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CTE Standards Unpacking
Diesel Technology

Course: Diesel Technology
Course Description: Students will develop an understanding of the Automotive Diesel service and repair pathway including Over the Road Transportation, Construction Equipment and Agricultural Equipment. The desire for students to receive industry training at the basic level and then be able to step up to the higher level of competency in this field is the ultimate goal of this course. Completion of this course will help students with post-secondary education and training and prepare them for the workforce and further technical education, qualifications and experience.
Career Cluster: Transportation, Distribution & Logistics
Prerequisites: Automotive Engine Repair and Performance
Program of Study Application: Diesel Technology is a second pathway course in the Transportation, Distribution & Logistics career cluster, Diesel pathway.

INDICATOR #DT 1: **Students will adhere to health and safety standards in the work place, including systems and procedures.**		
SUB-INDICATOR 1.1 (Webb Level: 1 Recall): Apply skills and knowledge of health and safety practices and expectations to ensure a safe working environment for the individual and co-workers (fellow students)		
Knowledge (Factual): -Work safety practices in the workplace. -Evacuation procedures in the workplace. -OSHA 10 certification & requirements -First Aid -General tools (Name and function of tool being used, proper use of each tool, care and storage) -Personal Safety Equipment -SDS(Safety Data Sheet)	**Understand (Conceptual):** -Consequences of incorrect usage of Fire extinguisher classifications -Maintenance of safety portfolio -Importance OSHA 10 certification -Consequences of proper use of general tools.	**Do (Application):** -Describe proper use of personal safety equipment, including eye, hair and hearing protection, clothing and footwear. -Demonstrate correct discharge procedures for different fire extinguisher -Administration of first aid

-Fire extinguisher classifications and uses		

Benchmarks:
Students will be assessed on their ability to:

- Completion of OSHA 10 Certification
- Demonstrate the use of SDS
- Completion of general tool test
- Maintain safety portfolio

Academic Connections	
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience HS	Students will write a blog of different types of fire extinguishers and explain proper use.
PS3-4 Plan and carry out an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system	Students will explain the impacts of various extinguishers and the effect that occurs on various fires

INDICATOR #DT 2: **Students will learn and understand basic electricity and electronics principles.**		
SUB-INDICATOR 2.1 (Webb Level: 2 Skill/Concept): Understand and implement basic electricity and electronic principles that apply to diesel powered equipment, including starting, charging, lighting and accessories		
SUB-INDICATOR 2.2 (Webb Level: 2 Skill/Concept): Perform basic electrical repair techniques		
Knowledge (Factual): -Series circuits -Parallel circuits	**Understand (Conceptual):** -Differentiate between different types of electrical systems	**Do (Application):** -Explain the basic fundamentals of electricity.

-Digital Multimeter -Safety and usage of a lead-acid battery -Electrical Math -Electrical connections -Ohms law -Load tester	-Function of Common electrical components -Digital multi-meter settings and meanings of those numbers -Consequences of working and non-working Lead-acid battery components -Load tester helps diagnose battery operation	-Calculate values of resistance, current and voltage using Ohms Law. -Assess the starter, its related components and circuits. -Explain the principles and components relating to the charging circuit. -Make solder connections. -Demonstrate the proper use of a digital multi-meter. -Diagnose the condition of starter circuits, performing the necessary steps using a load tester and multi-meter. -Analyze the function and condition of a lead-acid battery.

Benchmarks:
Test on fundamentals of electricity.

- Use Ohms Law to analyze electrical systems
- Complete Multimeter test: Lead-acid battery, starter and charging circuits,
- Test a solder connection with multimeter test and tension.

