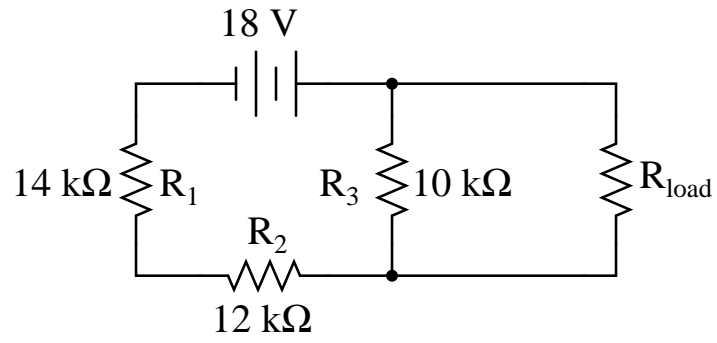


Question 1

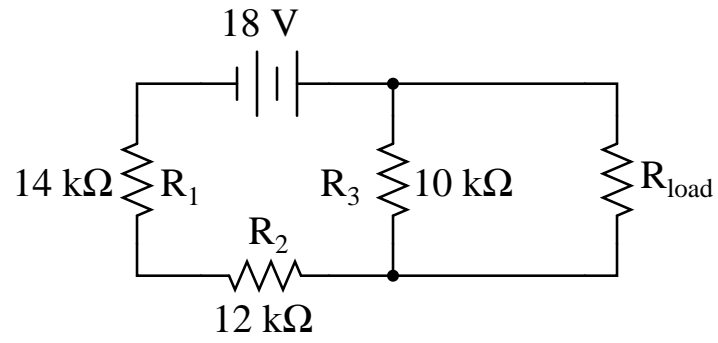
Animation: Applying Thévenin's theorem

This question consists of a series of images (one per page) that form an animation. Flip the pages with your fingers to view this animation (or click on the "next" button on your viewer) frame-by-frame.

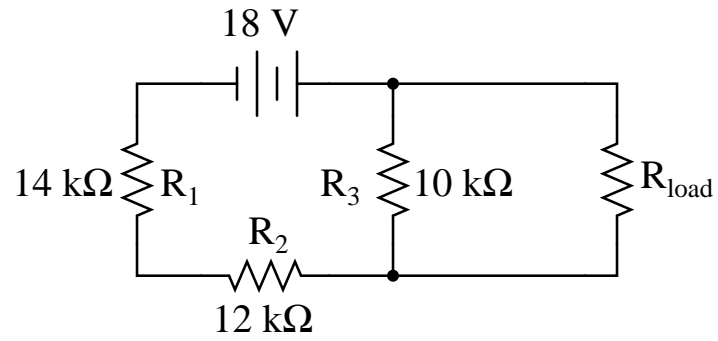
The following animation shows the steps involved in "Thévenizing" a circuit.



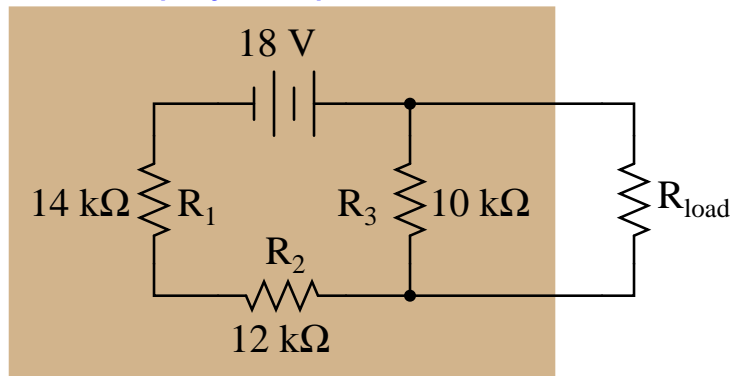
This is our original circuit:



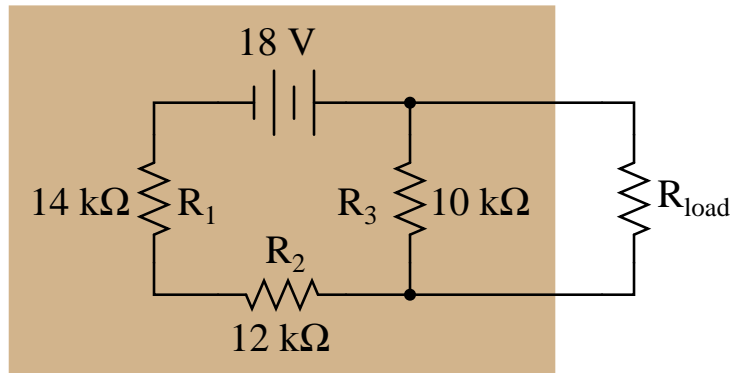
*We may use Thevenin's theorem
to simplify this portion of the circuit . . .*



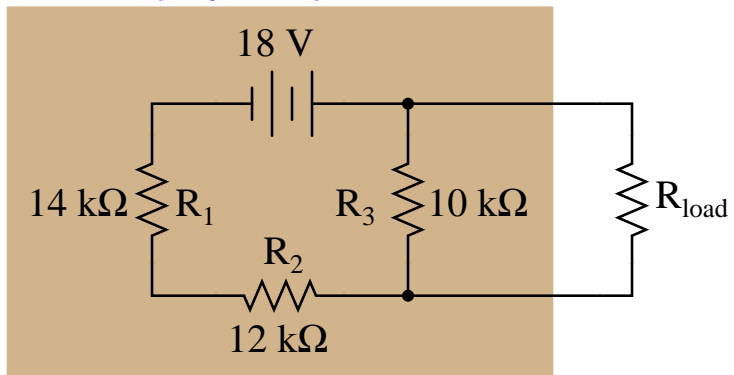
*We may use Thevenin's theorem
to simplify this portion of the circuit . . .*

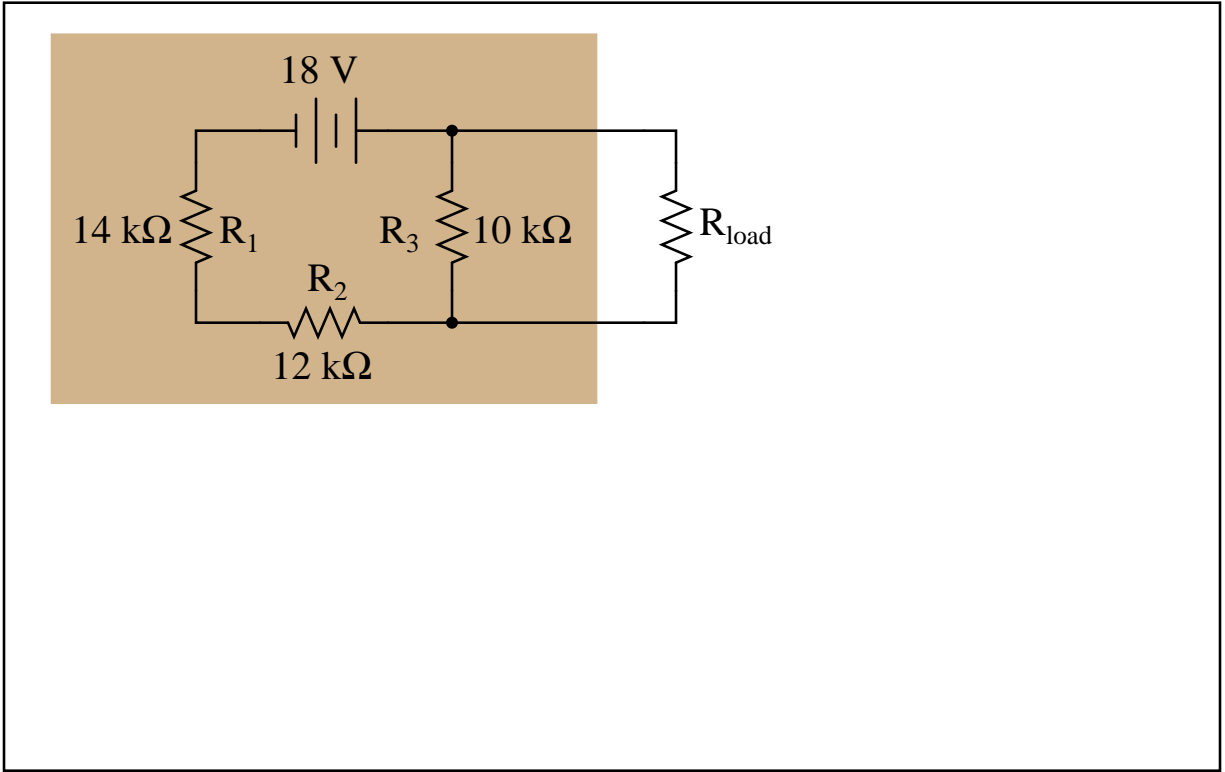


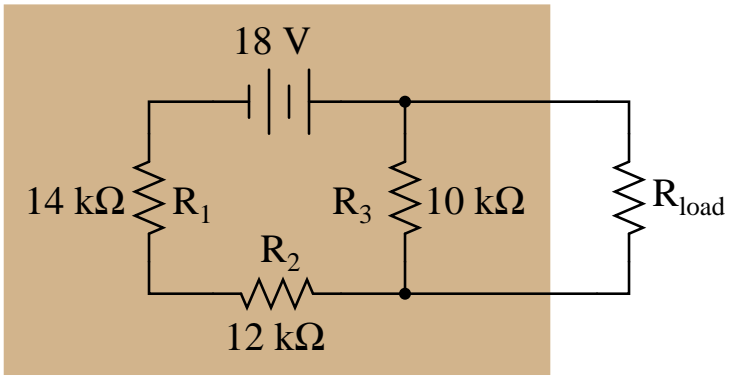
*We may use Thevenin's theorem
to simplify this portion of the circuit . . .*



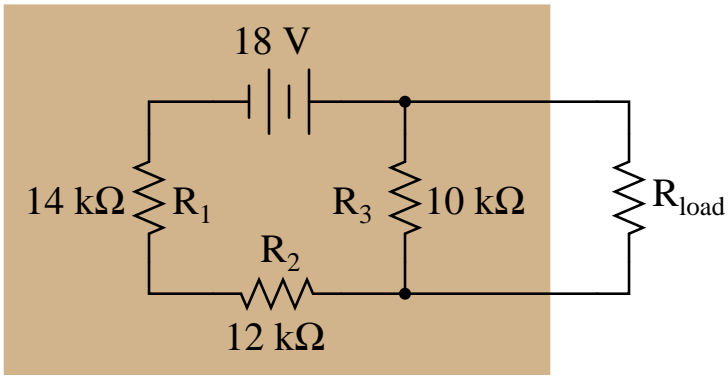
*We may use Thevenin's theorem
to simplify this portion of the circuit . . .*



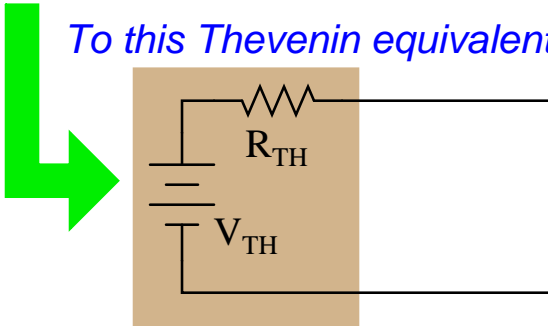


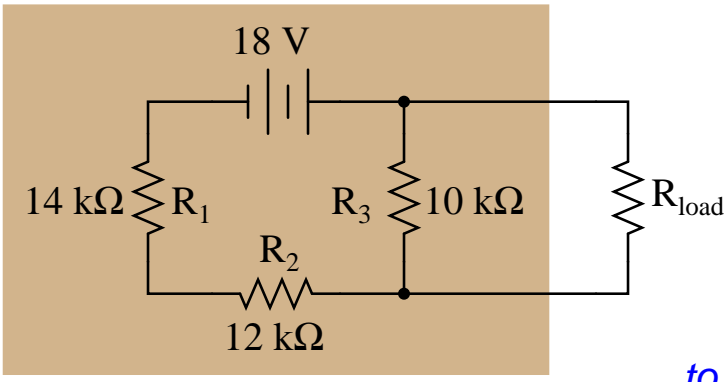


To this Thevenin equivalent circuit . . .

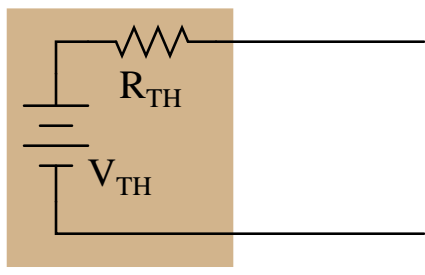


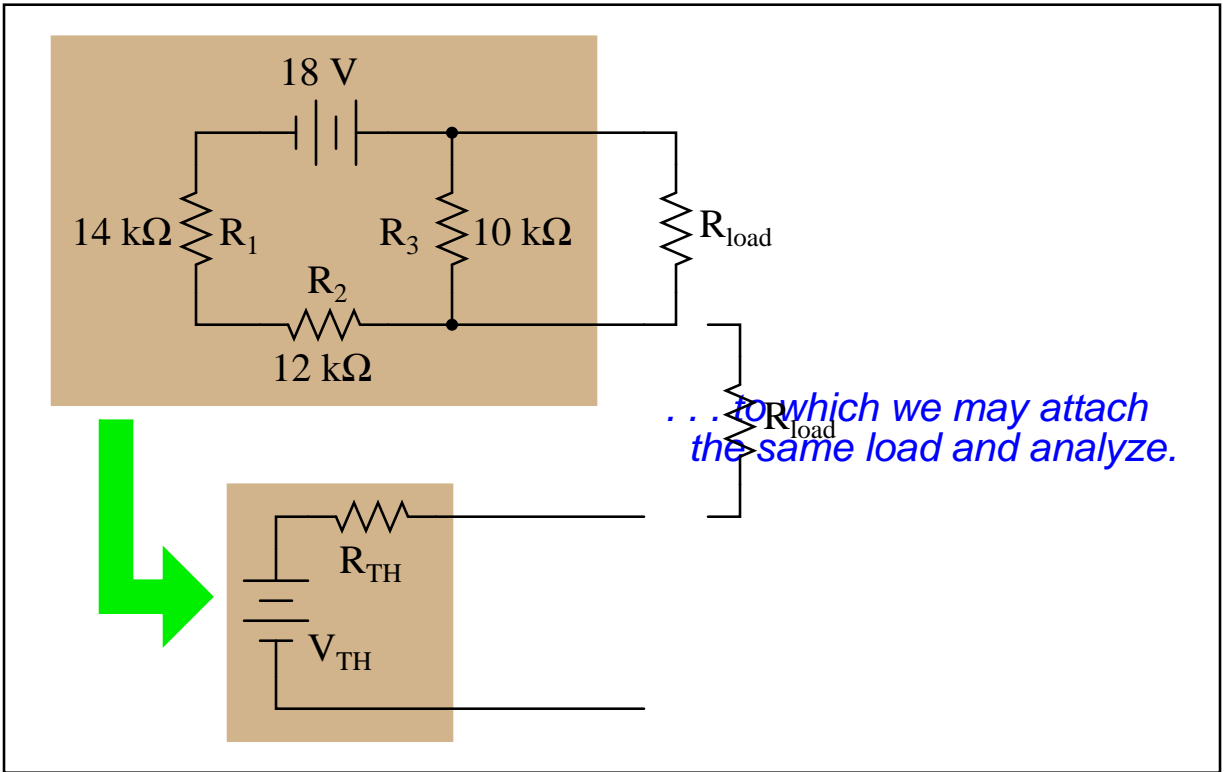
To this Thevenin equivalent circuit . . .

