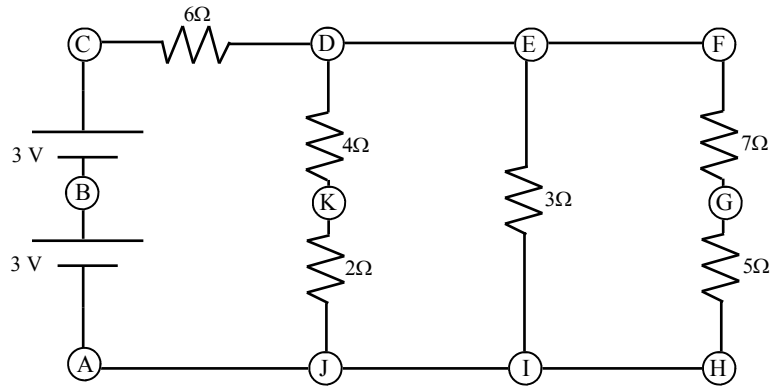
Working a Complicated Circuit

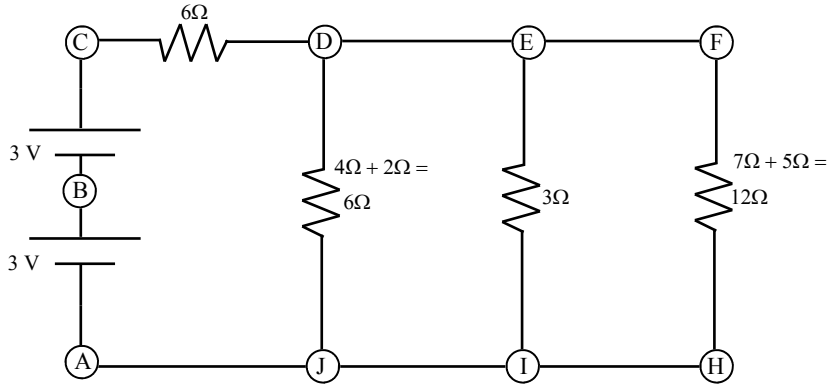
When given a complicated circuit it is always easier to simplify and redraw it. Indeed, it may take many redraws to simplify it enough to understand what's going on. Afterwards, you can work backwards to find what the current, voltage, or power in any part of the circuit.

Original circuit.



First redraw
(simplification 1)

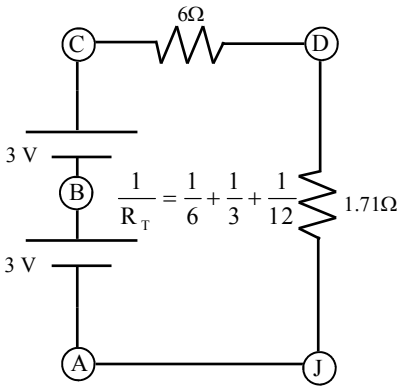
In this redraw each of the branches is simplified with its equivalent resistance.



Second redraw
(simplification 2)

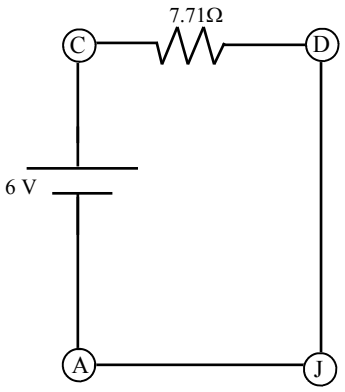
The total resistance of the three parallel branches is found by using:

$$\frac{1}{R_T}=\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}$$



Third redraw
(simplification 3)

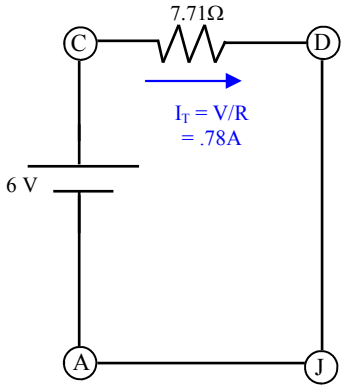
Since the 6Ω and 1.71Ω are in series, we just add them together find the total resistance of the circuit.



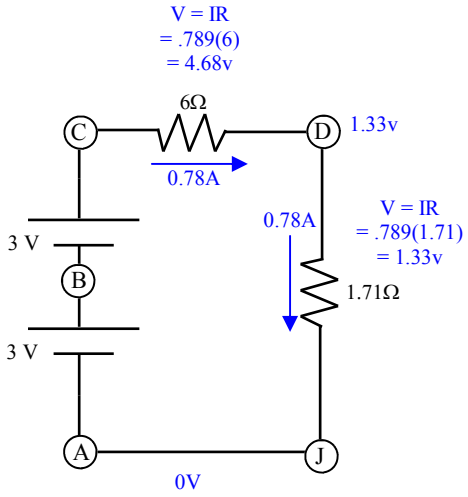
Now that you have the total resistance (7.71Ω) you can find the total current and start working backwards, as I will do on the second page.

Instead of showing the work on the previous page, this page shows exactly how to work backwards thru the circuit.

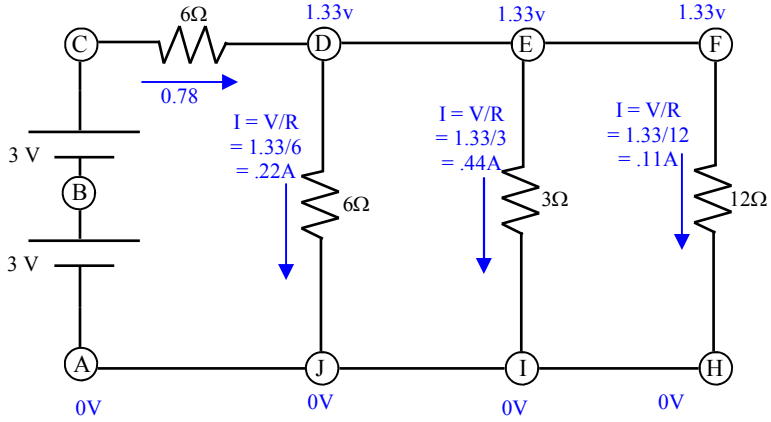
Third redraw (simplification 3): Find total current from total voltage and resistance.



Second redraw (simplification 2): Find the voltage from D to J.



First redraw (simplification 1): Now that you know the voltage from D to J, you can find the current in each branch.



Original circuit. Now that you have the current in each branch, you know the current in each resistor and can calculate any necessary quantity.