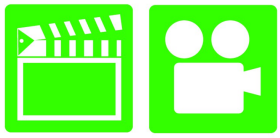
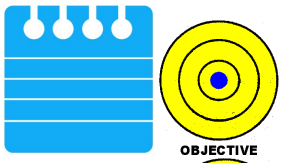
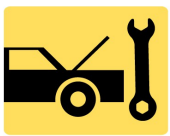
A8 Engine Performance 4th Edition

Chapter 4 Diesel & BioDiesel Fuel

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of **Automotive Engine Performance.** It correlates material to task lists specified by ASE and NATEF.
Motivate Learners	Explain how the knowledge of how something works translates into the ability to use that knowledge to figure why the engine does not work correctly and how this saves diagnosis time, which translates into more money.
State the learning objectives for the chapter or course you are about to cover and explain this is what they should be able to do as a result of attending this session or class.	Explain the chapter learning objectives to the students. 1. Explain diesel fuel specifications. 2. List the advantages and disadvantages of biodiesel. 3. Discuss API gravity. 4. Explain E-diesel specifications
Establish the Mood or Climate	Provide a *WELCOME,* Avoid put downs and bad jokes.
Complete Essentials	Restrooms, breaks, registration, tests, etc.
Clarify and Establish Knowledge Base	Do a round robin of the class by going around the room and having each student give their backgrounds, years of experience, family, hobbies, career goals, or anything they want to share.

ICONS	Ch07 Diesel & BioDiesel Fuel
	1. SLIDE 1 CH7 Diesel & BioDiesel Fuel
	Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE REGULARLY UPDATED
	POWER POINTS DONE BY INDIVIDUAL LEARNING OBJECTIVES, SO THERE IS POWER POINT FILE FOR EACH LEARNING OBJECTIVE
	2. SLIDE 2 EXPLAIN OBJECTIVE CH7 AEP_LO1 3. SLIDES 3-4 EXPLAIN Features of Diesel Fuel
	5. SLIDE 5 EXPLAIN Diesel Fuel Requirements 6. SLIDES 6-7 EXPLAIN Cetane Number
	DISCUSSION: HAVE THE STUDENTS TALK ABOUT FEATURES & REQUIREMENTS OF DIESEL FUEL. REVIEW WHAT AMBIENT TEMPERATURE IS. WHAT IS MEANT BY DIESEL FUEL'S "POUR POINT"?
	DISCUSSION: DISCUSS CLOUD POINT. HOW DOES CLOUD POINT AFFECT FILTERS? HOW DO DIESEL FUEL SUPPLIERS ACCOMMODATE POUR POINT AND CLOUD POINT?
	DISCUSSION: TALK ABOUT CETANE # FOR DIESEL FUEL. REVIEW WHY OCTANE RATING FOR DIESEL IS LOWER THAN THE OCTANE RATING FOR GAS. DOES COMBUSTION PRESSURE AFFECT DIESEL FUEL'S CETANE NUMBER?
	HANDS-ON TASK: HAVE STUDENTS EXPLAIN WHAT A CETANE RATING MEANS & WHAT EFFECTS IF ANY IT HAS ON DRIVABILITY.
	CETANE # IS A MEASURE OF IGNITION QUALITY OF FUEL RELATIVE TO A REFERENCE FUEL MIXTURE COMPOSED OF CETANE AND ALPHA-METHYLNAPHTHALENE, THE %, BY VOLUME, OF CETANE IN MIXTURE BEING CETANE #. CCI

ICONS	Ch07 Diesel & BioDiesel Fuel
	STANDS FOR CALCULATED CETANE INDEX. HIGH CETANE NUMBERS INDICATE GOOD IGNITION QUALITY RESULTING IN A SHORT DELAY PERIOD AND LOW CETANE NUMBERS INDICATE POOR IGNITION QUALITY THAT RESULTS IN LONG DELAY PERIOD. LOW CETANE NUMBERS CAN CAUSE A LONG IGNITON DELAY, WHICH CAN CAUSE A HARD STARTING WITH WHITE SMOKE & MISFIRING. CETANE # FOR DIESEL FUELS IS NOT TO BE INTERPRETED IN THE SAME MANNER AS THE OCTANE NUMBER FOR GASOLINE. OCTANE # REQUIREMENT DEPENDS ON THE FULL-LOAD PERFORMANCE, WHILE THE CETANE # DEPENDS ON THE REQUIREMENTS FOR GOOD IGNITION AT LIGHT LOADS AND LOW TEMPERATURES
	
