

EXAMPLE: UNDERSTANDING BY DESIGN (UBD)* CROSSWALK

Automotive Technology I

Course Title and Code: Automotive Technology I (AUTO101) **Unit Title:** Battery, Starting, Charging Systems **Grade Level(s):** 11-12

Unit Description: Students will evaluate the condition and perform maintenance and light repair of battery, starting and charging systems.

Stage 1 - Desired Results

Standards- *What are the content standards and mission related goals?*

Battery, Starting, and Charging System Skills-Students will evaluate the condition and perform maintenance and light repair of battery, starting and charging systems.

Common Core Standards:

READING STANDARDS Include:

1. Cite strong and thorough textual evidence to support analysis of text as well as inferences drawn from text. (RI.11-12.1)
2. Determine two or more central ideas of a text and analyze its development over the course of text. (RI.11-12.2)
3. Determine the meaning of words and phrases as they are used in a text including technical meanings. (RI.11-12.4)
4. Determine the author's point of view or purpose in a text. (RI.11-12.6)
5. Read and comprehend literary nonfiction text complexity independently and proficiently. (RI.11-12.10)

WRITING STANDARDS Include:

1. Write arguments to support claims in an analysis of the article using valid reasoning and sufficient evidence. (W.11-12.1)
2. Examine and convey ideas and information clearly and accurately through organization and analysis of the content presented. (W.11-12.2)
3. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (W.11-12.4)
4. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (W.11-12.5)
5. Draw evidence from the informational text to support analysis, reflection, and research. (W.11-12.9)
6. Write routinely over extended time frames and shorter time frames for a range of tasks, purposes, and audiences. (W.11-11.10)

SPEAKING and LISTENING STANDARDS Include:

1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) on topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. (SL.11-12.1)
2. Propel conversations by posing and responding to questions that probe reasoning and evidence. (SL.11-12.1c)
3. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. (SL11-12.2)

LANGUAGE STANDARDS Include:

1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. (L.11-12.1)
2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. (L.11-12.2)
3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening. (L.11-12.3)
4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grades 11–12 reading and content*, choosing flexibly from a range of strategies. (L.11-12.4)
5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings. (L.11-12.5)
6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career

EXAMPLE: UNDERSTANDING BY DESIGN (UBD)* CROSSWALK

Automotive Technology I

Stage 1 - Desired Results

readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. (L.11-12.6)

MATH STANDARDS Include:

1. Apply basic mathematical operations to solve problems.
2. Solve problems involving whole numbers, decimals, fractions, percents, ratios, averages, and proportions.
3. Use algebraic operations to solve problems.
4. Use common international standards of measurement when solving problems.

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Meaning

Understandings (U): *What kinds of long-term independent accomplishments are expected?*

- Students will understand the basic construction of the different types of automotive batteries.
- Students will understand the principles of the 12 volt charging system.
- Students will understand motor principle and how it relates to the starting system.

Essential Questions (Q): *What thought-provoking questions will foster inquiry, meaning making and transfer?*

- Why do automotive engineers use alternators instead of generators in the automotive charging systems?
- How do new technologies affect batteries, charging, and starting systems?

Students will know..... (Knowledge)

[noun phrases-facts and basic concepts to recall]

- Students will know how to interpret test data as it relates to batteries.
- Students will know how to interpret test data as it relates to charging systems.
- Students will know how to interpret test data as it relates to starting systems.

Students will be able to (Skills)

[verb phrases- discrete skills and processes to use]

- Students will be able to diagnose, repair, and service automotive starting systems.
- Students will be able to diagnose, repair, and service the 12 volt charging systems
- Students will diagnose and service automotive batteries.

EXAMPLE: UNDERSTANDING BY DESIGN (UBD)* CROSSWALK

Automotive Technology I

Stage 2 – Assessments/ Other Evidence

Performance Tasks (T): How will meaning making and transfer be demonstrated?