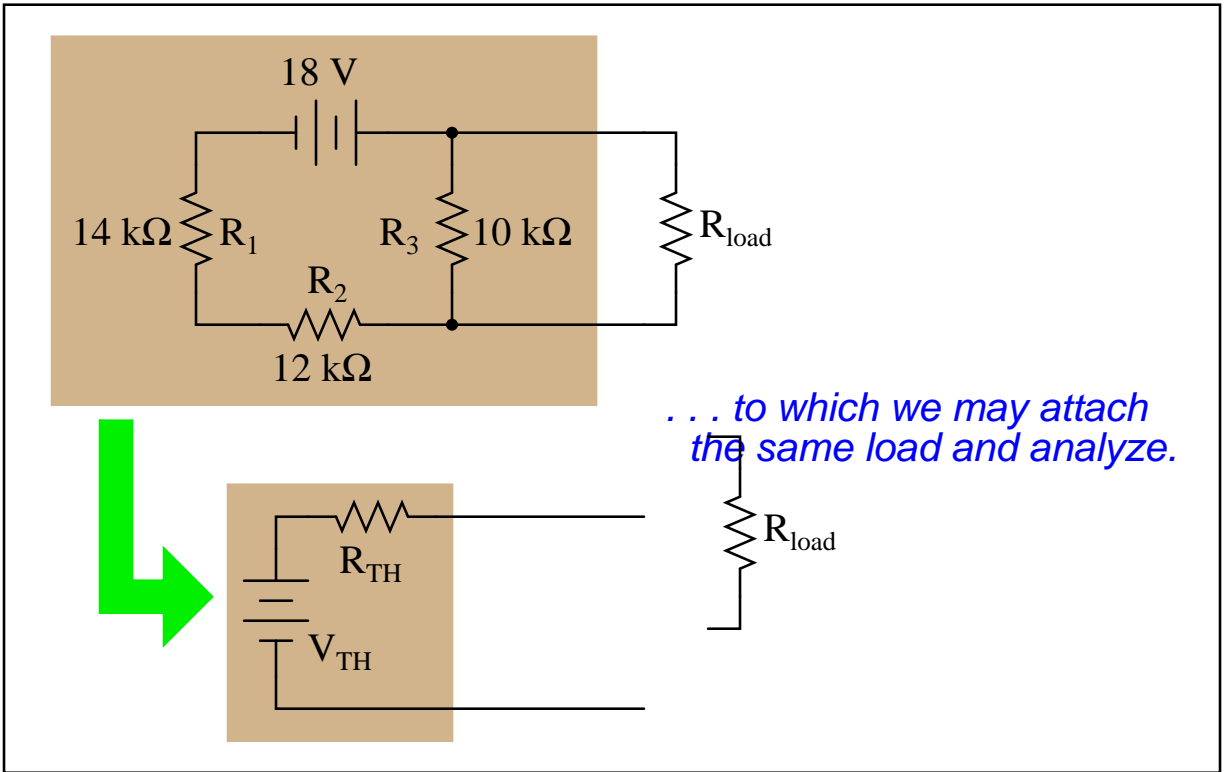


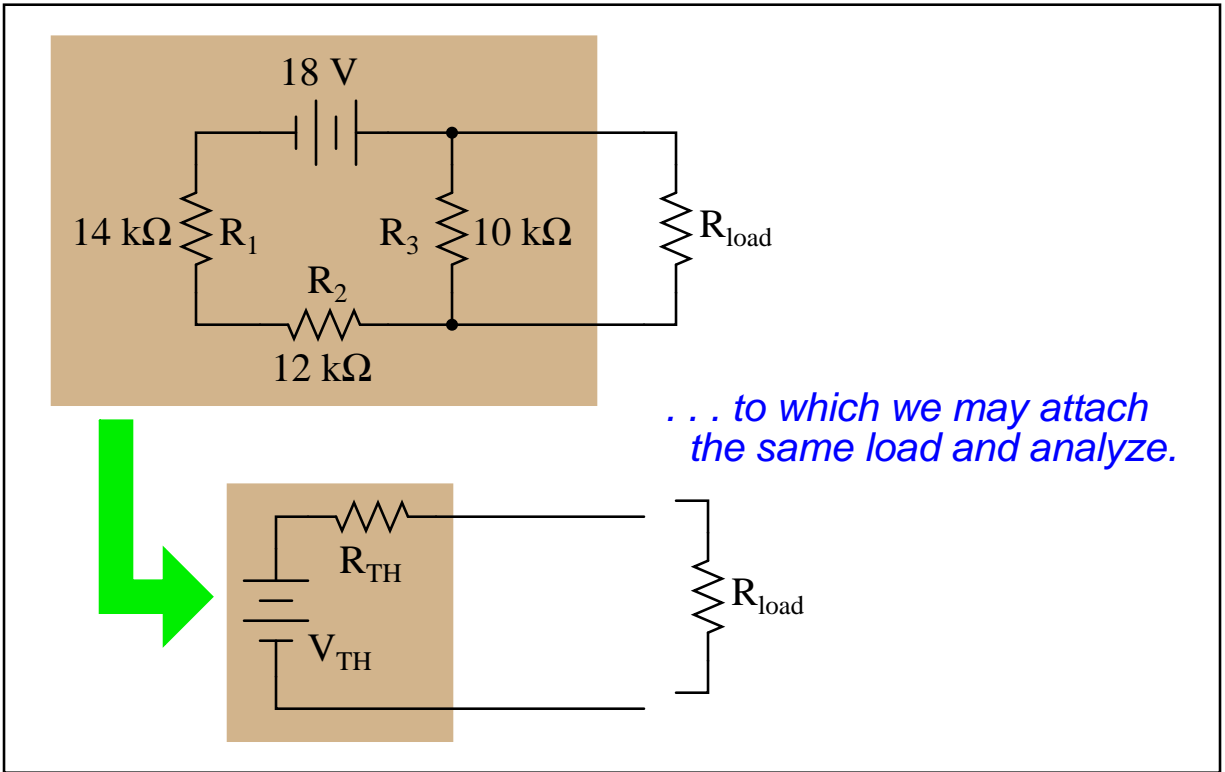


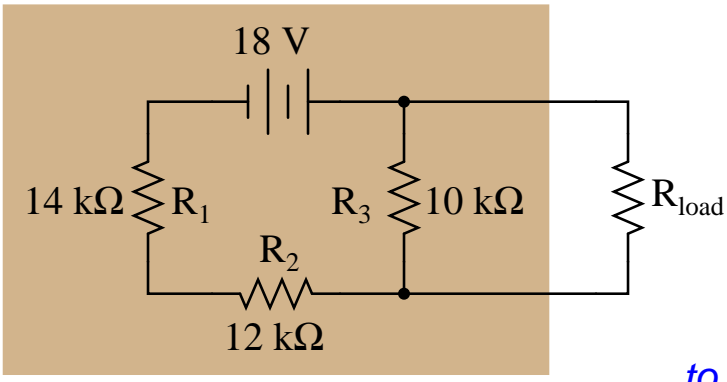
... to which we may attach the same load and analyze.



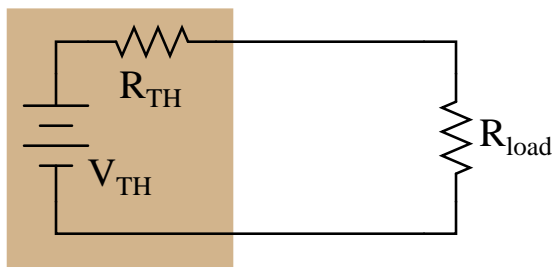


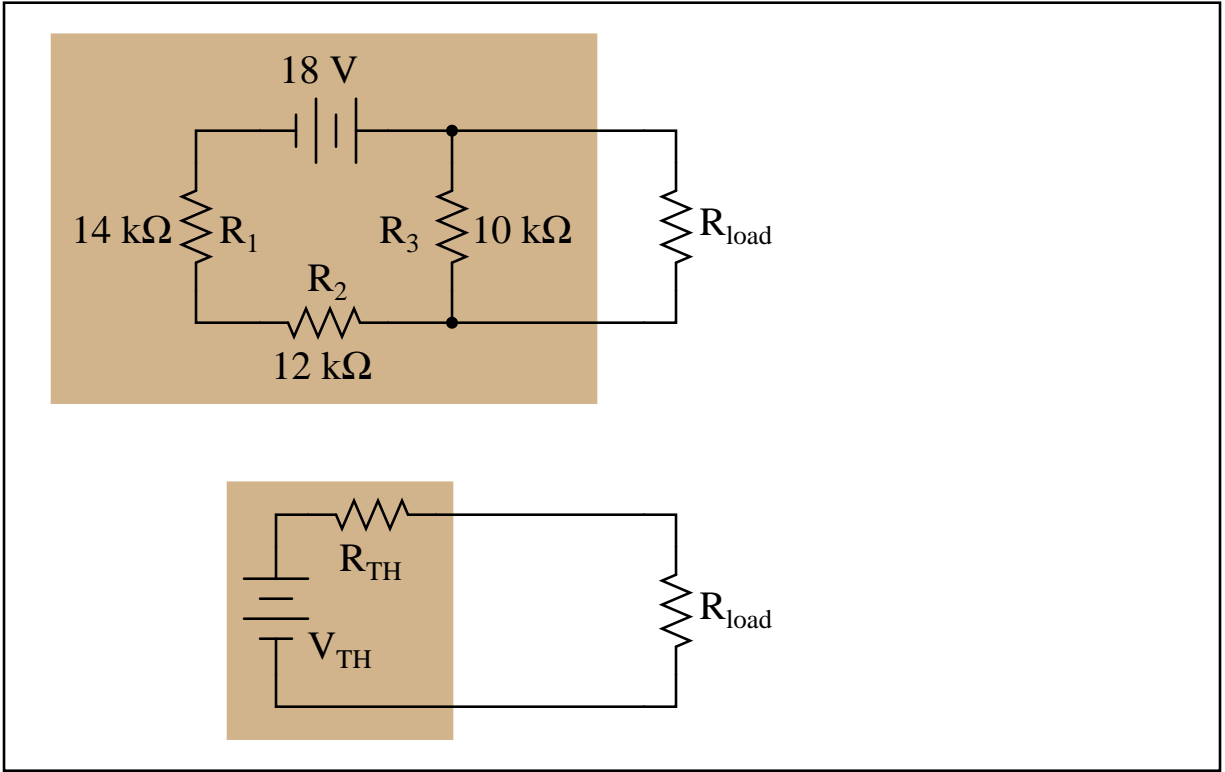


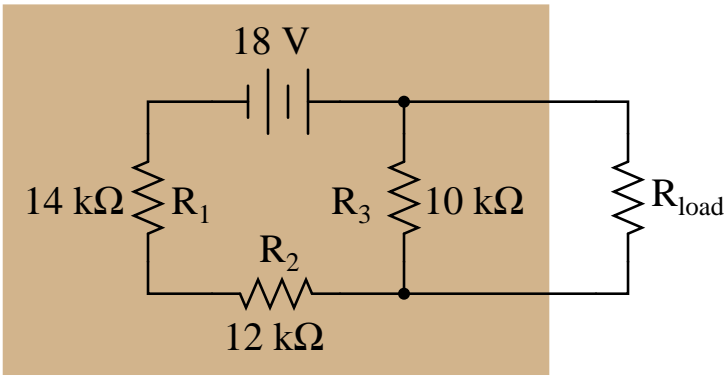




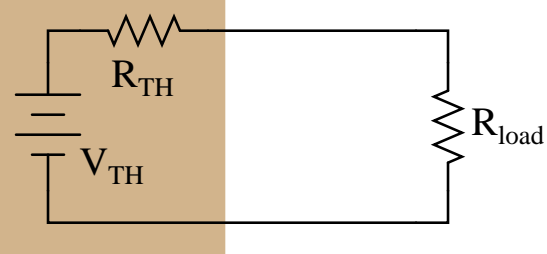
... to which we may attach the same load and analyze.

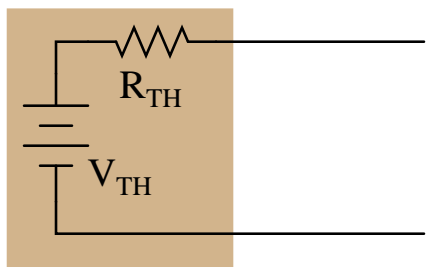
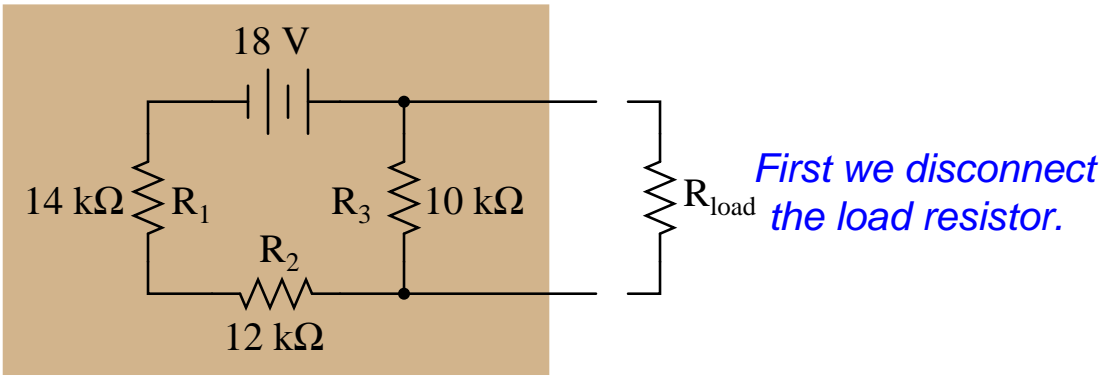


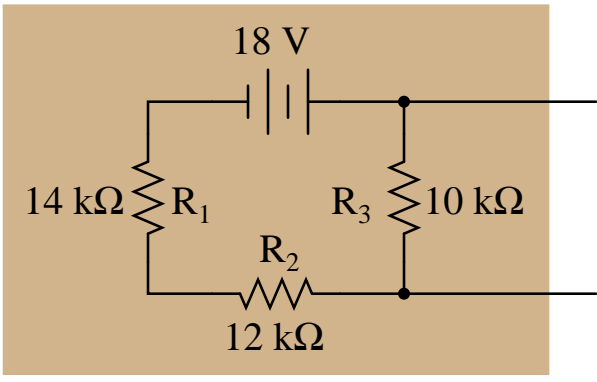




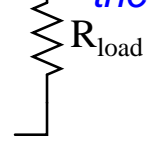
First we disconnect the load resistor.



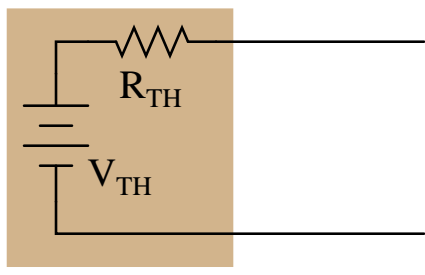


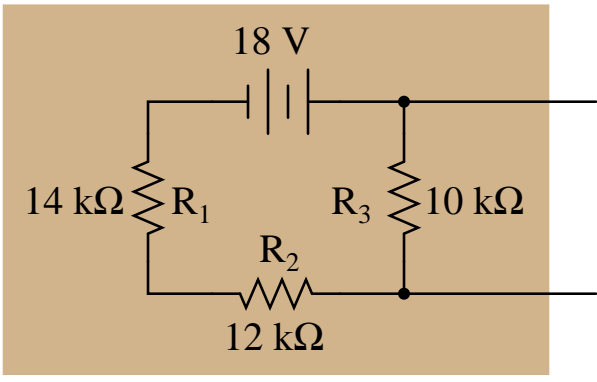


*First we disconnect
the load resistor.*

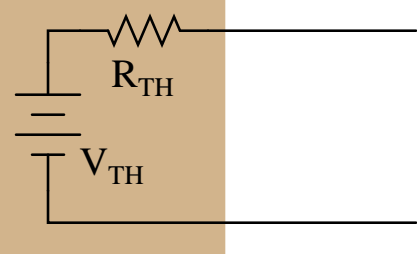
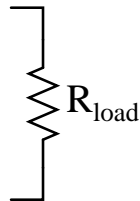


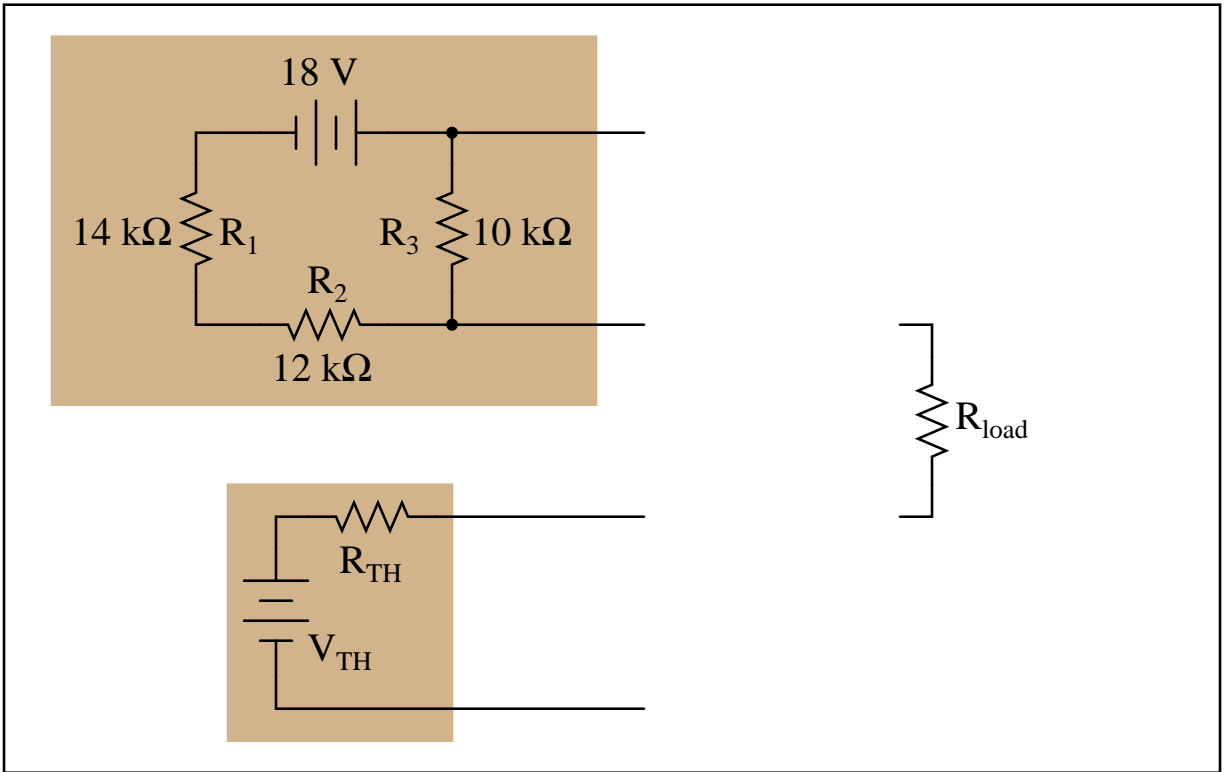
A resistor symbol with the label R_{load} next to it. The resistor is oriented vertically, with its terminals extending to the left and right.

