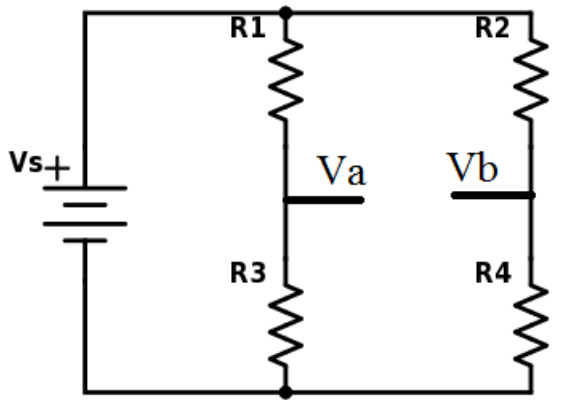
EN-3212 Electronics Worksheet 5

Thevenin's Theorem

The circuit below is called a Wheatstone Bridge. Derive an expression for Vab given the circuit below.



Find Vab if Vs = 12V, R1 = 1.2kΩ, R2 = 470Ω, R3 = 500Ω, and R4 = 2kΩ.

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Thevenin's Theorem

What would happen if Va = Vb? See what you get when you assume this. Be sure to simplify the expression.

If Vs = 18V, R2 = 1kΩ, R3 = 3.3kΩ, and R4 = 2.4kΩ, what value would R1 have to be to make Vab = 0?

What would happen to Vab if:

R1 increases?

R1 decreases?

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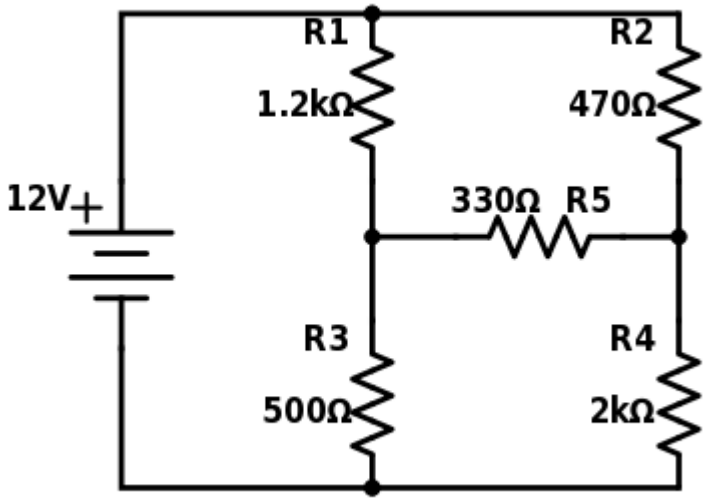
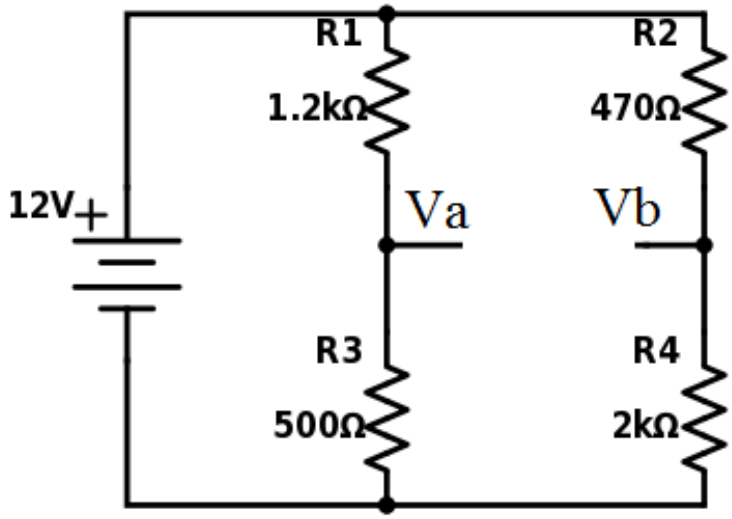
Thevenin's Theorem

Can you find the equivalent resistance of the following circuit? Are any of these resistors in series or in parallel?



Here's what we're going to do. R5 is going to be called our "load resistor". We remove it and leave the two terminals open.



Calculate Vab. This will be the Thevenized voltage.

