

Unit Title: Lubrication and Cooling Systems

Prepared By: Arne Duncan

School: Oahu High School

Grade(s)/Course: Automotive I

Period/Time: 2nd period (9:48 – 11:11)

Date Range: 3/30 – 4/8

Unit Summary:

- The students will learn about the main components and functions of the lubrication and cooling systems in an automobile. Students will work in teams to:
 - Identify and evaluate how components interact
 - Present a component of the cooling system to rest of class
 - Apply tools and prepare a work order for lubrication and cooling system maintenance

Unit Rationale: Answer the following questions:

- How did your students' interest, development, background, and/or prior knowledge inform your unit/lesson plan design?
- How did your colleagues and/or families inform your unit/lesson plan design?

The majority of students in my automotive class are there because they like to work with their hands and they also are interested in motors and cars. This unit is in conjunction with my students learning about the major components of car maintenance and repair, and lubrication and cooling systems are the next major component that is outlined in the course text. In my experience and after speaking with my cooperating teacher, this system is covered in every automotive class. It is also important for my students to learn these systems because many of them are driving cars and they need to be able to keep the engines cool and lubricated.

Unit CTE Content or State Standards:

- ICO1.0: Evaluate the interrelatedness of systems and how a technological change in one system impacts other systems (Lessons 1, 4, & 5)
- ICO3.0: Use communication skill to effectively transfer IET information (Lessons 1, 2, 4 & 5)
- ICO5.0: Use the design process to address needs in the global marketplace (Lesson 2)
- ICO6.0: Evaluate and apply service excellence concepts and skills to achieve customer satisfaction. (Lesson 3)
- Common Core LA Standard for Writing: Research to Build and Present Knowledge/ Speaking and Listening: Comprehension and Collaboration (Lesson 3)

Materials/Resources:

- CDX digital textbook, laptop, overhead projector, dry erase markers
- Engine block with oil pan removed, plastigauge oil clearance check, breaker bar, torque wrench, safety glasses
- Oil Filter, straight edge, feeler gauges
- ProDemand online service to access manufacturer specifications
- 6 computers ready with powerpoint (or google slides)
- Cooling system group project instructions and expectations, group project assessment rubric
- Work order forms, practical assessment rubric
- Lubrication system handout activity, answer key
- Cooling system handout activity, answer key
- Written summative assessment, answer key
- Practical assessment: blue tape, sharpie

Lesson Objective(s)	Lesson Assessment(s)	Lesson Duration & Instruction Summary
<p>Lesson 1:</p> <ul style="list-style-type: none"> Benchmark: ICO 1.1: Describe how an automobile's lubrication system functions, using the main components and correct terminology and technical vocabulary Benchmark: ICO 3.1: Identify the 5 functions of oil in an automobile's lubrication system ~ 	<p>To measure the lesson objectives, the students will answer the following 2 questions on a worksheet:</p> <p>ICO 1.1: ~ Describe, in your own words (and in complete sentences), how an automobile's lubrication system works; be sure to include each of the main components of the lubrication system and their function (5 points)</p> <p>ICO 3.1: Identify the 5 functions of oil in an automobile's lubrication system. (5 points)</p> <p>Scoring Criteria: A – 10-9 pts B – 8 pts C – 7 pts D – 6 pts F – below 5 pts</p>	<p>Duration: 83 min (1 class period)</p> <p>~ Pretest: Teacher asks the class to list the functions of oil in an automobile</p> <p>~ Using CDX digital textbook, students read about the 5 functions of oil and watch short video, then students list the 5 functions on the board / in notes</p> <p>~ Teacher uses diagram / animation from CDX digital textbook and reviews the main components of the lubrication system</p> <p>~ students work on the handout activity in teams with remaining class time</p>
<p>Lesson 2:</p> <ul style="list-style-type: none"> Benchmark: ICO 5.2: Employ the correct tools, technology, and technical information to collect data and model correct procedures to precisely measure oil clearance in the crankshaft journal and oil pump clearances Benchmark: ICO 3.2: Prepare a realworld "work order" form, by using real data from measurements determined in the oil clearance and oil pump checks 	<p>To measure the lesson objective ICO 5.2, the students will be assessed through informal observation using the following checklist:</p> <ol style="list-style-type: none"> Students use correct tools Students collect proper technical data. Students model correct procedures for using precision measurement checks. <p>To measure the lesson objective ICO 3.2, the students will be assessed on real-world work order form. The students will be scored as credit/no credit based on the following criteria:</p> <ol style="list-style-type: none"> Form is complete, accurate, and language is clear. (10 points total) 	<p>Duration: 166 min (2 class periods)</p> <p>~ Teacher will model the procedures for measuring oil clearance in the crankshaft journal and oil pump clearances, using proper PPE and the correct use of tools</p> <p>~ Teams will go into the shop group by group (one group on the oil clearance, one group on the oil pump clearances); the other groups will remain in the classroom and finish the work order activity and practice using other precision measurement tools, such as the micrometer; groups will rotate once each group completes the practical activities in the shop.</p>

