ELECTRONICS Level 3

Common Assessment Task

Work Requirements:

Practical Work

Assessment Type:

Short response to a practical task

Criteria being assessed:

- Criteria 1, 6 and 7 - all elements

Suggested conditions:

- This task should take learners 2 hours in total.
- This task requires an individual response by each learner.

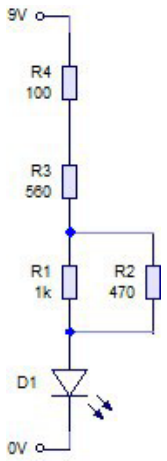
Task Description:

This task has three parts. You must complete each part, your responses need to be in a separate document.

In this task you will conduct an experiment on some of the properties of circuits; conduct calculations and evaluate your results.

Practical: Components in Series and Parallel

It is often required to have components in series, parallel, or some combination of the two.



Materials and equipment needed:

- the resistors shown in the circuit diagram
- a DC power supply (incl. 9V), with two power leads (red and green)
- a DMM
- a breadboard

What you need to do:

Complete all 3 parts of the task.

Provide your responses to the questions on a separate page. Clearly identify each question you are responding to.

Part 1: Breadboard this circuit and record the following measurements (Criterion 1)

1. Measure the **voltage across** the power supply.

2. Measure the **current through** the circuit. Connect your DMM in series with the positive power supply and the 100R resistor. *Note: the meter must be in series.*

3. (a) Is the current the same though **every** component in this circuit?
   (b) Explain your answer.

4. Measure the voltage across each of these components: 100R resistor; 560R resistor; 1k resistor; 470R resistor; LED.

5. Calculate the total resistance of the 1k and 470R resistors.

6. (a) Now isolate this parallel resistor pair (R1, R2) from the rest of the circuit, then measure its resistance (with your DMM).
   (b) How does this measurement compare to the calculation above (Question 5)?

7. (a) Use the voltages measured above to calculate the **current** through the: 100R resistor and the 560R resistor.
   (b) How does the current from these calculations compare to the measurement you made in Question 2 above?

Part 2: Calculations (Criterion 7)

8. (a) Calculate the current through the 1k resistor.
   (b) Calculate the current through the 470R resistor.

9. How do these compare with the total current you measured in step 2?

10. Calculate the **total resistance** in series with the LED.

11. Calculate the power dissipated by each resistor: 100R resistor; 560R resistor; 1k resistor; 470R resistor; LED.

12. If the maximum current rating of the LED is 20mA, what should be the ***minimum total resistance*** in the circuit? (Use Ohm's Law.)

Part 3: Evaluation of results (Criterion 6)

13. Measure the voltage across the LED while increasing the power supply voltage from about 1.5V to 12V. What happens to the voltage across the LED?

14. (a) Sketch a graph of **LED voltage versus supply voltage** while you increase the power supply voltage.

    (b) Explain what you think is happening.

15. Redraw the circuit, representing all the resistances with one overall (equivalent) resistor. On your diagram show the voltages, total resistance and current through the circuit.

Teacher use only - What needs to be submitted for assessment?
Learners respond to the questions in a separate document, clearly identifying each question number they are responding to.