
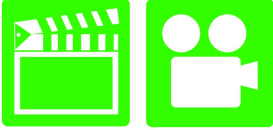
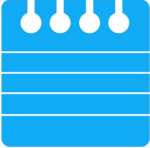

















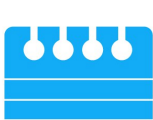

Automotive Maintenance and Light Repair, 1ST Edition

Chapter 18 Lube, Oil, and Filter Service

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers Automotive Maintenance and Light Repair . 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. <ul style="list-style-type: none">• Prepare for ASE Engine Repair (A1) certification test content area "A" (General Engine Diagnosis) and content area "D" (Lubrication and Cooling Systems Diagnosis and Repair).• Describe chassis system lubrication and under vehicle inspection.
Establish the Mood or Climate	Provide a <i>WELCOME</i> , 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	Ch18 Lube, Oil, and Filter Service
       	<p>1. SLIDE 1 CH18 Lube, Oil, and Filter Service</p> <p>2. SLIDE 2 EXPLAIN OBJECTIVES</p> <p>Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE REGULARLY UPDATED</p> <p>NOTE: POWER POINT SLIDES ARE INCORRECTLY MARKED CHAPTER 19</p> <p>3. SLIDE 3 EXPLAIN Properties of Engine Oil</p> <p>4. SLIDE 4 EXPLAIN FIGURE 18-1 Clean engine oil is the life blood of any engine</p> <p>5. SLIDE 5 EXPLAIN FIGURE 18-2 SAE viscosity rating required is often printed on the engine oil filler cap</p> <p>DEMONSTRATION: PUT QUART OF 10W-30 & A QUART OF 30W OIL IN FREEZER TO DEMONSTRATE FLOW CHARACTERISTICS OF MULTIGRADE VS. SINGLE-GRADE OIL IN FREEZING TEMPERATURES.</p> <p>DISCUSSION: DISCUSS WHY OEMS DO NOT RECOMMEND SINGLE-VISCOSITY OIL. ASK STUDENTS WHY IT WAS OK FOR SINGLE-VISCOSITY OIL TO BE USED IN OLDER ENGINES & ENGINES DESIGNED FOR HIGH PERFORMANCE. WHY IS OIL VISCOSITY IMPORTANT?</p> <p>INTERNAL COMBUSTION ENGINE (ICE) LUBRICATION SYSTEM ABSORBS 1/3 OF HEAT PRODUCED BY ENGINE.</p> <p>6. SLIDE 6 EXPLAIN FIGURE 18-3 API doughnut for a SAE 5W-30, SN engine oil. When compared to a reference oil, the “energy conserving” designation indicates a 1.1% better fuel economy for SAE 10W-30 oils and 0.5% better fuel economy for SAE 5W-30 oils.</p> <p>7. SLIDE 7 EXPLAIN ILSAC Oil Rating</p> <p>8. SLIDE 8 EXPLAIN FIGURE 18-4 International Lubricant Standardization & Approval Committee (ILSAC) starburst symbol. If symbol is on front of oil, it is acceptable for use in almost gas engine.</p>

