and respond to questions
Participate in group discussions
Fill out personal forms
Complete reading assignments
Complete written assignments
Participate with the group activities
Explain the special notations in the text labeled Shop Talk, Caution, and warning
Identify the basic procedures for lifting and carrying heavy objects and materials
Explain the role of personal protective equipment
Describe safety warnings as they relate to work area safety
Identify the different classifications of fires and the proper procedures for extinguishing each
Identify the four categories of hazardous waste and their respective hazards to health and the environment
Explain laws regulating hazardous materials, including the "right-to-know" and employee/employer obligations
Explain how these standards are mandatory in industry

Skill:

Complete all forms required by Medium/Heavy Truck and Steel Center
Demonstrate safety standards as they apply to the transportation, construction, and farming industry
Locate and interpret information gathered from maintenance manuals via paper manuals and computer generated manuals
Demonstrate proper safety procedures for chemical and paint handling and disposal
Demonstrate safe usage of shop equipment
Demonstrate safe lifting and carrying of heavy objects
Operate the various types of fire extinguishers based on the type of extinguishing agent each uses

Remediation:

Re-teach major concepts
Review with teacher assistance
Study group
Worksheets
Individual tutoring when needed
Reading comprehension packets
Placing events in a time line/ordinal steps
Re-test
Study guides
Checklists

Enrichment:

Assist other students with projects or remediation
Leadership activities such as Shop Foreman
Complete a special project to benefit the class

Safety:

Student must:
Pass safety test with 100% for tools and equipment
Locate, read, and interpret MSDS sheet
Demonstrate fire safety procedures
Use proper safety precautions when using hand tools and operating equipment
Follow proper safety procedures for chemical and paint handling and disposal
Handle material in a safe and workmanlike manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Worksheets
Quizzes
Post Tests
Summaries
Log/Journal
Time Cards
Writing Activities
Video/DVD Worksheets
Portfolio
Checklist
Rubrics

Resources/Equipment:

CDX Automotive (2016) Medium/Heavy Duty Commercial Vehicle Systems. Jones & Bartlett Learning.

CDX Automotive (2016) Medium/Heavy Duty Diesel Engines. Jones & Bartlett Learning

CDX Automotive (2016).Tasksheet Manual for NATEF Proficiency. Burlington, MA. Jones & Bartlett Learning

Student forms:
Time Cards
Journals
Math ATB Worksheet
"Safety Rules for Power Tools" packet of worksheets
Fasteners packet worksheets

Chemical and Paint Worksheets:

Parts Washer
Brake Parts Cleaner
Liquid Penetrants
Liquid Lubricants
Coolants
Battery Acid
Fuels
Gases
Paint

General Shop Tools and Supplies:

Tie Downs
Anchors
Bolts
Rivets
Bushings
Chain
Collars
Hooks
Keys
Links
Nuts
O-Rings
Pins
Rods
Screws
Springs
Studs
Stock
Washers
Air Chucks
Tire Fillers
Battery Chargers
Blow Guns
Brake Tools
Compressors
Extractors
Grinders
Power Tool Accessories
Hammers
Heat Gun
Impact Drivers
Leak Detectors
Lift Equipment
Lighting
Pliers
Cutters
Power Tools
Pressure Equipment
Prybars
Pullers
Presses
Ratchets
Sanders
Scrapers
Screw Drivers
Sockets
Striking Tools
Threading Tools
Tire Changers
Torque Wrenches
Welders
OXY-Acetylene Cutters
Wheel Alignment
Wrenches

Steel Center CTE
Course Name: Medium/Heavy Truck

Unit Name: PA200 TOOLS AND FASTENERS/HARDWARE
Unit Number: PA200

Dates: Fall 2019
Hours: 190

Unit Description/Objectives:

Student will know and be able to identify and safely use all tools, fasteners, hardware, standard and precision measuring tools, oxy-acetylene torch, and SMAW electric welder according to OSHA and industry standards.

Tasks:

PA201 - Identify and demonstrate the proper use of basic hand tools and power tools

PA202 - Identify and demonstrate the proper use of fasteners and hardware

PA203 - Drill and use threading tools and extractors

PA204 - Demonstrate the proper use of fractional and precision measuring tools

PA205 – Demonstrate electric welding proficiency

PA206 - Set up/ Shut down, Cut and heat with Oxy-Acetylene Torch

L207 - Set up/Shut down and demonstrate safe SMAW electric welding procedures.

Standards / Assessment Anchors

Focus Standard/Anchor #1

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Standards/Anchors

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

Connecting Standard/Anchor

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Standards/Anchors

CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.
CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.

Instructional Activities:

Knowledge:

Complete assignments related to the textbook
Participate in lecture and discussion and respond to questions
Participate in group discussions
Fill out personal forms
Complete reading assignments
Complete written assignments
Participate with the group activities
Complete Task Sheet Assignment
Explain how fasteners are graded
Describe what a Huck faster is and where it is used in truck assembly
Explain why proper torque is essential

Skill:

Demonstrate the proper use of Hand tools, Power tools, Shop equipment
Demonstrate how to read and use accurately standard measuring tools, and precise measuring instruments
Identify all required fasteners used in the transportation industry
Demonstrate the proper use regarding:
Set up, shut down, and demonstrate safe SMAW electric welding procedures
Set up, shut down, and demonstrate safe oxy-acetylene torch
Demonstrate oxy-acetylene proficiency
Demonstrate electric welding proficiency
Outline the safety procedures required to work with oxy-acetylene cutting and welding equipment and how to safely use arc-welding stations
List and describe the use of common hand tool used in heavy duty truck shops
Describe how to use common pneumatic, electrical, and hydraulic power tools used in heavy-duty truck shops
Identify the mechanical and electronic measuring tools used the heavy duty truck shops
Demonstrate an accurate measurement with a micrometer
Demonstrate the proper use of a torque wrench
Demonstrate how to check a drill bit for proper cutting angle and lip length
Describe how threads may be repaired
Describe ways in which broken studs or fasteners may be extracted
Explain procedures for using thread locking compounds
List procedures for performing buck riveting

Remediation:

Re-teach major concepts
Review with teacher assistance
Study group
Worksheets
Individual tutoring when needed
Reading comprehension packets
Placing events in a time line/ordinal steps
Retest
Study guides
Checklists

Enrichment:

Assist other students with projects or remediation
Leadership activities such as Shop Foreman

Complete a special project to benefit the class

Safety:

Student must:
Pass safety test with 100% for all tools and equipment
Locate, read, and interpret MSDS sheet
Demonstrate fire safety procedures
Use proper safety precautions when using hand tools and operating equipment
Follow proper safety procedures for chemical and paint handling and disposal
Handle material in a safe and workmanlike manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools.
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Worksheets
Quizzes
Post Tests
Summaries
Log/Journal
Time Cards
Writing Activities
Video/DVD Worksheets
Portfolio
Checklist
Rubrics

Resources/Equipment:

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Student forms:
Time Cards
Journals
Math ATB Worksheet
"Safety Rules for Power Tools" packet of worksheets
Fasteners packet worksheets

Measuring tools worksheets:
Tapes
Rulers
Levels

Precision Measuring Tool Worksheets:
Micrometers
Calipers
Dial Indicator
Bore Gauge
Plastic Gauge
Air Pressure Gauge

Multimeters
AVR Battery Testers
Diagnostic Equipment

General Shop Tools and Supplies:

Tie Down
Anchors
Bolts
Rivets
Bushings
Chain
Collars
Hooks
Keys
Links
Nuts
O-Rings
Pins
Rods
Screws
Springs
Studs
Stock
Washers
Air Chucks
Tire Fillers
Battery Chargers
Blow Guns
Brake Tools
Compressors
Extractors
Grinders
Power Tool Accessories
Hammers
Heat Gun
Impact Drivers
Leak Detectors
Lift Equipment
Lighting
Pliers
Cutters
Power Tools
Pressure Equipment
Prybars
Pullers
Presses
Ratchets
Sanders
Scrapers
Screw Drivers
Sockets
Striking Tools
Threading Tools
Tire Changers
Torque Wrenches
Welders
OXY-Acetylene Cutters
Wheel Alignment
Wrenches

Steel Center Career And Technical Education
Course Name: Medium/Heavy Truck

Unit Name: PA300 SUSPENSION AND STEERING SYSTEMS

Unit Number: PA300
Dates: Fall 2019 **Hours:** 90

Unit

Unit Description/Objectives:

Student will know and be able to describe the principles of suspension and steering systems for medium and heavy trucks, and be able to apply the principles to the inspection, diagnosing, and repair procedures of the systems.