Academic Connections

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ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
SL4. 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 or formal and informal tasks	Students will explain the proper use of digital multi-meter.
A-CED4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.	Students will calculate Ohms Law to analyze electrical systems

INDICATOR #DT 3: **Students will demonstrate their understanding of basic aspects of diesel engines.**		
SUB-INDICATOR 3.1 (Webb Level: 2 Skill/Concept): Understand the technical and nontechnical aspects of diesel engines		
Knowledge (Factual): -Math associated with Diesel industry -Cylinder head components	**Understand (Conceptual):** -The role of the technician in the diesel industry -Power formulas in Diesel industry	**Do (Application):** -Identify and define basic diesel engine principles. -Disassemble a diesel engine. -Assemble a diesel engine per engine manual. -Demonstrate rebuilding a cylinder head.
Benchmarks: *Students will be assessed on their ability to:* • Complete basic diesel engine parts test • Start a diesel engine after teardown and rebuild.		
Academic Connections		

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ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience	Students will write a report explaining the of the functionality of a diesel engine

INDICATOR #DT 4: **Students will apply principles of basic hydraulic systems.**		
SUB-INDICATOR 4.1 (Webb Level: 2 Skill/Concept): Research and inspect basic mobile hydraulics		
Knowledge (Factual): -Basic hydraulic systems components. -Different hydraulic pump types	**Understand (Conceptual):** -Hydrauli jack function. -S-vane pump, piston pump impacts possible repairs. -Hydraulic ISO symbols.	**Do (Application):** **-**Calculate the force of a given cylinder under given pressures. -Assess efficiency of a hydraulic cylinder. -Flow rate a pump on the test stand. -Analyze the circuits on the test stand
Benchmarks: *Students will be assessed on their ability to:* • Create an artifact that demonstrates the advantages and disadvantages of hydraulic pumps. • Complete checklist for different types and the uses of hydraulic pumps. • Complete the force test of a given cylinder		
Academic Connections		

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ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience	Students will create a poster depicting the advantages and disadvantages of hydraulic pumps.
A-CED4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations	Students will calculate the force of a given cylinder

INDICATOR #DT 5: **Students will demonstrate how basic braking systems operate.**		
SUB-INDICATOR 5.1 (Webb Level: 2 Skill/Concept): Identify and understand basic vehicle braking systems, including hydraulic and air brake systems		
Knowledge (Factual): -Principles of brakes systems. -Brake valves -Power tools and hand tools	**Understand (Conceptual):** -Types of power brake Systems -Proper selection of tools and procedure for a brake rebuild	**Do (Application):** -Demonstrate a drum brake rebuild procedure. -Demonstrate a disc brake rebuild procedure. -Explain the operation of brake valves. -Assess condition of the Air Brake system. -Assess the condition of the Hydraulics Brake system.
Benchmarks: *Students will be assessed on their ability to:* • Define the steps in rebuilding a drum brake • Create an artifact explaining the air brake system. • Create an artifact explaining the hydraulic brake system		
Academic Connections		

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	Sample Performance Task Aligned to the Academic Standard(s):
W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience	Students will create a power point that compares and contrasts air brake system to hydraulic brake system
HS-PS2-1Analyze data to support the claim that Newton's Second Law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	Students will calculate the power within the breaking system to determine acceleration (braking)

INDICATOR #DT 6: **Students will apply principles of fuel systems on diesel engines.**		
SUB-INDICATOR 6.1 (Webb Level: 2 Skill/Concept): Differentiate between, and identify components of, fuel delivery systems		
Knowledge (Factual): -Fuel delivery system components -Fuel injection -Fuel pump systems	**Understand (Conceptual):** -Consequences of incorrect fuel system operation -Consequences of non-functioning fuel pump system	**Do (Application):** -Identify principles, components, systems and circuits for fuel delivery systems -Analyze fuel injection components and principle -Demonstrate how to time an in-line fuel pump -Demonstrate how to time a rotary fuel pump -Analyze non-starting situations related to fuel and engine phasing
Benchmarks:		

Students will be assessed on their ability to:

- Explain the process of trouble shooting a non-starting fuel engine
- Follow a checklist of steps after trouble shooting to fix a non-starting engine
- Write the steps of timing an in-line pump.

Academic Connections	
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience	Students will write the steps of timing an in-line pump.
SL1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on texts, and issues, building on others' ideas and expressing their own clearly and persuasively.	Students will explain the process of trouble shooting a non-starting fuel engine

Additional Resources

Please list any resources (e.g., websites, teaching guides, etc.) that would help teachers as they plan to teach these new standards.