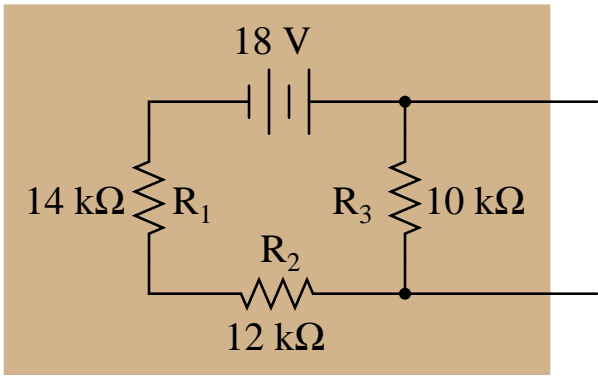




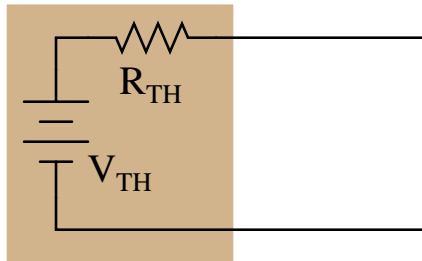
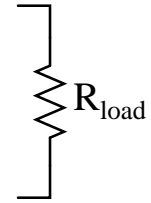
First we disconnect the load resistor.

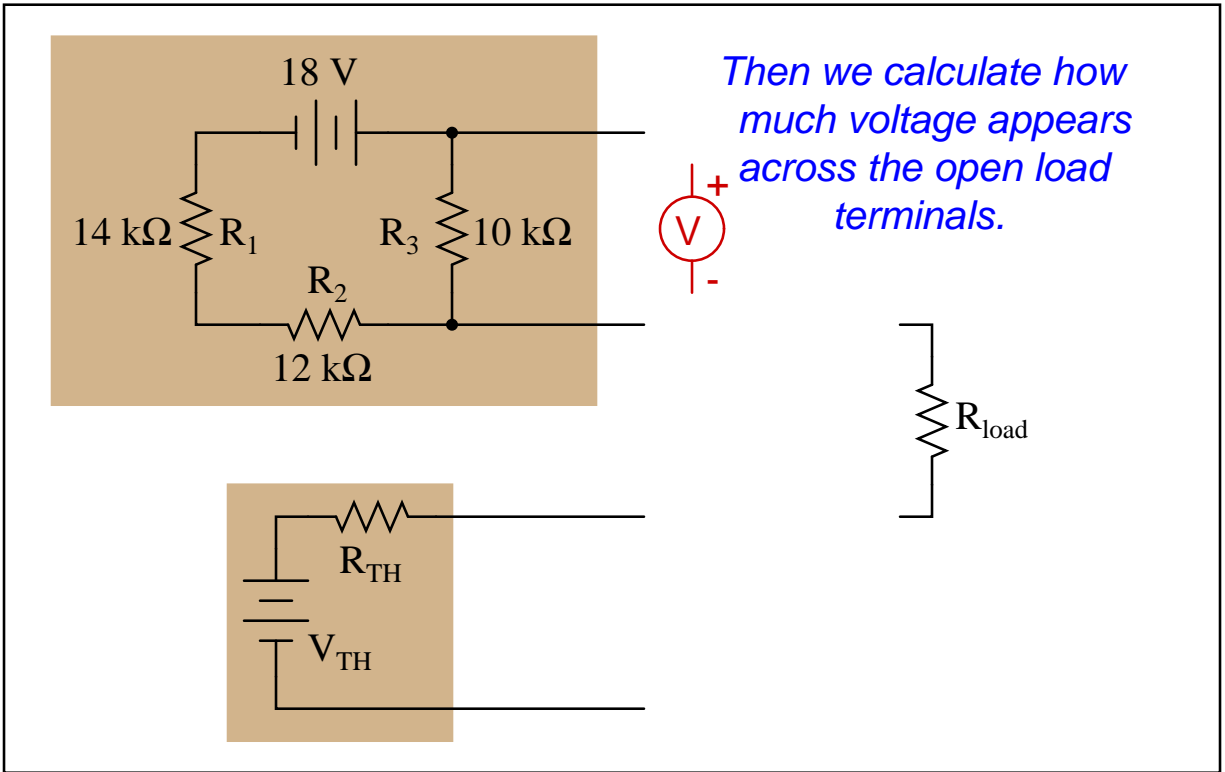




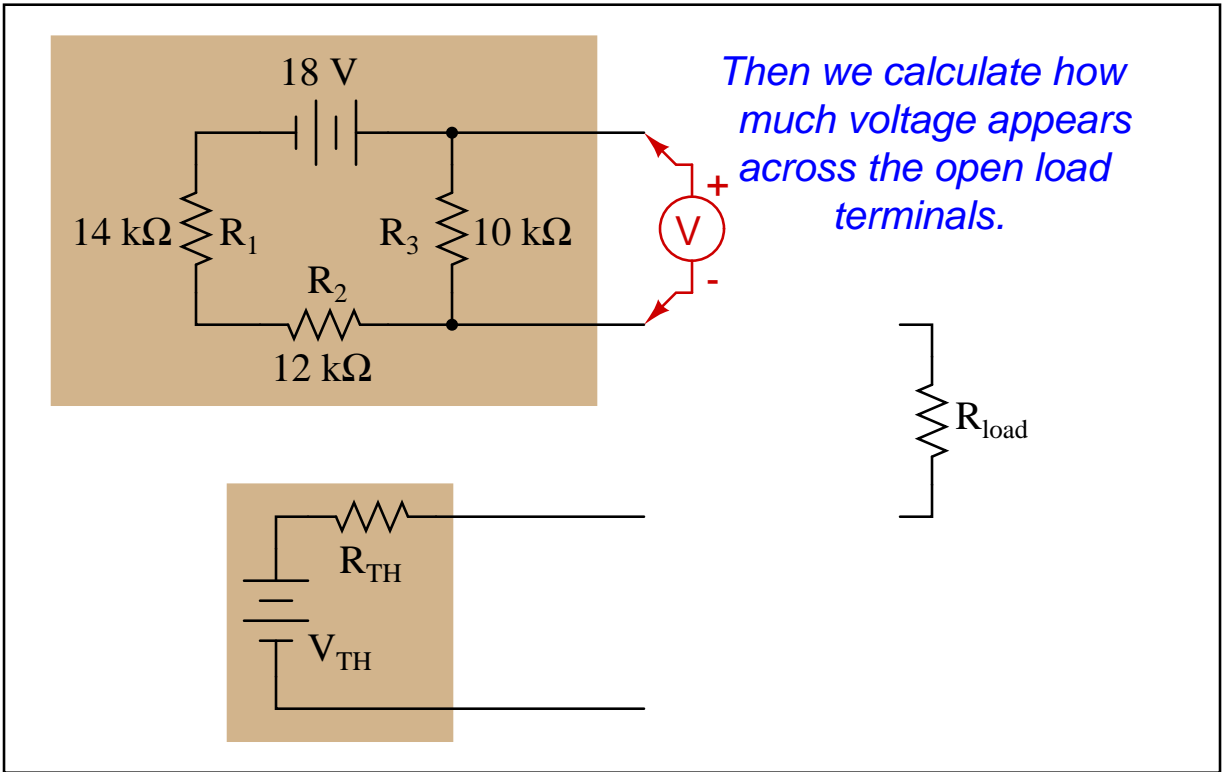


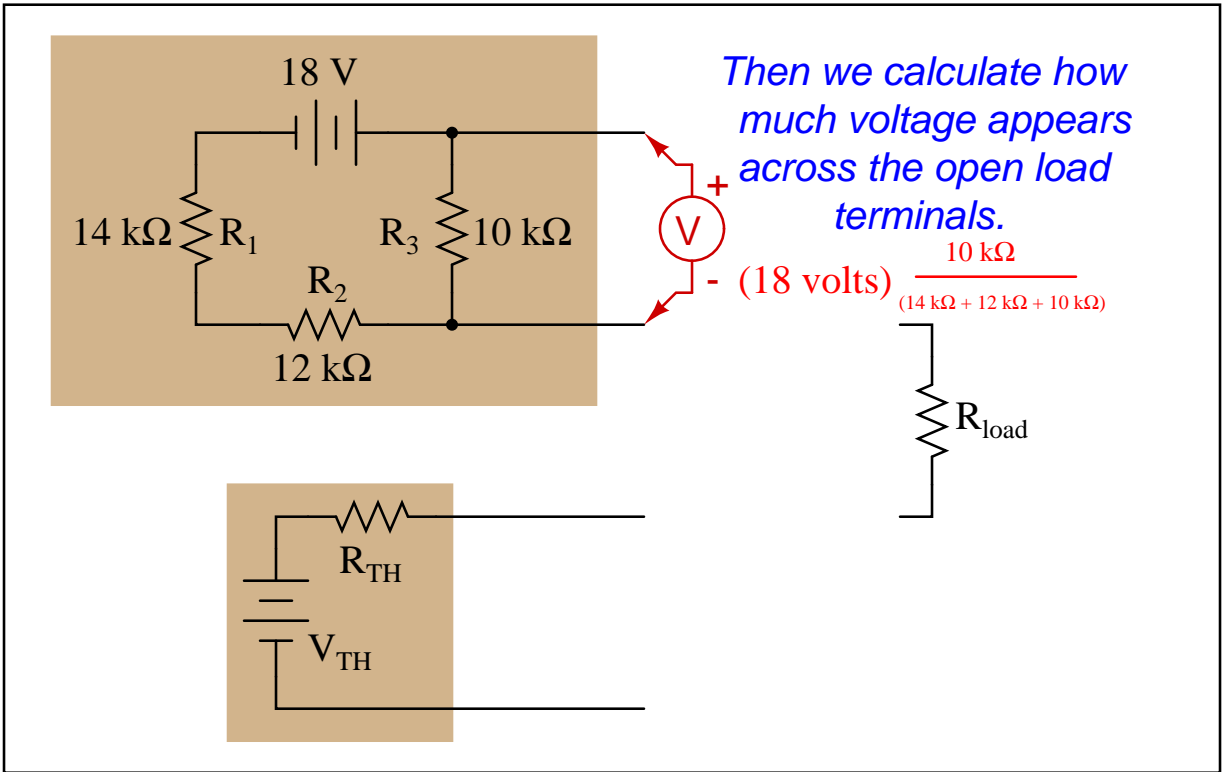
Then we calculate how much voltage appears across the open load terminals.