Tasks:

PA301 - Inspect, repair, or replace steering linkage

PA302 - Inspect and adjust basic wheel alignment/inspect tires

PA303 - Inspect, repair, or replace steering gear box

PA304 - Test/service power steering system

PA305 - Service wheel bearings and hubs, according to TMC Guidelines

PA306 - Inspect, repair, or replace shock absorbers

PA307 - Inspect, repair, or replace king pins

PA308 - Inspect, repair, or replace leaf springs

PA309 - Inspect, repair or replace air suspension components

PA310 - Inspect and service wheel assemblies

Standards / Assessment Anchors

Focus Standard/Anchor #1

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Standards/Anchors

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.

3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

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Supporting Standards/Anchors

CC.3.5.9-10.D. 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.

CC.3.5.11-12.D. 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.

Connecting Standard/Anchor

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Standards/Anchors

CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.

CC.2.3.6.A.1 Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.

Instructional Activities:

Knowledge:

Complete assignments related to the textbook
Participate in lecture and discussion and respond to questions
Participate in group discussions
Fill out personal forms
Complete reading assignments
Complete written assignments
Participate with the group activities
Complete Task Sheet Assignment
Describe a fiber composite spring
Explain the difference between standard and wide-base wheel systems and stud- and hub-piloted mountings
Explain how toe, camber, caster, axle inclination, turning radius, and axle alignment affect tire wear, directional stability, and handling
Explain the relationship between axle alignment and suspension system alignment
Explain the importance of proper matching and assembly of tire and rim hardware
Explain the elements of frame construction
Define the terms yield strength, section modulus (SM), and resist bend moment (RBM)
List the materials from which frame rails are made and describe the characteristics of each
Understand the importance of correctly locating the fifth wheel on the tractor
Define high hitch and outline what is required to avoid it
Outline the function of the kingpin and upper coupler assembly

Skill:

Complete all forms required by Medium/Heavy Truck Technology and Steel Center
Demonstrate safety standards as they apply to the transportation, construction, and farming industry
Understand how these standards are mandatory in industry
Read and interpret information gathered from maintenance manuals via paper manuals and computer generated manuals
Demonstrate the proper use of hand, power tools, and shop equipment
Demonstrate proper safety procedures for chemical and paint handling and disposal
Read and use accurately precise measuring instruments
Identify all required fasteners used in the transportation industry
Identify the components of the steering system of a heavy-duty truck
Describe the procedure for inspecting front axle components for wear

Describe the components and operation of a worm and sector shaft and a recalculating ball-type steering gear
Explain how to check and adjust a manual steering gear preload and backlash
Identify the components of a power steering gear and pump and explain the operation of a power steering system
Describe the components and operation of a pneumatic steering system
Describe the components and operation of an electronically variable power steering system
Describe the components and operation of a load sensing power assist steering system
Identify and describe the types of suspension systems used on current trucks
List the components used on leaf and multi-leaf spring suspension systems and explain how they work
Identify equalizing beam suspension system components and explain how they function
Identify torsion bar suspension system components and explain how they function
Identify air spring suspension system components and explain how they function
Troubleshoot suspensions and locate defective suspension system components
Outline suspension system repair and replacement procedures
Perform full chassis suspension system alignments
Describe the operation of the cab air suspension system
Identify the wheel configurations used on heavy-duty trucks
Identify the common types of tire-to-rim hardware and describe their functions
Outline the safety procedure for handling and servicing wheels and tires
Describe brake drum mounting configurations
Perform wheel run out checks and adjustments
Properly match tires in dual and tandem mountings
List the major components of both grease- and oil-lubricated wheel hubs
Perform bearing and seal service on grease-lubricated front and rear wheel hubs
Perform bearing and seal service on oil-lubricated front and rear wheel hubs
Perform front and rear bearing adjustment
Describe TMC wheel-end procedure
Outline the procedure for installing pre-set bearing wheels
Describe the chassis frame of a heavy-duty truck
Describe the different ways frame damage can occur as a result of impact and overloading
Perform some basic chassis frame alignment checks
Describe the various categories of frame damage including diamond, twist, sideway, sag and bow
Explain how the chassis frame, side rails, and cross-members can be repaired
List some guidelines to follow when using frame repair hardware
Outline some basic frame welding techniques
Describe the different types of fifth wheels used on tractors
Outline the operating principles of the Holland, Fontaine, and ConMet fifth wheels
Describe the locking principles of each type of fifth wheel
Outline the procedure required to couple and uncouple a fifth wheel
Service the common types of fifth wheels
Describe the procedure required to overhaul a fifth wheel
Identify the overhaul procedure required of some common fifth wheels
Describe the operating principle of a pintle hook and draw bar

Remediation:

Re-teach major concepts
Review with teacher assistance
Study group
Worksheets
Individual tutoring when needed
Reading comprehension packets
Placing events in a time line/ordinal steps
Retest
Study guides
Checklists

Enrichment:

Assist other students with projects or remediation
Leadership activities such as Shop Foreman
Complete a special project to benefit the class

Safety:

Student must:
Pass safety test with 100% for tools and equipment
Locate, read, and interpret MSDS sheet
Use proper safety precautions when using hand tools and operating equipment
Follow proper safety procedures for chemical and paint handling and disposal
Handle material in a safe and workmanlike manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

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Summaries
Log/Journal
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Resources/Equipment:

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CDX Automotive (2016) Medium/Heavy Duty Diesel Engines. Jones & Bartlett Learning

CDX Automotive (2016).Tasksheet Manual for NATEF Proficiency. Burlington, MA. Jones & Bartlett Learning

Time Cards
Journals
Math ATB Worksheet
Tapes
Rulers
Levels
Calipers
Dial Indicator
Air Pressure Gauge
Parts Washer
Brake Parts Cleaner
Liquid Penetrants
Liquid Lubricants
Gases
Paint

General Shop Tools and Supplies:

Bolts
Bushings
Nuts
O-Rings
Pins
Screws
Springs
Studs
Washers
Air Chucks
Tire Fillers
Blow Guns
Compressors
Extractors
Grinders
Power Tool Accessories
Hammers
Impact Drivers
Lift Equipment
Lighting
Pliers
Cutters
Power Tools
Pressure Equipment
Prybars
Pullers
Presses
Ratchets
Scrapers
Screw Drivers
Sockets
Striking Tools
Threading Tools
Tire Changers
Torque Wrenches
Welders
OXY-Acetylene Cutters
Wheel Alignment
Wrenches

Steel Center CTE
Course Name: Medium/Heavy Truck

Unit Name: PA400 PREVENTIVE MAINTENANCE
Unit Number: PA400

Dates: Fall 2019 **Hours:** 66

Unit Description/Objectives:

Student will know and be able to identify the proper procedures and practices for preventive maintenance and be able to perform servicing of medium/heavy trucks.

Tasks:

PA401 - Preventive maintenance schedules and procedures such as lube, oil, and filter service

PA402 - Perform preventive maintenance inspection

PA403 - Inspect, repair, or replace fifth wheel and mount

L404 - Inspect instruments and controls

L405 - Inspect safety equipment

L406 - Inspect hardware

L407 - Inspect heating, ventilation, and air conditioning

L408 - Inspect frame and fifth wheel

Standards / Assessment Anchors

Focus Standard/Anchor #1

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Standards/Anchors

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

Focus Standard/Anchor #2

- CC.3.5.11-12.C. 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.

Supporting Standards/Anchors

CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.
CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Connecting Standard/Anchor

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Standards/Anchors

CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems.
CC.2.3.6.A.1 Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.