ICONS	Ch18 Lube, Oil, and Filter Service
	<p>DISCUSSION: ASK STUDENTS TO DISCUSS DIFFERENCES BETWEEN SAE & API RATINGS. THEN HAVE THEM IDENTIFY THOSE RATINGS ON DIFFERENT BRANDS AND VISCOSITIES OF OILS. THEN ASK THEM TO COMPARE API, ILSAC, & EUROPEAN OIL RATINGS STANDARDS.</p>
	<p>OIL RATINGS ARE UPDATED & NEWER OIL IS BACKWARD COMPATIBLE, MEANING THEY CAN BE USED IN OLDER VEHICLES</p>
	<p>9. SLIDE 9 EXPLAIN European Oil Rating System</p>
	<p>10. SLIDE 10 EXPLAIN FIGURE 18-5 ACEA ratings are included on the back of the oil container if it meets any of the standards. ACEA ratings apply to European vehicles only such as BMW, Mercedes, Audi, and VW</p>
	<p>11. SLIDE 11 EXPLAIN Engine Oil Additives</p>
	<p>12. SLIDE 12 EXPLAIN FIGURE 18-6 Viscosity index (VI) improver is a polymer and feels like finely ground foam rubber. When dissolved in the oil, it expands when hot to keep the oil from thinning.</p>
	<p>13. SLIDE 13 EXPLAIN Engine Oil Additives</p> <p>DEMONSTRATION: USING SAVED OIL SHOW STUDENTS THE DIFFERENCE BETWEEN NEW OIL AND OIL THAT IS DIRTY. HAVE STUDENTS USE LATEX GLOVES TO FEEL DIFFERENCE BETWEEN NEW & CONTAMINATED OIL</p>
  <p>QUESTION</p>	<p>DISCUSSION: HAVE STUDENTS DISCUSS REASON WHY OIL ADDITIVES ARE IMPORTANT. ASK THEM WHETHER ALL OEMS USE SAME ADDITIVES</p>
	<p>14. SLIDE 14 EXPLAIN Synthetic Oil</p>
	<p>15. SLIDE 15 EXPLAIN FIGURE 18-7 Mobil 1 synthetic engine oil is used by several vehicle manufacturers in new engines.</p>
	<p>SYNTHETIC OILS 1ST DEVELOPED FOR ARMY AIR FORCES (WWII) TO KEEP THEIR HIGH-PERF. TURBO RADIAL AIRCRAFT ENGINES ALIVE, WHICH COULD NOT BE DONE WITH CONVENTIONAL OILS.</p>

ICONS

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DISCUSSION: ASK STUDENTS TO COMPARE ADVANTAGES & DISADVANTAGES OF SYNTHETIC AND CONVENTIONAL OILS INCLUDED IN SERVICE INTERVALS

16. **SLIDE 16 EXPLAIN** Vehicle-Specific Specifications
17. **SLIDE 17 EXPLAIN FIGURE 18-8** Dexos is the oil specified for use in all General Motors engines starting with the 2011 model year.
18. **SLIDE 18 EXPLAIN FIGURE 18-9** European vehicle manufacturers usually specify engine oil with a broad viscosity range, such as SAE 5W-40, and their own unique standards, such as the Mercedes specification 229.51. Always use the oil specified by OEM
19. **SLIDE 19 EXPLAIN** High Mileage Oils
20. **SLIDE 20 EXPLAIN FIGURE 18-10** Using a zinc additive is important when using SM or SN rated oil in an engine equipped with a flat-bottom lifter, especially during the break-in period

DISCUSSION: ASK THE STUDENTS TO DISCUSS ANY ADVANTAGES & DISADVANTAGES THAT HIGH MILEAGE OILS HAVE COMPARED TO CONVENTIONAL AND SYNTHETIC OILS

HANDS-ON TASK: HAVE STUDENTS USE OWNER'S MANUAL INFORMATION TO LOOK UP & FIND OEM SPECIFIC OIL SPECIFICATIONS FOR AT LEAST 2 DIFFERENT VEHICLES

21. **SLIDE 21 EXPLAIN** Oil Filters
22. **SLIDE 22 EXPLAIN FIGURE 18-11** cutaway of a typical spin-on oil filter. Engine oil enters the filter through the small holes around the center of the filter and flows through the pleated paper filtering media and out the large hole in the center of the filter. The center metal cylinder with holes is designed to keep the paper filter from collapsing under the pressure. The bypass valve can be built into the center on the oil filter or is part of the oil filter housing and located in the engine.
23. **SLIDE 23 EXPLAIN FIGURE 18-12** rubber diaphragm acts as an antidrainback valve to keep the oil in filter when engine is stopped and oil pressure drops to zero.
24. **SLIDE 24 EXPLAIN FIGURE 18-13** typical filter crusher. Hydraulic ram forces out most of oil from filter. The oil is trapped underneath the crusher and is recycled.