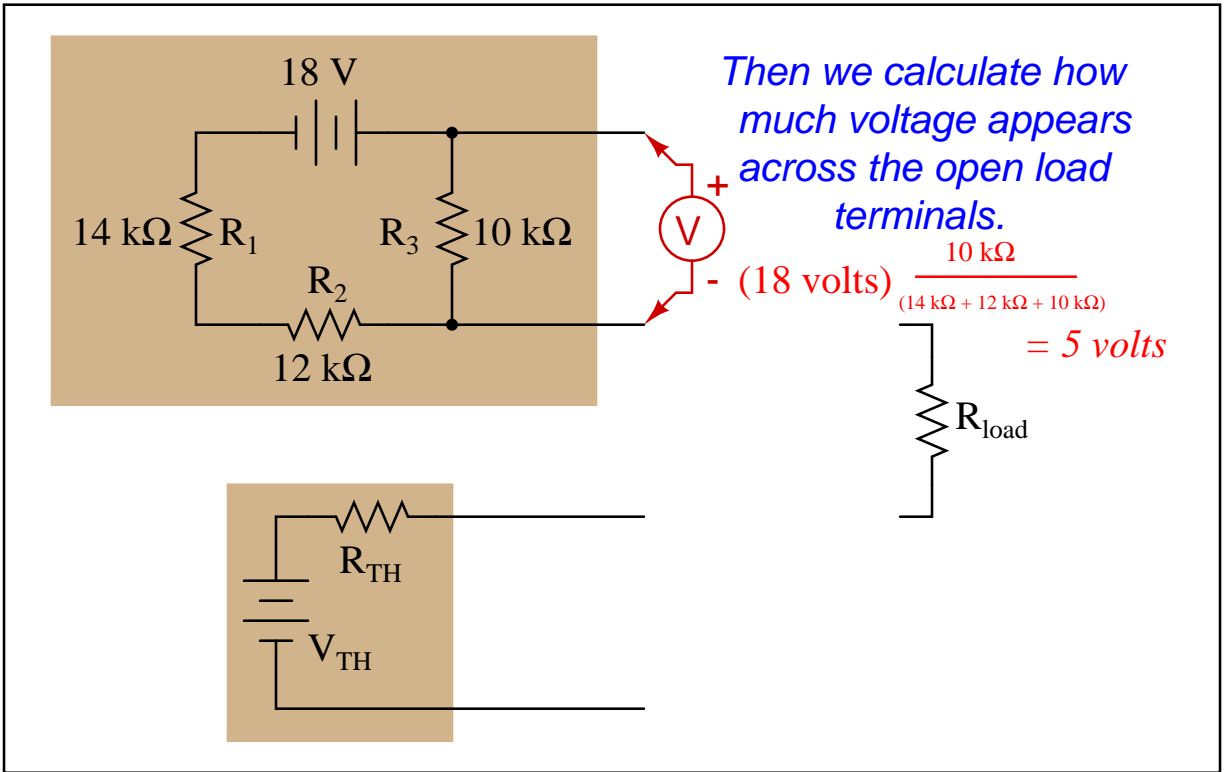


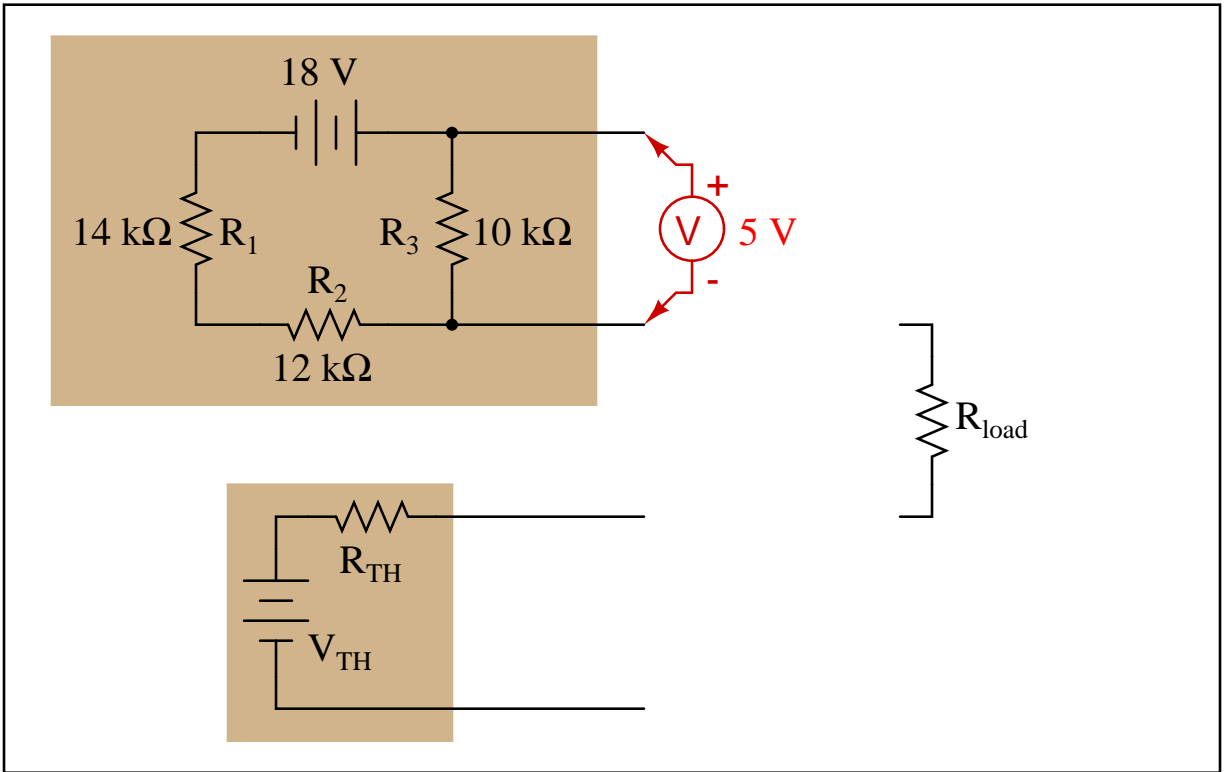


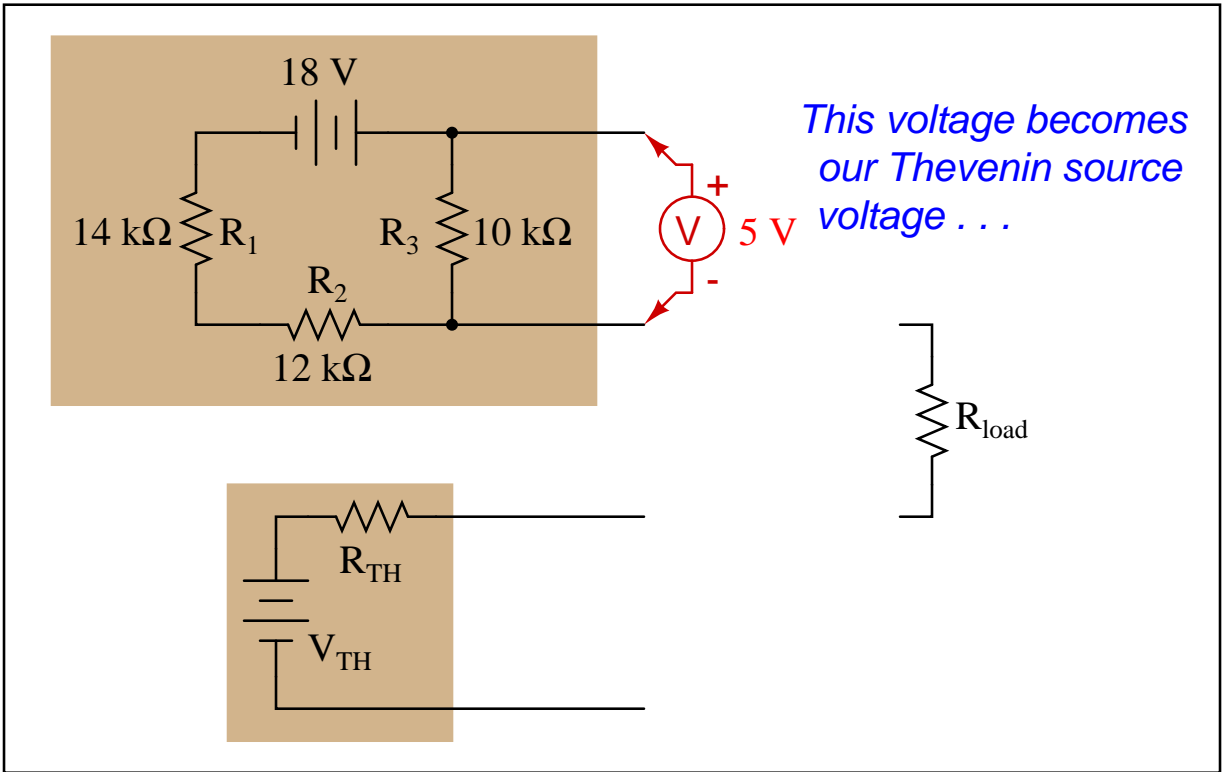
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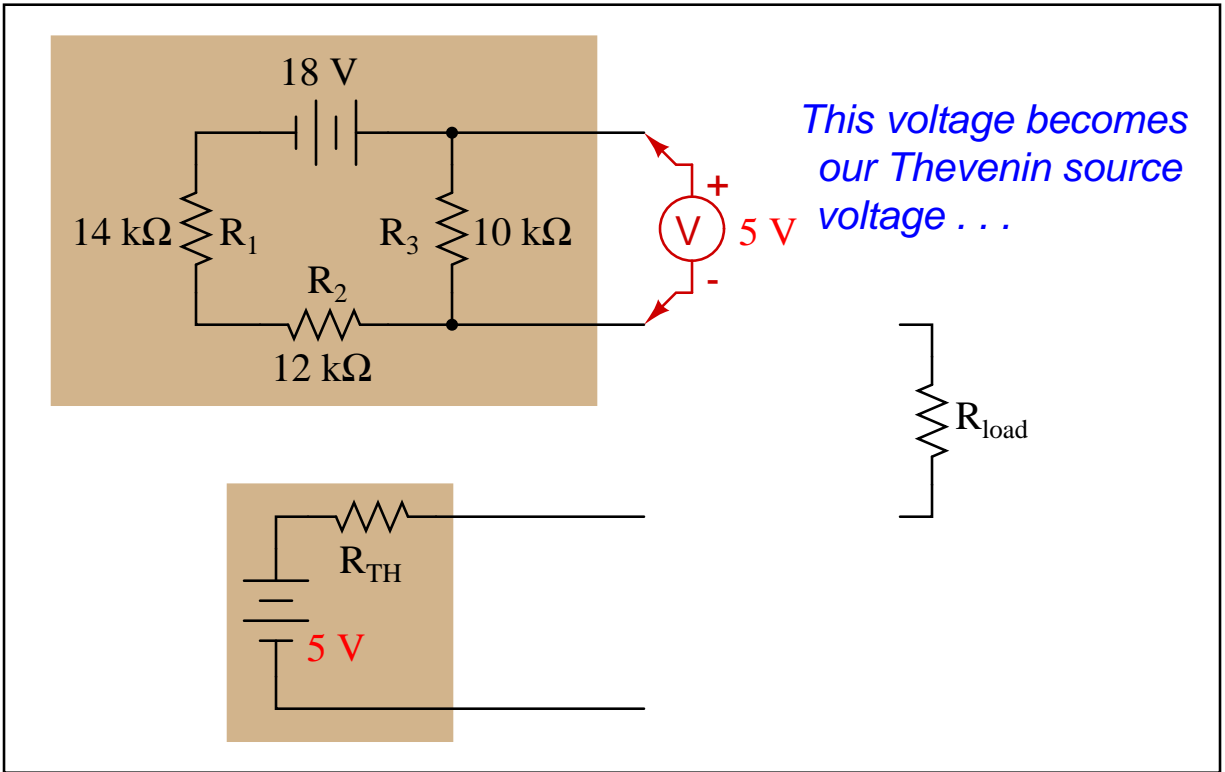


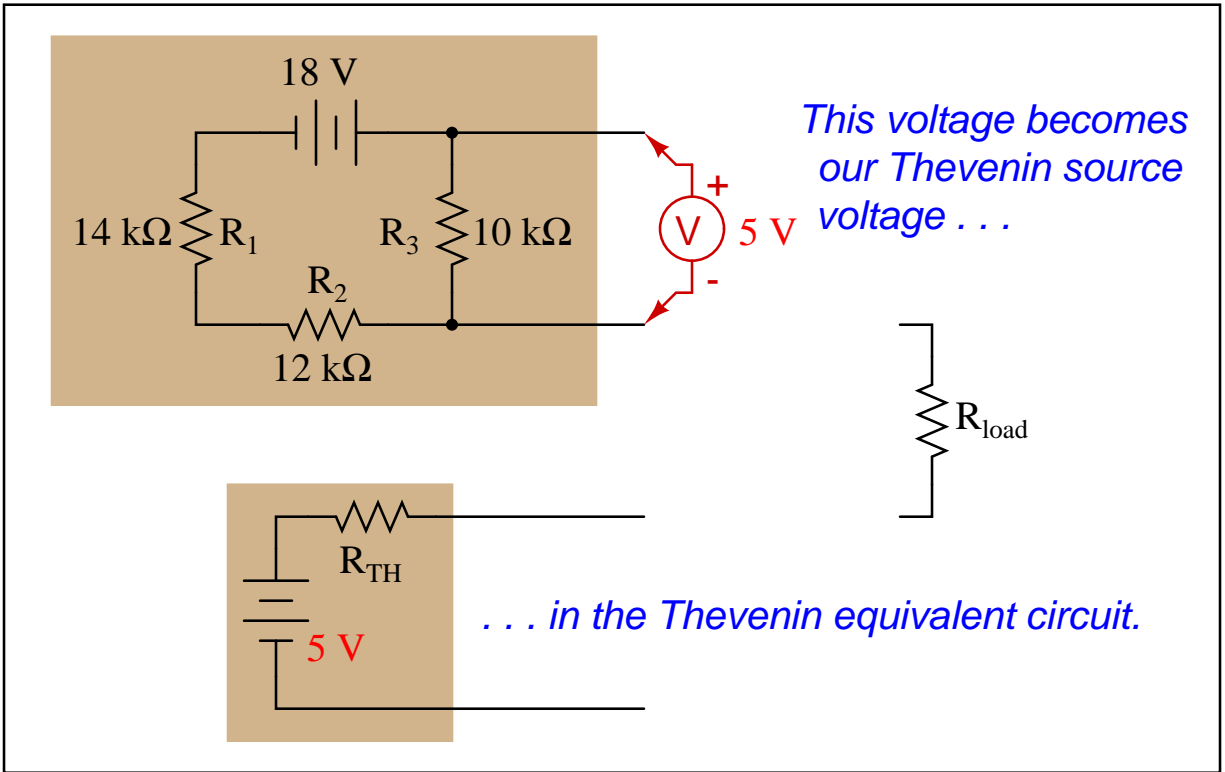


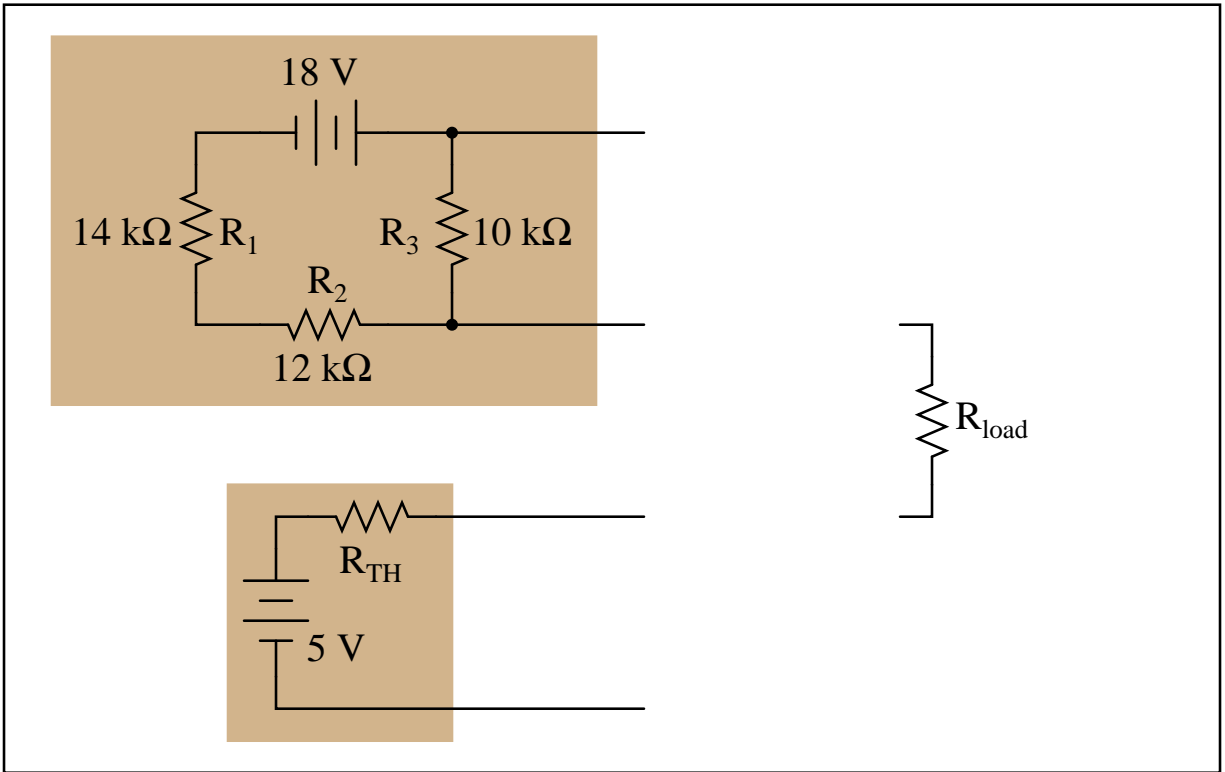


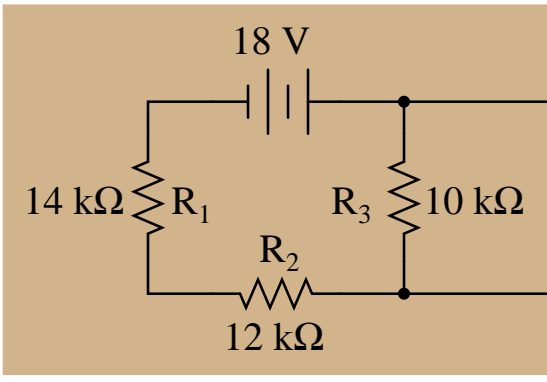




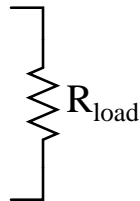
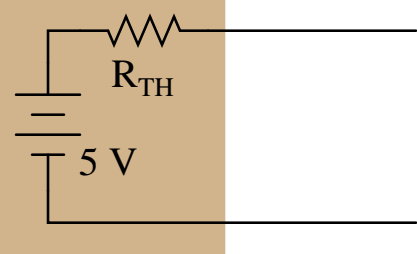


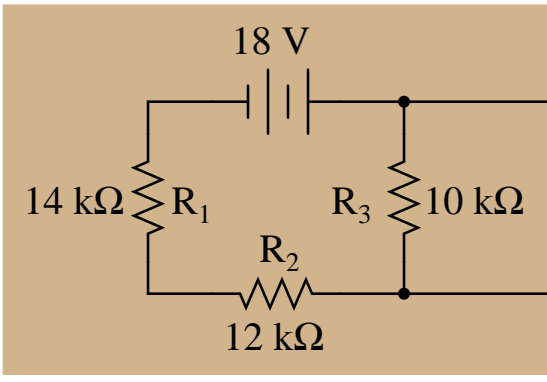




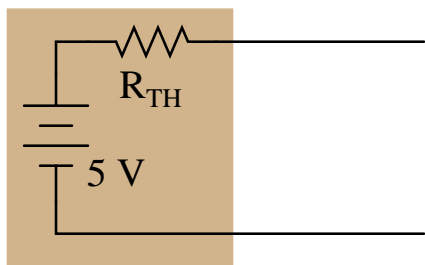
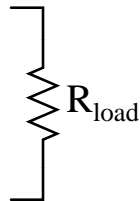


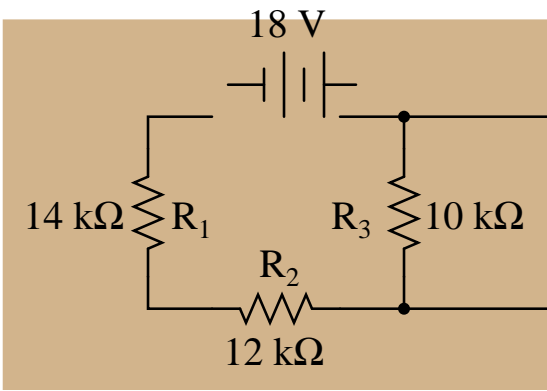
Now we replace each source in the original circuit with its own internal resistance.