Instructional Activities:

Knowledge:

Complete assignments related to the textbook
Participate in lecture and discussion and respond to questions
Participate in group discussions
Fill out personal forms
Complete reading assignments
Complete written assignments
Participate with the group activities
Complete Task Sheet Assignment
Explain in detail the positives aspects of a well implemented preventative maintenance program
Explain the differences between an A,B,C,D, and L inspection
Follow through the steps to perform a pre-trip inspection
Describe maintenance issues that would require deadlining a vehicle and an out of service (OSS) sticker applied
Apply a policy of preventative maintenance scheduling that conforms to federal inspection regulations
Explain the responsibilities of the inspecting person and record-keeping requirements
List the three types of antifreeze used in today's diesel engines and the advantages and disadvantages of each
Describe the need for a supplemental cooling additive package
Explain the function of and oil filter
Explain the function of a fuel filter
Explain the function and need for a water separator
Explain how to service and water separator
Explain how to prime a fuel system
Explain how to check a harmonic balancer and why they should be replaced at OEM intervals
List other checks that should be preformed in the engine compartment while Explain the effects if mixing lubricants
Explain the function of the drive shaft and U-joints
Outline the procedures for installing pre-set bearing wheels
List the different types of tires used in the trucking industry based upon construction
Describe how to change brake fluid in a hydraulic braking system
Explain how to inspect and service a typical master cylinder
Describe how to inspect and service drum brakes
Explain how to inspect and check rotor runout
Describe the inspection process for brake lines and hoses
Explain how to inspect brake linings and pads and take accurate measurements of pad and lining thickness to determine serviceability

List and explain three different methods of bleeding a hydraulic brake system
Explain how to test the operation of the parking brakes
Describe how to test a trucks service brakes
List some of the out-of-service criteria for hydraulic braking systems
Explain some of the safety precautions when working with air brake systems
Describe the procedures to service a trucks air supply system
Explain service and inspection procedures for a typical air dryer
Explain how the air dryer operates and how to perform a leakage test
List and explain is sequential order the procedures for testing the components of a typical air brake system
Describe how to perform a check or the manual parking brakes or emergency parking brakes
Explain the inspection and testing procedure for checking the foundation brakes
List some of the out-of-service criteria for air brake systems
List the various components that should be checked within the cab of the vehicle during a vehicle service
Explain how to make the actual determination as to weather an item within the cab requires maintenance
Explain how to test the HVAC system
List the safety items within the cab that must be inspected and account for any mandatory safety equipment
List and explain how to maintain cab hardware
Explain 2 different methods of maintaining the vehicle by preventing premature corrosion
Explain how to performance test on an air conditioning system
List the different methods for finding potential refrigerant leaks in an air conditioning system
List the components of the steering system and explain their function
Explain some of the basic steering geometry
List the importance of a suspension system
Explain some of the basic terminology used when discussing suspensions
Explain the different types of suspension systems used in the heavy-duty truck industry
Explain the importance and list the consequences of correctly locating the fifth wheel on the tractor
Describe the locking principles of each type of fifth wheel
Explain how to couple and uncouple a tractor trailer
Explain the term high hitch and how it can be avoided
Describe the operating principle of a pintle hook/couplers and draw bars
Describe the benefits of cushioning to a coupling system
Outline prescribed maintenance for pintle hooks/couplers and drawbars
Outline the function of the kingpin and upper coupler assembly

Skill:

Complete all forms required by Medium/Heavy Truck and Steel Center
Demonstrate safety standards as they apply to the transportation, construction, and farming industry
Understand how these standards are mandatory in industry
Read and interpret information gathered from maintenance manuals via paper manuals and computer generated manuals
Demonstrate the proper use of hand, power tools, and shop equipment
Demonstrate proper safety procedures for chemical and paint handling and disposal
Read and use accurately precise measuring instruments
Identify all required fasteners used in the transportation industry
Determine the freezing and boiling point of a coolant mixture based on antifreeze and water ratios
Properly mix coolant using the correct proportions of water, antifreeze and supplemental coolant additives (SCAs) according to the OEMs recommendations and ambient temperature conditions
Measure the coolant strength (freeze level) using the appropriate instrument
Test the SCA level and maintain it at the desired level
Test coolant for contamination
Remove and replace a coolant filter and check it for leaks
Pressure test a radiator cap and determine its serviceability
Test a cooling system thermostat and determine its serviceability
Check the condition of the water pump and drive belt tension and condition
Test the various forms of cooling fans
Diagnose basic cooling system malfunctions

Inspect the radiator condition and mounting as well as pressure test the cooling system for leaks and restrictions to proper air flow
Inspect coolant lines, hoses, and clamps
Inspect the coolant recovery system and determine its serviceability
Choose the correct engine oil viscosity for the climatic conditions that the vehicle will be subjected to
Perform an engine oil change
Perform an oil filter change
Perform a fuel filter change
Demonstrate the use of a hand primer pump
Service an engine air filter and check restriction indicator
Perfume a PM engine service
Perform a drive axle lube service
Perform a check of the fluid level on a drive axle
Service the drive shaft and U-joints
Check the oil level in a manual transmission
Perform a service and inspection on a manual transmission
Perform adjustments on various styles of clutches
Perform service and inspection on various types of clutch linkages
Perform serviced and inspection on an automatic transmission
Identify the different wheel configurations used in the trucking industry
Perform wheel inspections on the different wheel configurations used in heavy duty trucks
Explain the difference between standard and wide-base wheel systems and stud-and hub-piloted mountings
Explain the importance of proper matching and assembly of tire and rim hardware
Describe brake drum mounting configurations
Explain the proper mounting procedures for the wheel configurations used on heavy-duty trucks
Perform wheel runout checks and adjustments
Explain the proper techniques for front and rear wheel bearing adjustment
Properly match tires in dual and tandem mounting
Explain inspection procedures for tires
Identify tire wear conditions and causes
Explain the importance of changing brake fluid at manufactures specified time
Perform and inspection of the air conditioning system
Perform a steering axle inspection
Verify a steering complaint
Perform a completer steering knuckle inspection
Explain how to perform a tie-rod inspection
Perform a wheel bearing inspection
Perform service inspections on the various types of suspensions
Explain how to identify and maintain U-bolts
Perform inspection procedures of air spring suspensions
Explain and perform servicing procedures for height control valves
Demonstrate safe working procedures around batteries
Explain the role of the battery in a trucks electrical system
Verify the condition of a battery using a voltmeter, hydrometer, refractometer, and carbon pile tester
Describe battery maintenance procedures
Describe and demonstrate safe charging procedure for batteries
Jump start a vehicle with a flat battery
Explain the role of the charging system
Verify the performance f and alternator
Explain what full fielding and alternator will accomplish
Demonstrate how to test a starter to ensuring a starter is in good condition
Explain the purpose of a lift gate
Describe maintenance procedures that must be performed on a lift gate
Troubleshoot for problems with a hydraulic lift gate
Describe some of the different styles and types of fifth wheels available in the trucking industry
Outline the operation of the Holland, Fontaine, and ConMet fifth wheels
Perform general service procedures to common fifth wheels
Describe the procedure required to overhaul a fifth wheel

Remediation:

Re-teach major concepts
Review with teacher assistance
Study group
Worksheets
Individual tutoring when needed
Reading comprehension packets
Placing events in a time line/ordinal steps
Retest
Study guides
Checklists

Enrichment:

Assist other students with projects or remediation
Leadership activities such as Shop Foreman
Complete a special project to benefit the class

Safety:

Pass safety test with 100% for tools and equipment
Locate, read, and interpret MSDS sheet
Demonstrate fire safety procedures
Use proper safety precautions when using hand tools and operating equipment
Follow proper safety procedures for chemical and paint handling and disposal
Handle material in a safe and workmanlike manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Worksheets
Quizzes
Post Tests
Summaries
Log/Journal
Time Cards
Writing Activities
Video/DVD Worksheets
Portfolio
Checklist
Rubrics

Resources/Equipment:

CDX Automotive (2016) Medium/Heavy Duty Commercial Vehicle Systems. Jones & Bartlett Learning.

