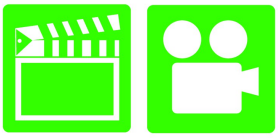
A6 Electricity & Electronics 4th Edition

Chapter 5 Series Circuits

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of **Automotive Electricity and Electronics Systems.** 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. Diagnose electrical/electronic integrity for series, parallel, and series-parallel circuits using Ohm's law. 2. Explain Kirchhoff's voltage law. 3. Calculate voltage drops in a series circuit. **This chapter will help you prepare for the ASE Electrical/Electronic Systems (A6) certification test content area "A" (General Electrical/Electronic System Diagnosis).**
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	Ch05 Series Circuits
	**1. SLIDE 1 CH5 SERIES CIRCUITS** **2. SLIDES 2-3 EXPLAIN OBJECTIVES**
	**Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/** **WEB SITE IS CONSTANTLY UPDATED**
	**4. SLIDE 4 EXPLAIN** SERIES CIRCUITS **5. SLIDE 5 EXPLAIN** Ohm's Law and Series Circuits **6. SLIDE 6 EXPLAIN Figure 5-1** Series circuit with 3 bulbs. All current flows through all resistances (bulbs). Total resistance of circuit is sum of total resistance of bulbs, & bulbs will light dimly because of increased resistance & reduction of current flow (amperes) through circuit
	**Series Circuit, Open Circuit**
	**DISCUSSION: HAVE STUDENTS TALK ABOUT SERIES CIRCUITS. WHERE, AND FOR WHAT PURPOSE, ARE SERIES CIRCUITS USED? REVIEW OHM'S LAW FOR USE IN UNDERSTANDING SERIES CIRCUITS. *WHY IS TOTAL RESISTANCE SUM OF ALL RESISTANCES? KIRCHHOFF'S VOLTAGE LAW*** **DEMONSTRATION: SET-UP CIRCUIT IN FIGURE 5-1 & SHOW STUDENTS HOW TO USE**
	
	**7. SLIDE 7 EXPLAIN Figure 5-2** series circuit with 2 bulbs. **8. SLIDES 8-9 EXPLAIN Kirchhoff's Voltage Law** **10. SLIDE 10 EXPLAIN Figure 5-3** As current flows through a circuit, voltage drops in proportion to amount of resistance in circuit. Most, if not all, of resistance should occur across load such as bulb in this circuit. All of other components and wiring should produce little, if any, voltage drop. If a wire or connection did cause a voltage drop, less voltage would be available to light bulb and bulb would be dimmer than normal

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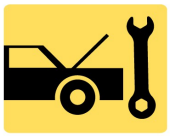
	**11. SLIDE 11 EXPLAIN Figure 5-4** In a series circuit voltage is dropped or lowered by each resistance in the circuit. Higher resistance, greater drop in voltage.
	**KIRCHHOFF'S VOLTAGE LAW: 2ND LAW:** **VOLTAGE AROUND ANY CLOSED CIRCUIT IS EQUAL TO THE SUM (TOTAL) OF THE VOLTAGE DROPS ACROSS THE RESISTANCES**
	**DISCUSSION: HAVE STUDENTS DISCUSS KIRCHHOFF'S SECOND VOLTAGE LAW. HOW DOES KIRCHHOFF'S LAW RELATE TO OHM'S LAW?**
	**12. SLIDE 12 EXPLAIN Figure 5-5** Voltmeter reads differences of voltage between test leads. Voltage read across a resistance is the voltage drop that occurs when current flows through a resistance. A voltage drop is also called an "IR" drop because it is calculated by multiplying the current (I) through the resistance (electrical load) by the value of the resistance (R).
	**13. SLIDE 13 EXPLAIN** VOLTAGE DROPS **14. SLIDES 14-15 EXPLAIN Series Circuit Laws**
	16. SLIDE 16 EXPLAIN Figure 5-6 In this series circuit with a 2-ohm resistor and a 4-ohm resistor, current (2 amperes) is same throughout even though voltage drops across each resistor.
	**17. SLIDES 17-18 EXPLAIN** Series Circuit Laws **19. SLIDE 19 EXPLAIN EXAMPLE 1** **20. SLIDE 20 EXPLAIN Figure 5-7 Example 1** **21. SLIDE 21 EXPLAIN Figure 5-8 Example 2** **22. SLIDE 22 EXPLAIN Figure 5-9 Example 3** **23. SLIDE 23 EXPLAIN Figure 5-10 Example 4**
	**COMPLETE SERIES CIRCUIT WORKSHEETS 1, 2, & 3** **TASK SHEET ON ELECTRICAL CIRCUITS**

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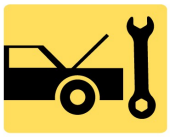
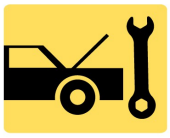
	TASK: HAVE STUDENTS PERFORM EXPERIMENTS ON SERIES CIRCUITS: CONSTRUCT A CIRCUIT SIMILAR TO ONE IN FIGURE 5–4. SHOW STUDENTS HOW TO CHECK VOLTAGE DROP AT EACH LAMP. ASK THEM TO ADD UP VOLTAGE DROPS & COMPARE THEM TO SOURCE VOLTAGE.
	TASK: HAVE STUDENTS PERFORM EXPERIMENTS ON SERIES CIRCUITS CONSTRUCT A CIRCUIT SIMILAR TO ONE IN FIGURE 5–8, FIGURE 5–9, & FIGURE 5–10. WHY DOES CURRENT REMAIN CONSTANT, EVEN THOUGH THERE ARE DIFFERENT RESISTANCES?
	HOMEWORK: SEARCH INTERNET:: RESEARCH 2 OR MORE APPLICATIONS OF SERIES CIRCUITS. ASK THEM TO DRAW CONCLUSIONS ABOUT SETTINGS IN WHICH SERIES CIRCUITS ARE USED & WHY ANOTHER TYPE OF CIRCUIT IS NOT USED. ASK STUDENTS TO PRESENT THEIR FINDINGS TO THE CLASS.
	**24. SLIDE 24 EXPLAIN SUMMARY**