*INSTRUCTORS: Time for this lesson may be used by the instructor to reinforce lessons taught, add new material, or for students to practice their skills on the tasks they’ve been given.*

The final accounts for 40% of the final grade. It will be a practical test of the skills you’ve learned throughout the term. The purpose of the final is for you to demonstrate your understanding of key principles in troubleshooting electrical systems, so that you can use those skills in the field.

1. You need to know how to use your DMM correctly to measure volts, amps, and ohms.
2. You need to know how to draw and read a ladder diagram.
   1. For instance, can you create a ladder diagram for the circuit you drew on the last page of Lab 4?
   2. Could you properly use the check-off method to wire the circuit you designed?
3. Could you test several transformers and relays to find one that was working correctly?
   1. Remember, don’t just test the coil of a relay, but test to make sure the contacts are working correctly, too.
   2. Where might you find the schematic for a relay?
4. When you test switches and fuses, both on ohms and volts, what results do you expect when they’re good/bad? Can you use your meter to test them properly?
5. Know the difference between a short, a dead short and a high-resistance short-to-ground.
   1. How do you verify a high-resistance short-to-ground?
      1. Once you know one exists, how do you locate it?
   2. How do you know when you have a dead short?
      1. Once you know it exists, how do you locate it?
   3. What’s the behavior of a short that is neither a dead short nor a high-resistance short-to-ground?
6. Do you remember how to measure 3-phase voltage?
   1. What about testing fuses on 3-phase?
   2. How do you know if a fuse or one of the lines is bad?
7. Think about opens.
   1. How do you know when one is present?
   2. How can you track-down the root cause, whether it’s a component (switch, load), connection, or wire?