CDX Automotive (2016) Medium/Heavy Duty Diesel Engines. Jones & Bartlett Learning

CDX Automotive (2016).Tasksheet Manual for NATEF Proficiency. Burlington, MA. Jones & Bartlett Learning

Student forms:
Time Cards
Journals
Math ATB Worksheet
Tapes

Rulers
Levels
Micrometers
Calipers
Dial Indicator
Air Pressure Gauge
Multimeters
AVR Battery Testers
Diagnostic Equipment
Parts Washer
Brake Parts Cleaner
Liquid Penetrants
Liquid Lubricants
Coolants
Battery Acid
Fuels
Gases
Paint

General Shop Tools and Supplies:

Tie Downs
Bolts
Rivets
Keys
Links
Nuts
O-Rings
Pins
Screws
Springs
Studs
Washers
Air Chucks
Tire Fillers
Battery Chargers
Blow Guns
Brake Tools
Compressors
Extractors
Grinders
Power Tool Accessories
Hammers
Heat Gun
Impact Drivers
Leak Detectors
Lift Equipment
Lighting
Pliers
Cutters
Power Tools
Pressure Equipment
Prybars
Pullers
Presses
Ratchets
Sanders
Scrapers
Screw Drivers
Sockets
Striking Tools
Threading Tools
Tire Changers
Torque Wrenches
Wheel Alignment
Wrenches

Steel Center CTE
Course Name: Medium/Heavy Truck

Name: PA500 BRAKE SYSTEM
Number: PA500
Dates: Fall 2019 **Hours:106**

STEEL CENTER FOR CAREER AND TECHNICAL EDUCATION **Unit**
Unit

Unit Description/Objectives:

Student will know and be able to describe the diagnosis, repair and/or service of the medium/heavy truck air, hydraulic, and antilock brake systems and be able to perform such tasks to original equipment manufacture's specifications.

Tasks:

PA501 - Inspect, repair, or replace hydraulic disc brakes components

PA502 - Inspect, repair, or replace hydraulic drum brakes components

PA503 - Inspect, repair, or replace S-cam drum brakes components

PA505 - Check operation of low air warning buzzer/indicator

PA506 - Inspect, repair, or replace air governors

PA507 - Replace hydraulic brake lines/bleed brakes

PA508 - Inspect, repair, or replace air brake lines

PA509 - Inspect, diagnose, or replace air brake chamber

PA510 - Inspect, diagnose, or replace master cylinder and hydraulic system components

PA511 - Diagnose, repair, or replace ABS components

PA512 - Inspect, repair, or replace air brake valves

PA513 - Inspect, repair, or replace air dryers

PA514 - Inspect, repair, or replace calipers

PA515 - Inspect, repair, or replace rotors

PA516 - Inspect, repair, or replace drums

PA517 - Inspect, repair, or replace slack adjusters

Standards / Assessment Anchors

Focus Standard/Anchor #1

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Standards/Anchors

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.

3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

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Focus Standard/Anchor #2

- CC.3.5.11-12.C. 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.

Supporting Standards/Anchors

CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.

CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

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Connecting Standard/Anchor

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Standards/Anchors

CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.

CC.2.3.6.A.1 Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.

Instructional Activities:

Knowledge:

Complete assignments related to the textbook
Participate in lecture and discussion and respond to questions
Participate in group discussions
Fill out personal forms
Complete reading assignments
Complete written assignments
Participate with the group activities
Complete Task Sheet Assignment
Understand what is meant by pneumatic and torque imbalance
Discuss the effects of the Federal Motor Vehicle Safety Standard No. 121 (FMVSS No. 121) on present-day air brake systems
Describe the operation of desiccant and aftercooler-type air dryers
Outline the operating principles of the valves and controls used in an air brake system
Explain the operation of an air brake chamber
Outline the functions of the hold-off and service circuits in truck and trailer brake systems
Describe the operation of S-cam and wedge-actuated drum brakes
Describe the operating principles of manual and automatic slack adjusters
List the components and describe the operating principles of an air disc brake system
Describe the major components and operation of parking and emergency braking systems
Define the principles of brake balance
Describe the principles of operation of a hydraulic brake system
Describe the operation of drum and brakes in a hydraulic braking system
List the major components of a master cylinder

Describe the use and operation of wheel cylinders and calipers
Explain the operation of a hydraulic power booster
Outline the role of the ABS module when managing antiskid mode
Explain how the ABS module controls the service modulator valves
Explain what is meant by the number of channels of an ABS system
Describe how trailer ABS is managed
Explain how an electronic brake system (EBS) manages service brake applications
Outline the reasons why an EBS system has to meet current FMVSS No. 121 requirements
Understand the safety requirements of working on an air brake system

Skill:

Complete all forms required by Diesel Technology and MCTI
Demonstrate safety standards as they apply to the transportation, construction, and farming industry
Understand how these standards are mandatory in industry
Read and interpret information gathered from maintenance manuals via paper manuals and computer generated manuals
Demonstrate the proper use of hand, power tools, and shop equipment
Demonstrate proper safety procedures for chemical and paint handling and disposal
Read and use accurately precise measuring instruments
Identify all required fasteners used in the transportation industry
Identify the components of a truck air brake system
Explain the operation of a dual-circuit air brake system
Identify the major components of an air compressor
Identify the major components in a truck hydraulic brake system
Explain the operation of a hydraulic brake system
Identify the hydraulic valves and controls used in hydraulic brake systems
List the major components of an air-over-hydraulic braking system
Outline some typical maintenance and service procedures performed on hydraulic and air-over-hydraulic brake systems
Describe the operation of a typical hydraulic ABS system
Describe how an antilock brake system (ABS) works to prevent wheel lock-up during braking
List the major components of a truck ABS system
Describe the operation of ABS input circuit components
Outline the procedure for diagnosing ABS system faults
Describe the procedure required to set up and adjust a wheel speed sensor
Perform basic maintenance on an air brake system
Diagnose common compressor problems
Describe the procedure required to service an air dryer
Performance test an air dryer
Check out the service brakes on a truck
Test the emergency and parking brake systems
Verify the operation of the trailer brakes
Understand the OOS criteria used by safety inspection officers
Diagnose some brake valve failures
Describe the procedure required to overhaul foundation brakes
Determine brake free-stroke and identify when an adjustment is required
Outline some common service procedures used on air disc brake systems

Remediation:

Re-teach major concepts
Review with teacher assistance
Study group
Worksheets
Individual tutoring when needed
Reading comprehension packets
Placing events in a time line/ordinal steps
Retest
Study guides
Checklists

Enrichment:

Assist other students with projects or remediation
Leadership activities such as Shop Foreman
Complete a special project to benefit the class

Safety:

Student must:
Pass safety test with 100% for tools and equipment
Locate, read, and interpret MSDS sheet
Demonstrate fire safety procedures
Use proper safety precautions when using hand tools and operating equipment
Follow proper safety procedures for chemical and paint handling and disposal
Handle material in a safe and workmanlike manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc
Use proper safety precautions when using /operating hand tools

Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Worksheets
Quizzes
Post Tests
Summaries
Log/Journal
Time Cards
Writing Activities
Video/DVD Worksheets
Portfolio
Checklist
Rubrics

Resources/Equipment:

CDX Automotive (2016) Medium/Heavy Duty Commercial Vehicle Systems. Jones & Bartlett Learning.

CDX Automotive (2016) Medium/Heavy Duty Diesel Engines. Jones & Bartlett Learning

CDX Automotive (2016).Tasksheet Manual for NATEF Proficiency. Burlington, MA. Jones & Bartlett Learning

Student forms:
Time Cards
Journals
Math ATB Worksheet

Tapes
Rulers
Levels
Micrometers
Calipers
Dial Indicator
Multimeters
Diagnostic Equipment
Parts Washer
Brake Parts Cleaner
Liquid Penetrants
Liquid Lubricants
General Shop Tools and Supplies:
Bolts
Rivets
Bushings
Nuts
Pins
Rods
Screws
Springs
Studs
Washers
Blow Guns
Brake Tools
Compressors

Extractors
Grinders
Power Tool Accessories
Hammers
Impact Drivers
Lift Equipment
Lighting
Pliers
Cutters
Power Tools
Pressure Equipment
Prybars
Pullers
Presses
Ratchets
Scrapers
Screw Drivers
Sockets
Striking Tools
Threading Tools
Torque Wrenches
Welders
Wrenches

Steel Center CTE
Course Name: Diesel Technology

Unit Name: PA600 DEMONSTRATE THE KNOWLEDGE OF THE ENGINE
Unit Number: PA600

Dates: Fall 2019 **Hours:** 148

Unit Description/Objectives:

Student will know and be to perform the operation, removal, inspection, and installation of heavy truck diesel engine components, and perform such tasks to original equipment manufacturer's specifications.