<p>Lesson 3:</p> <ul style="list-style-type: none"> • Benchmark: ICO6.1: For the group project, Describe your IET team and explain how each member contributes to accomplishing team goals • Benchmark: 910.W.8: Research / gather relevant information from multiple authoritative print and digital sources; illustrate relevant information in a visual presentation format (such as powerpoint) • Benchmark: 9-10.SL.4: Each team will present to the class their topic information, in a clear and logical manner 	<p>To measure the lesson objective ICO 6.1, the students will be assessed through credit/no credit on the following: Each team provides:</p> <ul style="list-style-type: none"> • Description of your team and an explanation of how each member contributes to accomplishing the team goals. (10 pts) <p>To measure the lesson objective Benchmark 910.W.8 and 9-10.SL.4, the students will be assessed using the following criteria: (5 points for each criteria)</p> <ul style="list-style-type: none"> • Information is appropriate • Information is accurate • Information is clear • Information is organized <p>Scoring Criteria: A – 20-18 pts B – 17-16 pts C – 15-14 pts D – 13-12 pts F – below 12 pts</p>	<p>Duration: 166 min (2 class periods)</p> <p>~ Teacher will review the requirements of the group project and handout the expectations & rubric to each team</p> <p>~ IET teams will draw straws to determine the order in which the groups choose their cooling system component; then each team will assign roles within their team</p> <p>~ IET teams will research and develop their powerpoint presentations, using the computers in the classroom as needed.</p> <p>~ Once the teams have completed their presentations, each team will present their findings to the class; teacher will write the main components and their functions on the board / students will write this information in their notes</p>
<p>Lesson 4:</p> <ul style="list-style-type: none"> • Benchmark: ICO 3.1: Diagram the cooling system by identifying its main components 	<p>To measure the lesson objective Benchmark ICO 3.1 the students will complete a worksheet with the following question:</p> <ul style="list-style-type: none"> • Diagram the cooling system by identifying its main components; (10 points) <p>Scoring Criteria: A – 10-9 pts B – 8 pts C – 7 pts D – 6 pts F – below 5 pts</p>	<p>Duration: 30 min (1 class period) – special assembly</p> <p>~ The class will review the components and functions of the cooling system shown in the team presentations</p> <p>~Teams work on the worksheet with remaining class time</p>

<p>Lesson 5:</p> <ul style="list-style-type: none"> Benchmark: ICO3.1: Interpret system diagrams to solve problems 	<p>To measure the lesson objective Benchmark ICO 3.1 the students will take a short answer quiz where they are presented with a scenario of a cooling system or lubrication issue. The students will be assessed using the following criteria: (5 points for each criteria)</p> <ul style="list-style-type: none"> Answer is appropriate and accurate Answer provides a specific solution <p>Scoring Criteria: A – 10-9 pts B – 8 pts C – 7 pts D – 6 pts F – below 5 pts</p>	<p>Duration: 30 min (1 class period) – special assembly</p> <p>~Teams work on scenario quiz for the entire class period.</p>
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