

Scope:

- Verify concepts of linearity and superposition

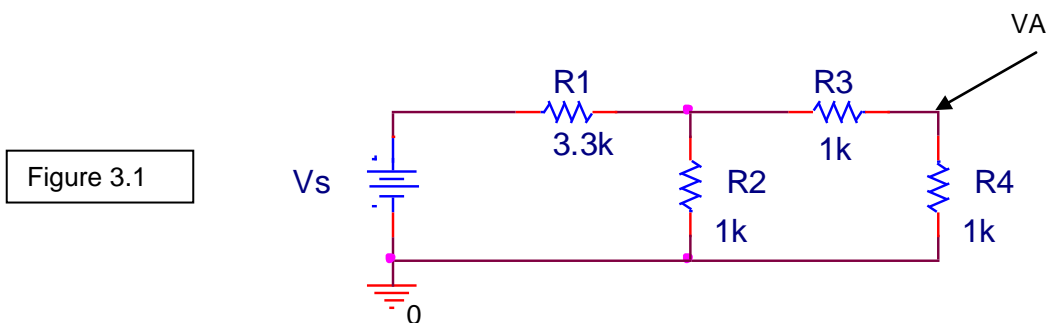
Home preparation:

- Review sections 2.4-2.7 of Hambley.
- Read through the experiment.
- Calculate all electrical parameters you will be measuring in lab.
- Practice recording and interpreting calculated and measured results of an experiment.

Laboratory experiment:

1) Build the circuit shown in Fig. 3.1 on your breadboard.

- Increase DC voltage V_s from 0 to 10V in steps of 1V and record the node voltage V_A .
- Plot " V_A vs. V_s ", i.e., V_s is the independent variable (x axis) and V_A is the dependent variable (y axis).
- Based on your graph, can you express mathematically the relationship between V_A and V_s ? Now use node equation(s) to analyze the circuit so that V_A can be determined from V_s . Does your analysis match the graph? Comment on the results.



2) Build the circuit shown in Fig. 3.2 on your breadboard, using the independent DC outputs of the bench power supply.

- Connect both sources V_1 and V_2 and measure V_B . Calculate the voltage drop across R_5 and the power delivered to R_5 .
- Next, keep V_1 attached but disconnect V_2 and replace it with a jumper wire (effectively sets V_2 to zero). Measure node voltage V_B , and again calculate the voltage drop across R_5 and the power delivered to R_5 .
- Finally, remove the jumper wire and reconnect source V_2 , but now disconnect source V_1 and replace V_1 with a jumper wire (effectively sets V_1 to zero). Measure node voltage V_B once again, and calculate the voltage drop across R_5 and the power delivered to R_5 .
- Comment on the results. How does superposition apply to voltage and power?