Tasks:

PA601 - Explain diesel engine operation and identify parts

PA602 - Remove, inspect, or install camshaft, and value train components

PA603 - Remove, inspect, or install piston, connecting rod, and liner

PA604 - Remove, inspect, or install crankshaft and bearings (mains and rods)

PA606 - Perform diesel tune-up (set overhead)

PA607 - Remove, inspect, or install cylinder head and gasket

PA608 - Remove, inspect, or install oil pump

PA609 - Remove, inspect, or install vibration dampener and flywheel

Standards / Assessment Anchors

Focus Standard/Anchor #1

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Standards/Anchors

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

Focus Standard/Anchor #2

- CC.3.5.11-12.C. 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.

Supporting Standards/Anchors

CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.

CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.

Connecting Standard/Anchor

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Standards/Anchors

CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.

CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.

Instructional Activities:

Knowledge:

Complete assignments related to the textbook
Participate in lecture and discussion and respond to questions
Participate in group discussions
Fill out personal forms
Complete reading assignments
Complete written assignments
Participate with the group activities
Complete Task Sheet Assignment
Interpret basic engine terminology.
Calculate engine displacement.
Define the term mean effective pressure.
Describe the differences naturally-aspirated and manifold-boosted engine.
Explain how volumetric efficiency affects cylinder breathing.
Define rejected heat and explain thermal efficiency in diesel engines.
Outline the operation of a diesel four-stroke cycle.
Outline the operation of a diesel two-stroke cycle.
Calculate engine displacement
Outline the forces a crankshaft is subjected to under normal operation.
Outline the roles played by vibration dampers and flywheel assemblies.
Describe how vibration dampers function.
Define the role of the camshaft in a typical diesel engine.
Interpret camshaft terminology.

Skill:

Complete all forms required by Diesel Technology and Steel Center CTE
Demonstrate safety standards as they apply to the transportation, construction, and farming industry
Understand how these standards are mandatory in industry
Read and interpret information gathered from maintenance manuals via paper manuals and computer generated manuals
Demonstrate the proper use of hand, power tools, and shop equipment
Demonstrate proper safety procedures for chemical and paint handling and disposal
Read and use accurately precise measuring instruments
Identify all required fasteners used in the transportation industry
Identify the subsystems that make up a diesel engine.
Identify the engine power train components.
Define the roles of piston assemblies, crankshafts, flywheels, and dampers.
Identify the different types of pistons used in current diesel engines.
Describe the combustion chamber designs used in diesel engines.
Explain the function of piston rings.

Classify piston wrist pins by type.
Describe the role of connecting rods and outline the stresses they are subject to.
Identify common crankshaft throw arrangements.
Identify some typical crankshaft failures and their causes.
Outline the procedure for an in-chassis, rod and main bearing rollover.
Measure friction bearing clearance using Plastigage.
Identify the engine timing gear train components.
Outline the procedure required to time an engine gear train.
Perform a camshaft inspection.
Identify the role valve train components play in running an engine.
List the types of tappet/cam follower used in diesel engines.
Inspect a set of push tubes or rods.
Describe the function of rockers.
Define the role played by cylinder head valves.
Outline the procedure required to recondition cylinder head valves.
Describe how valve rotators operate.
Perform a valve lash adjustment.
Outline the consequences of either too much or too little valve lash
Identify the components classified as engine housing components.
Identify the types of cylinder block used in diesel engines.
Outline the procedure required to inspect a cylinder block.
Measure an engine block to specifications using service literature.
Identify the types of cylinder liners used in diesel engines.
Explain the procedure required to remove dry, wet, and midstop liners.
Perform selective fitting of a set of dry liners to a cylinder block.
Explain how cavitation erosion occurs on wet liners.
Identify the types of cylinder heads used in diesel engines.
Describe the component parts of a cylinder head.
Explain the procedure required to measure, test, and recondition a cylinder head.
Describe the role of the intake and exhaust manifolds.
Describe the function of the oil pan in the engine.
Identify some of the different types of engine brake used on highway diesel engines.
Describe the operating principles of each type of engine brake.
Outline the controls used to manage engine brakes.
Describe how the hydraulic actuation of internal engine compression brakes is managed and timed

Remediation:

Re-teach major concepts
Review with teacher assistance
Study group
Worksheets
Individual tutoring when needed
Reading comprehension packets
Placing events in a time line/ordinal steps
Retest
Study guides
Checklists

Enrichment:

Assist other students with projects or remediation
Leadership activities such as Shop Foreman
Complete a special project to benefit the class

Safety:

Student must:
Pass safety test with 100% for tools and equipment
Locate, read, and interpret MSDS sheet
Demonstrate fire safety procedures
Use proper safety precautions when using hand tools and operating equipment

Follow proper safety procedures for chemical and paint handling and disposal
Handle material in a safe and workmanlike manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Worksheets
Quizzes
Post Tests
Summaries
Log/Journal
Time Cards
Writing Activities
Video/DVD Worksheets
Portfolio
Checklist
Rubrics

Resources/Equipment:

CDX Automotive (2016) Medium/Heavy Duty Commercial Vehicle Systems. Jones & Bartlett Learning.

CDX Automotive (2016) Medium/Heavy Duty Diesel Engines. Jones & Bartlett Learning

CDX Automotive (2016).Tasksheet Manual for NATEF Proficiency. Burlington, MA. Jones & Bartlett Learning

Student forms:
Time Cards, Journals, Math ATB Worksheet

Tapes
Rulers
Micrometers
Calipers
Dial Indicator
Parts Washer
Brake Parts Cleaner
Liquid Penetrants
Liquid Lubricants
Bolts
Nuts
Screws
Studs
Washers
Blow Guns
Compressors
Extractors

Power Tool Accessories
Hammers
Impact Drivers
Lighting
Pliers
Cutters
Power Tools
Pressure Equipment
Prybars
Ratchets
Scrapers
Screw Drivers
Sockets
Striking Tools
Threading Tools
Torque Wrenches
Wrenches

Steel Center CTE
Course Name: Diesel Technology

Name: PA700 AIR INTAKE AND EXHAUST SYSTEMS
Number: PA700
Dates: Fall 2019 **Hours:** 152

Unit

Unit

Unit Description/Objectives:

Student will know and be able to demonstrate knowledge of the diesel engine air intake and exhaust system and be able to follow proper procedures for removal, inspection, or installation of components as per original equipment manufacturer's specifications.

Tasks:

PA701 - Inspect, repair, or replace air induction system components

PA702 - Inspect, repair, or replace exhaust system and components

PA703 - Inspect, repair, or replace charge air-coolers and after coolers

PA704 - Inspect, repair, or replace turbocharger

Standards / Assessment Anchors

Focus Standard/Anchor #1

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Standards/Anchors

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.

3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

Focus Standard/Anchor #2

- CC.3.5.11-12.C. 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.

Supporting Standards/Anchors

CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.

CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.

Connecting Standard/Anchor

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Standards/Anchors

CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.
CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.