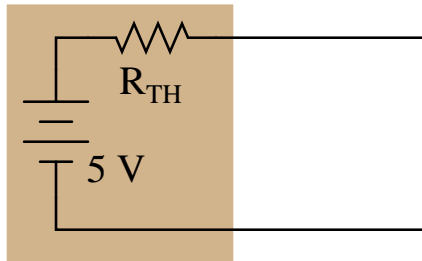
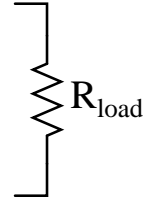


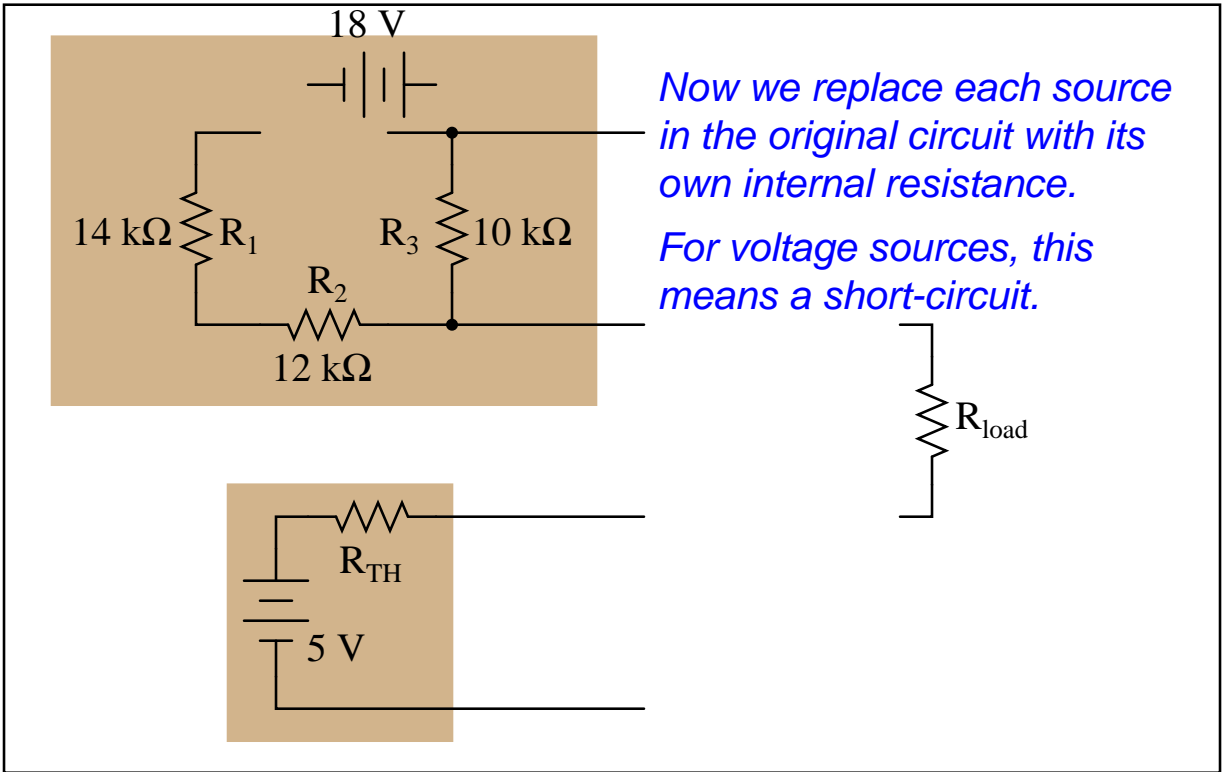
*Now we replace each source in the original circuit with its own internal resistance.
For voltage sources, this means a short-circuit.*

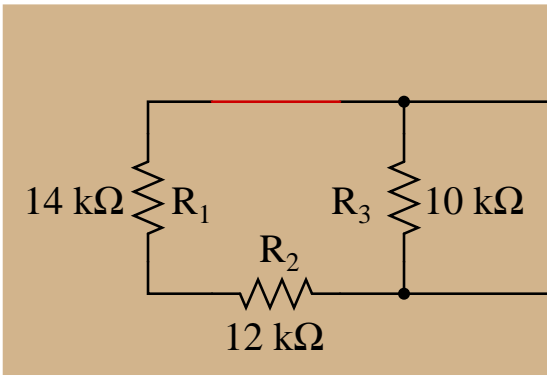




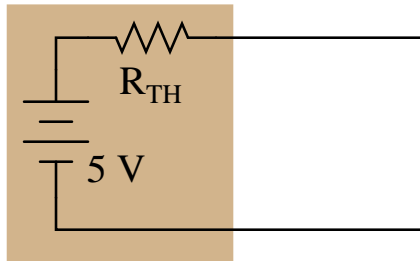
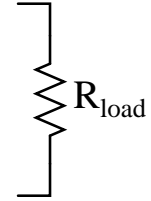
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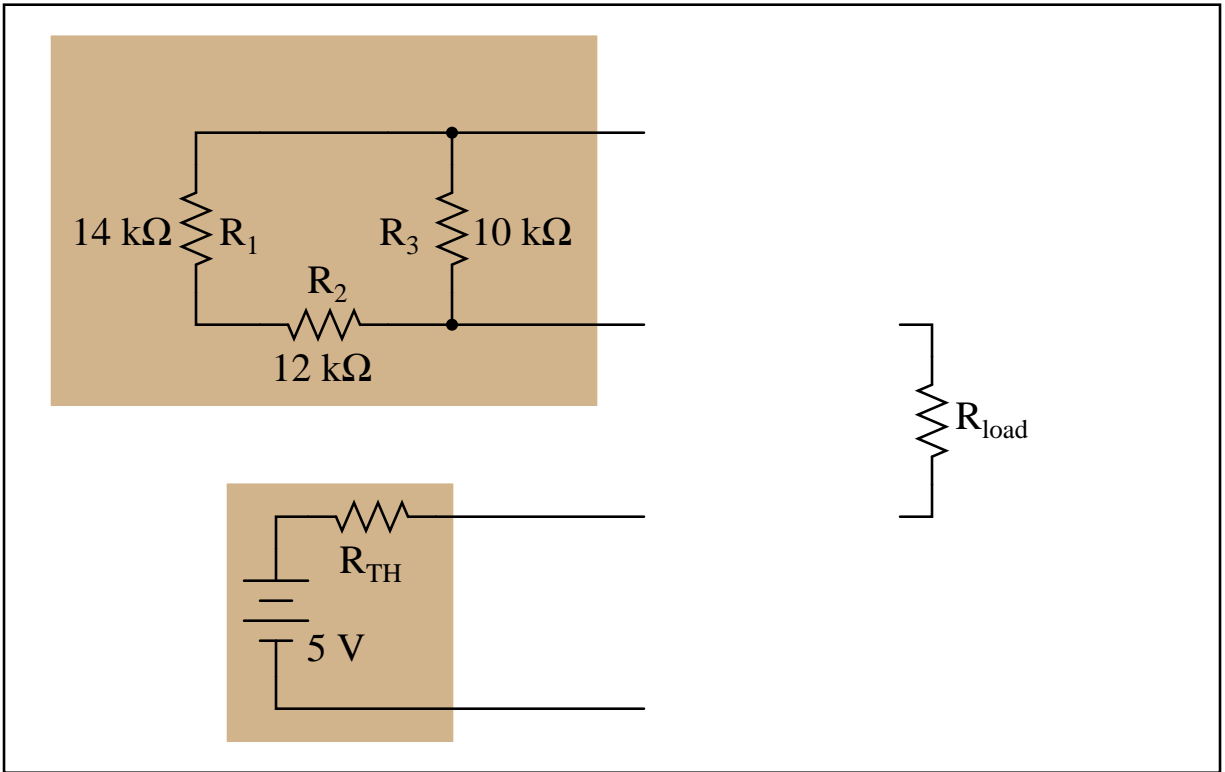


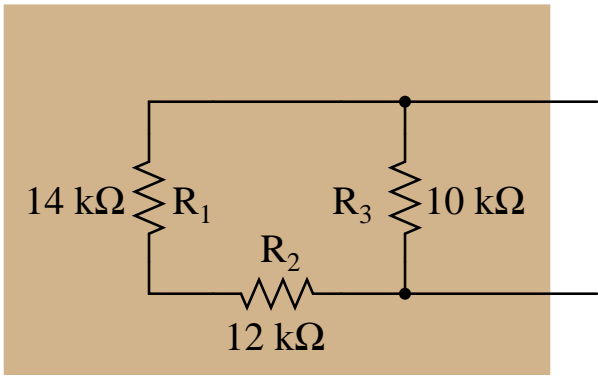




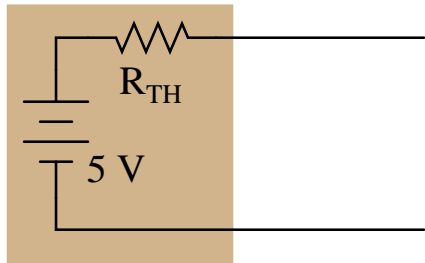
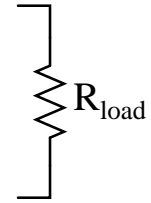
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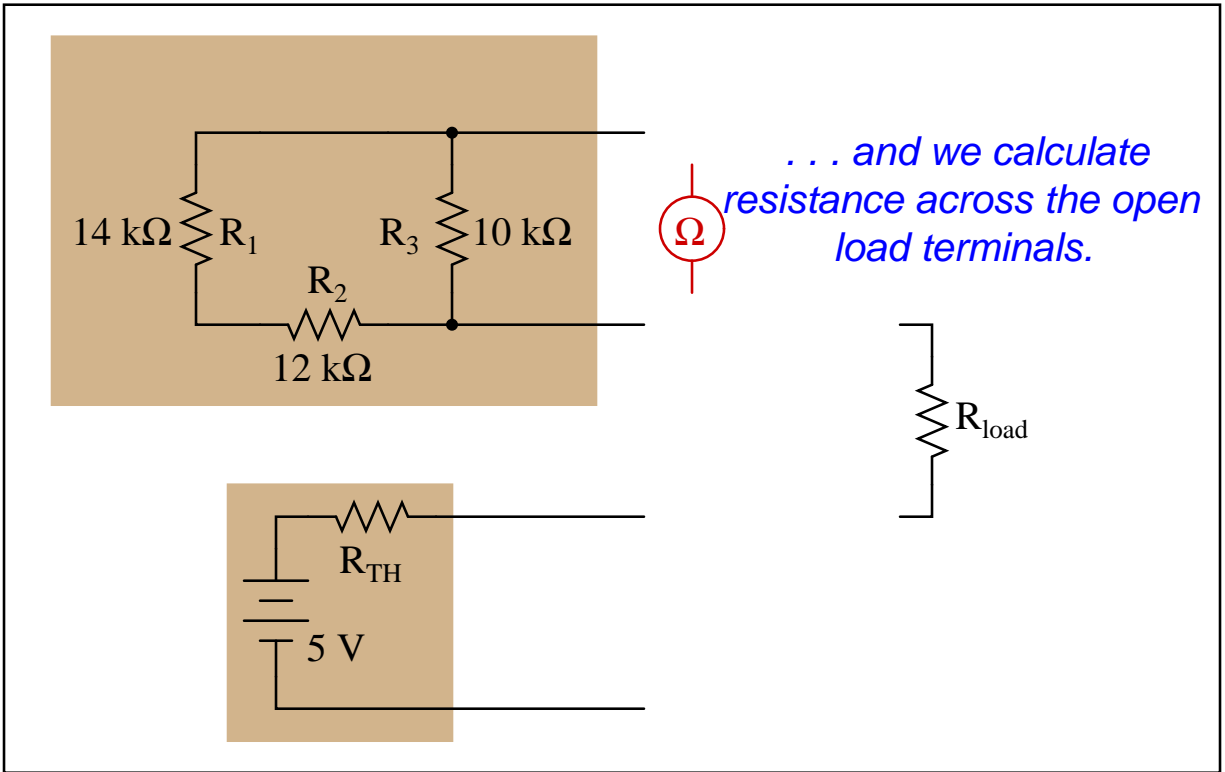


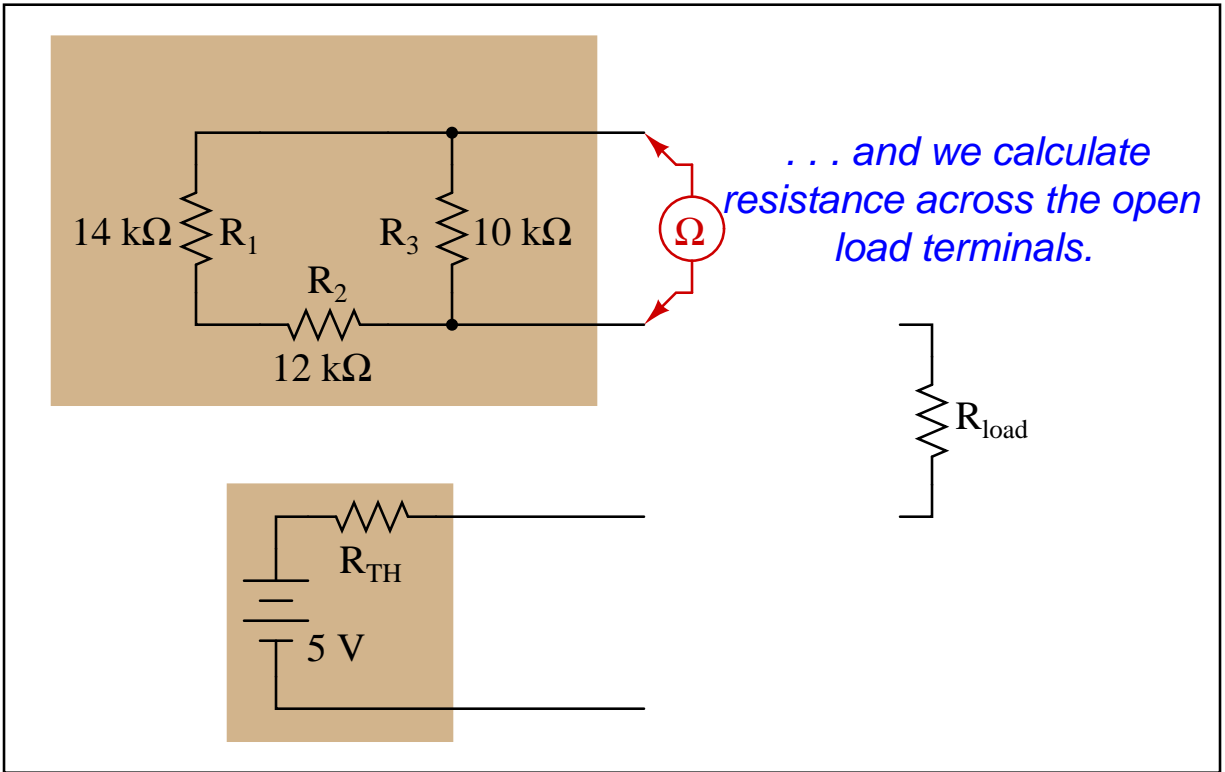


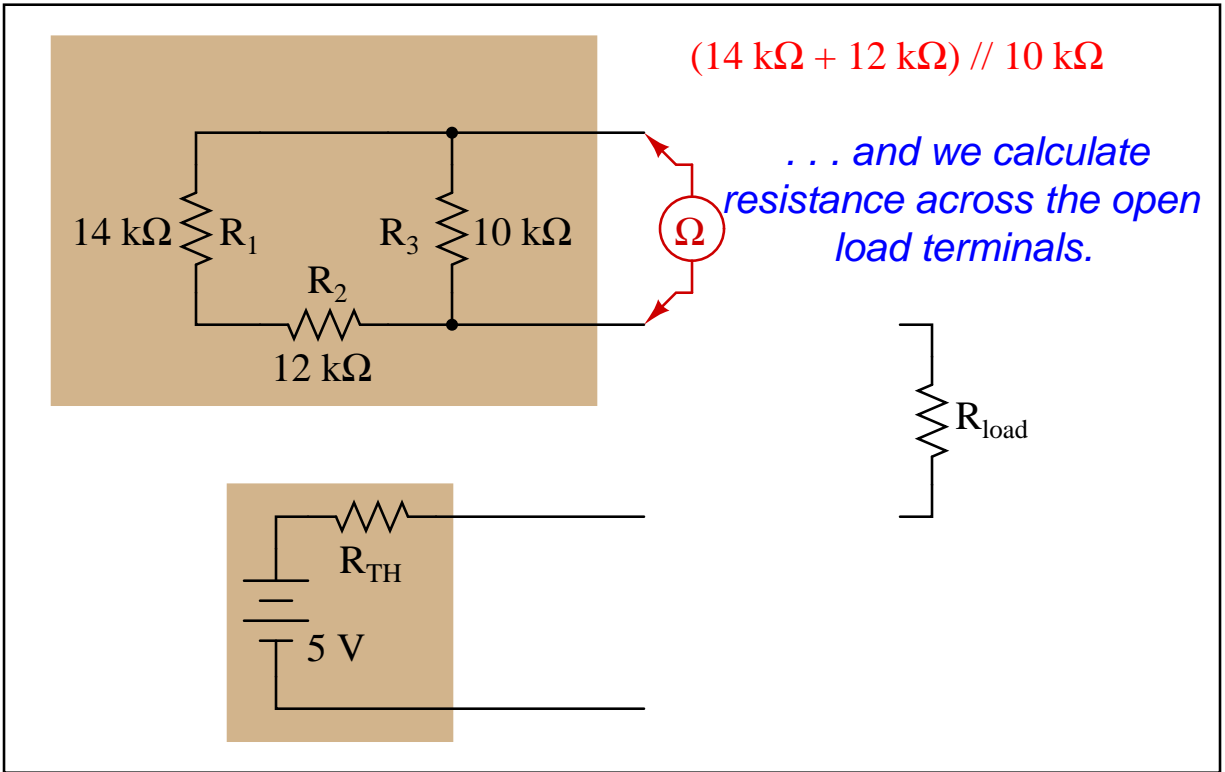


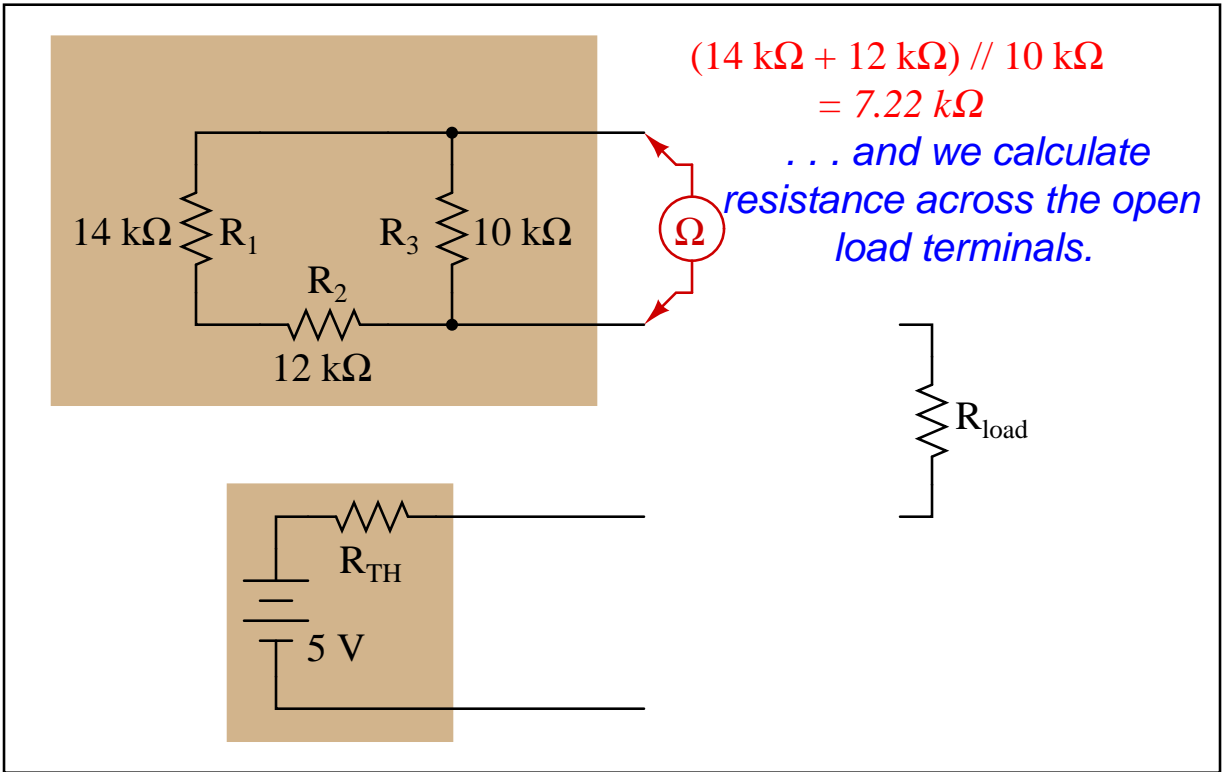
... and we calculate resistance across the open load terminals.