State Automotive Competency “Knowledge, Content and Skills”

1. Students will identify and describe operation of battery, starting and charging systems.
2. Students will evaluate condition and perform maintenance and light repair of battery, starting and charging systems.

http://www.education.nh.gov/career/career/documents/pc_trans_am.pdf

NATEF Tasks

- EL:BS:8. Identify electronic modules, security systems, radios, and other accessories that require re-initialization or code entry after reconnecting vehicle battery.
- EL:BS:1. Perform battery state-of-charge test; determine necessary action.
- EL:BS:2. Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.
- EL:BS:3. Maintain or restore electronic memory functions.
- EL:BS:4. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.
- EL:BS:5. Perform slow/fast battery charge according to manufacturer’s recommendations.
- EL:BS:6. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.
- EL:ST:1. Perform starter current draw test; determine necessary action.
- EL:ST:2. Perform starter circuit voltage drop tests; determine necessary action.
- EL:ST:4. Remove and install starter in a vehicle.
- EL:CH:1. Perform charging system output test; determine necessary action.
- EL:CH:3. Remove, inspect, and re-install generator (alternator).
- EL:CH:4. Perform charging circuit voltage drop tests; determine necessary action.

Other Evidence (OE): What tasks/activities determine whether desired results have been accomplished? Formative Assessments DOK1-2

DOK 2 Skill/Concept	DOK 1 Recall
1. Evidence binder	1. Evidence binder
2. Battery construction	2. Heavy load test
3. Generator principle	3. Parasitic draw test
4. Motor principle	4. Voltage drop test
5. Electron theory	5. Current draw test
6. Conventional theory	6. Static voltage test
	7. R&R alternator
	8. R&R battery
	9. R&R starter

EXAMPLE: UNDERSTANDING BY DESIGN (UBD)* CROSSWALK

Automotive Technology I

Stage 3 – Learning Plan

Learning Activities (L): *What is the goal for each activity, task, and event?*

HOOK: Wire fire demonstration

Common Misconceptions:

- Batteries provide power while the vehicle is running.
- The alternator is for recharging the battery

Required learning activities:

- Battery Notes
- Charging system notes
- Starting system notes
- Battery System testing handout
- Perform Static voltage test
- Perform Heavy load test
- Test for surface discharge
- Perform starter current draw test
- Perform starter voltage drop test
- Jump start a vehicle
- Perform a parasitic draw test
- Perform charging current draw
- Perform charging voltage drop
- Evidence binder Battery, charging, and starting section.
- Each Competency evidence sheet

Required Literacy activities:

- Evidence binder
- Each Competency evidence sheet
- Complete an inquiry task.

Required Numeracy activities:

- Perform charging current draw
- Perform charging voltage drop
- Perform Static voltage test
- Perform Heavy load test
- Test for surface discharge
- Perform a parasitic draw test

Anticipated time span for teaching this unit: 3-4 weeks

Core Unit Vocabulary

A/C, D/C, Diode, Current, Amperage, Fuse, Voltage, Relay, Solenoid, Voltage drop, Inductive current, Open circuit, Short circuit, AGM battery, Reserve capacity, CCA, Electrolyte, Induction, Insulated, Rotor, Stator, Rectifier, PCM, GFS, Parasitic load, Current draw, Static charge, Static discharge

*Honors leveled students are required to reach
Mastery "4"
Non-leveled students are required to reach
proficient "3"
For each NATEF Competency*

NH State Competency Rating Scale

4	Mastery	Completes task correctly, without intervention, to industry standards. (7min)
3	Proficient	Completes task correctly but needs no more than 3 vocal interventions to meet industry standards.
2	Novice	Completes task correctly, but needs more than 3 vocal interventions and/or the instructor has to physically demonstrate any steps.
1	Developing	Can NOT or will NOT complete task. Or student needs more than 1 physical demonstration of a step.

Recommended learning activities:

- Perform starter current draw test
- Perform starter voltage drop test
- Jump start a vehicle