Instructional Activities:

Knowledge:

Complete assignments related to the textbook
Participate in lecture and discussion and respond to questions
Participate in group discussions
Fill out personal forms
Complete reading assignments
Complete written assignments
Participate with the group activities
Complete Task Sheet assignment
Describe the role of the intake and exhaust manifolds
Define the term positive filtration
Outline the operating principle of an air precleaner
Define constant and variable geometry turbochargers
Outline the operating principles of turbochargers
Define the role of a charge air cooler in the intake circuit
Outline the role of a diesel engine muffler device

Skill:

Complete all forms required by Diesel Technology and Steel Center CTE
Demonstrate safety standards as they apply to the transportation, construction, and farming industry
Understand how these standards are mandatory in industry
Read and interpret information gathered from maintenance manuals via paper manuals and computer generated manuals
Demonstrate the proper use of hand, power tools, and shop equipment
Demonstrate proper safety procedures for chemical and paint handling and disposal
Read and use accurately precise measuring instruments
Identify all required fasteners used in the transportation industry
Identify the intake and exhaust system components
Describe how intake air is routed to the engine's cylinders
Describe how exhaust gases are routed out to aftertreatment devices
Service a dry, positive air cleaner
Perform an inlet restriction test
Identify the subcomponents on a truck diesel engine turbocharger
Troubleshoot common turbocharger problems
Define the role of a charge air cooler in the intake circuit
Troubleshoot common turbocharger problems
Test a charge air heat exchanger for leaks
Test a charge air heat exchanger for leaks
Identify the different types of catalytic converters used on current diesels
Describe the operation of EGR and DPF systems

Remediation:

Re-teach major concepts
Review with teacher assistance
Individual tutoring when needed
Study groups
Placing events in a time line/ordinal steps
Retest
Study guides
Checklists

Enrichment:

Assist other students with projects or remediation
Leadership activities such as Shop Foreman
Complete a special project

Safety:

Student must:
Pass safety test with 100% for tools and equipment
Locate, read, and interpret MSDS sheet
Demonstrate fire safety procedures
Use proper safety precautions when using hand tools and operating equipment
Follow proper safety procedures for chemical and paint handling and disposal
Handle material in a safe and workmanlike manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Worksheets
Quizzes
Pre/Post Tests
Summaries
Log/Journal
Time Cards
Writing Activities
Video/DVD Worksheets
Diagrams
Individual Projects
Group Projects
Research Papers
Any content related assessment
Portfolio

Resources/Equipment:

CDX Automotive (2016) Medium/Heavy Duty Commercial Vehicle Systems. Jones & Bartlett Learning.

CDX Automotive (2016) Medium/Heavy Duty Diesel Engines. Jones & Bartlett Learning

CDX Automotive (2016).Tasksheet Manual for NATEF Proficiency. Burlington, MA. Jones & Bartlett Learning

Student forms:
Time Cards
Journals
Math ATB Worksheet

Tapes
Rulers
Micrometers
Calipers
Dial Indicator
Parts Washer
Brake Parts Cleaner
Liquid Penetrants

Liquid Lubricants
Bolts
Nuts
Screws
Studs
Washers
Blow Guns
Compressors
Extractors
Power Tool Accessories
Hammers
Impact Drivers
Lighting
Pliers
Cutters
Power Tools
Pressure Equipment
Prybars
Ratchets
Scrapers
Screw Drivers
Sockets
Striking Tools
Threading Tools
Torque Wrenches
Wrenches

Steel Center CTE
Course Name: Diesel Technology

Unit Name: PA800 DEMONSTRATE THE KNOWLEDGE OF THE COOLING SYSTEM

Unit Number: PA800

Dates: Fall 2019 **Hours:152**

Unit Description/Objectives:

Student will know and be able to perform the operation, removal, inspection, and installation of heavy truck diesel engine cooling system components and perform such tasks to original equipment manufacturer's specifications.

Tasks:

PA801 - Inspect/replace belts and pulleys

PA802 - Inspect/replace hoses and clamps

PA803 - Test/replace thermostat

PA804 - Drain, flush, refill and bleed cooling system

PA805 - Test anti-freeze and supplemental coolant additives

PA806 - Test/replace radiator and pressure cap

PA807 - Inspect/replace water pump

PA808 - Test/inspect/repair fan drives

Standards / Assessment Anchors

Focus Standard/Anchor #1

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Standards/Anchors

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.

3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

Focus Standard/Anchor #2

- CC.3.5.11-12.C. 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.

Supporting Standards/Anchors

CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.

CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Connecting Standard/Anchor

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Standards/Anchors

CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.

CC.2.1.6.E.4 Apply and extend previous understandings of numbers to the system of rational numbers.

Instructional Activities:

Knowledge:

Complete assignments related to the textbook
Participate in lecture and discussion and respond to questions
Participate in group discussions
Fill out personal forms
Complete reading assignments
Complete written assignments
Participate with the group activities
Complete Task Sheet Assignment
Define the terms conduction, convection, and radiation.
Outline the properties of a heavy-duty antifreeze.
List the advantages claimed for extended life coolants
Outline the causes of wet liner cavitation and the steps required to minimize it
Define the role of the coolant filters and their servicing requirements
List the types of temperature gages used in highway diesel engines
Describe how a coolant level warning indicator operates
Define the roles played by the shutters and engine fan in managing engine temperatures
Outline the operation of an actively pressurized cooling system (APCS)

Skill:

Complete all forms required by Diesel Technology and Steel Center CTE
Demonstrate safety standards as they apply to the transportation, construction, and farming industry
Understand how these standards are mandatory in industry
Read and interpret information gathered from maintenance manuals via paper manuals and computer generated manuals
Demonstrate the proper use of hand, power tools, and shop equipment
Demonstrate proper safety procedures for chemical and paint handling and disposal
Read and use accurately precise measuring instruments
Identify all required fasteners used in the transportation industry
Identify diesel engine cooling system components and their principles of operation
Identify the three types of coolant used in current highway diesel engines
Calculate the boil and freeze points of a coolant mixture
Mix coolant using the correct proportions of water, antifreeze, and SCAs
Perform standard SCA tests and measure antifreeze protection
Identify the problems scale build-up can create in an engine cooling system
Identify the types of heavy-duty radiators including down flow, cross flow, and counter flow
Test a radiator for external leakage using a standard cooling system pressure tester
Test a radiator cap
Identify the different types of thermostats in use and describe their principle of operation
Describe the role of the coolant pump
Diagnose basic cooling system malfunctions

Remediation:

Re-teach major concepts
Review with teacher assistance
Study group
Worksheets
Individual tutoring when needed
Reading comprehension packets
Placing events in a time line/ordinal steps
Retest
Study guides
Checklists

Enrichment:

Assist other students with projects or remediation
Leadership activities such as Shop Foreman
Complete a special project to benefit the class

Safety:

Student must:
Pass safety test with 100% for tools and equipment
Locate, read, and interpret MSDS sheet
Demonstrate fire safety procedures
Use proper safety precautions when using hand tools and operating equipment
Follow proper safety procedures for chemical and paint handling and disposal
Handle material in a safe and workmanlike manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Worksheets
Quizzes
Post Tests
Summaries
Log/Journal
Time Cards
Writing Activities
Video/DVD Worksheets
Portfolio
Checklist
Rubrics

Resources/Equipment:

CDX Automotive (2016) Medium/Heavy Duty Commercial Vehicle Systems. Jones & Bartlett Learning.

CDX Automotive (2016) Medium/Heavy Duty Diesel Engines. Jones & Bartlett Learning

CDX Automotive (2016).Tasksheet Manual for NATEF Proficiency. Burlington, MA. Jones & Bartlett Learning

Student forms:
Time Cards
Journals
Math ATB Worksheet

Tapes
Rulers
Micrometers
Calipers
Dial Indicator
Coolant Pressure Tester
Refractometer
Belt Tension Gage
Temperature Gage
Parts Washer
Brake Parts Cleaner
Liquid Penetrants
Liquid Lubricants

General Shop Tools and Supplies:
Bolts
Nuts
Screws
Studs
Washers

Blow Guns
Compressors
Extractors
Power Tool Accessories
Hammers
Impact Drivers
Lighting
Pliers
Cutters
Power Tools
Pressure Equipment
Pry bars
Ratchets
Scrapers
Screw Drivers
Sockets
Striking Tools
Threading Tools
Torque Wrenches
Wrenches

Steel Center CTE
Course Name: Diesel Technology

Unit Name: PA900 FUEL SYSTEM
Unit Number: PA900
Dates: Fall 2019 **Hours:** 92

Unit Description/Objectives:

Student will know and be able to diagnosis, inspect, test, service, and install components of the fuel system on the heavy truck diesel engine, and be able to perform such tasks to original equipment manufacturer's specifications.