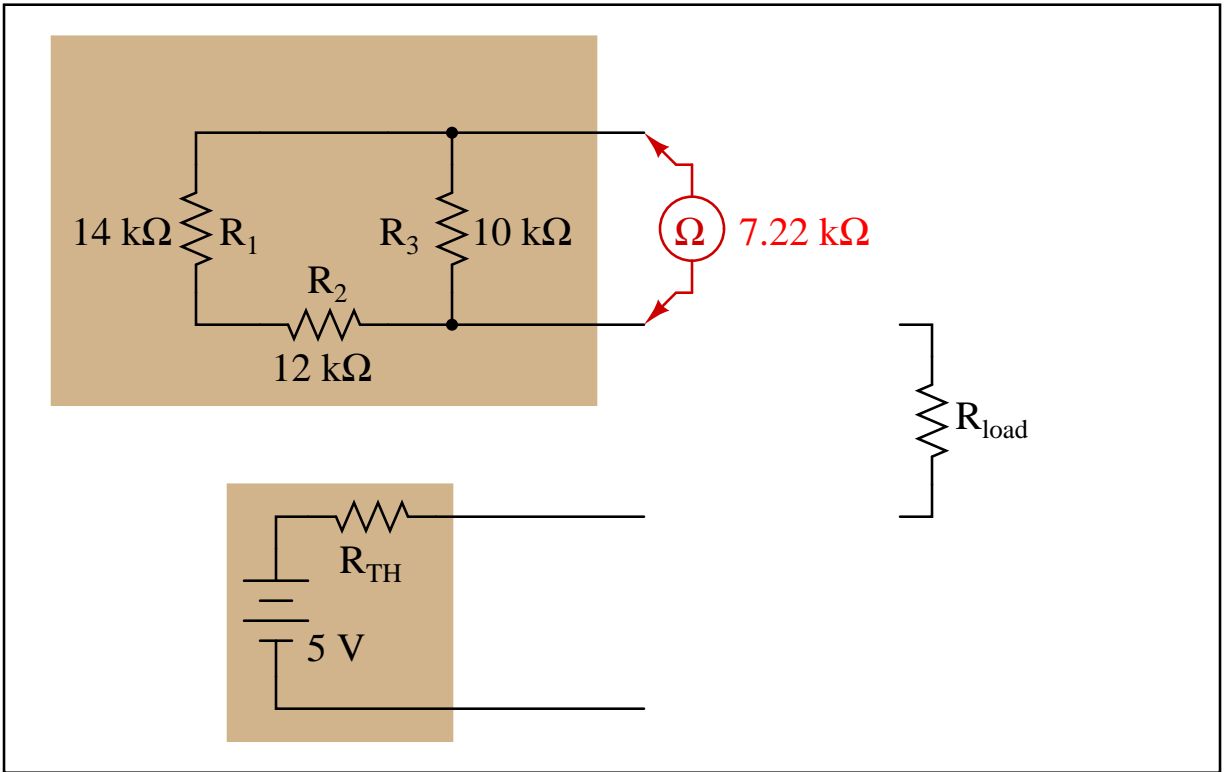


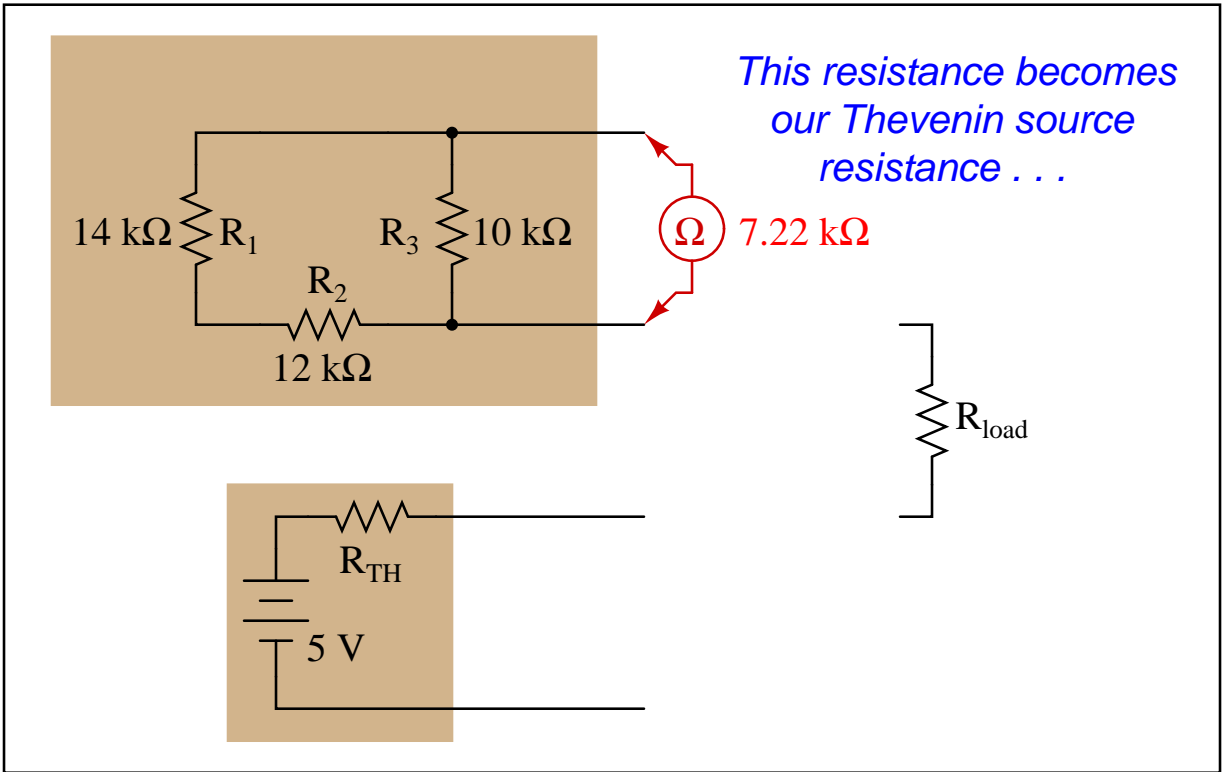


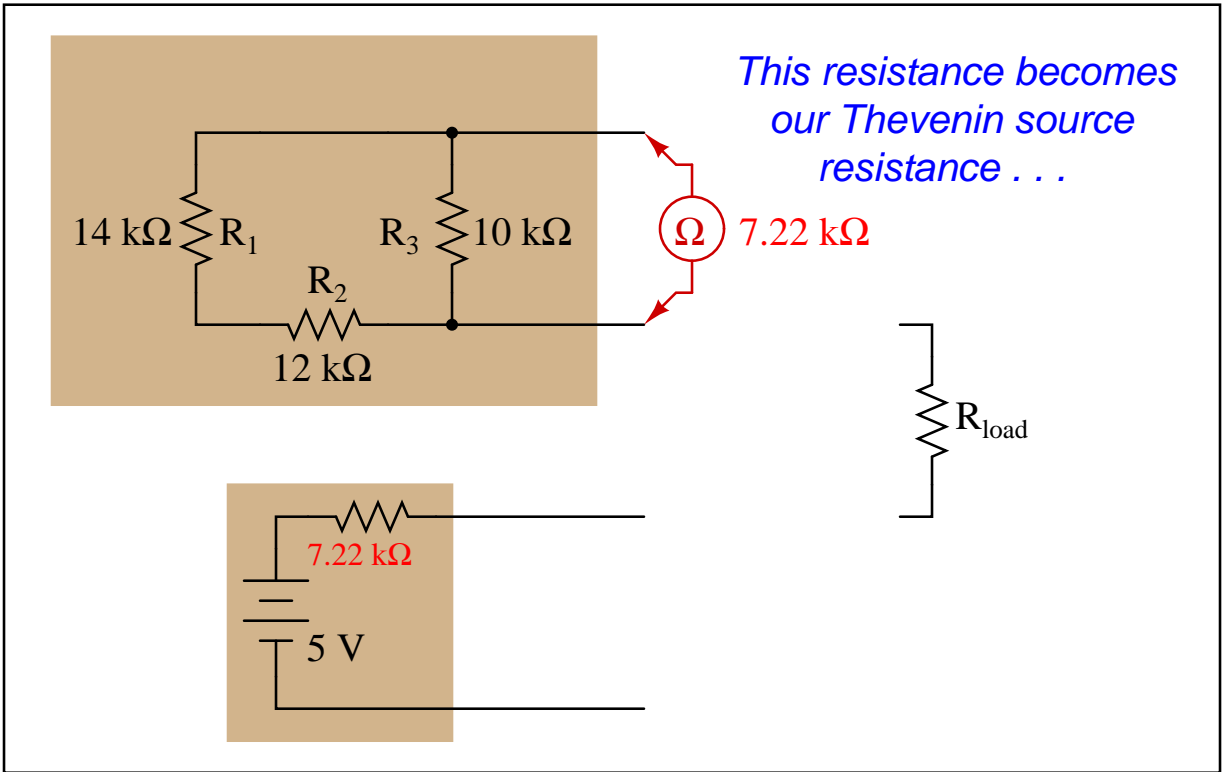


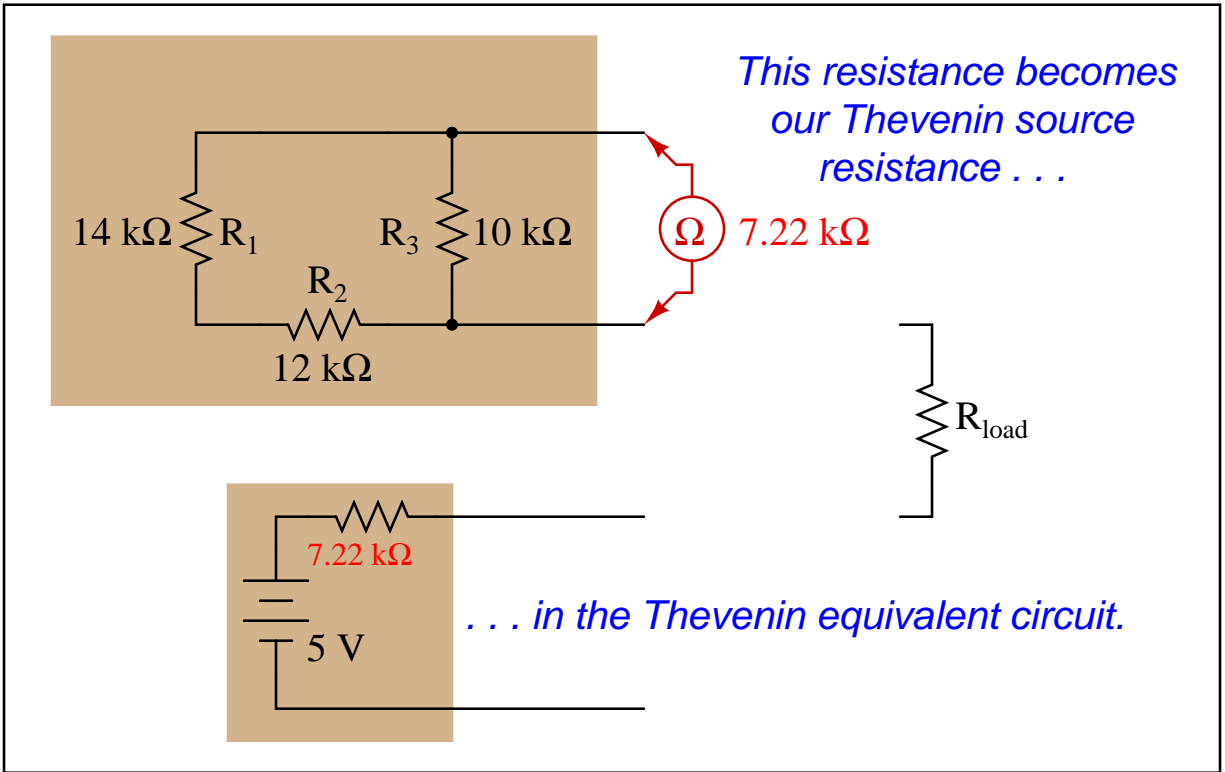


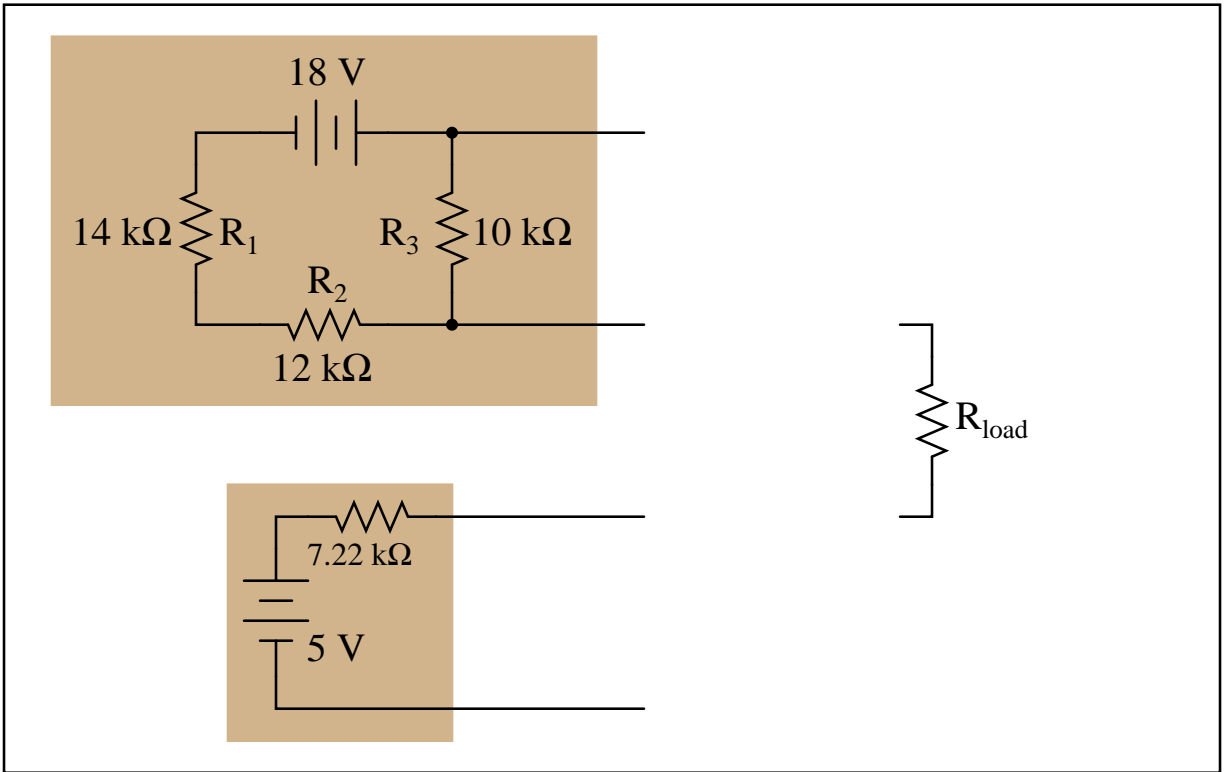


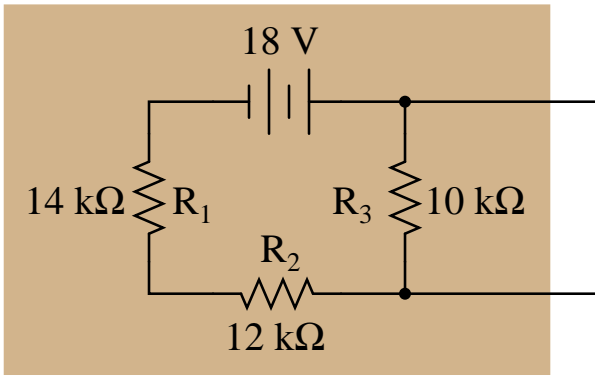




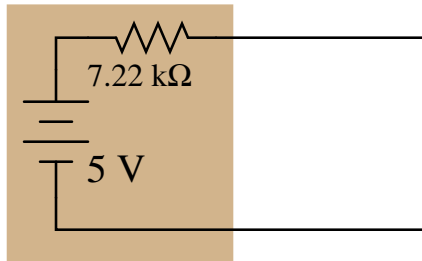
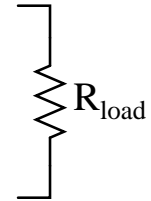