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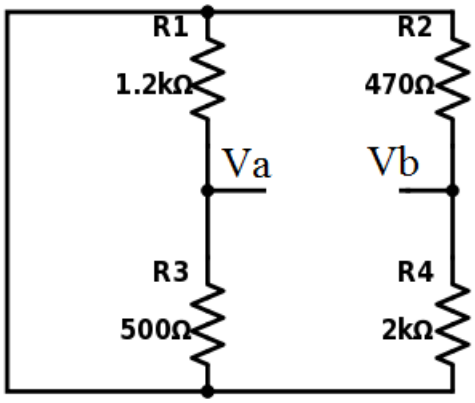
Thevenin's Theorem

Now, remove Vs and calculate the equivalent resistance between terminals a and b (it may be easier if you redraw this picture). This will be the Thevenized resistance.



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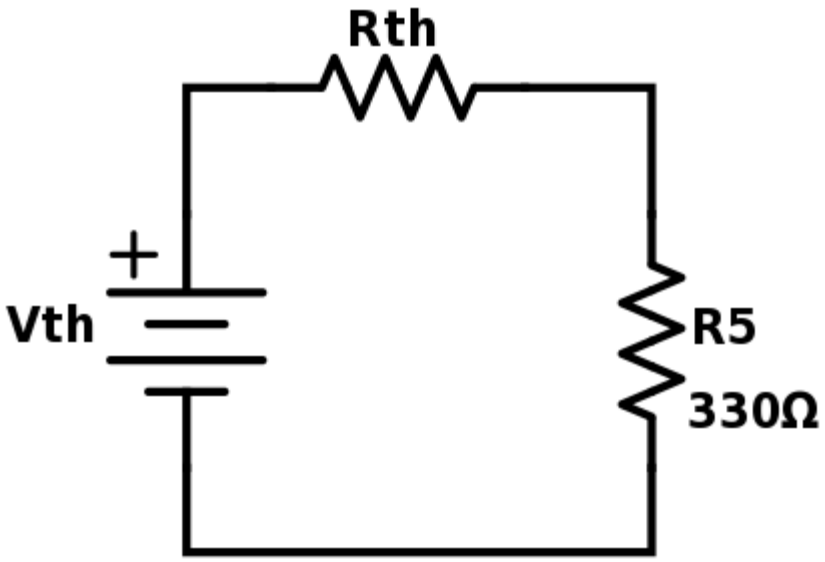
Thevenin's Theorem

Now, you can redraw the circuit.



Calculate the current through and voltage drop across R5. This will give you the correct value.

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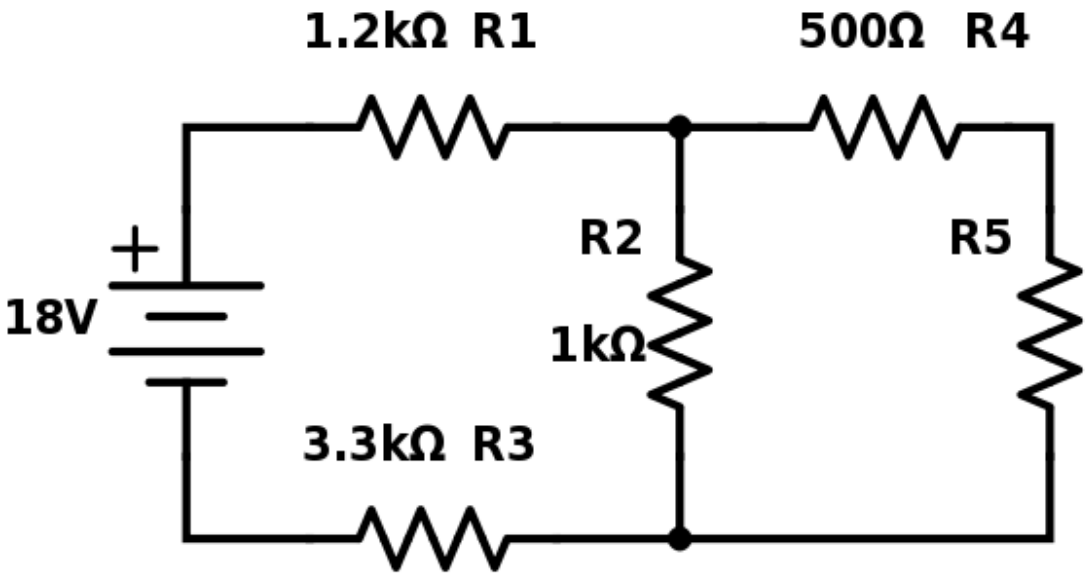
Thevenin's Theorem

Try doing the same of the circuit below for R5. R5 = 200Ω. You can analyze this circuit using the parallel/series method that you know if you would like to verify that your answer is correct.



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Thevenin's Theorem

Thevenize the following circuit. Calculate the current through and the voltage drop across R7 if its value 250 Ω.