Tasks:

PA901 - Replace fuel filters/strainers

PA902 - Inspect/replace fuel lines, tank, cap, and fittings

PA903 - Prime and bleed fuel system

PA904 - Test/service/remove/install injector/nozzle

Standards / Assessment Anchors

Focus Standard/Anchor #1

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Standards/Anchors

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

Focus Standard/Anchor #2

- CC.3.5.11-12.C. 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.

Supporting Standards/Anchors
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CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.
CC.3.5.11-12.G. 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.

Connecting Standard/Anchor

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Standards/Anchors

CC.2.1.6.E.4 Apply and extend previous understandings of numbers to the system of rational numbers.

CC.2.3.6.A.1 Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.

Instructional Activities:

Knowledge:

Complete assignments related to the textbook
Participate in lecture and discussion and respond to questions
Participate in group discussions
Fill out personal forms
Complete reading assignments
Complete written assignments
Participate with the group activities
Complete Task Sheet Assignment
Describe the injector nozzle's role in system pressure management
Identify two types of injector nozzles
Describe the principles of operation of multiple-orifice and electrohydraulic nozzles
Define nozzle differential ratio
Describe a valve closes orifice (VCO) nozzle
Understand how rail pressures are managed in electronically managed, common rail diesel fuel system
Identify some of the characteristics of different OEM common rail diesel fuel injection systems

Skill:

Complete all forms required by Diesel Technology and Steel Center CTE
Demonstrate safety standards as they apply to the transportation, construction, and farming industry
Understand how these standards are mandatory in industry
Read and interpret information gathered from maintenance manuals via paper manuals and computer generated manuals
Demonstrate the proper use of hand, power tools, and shop equipment
Demonstrate proper safety procedures for chemical and paint handling and disposal
Read and use accurately precise measuring instruments
Identify all required fasteners used in the transportation industry
Identify fuel subsystem components on a typical diesel engine
Describe the construction of a fuel tank
Explain the operation of and troubleshoot a fuel sending unit
Define the role of primary and secondary fuel filters
Service primary and secondary fuel filters
Explain how a water separator functions
Service a water separator
Define the operating principles of a transfer pump
Prime a fuel subsystem
Test the low pressure side of the fuel subsystem for inlet restriction
Test the charge side of the fuel subsystem for charging pressure
Identify the some typical sensors used in diesel fuel subsystems
Identify the subcomponents of a nozzle assembly
Bench (pop) test a hydraulic injector nozzle
Test a nozzle for forward leakage
Test nozzle back leakage
Outline the procedure required to remove, inspect, and reconnect high-pressure lines
Describe the system layout and the primary components in current full authority, electronic fuel management systems
Identify the key features of electronic unit injector (EUI) and common rail (CR) diesel fuel injection systems

Outline the role the four primary subsystems play in managing an EUI-fueled engine
Identify common rail (CR) diesel fuel systems
Identify some of the diesel engines currently using common rail diesel fuel injection
Trace fuel flow routing from tank to injector on common rail, diesel fueled engines
Describe the electronic management circuit components used in common rail fuel systems

Remediation:

Re-teach major concepts
Review with teacher assistance
Study group
Worksheets
Individual tutoring when needed
Reading comprehension packets
Placing events in a time line/ordinal steps
Retest
Study guides
Checklists

Enrichment:

Assist other students with projects or remediation
Leadership activities such as Shop Foreman
Complete a special project to benefit the class

Safety:

Student must:
Pass safety test with 100% for tools and equipment
Locate, read, and interpret MSDS sheet
Demonstrate fire safety procedures
Use proper safety precautions when using hand tools and operating equipment
Follow proper safety procedures for chemical and paint handling and disposal
Handle material in a safe and workmanlike manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Worksheets
Quizzes
Post Tests
Summaries
Log/Journal
Time Cards
Writing Activities
Video/DVD Worksheets
Portfolio
Checklist
Rubrics

Resources/Equipment:

CDX Automotive (2016) Medium/Heavy Duty Commercial Vehicle Systems. Jones & Bartlett Learning.

CDX Automotive (2016) Medium/Heavy Duty Diesel Engines. Jones & Bartlett Learning

CDX Automotive (2016).Tasksheet Manual for NATEF Proficiency. Burlington, MA. Jones & Bartlett

Learning

Student forms:
Time Cards
Journals
Math ATB Worksheet

Tapes
Rulers
Micrometers
Calipers
Dial Indicator
Parts Washer
Brake Parts Cleaner
Liquid Penetrants
Liquid Lubricants
Bolts
Nuts
Screws
Studs
Washers
Blow Guns
Compressors
Extractors

Power Tool Accessories
Hammers
Impact Drivers
Lighting
Pliers
Cutters
Power Tools
Pressure Equipment
Pry bars
Ratchets
Scrapers
Screw Drivers
Sockets
Striking Tools
Threading Tools
Torque Wrenches
Wrenches

Steel Center CTE
Course Name: Diesel Technology

Unit Name: PA1000 ELECTRICAL/ELECTRONIC SYSTEM
Unit Number: PA1000

Dates: Fall 2019 **Hours:84**

Unit Description/Objectives:

Student will know and be able to identify and apply the principles of electricity and electronics to the medium/heavy truck, and be able to perform these tasks to original equipment manufacturer's specification.

Tasks:

PA1001 - Test/service battery

PA1002 - Test/replace/adjust bulbs and lamps

PA1003 - Diagnose repair/replace electrical circuits and components

PA1004 - Test starting system and replace component assemblies

PA1005 - Test charging system output and replace component assemblies

PA1006 - Analyze and interpret schematics

PA1007 - Perform computer systems tests and analyze codes

Standards / Assessment Anchors

Focus Standard/Anchor #1

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Standards/Anchors

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.

3.2.10.B4 Describe quantitatively the relationships between voltage, current, and resistance to electrical energy and power. Describe the relationship between electricity and magnetism as two aspects of a single electromagnetic force.

Focus Standard/Anchor #2

- CC.3.5.11-12.C. 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.

Supporting Standards/Anchors

CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.
CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Connecting Standard/Anchor

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Standards/Anchors

CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.
CC.2.3.6.A.1 Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.

Instructional Activities:

Knowledge:

Complete assignments related to the textbook
Participate in lecture and discussion and respond to questions
Participate in group discussions
Fill out personal forms
Complete reading assignments
Complete written assignments
Participate with the group activities
Complete Task Sheet assignment
Define the terms electricity and electronics
Describe the atomic structure
Outline how some of the chemical and electrical properties of atoms are defined by the number of electrons in their outer shells
Outline the properties of conductors, insulators, and semiconductors
Describe the characteristics of static electricity
Define what is meant by the conventional and electron theories of current flow
Describe the characteristics of magnetism and the relationship between electricity and magnetism
Describe how electromagnetic field strength is measured in common electromagnetic devices
Define what is meant by an electrical circuit and the terms voltage, resistance, and current flow
Outline the components required to construct a typical electrical circuit
Perform electrical circuit calculations using Ohm's law
Identify the characteristics of DC and AC
Describe some methods of generating a current flow in an electrical circuit
Describe and apply Kirschhoff's first and second laws
Define the role of a battery in a vehicle electrical system
Outline the construction of standard, maintenance-free, and gelled electrolyte batteries
Describe the chemical action within the battery during the charging and discharging cycles
Describe how a light bulb functions
Explain the operating principles of halogen and high-intensity discharge (HID) lamps
Describe the function of the reflector and lens in a headlamp assembly

Skill:

Outline how batteries are arranged in multiple battery banks in truck chassis
Verify the performance of a lead-acid battery using a voltmeter, hydrometer, refratometer, and carbon pile tester
Analyze maintenance-free battery condition using an integral hydrometer sight glass
Describe the procedure required to charge different types of batteries
Jump-start vehicles with dead batteries using another vehicle and generator methods
Outline how batteries should be safely stored out of chassis