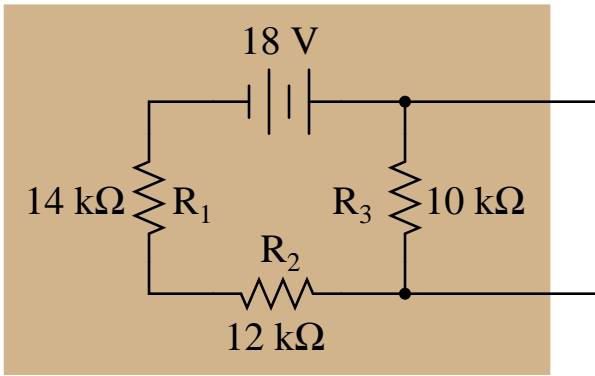




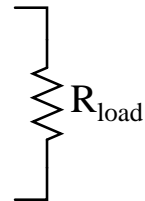
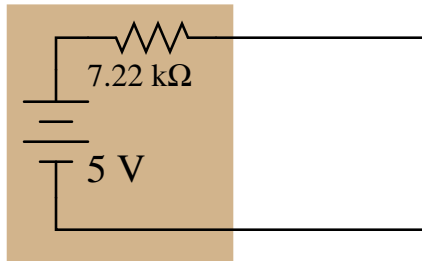


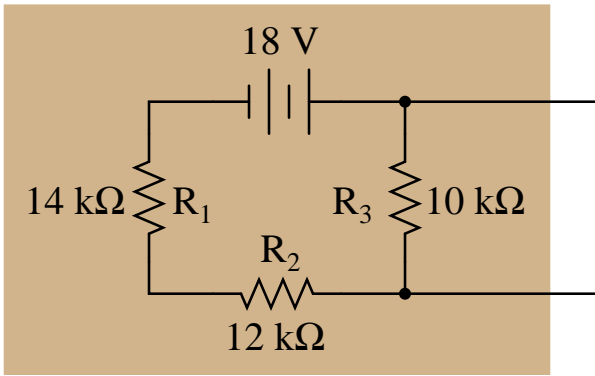
Now that we have an equivalent circuit to work with, we may insert the load there to see what happens!



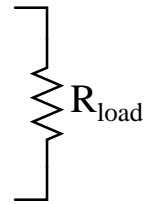
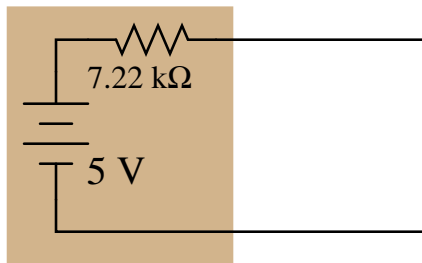


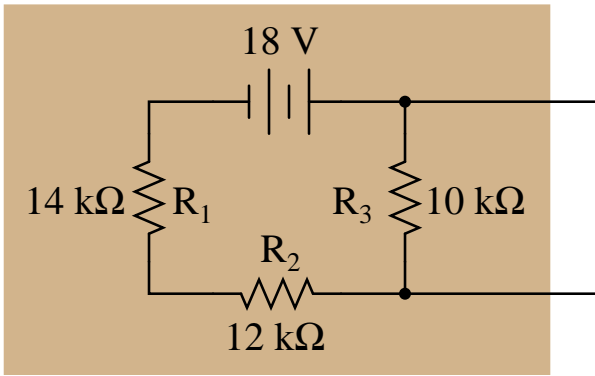
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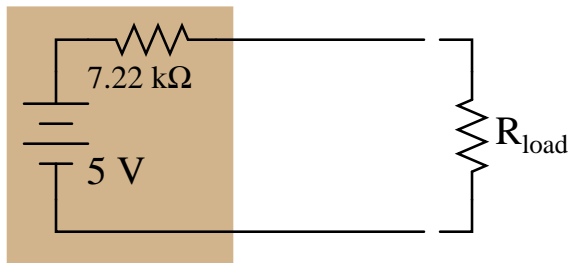


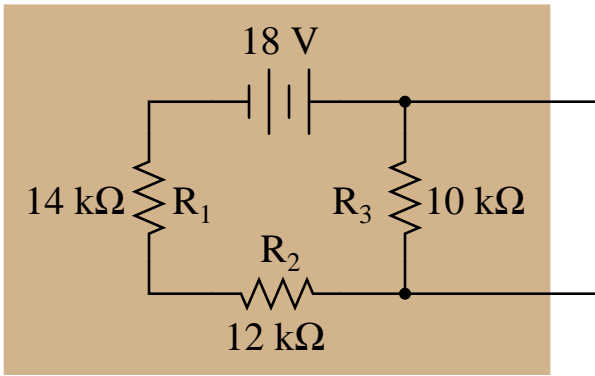
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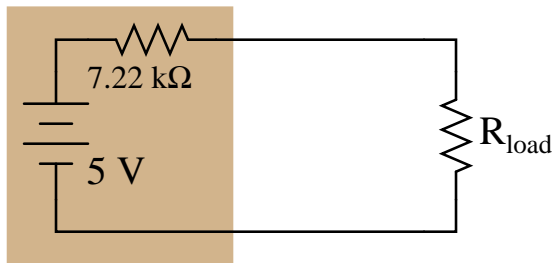


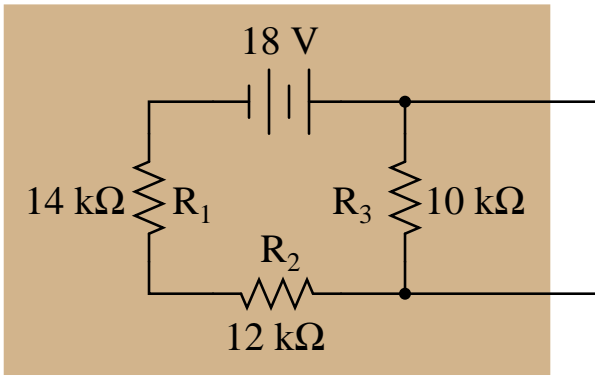
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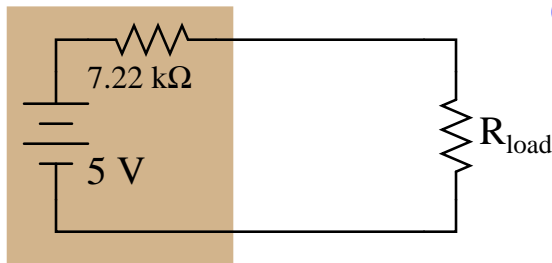


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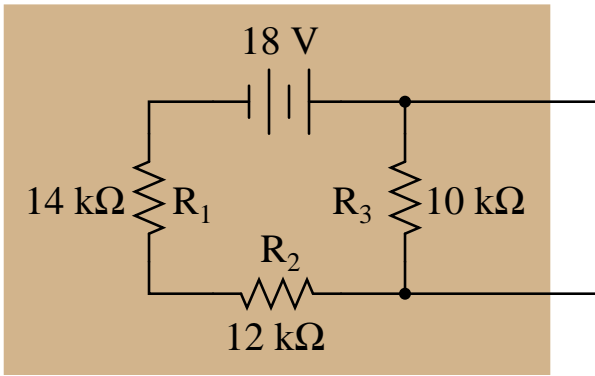




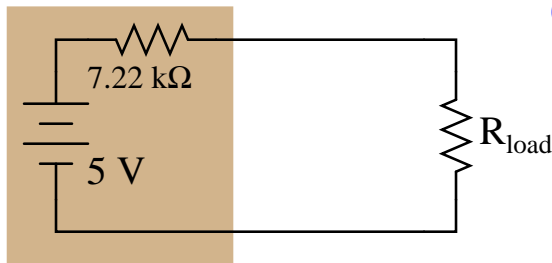
Now that we have an equivalent circuit to work with, we may insert the load there to see what happens!



Calculate:

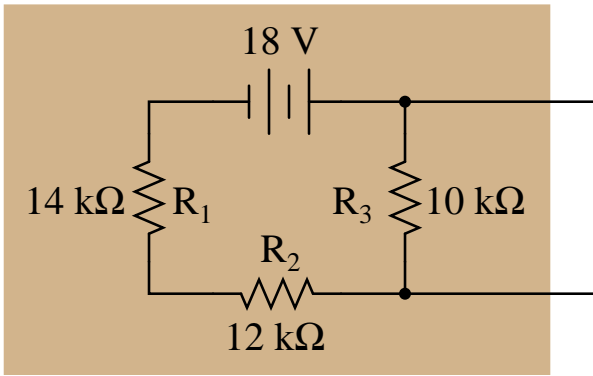


Now that we have an equivalent circuit to work with, we may insert the load there to see what happens!

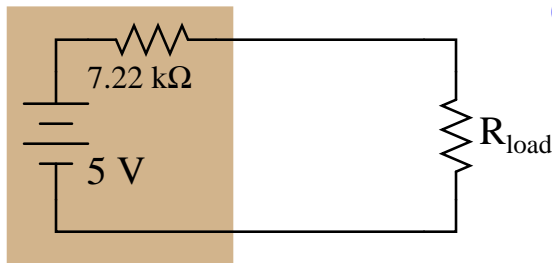


Calculate:

$$V_{\text{load}}$$



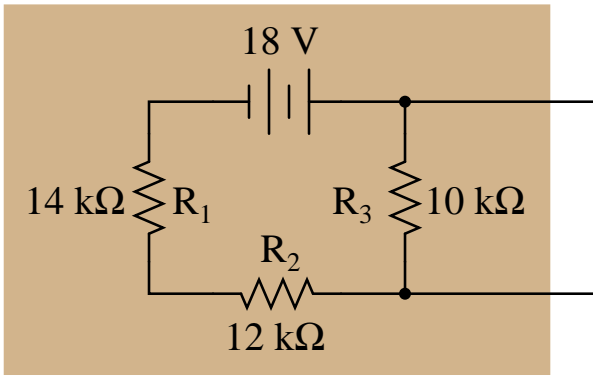
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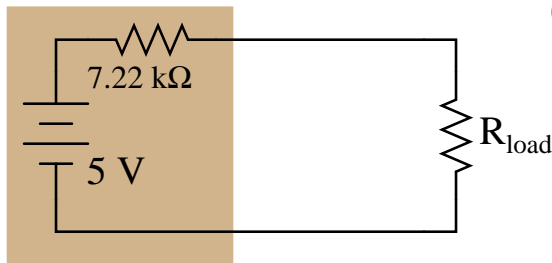
Calculate:

$$V_{load}$$

$$I_{load}$$



Now that we have an equivalent circuit to work with, we may insert the load there to see what happens!

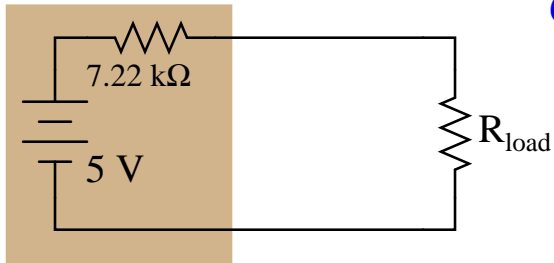
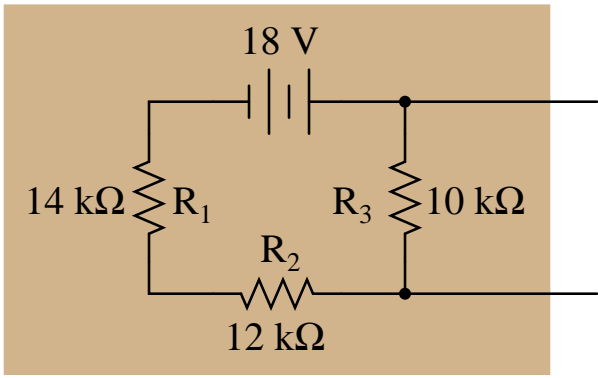


Calculate:

$$V_{\text{load}}$$

$$I_{\text{load}}$$

$$P_{\text{load}}$$

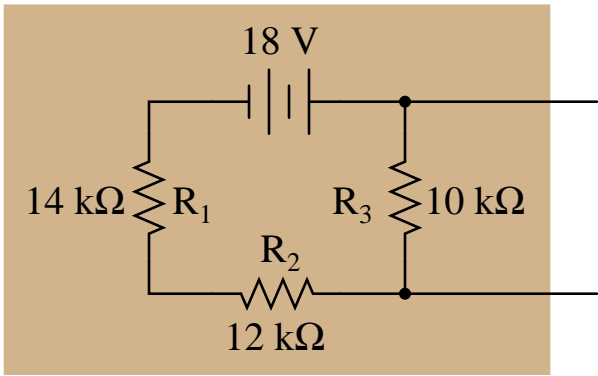


Calculate:

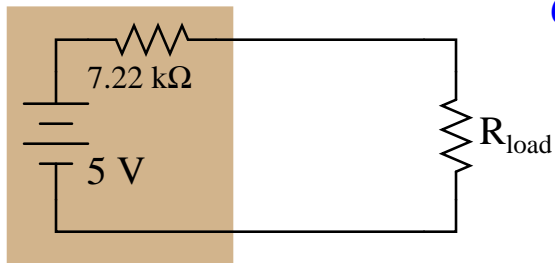
V_{load}

I_{load}

P_{load}



These load calculations will reflect what happens in the original circuit!

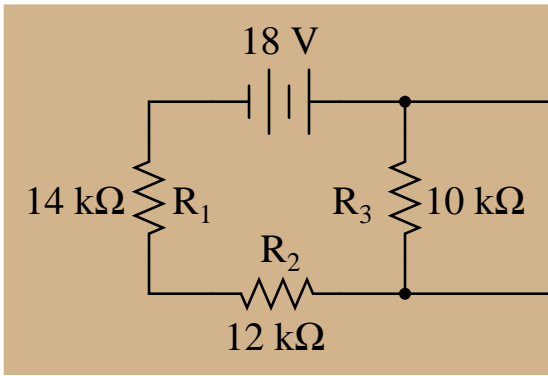


Calculate:

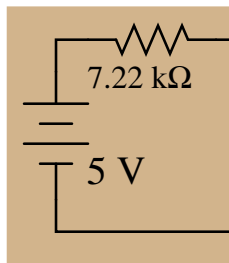
V_{load}

I_{load}

P_{load}



These load calculations will reflect what happens in the original circuit!