ICONS	Ch18 Lube, Oil, and Filter Service
  	<p>DEMONSTRATION: TAKING A NAME BRAND FILTER AND A CHEAP OIL FILTER THAT HAVE BEEN CUT OPEN, SHOW THE STUDENTS DIFFERENCE BETWEEN THE TWO</p> <p>DISCUSSION: ASK STUDENTS TO DISCUSS DIFFERENCE BETWEEN NAME BRAND FILTER AND CHEAPER FILTER AND WHAT IT COULD MEAN TO THEM AS CONSUMERS</p> <p>25. SLIDE 25 EXPLAIN Oil Change Interval</p> <p>26. SLIDE 26 EXPLAIN FIGURE 18-14 Many OEMS can display the percentage of oil life remaining, whereas others simply turn on a warning lamp when it has been determined that an oil change is required.</p>
   	<p>DEMONSTRATION: SHOW THE STUDENTS HOW TO REST THE OIL LIFE SERVICE MONITOR</p> <p>DISCUSSION: ASK STUDENTS TO FIND OUT IF THEIR VEHICLES HAVE SERVICE MONITOR AND AT WHAT INTERVALS THAT LIGHT COMES ON. HAVE THEM WRITE DOWN PROCEDURE TO RESET LIGHT</p> <p>HANDS-ON TASK: HAVE THE STUDENTS RESEARCH THE OEM PROCEDURE FOR RESETTING THE OIL LIFE SERVICE MONITOR AND TO REST ONE IF A VEHICLE IS AVAILABLE.</p> <p>27. SLIDE 27 EXPLAIN Oil Change Procedure</p> <p>28. SLIDE 28 EXPLAIN FIGURE 18-15 Always check to make sure that the oil drain plug is the plug being removed as some vehicles also have transmission or transfer cases that also have drain plugs. This oil pan has a label and an arrow pointing to the engine oil drain plug</p>
	<p>29. SLIDE 29 EXPLAIN Chassis Lubrication</p> <p>30. SLIDE 30 EXPLAIN FIGURE 18-16 Greasing a tie rod end. Some joints do not have a hole for excessive grease to escape, and excessive grease can destroy seal</p> <p>31. SLIDE 31 EXPLAIN FIGURE 18-17 Part of steering linkage lubrication is applying grease to the steering stops. If these stops are not lubricated, a grinding sound may be heard when the vehicle hits a bump when the wheels are turned all the way one direction or the other. This often occurs when driving into or out of a driveway</p>

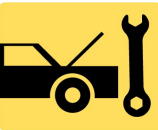
ICONS

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DEMO



DEMO



that has a curb

DEMONSTRATION: SHOW THE STUDENTS HOW TO LUBRICATE THE STEERING STOPS

32. **SLIDE 32 EXPLAIN FIGURE 18-18** To check an idler arm, most vehicle manufacturers specify that 25 lb force be applied by hand up and down to the idler arm. The idler arm should be replaced if the total movement (up and down) exceeds 1/4 in. (6mm)

DEMONSTRATION: SHOW THE STUDENTS HOW TO PERFORM A STEERING LINKAGE INSPECTION

HANDS-ON TASK: HAVE THE STUDENTS RESEARCH STEERING & SUSPENSION GREASE (ZERK) FITTINGS AND WHAT IF ANY VEHICLES STILL USE THEM. HAVE THEM CHECK THEIR OWN VEHICLES OR A LAB VEHICLE FOR FITTINGS AND TAG THEM FOR INSPECTION.