Identify charging circuit components
Navigate a charging circuit schematic
Voltage drop-test charging circuit wiring and components
Describe the construction of an alternator
Explain full-wave rectification
Full-field an alternator
Measure AC leakage in the charging circuit
Verify the performance of an alternator
Use Intelli-check to assess charging circuit performance
Disassemble and reassemble a Delcotron 40SI alternator
Identify the components in a truck cranking system
Explain the operating principles of magnetic switches, solenoids, and starter motors
Describe the operating principles of lightweight, planetary gear reduction starter motors
Test and troubleshoot a cranking circuit using voltage drop testing
Disassemble a heavy-duty truck starter motor
Test an armature for shorts using a growler
Test an armature for grounds and opens
Use a test light to check out field coils
Outline the procedure required to rebuild a Delco-Remy 42MT starter motor
Aim truck headlights
Troubleshoot lighting circuit malfunctions
Describe the operation of typical truck auxiliary equipment
Explain how a trailer electrical plug and connector are connected
Outline the operating principles of truck instrument cluster components
Diagnose and repair some typical truck instrument cluster failures
Explain the function and operation of warning and shutdown systems
Identify the types of circuit protection used in truck electrical systems including fuses and cycling and non-cycling circuit breakers
Describe the procedure and material required to solder a pair of copper wires
Outline the procedure required to quickly check out a truck electrical system

Remediation:

Re-teach major concepts
Review with teacher assistance
Worksheets
Individual tutoring when needed
Study group
Placing events in a timeline/original steps
Retest or alternative assessment
Reading comprehension packets
Study guides
Computer assisted instruction
Checklists

Enrichment:

Assist other students with projects or remediation
Leadership activities such as Shop Foreman
Complete a special project

Safety:

Student must:
Pass safety test with 100% for tools and equipment
Locate, read, and interpret MSDS sheet
Demonstrate fire safety procedures
Use proper safety precautions when using hand tools and operating equipment
Follow proper safety procedures for chemical and paint handling and disposal
Handle material in a safe and workmanlike manner
Use protective clothing and equipment

Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Worksheets
Quizzes
Pre/Post Tests
Summaries
Log/Journal
Time Cards
Writing Activities
Video/DVD Worksheets
Check Lists
Diagrams
Individual Projects
Group Projects
Research Papers
Portfolio

Resources/Equipment:

CDX Automotive (2016) Medium/Heavy Duty Commercial Vehicle Systems. Jones & Bartlett Learning.

CDX Automotive (2016) Medium/Heavy Duty Diesel Engines. Jones & Bartlett Learning

CDX Automotive (2016).Tasksheet Manual for NATEF Proficiency. Burlington, MA. Jones & Bartlett Learning

Student forms:
Time Cards, Journals, Math ATB Worksheet, Chemical and Paint Worksheets

Multimeters
AVR Battery Testers
Diagnostic Equipment
Electrical Parts Cleaner
Liquid Penetrants
Liquid Lubricants
Battery Acid
Gases
Tie Downs
Bolts
Screws
Springs
Battery Chargers
Power Tool Accessories
Hammers
Heat Gun
Lighting
Pliers
Cutters
Power Tools
Prybars
Ratchets
Screw Drivers
Sockets
Torque Wrenches
Wrenches

Steel Center CTE
Course Name: Diesel Technology

Unit Name: PA1100 DRIVE LINE
Unit Number: PA1100

Dates: Fall 2019 **Hours:** 112

Unit Description/Objectives:

Student will know and be able to diagnosis, inspect, and replace components in the heavy truck driver line and be able to perform such tasks to original equipment manufacturer's specifications.

Tasks:

PA1101 - Diagnose, replace and adjust drive-line components

PA1102 - Perform clutch/clutch brake maintenance and adjustment

Standards / Assessment Anchors

Focus Standard/Anchor #1

- 13.2.11 E Demonstrate, in the career acquisition process, the application of essential workplace skills/knowledge, such as, but not limited to: commitment, communication, dependability, health/safety, laws and regulations (that is Americans with Disabilities Act, Child Labor Law, Fair Labor Standards Act, OSHA, Material Safety Data Sheets), personal initiative, Self-advocacy, scheduling/time management, team building, technical literacy and technology.

Supporting Standards/Anchors

3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
3.4.10.D2 Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

Focus Standard/Anchor #2

- CC.3.5.11-12.C. 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.

Supporting Standards/Anchors

CC.3.5.9-10.I. 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.
CC.3.6.11-12.B. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

Connecting Standard/Anchor

- CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers.

Supporting Standards/Anchors

CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.
CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.

Instructional Activities:

Knowledge:

Complete assignments related to the textbook
Participate in lecture and discussion and respond to questions
Participate in group discussions
Fill out personal forms
Complete reading assignments
Complete written assignments
Participate with the group activities
Complete Task Sheet Assignment
Outline the operating principles of a clutch
Describe the function of a clutch brake
Define and explain the importance of phasing
Explain the importance of driveline working angles and how to calculate them
Define the terms dead axle, live axle, pusher axle, and tag axle
Outline the construction of a drive axle carrier assembly
Explain how a pinion and crown gearset change the direction of powerflow
Describe differential action and list the reasons it is required
Define the term spinout and explain how it is caused
Trace the powerflow path through different types of differential carriers

Skill:

Complete all forms required by Diesel Technology and Steel Center CTE
Demonstrate safety standards as they apply to the transportation, construction, and farming industry
Understand how these standards are mandatory in industry
Read and interpret information gathered from maintenance manuals via paper manuals and computer generated manuals
Demonstrate the proper use of hand, power tools, and shop equipment
Demonstrate proper safety procedures for chemical and paint handling and disposal
Read and use accurately precise measuring instruments
Identify all required fasteners used in the transportation industry
Identify the components of a clutch assembly
Explain the differences between pull-type and push-type clutches
Describe the procedure for adjusting manual and self-adjusting clutches
Explain how to adjust the external clutch linkage
Troubleshoot a clutch for wear and damage
Outline typical clutch defects and explain how to repair them.
Outline the procedure for removing and replacing a clutch
Identify the components in a truck driveline
Explain the procedures for inspecting, lubricating, and replacing a universal joint
Describe the various types of wear a universal joint might experience
Outline the procedure for sourcing chassis vibration
Troubleshoot some typical driveline complaints
Describe the procedure for balancing a driveshaft
Identify the types of axles used on trucks and trailers
Identify the components required to create differential action
Describe the operation of the various drive axle configurations
Identify the components used in an interaxle differential or power divider
Explain how an interaxle differential lock functions

Remediation:

Re-teach major concepts
Review with teacher assistance
Study group

Worksheets
Individual tutoring when needed
Reading comprehension packets
Placing events in a time line/ordinal steps
Retest
Study guides
Checklists

Enrichment:

Assist other students with projects or remediation
Leadership activities such as Shop Foreman
Complete a special project to benefit the class

Safety:

Student must:
Pass safety test with 100% for tools and equipment
Locate, read, and interpret MSDS sheet
Demonstrate fire safety procedures
Use proper safety precautions when using hand tools and operating equipment
Follow proper safety procedures for chemical and paint handling and disposal
Handle material in a safe and workmanlike manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Worksheets
Quizzes
Post Tests
Summaries
Log/Journal
Time Cards
Writing Activities
Video/DVD Worksheets
Portfolio
Checklist
Rubrics

Resources/Equipment:

CDX Automotive (2016) Medium/Heavy Duty Commercial Vehicle Systems. Jones & Bartlett Learning.

CDX Automotive (2016) Medium/Heavy Duty Diesel Engines. Jones & Bartlett Learning

CDX Automotive (2016).Tasksheet Manual for NATEF Proficiency. Burlington, MA. Jones & Bartlett Learning

Student forms:
Time Cards
Journals
Math ATB Worksheet
"Safety Rules for Power Tools" packet of worksheets
Fasteners packet worksheets

Measuring tools worksheets:
Tapes
Rulers
Levels

Precision Measuring Tool Worksheets:
Micrometers
Calipers
Dial Indicator
Plastic Gauge

Chemical and Paint Worksheets:
Parts Washer
Brake Parts Cleaner
Liquid Penetrants
Liquid Lubricants

General Shop Tools and Supplies:
Bolts
Nuts
O-Rings
Pins
Screws
Washers
Air Chucks
Blow Guns
Brake Tools
Compressors
Extractors
Power Tool Accessories
Hammers
Impact Drivers
Lift Equipment
Lighting
Pliers
Cutters
Power Tools
Prybars
Ratchets
Scrapers
Screw Drivers
Sockets
Striking Tools
Torque Wrenches
Wrenches