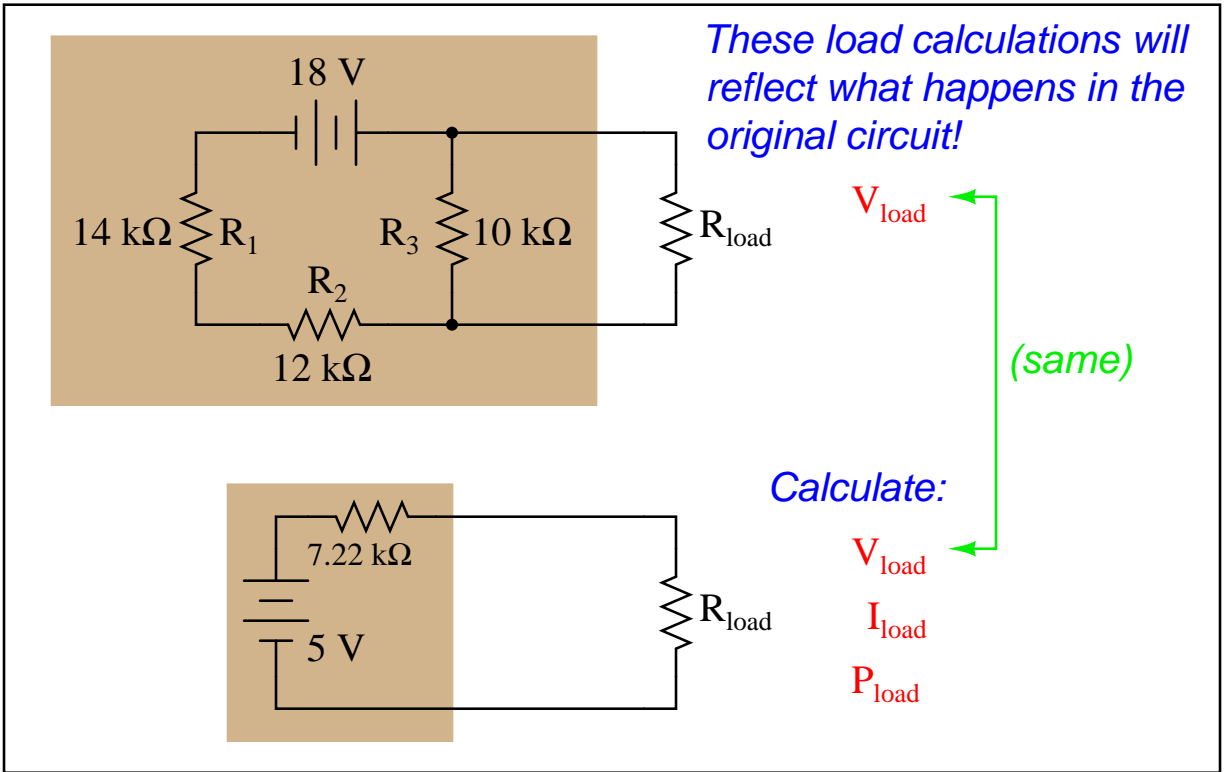


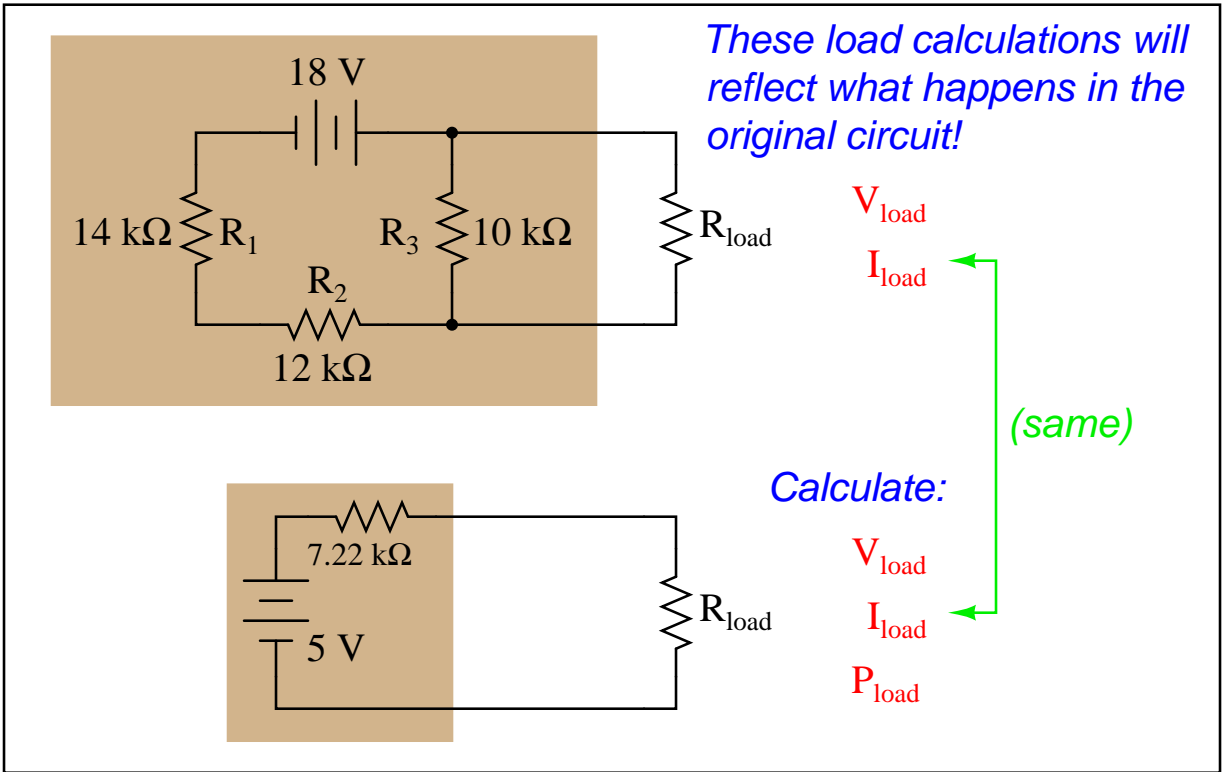
Calculate:

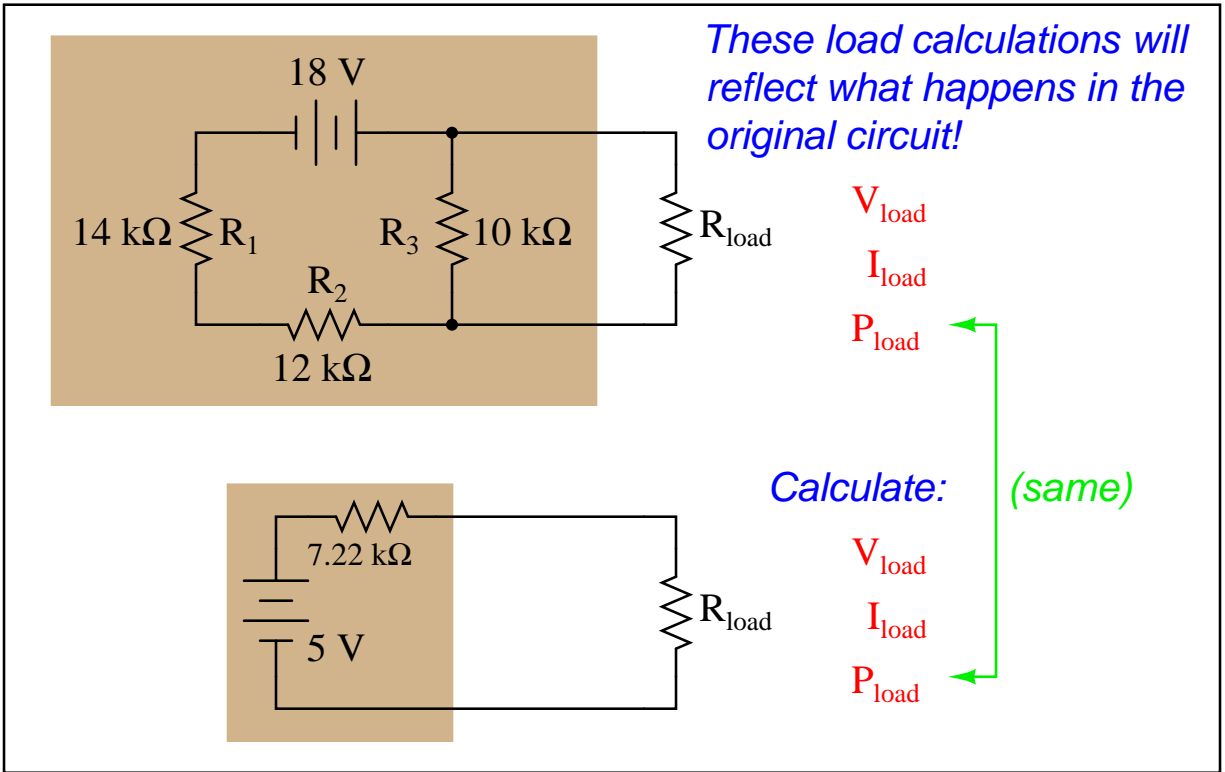
V_{load}

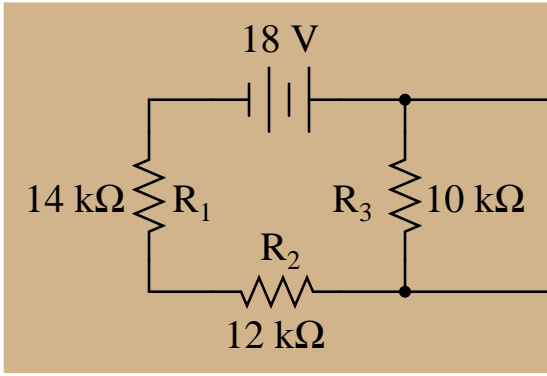
I_{load}

P_{load}







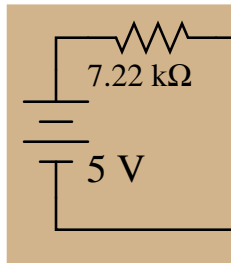


These load calculations will reflect what happens in the original circuit!

V_{load}

I_{load}

P_{load}

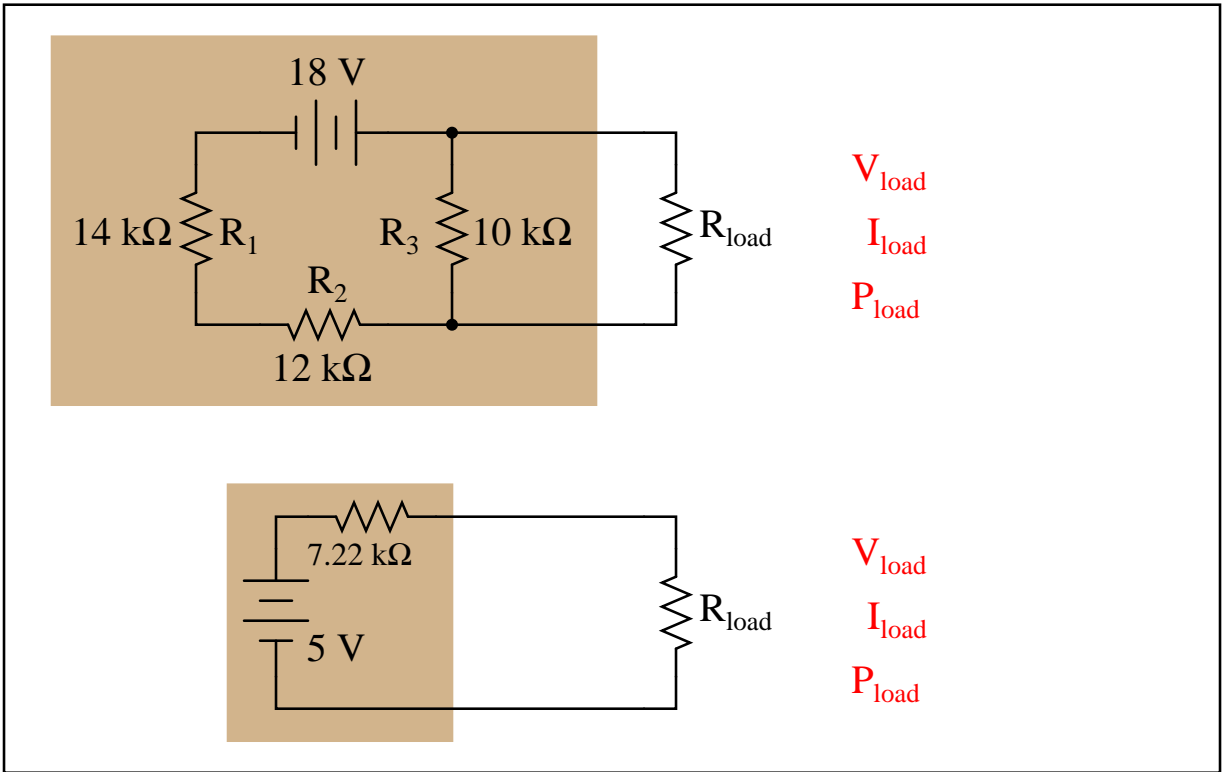


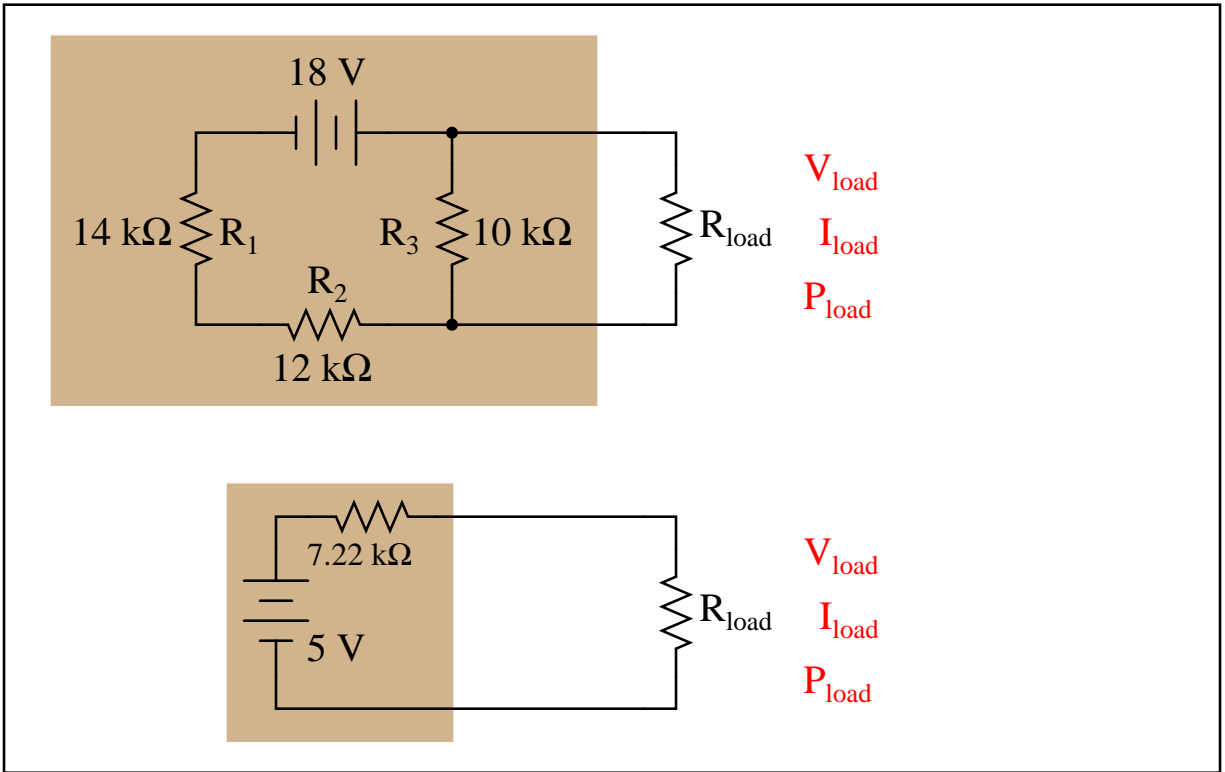
Calculate:

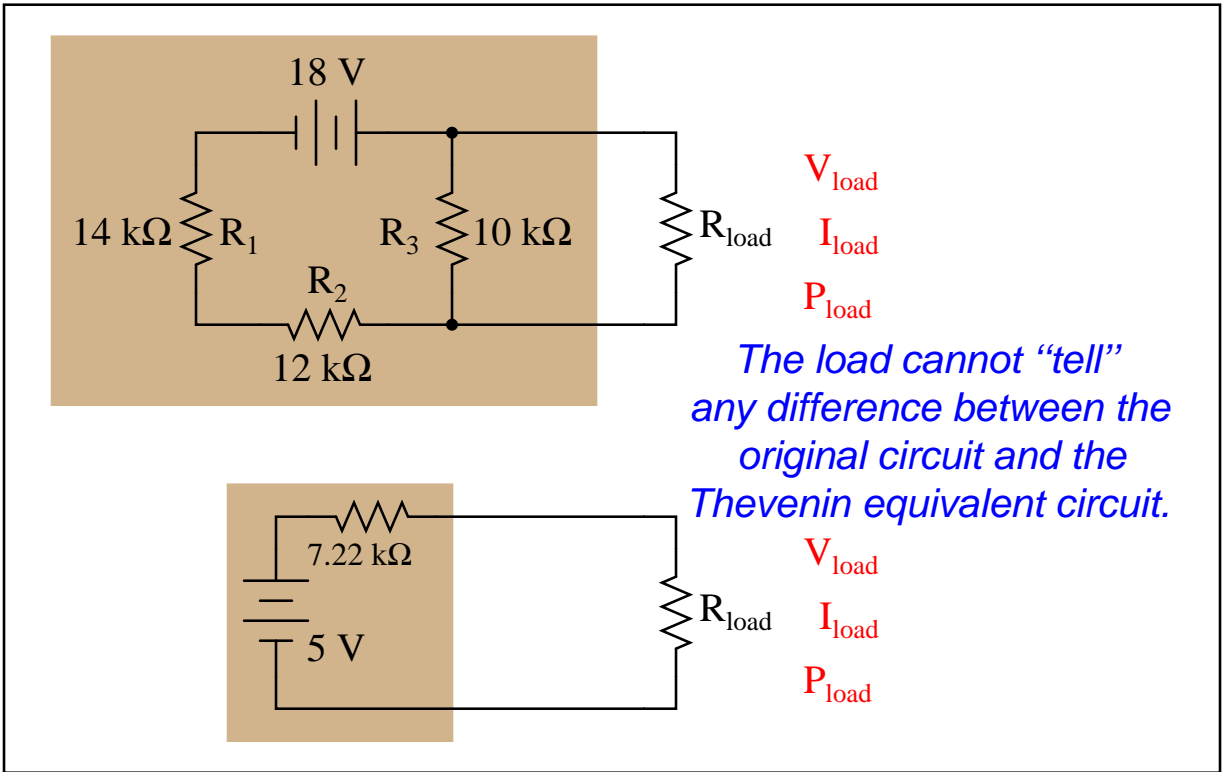
V_{load}

I_{load}

P_{load}







file 03261

Answer 1

Nothing to note here.

Notes 1

The purpose of this animation is to let students see how Thévenin's theorem may be applied to the simplification of a resistor network.