	8. SLIDES 8-9 EXPLAIN SULPHUR CONTENT 10. SLIDE 10 EXPLAIN Figure 7-1 (a) Regular diesel fuel on the left has a clear or greenish tint, whereas fuel for off-road use is tinted red for identification. (b) fuel pump in a farming area that clearly states the red diesel fuel is for off-road use only.
	**DEMONSTRATION:** OBTAIN REGULAR DIESEL AND OFF-ROAD DIESEL TO SHOW TO THE STUDENTS. HAVE THEM VISUALLY NOTE DIFFERENCE IN TWO FUELS. FIGURE 7-1
	11. SLIDE 11 EXPLAIN Grades of Diesel Fuel 12. SLIDES 12-13 EXPLAIN Diesel Fuel Heaters 14. SLIDE 14 EXPLAIN FIGURE 7–3 An electrical resistance heater coil in the air inlet on a GM 6.5-liter V-8 diesel engine used to warm the air entering the engine 15. SLIDE 15 EXPLAIN Ultra-Low-Sulfur Diesel Fuel
 	**DISCUSSION:** HAVE THE STUDENTS TALK ABOUT GRADES OF DIESEL FUEL. IN WHICH APPLICATIONS IS GRADE #1 USED? WHY? IN WHICH APPLICATIONS IS GRADE #2 USED? WHY?
 	2. SLIDE 2 EXPLAIN OBJECTIVE CH7 AEP_LO2 3. SLIDES 3-4 EXPLAIN Definition of Biodiesel
	5. SLIDE 5 EXPLAIN Figure 7-4 pump decal indicating that the biodiesel fuel is ultra-low-sulfur diesel (ULSD) and must be used in 2007 and newer diesel vehicles.

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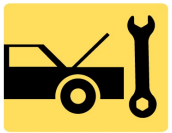
	**DISCUSSION:** TALK ABOUT WHY **SULFUR DIOXIDE** IS HARMFUL TO ENVIRONMENT. WHAT IS DIFFERENCE IN APPEARANCE OF **ULSD**? **FIGURE 7-4**
	6. SLIDES 6-7 EXPLAIN Biodiesel BLENDS 8. SLIDES 8-9 EXPLAIN Features of Biodiesel
	**DISCUSSION:** HAVE THE STUDENTS TALK ABOUT **BIODIESEL BLENDS**. CAN **B20** BE USED IN UNMODIFIED DIESEL ENGINES? SINCE BIODIESEL COSTS MORE THAN REGULAR DIESEL, WHAT ARE ITS BENEFITS?
	2. SLIDE 2 EXPLAIN **OBJECTIVE CH7 AEP_LO3** 3. SLIDES 3-4 EXPLAIN Diesel Fuel Specific Gravity Testing
	5. SLIDE 5 EXPLAIN **Figure 7-2** Testing API viscosity of a diesel fuel sample using a hydrometer.
	**DEMONSTRATION: USE A HYDROMETER TO SHOW THE STUDENTS HOW TO TEST API GRAVITY OF DIESEL FUEL: FIGURE 7-2**
	**DEMONSTRATION: SHOW LOCATION OF FUEL HEATER & FUEL FILTER ON A DIESEL VEHICLE**
	6. SLIDE 6 EXPLAIN **CHART 7–1** API gravity scale is based on the specific gravity of the fuel
	**HANDS-ON TASK: HAVE STUDENTS SAMPLE DIESEL FUEL AND TAKE AN API GRAVITY READING. HAVE THEM USE CHART 7–1 TO FIND WEIGHT DENSITY & POUNDS PER GALLON OF FUEL THAT THEY ARE SAMPLING.**
	**SAFETY REVIEW WITH STUDENTS THE SAFETY PRECAUTIONS THAT SHOULD BE TAKEN WHEN WORKING WITH AND TESTING, DIESEL FUEL.**

ICONS	Ch07 Diesel & BioDiesel Fuel
	2. SLIDE 2 EXPLAIN OBJECTIVE CH7 AEP_LO4 3. SLIDE 3 EXPLAIN E-Diesel
	4. SLIDES 4-5 EXPLAIN Cetane Rating of E-Diesel
	**DISCUSSION:** HAVE STUDENTS TALK ABOUT BIODIESEL IN RELATION TO VEGETABLE OIL. WHAT IS DIFFERENCE BETWEEN BIODIESEL POWERED VEHICLES & VEGETABLE-OIL-POWERED VEHICLES? ALSO DISCUSS E-DIESEL FUEL. WHAT IS A TYPICAL BLEND LEVEL FOR E-DIESEL?
	**DISCUSSION:** HAVE THE STUDENTS TALK ABOUT THE CETANE RATING OF E-DIESEL. IN WHAT APPLICATIONS IS E-DIESEL CURRENTLY USED?