33. **SLIDE 33 EXPLAIN FIGURE 18-19** Steering system component (s) should be replaced if any noticeable looseness is detected when moved by hand


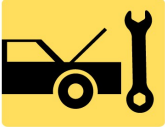

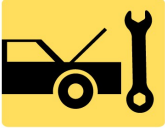







HANDS-ON TASK: HAVE THE STUDENTS DO A STEERING LINKAGE INSPECTION ON THEIR OWN VEHICLES OR A LAB VEHICLE.


34. **SLIDE 34 EXPLAIN FIGURE 18-20** All joints should be checked by hand for any lateral or vertical play.

35. **SLIDE 35 EXPLAIN FIGURE 18-21** This differential assembly has been leaking fluid. The root cause should be determined and the unit filled to the proper level using the specified lubricant, to help prevent early failure and an expensive repair later

HANDS-ON TASK: HAVE THE STUDENTS DO A STEERING LINKAGE INSPECTION ON THEIR OWN VEHICLES OR A LAB VEHICLE.

36. **SLIDE 36 EXPLAIN FIGURE 18-22** Always ensure that the fill plug can be accessed and removed before draining the fluid from a manual transmission

ICONS	Ch18 Lube, Oil, and Filter Service
	<p>DEMONSTRATION: SHOW THE STUDENTS HOW TO PERFORM TO CHECK FLUID LEVELS ON FINAL DRIVES AND MANUAL TRANSMISSIONS</p>
	<p>HANDS-ON TASK: HAVE STUDENTS CHECK FLUID LEVELS ON FINAL DRIVES AND MANUAL TRANSMISSIONS</p>
	<p>37. SLIDE 37 EXPLAIN Under Vehicle Inspection</p> <p>38. SLIDE 38 EXPLAIN FIGURE 18-23 broken coil spring was found during an under-vehicle inspection. The owner was not aware of the problem and it did not make any noise, but the vehicle stability was affected</p>
	<p>39. SLIDE 39 EXPLAIN FIGURE 18-24 This corroded muffler was found during a visual inspection, but was not detected by the driver because it was relatively quiet</p> <p>40. SLIDE 40 EXPLAIN FIGURE 18-25 A drive axle shaft equipped with 2 flexible rubber grease boots at each of axles. Look for signs of grease leaking from boots</p>
	<p>HANDS-ON TASK: HAVE STUDENTS DO A CHASSIS INSPECTION ON THEIR OWN OR A LAB VEHICLE AND TAG WHAT THEY FOUND.</p>
	<p>41. SLIDES 41-58 EXPLAIN OIL CHANGE PROCESS: WORDS & GRAPHICS. OPTIONAL COVERAGE. You will be doing an ON-VEHICLE Task Sheet on this NATEF Task</p>
	<p>ON-VEHICLE NATEF TASK PERFORM OIL AND FILTER CHANGE SEE 2013 NATEF TASK CORRELATION CHART</p>
	<p>SAFETY: MAKE SURE STUDENTS ARE AWARE THAT HOT OIL CAUSES BURNS AND IS CARCINOGENIC, AND USE OF LATEX GLOVES IS HIGHLY RECOMMENDED</p>
	<p>HOMework: HAVE STUDENTS USE INTERNET TO RESEARCH DIFFERENCE HIGH MILEAGE & SYNTHETIC OILS & WHAT MAKES HIGH MILEAGE OIL DIFFERENT FROM REGULAR MOTOR OIL. ASK</p>
 	

ICONS	Ch18 Lube, Oil, and Filter Service
	<p>THEM TO ANSWER QUESTION "ARE HIGH MILEAGE OILS WORTH THE EXTRA COST?" & "DO HIGH MILEAGE OILS REALLY WORK?" AND REPORT THEIR FINDINGS AT THE BEGINNING OF THE NEXT CLASS IN A DISCUSSION</p> <p><u>HOMEWORK:</u> COMPLETE CH18 CROSSWORD PUZZLE: HTTP://WWW.JAMESHALDERMAN.COM</p>