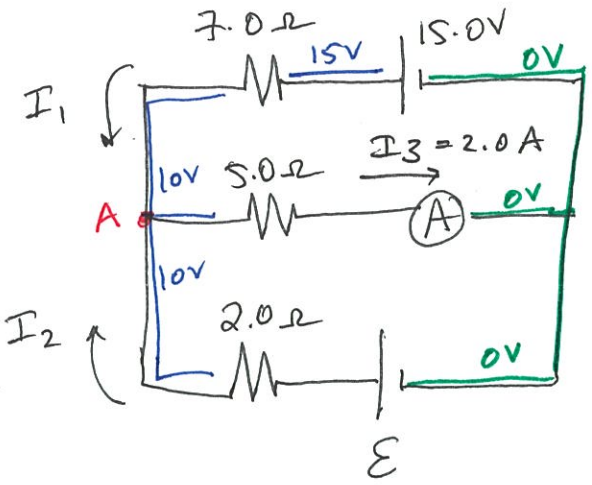
Problem 18.17



Find unknowns ($I_1, I_2, \mathcal{E}$).

$I_1 + I_2 = 2.0$ A → combine @ A

① Need to go piecemeal: start w/ what we know about ΔV in places:

— line = 0 V (low V side of both batteries)

② @ 15V battery, know V on high V side is 15V

③ for middle branch, know R + I so…

$$\Delta V = IR = (2.0\text{ A})(5.0\ \Omega) = 10\text{ V}$$

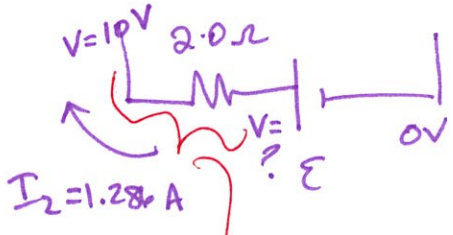
That means V @ A is 10V

④ so, $\Delta V_{7\Omega} = 5$V. $I = \frac{\Delta V}{R} = \frac{5\text{V}}{7.0\Omega} = \boxed{0.714\text{ A}} = I_1$

⑤ back to $I_1 + I_2 = 2.0$A, so $I_2 = 2.0\text{A} - 0.714\text{ A} =$

$\boxed{1.286\text{ A}} = I_2$

⑥ to find $\mathcal{E}$: here's what we know:



$\Delta V = IR = (1.286\text{ A})(2.0\ \Omega) = 2.572$ V

so V @ $\mathcal{E}_+ = 10 + 2.572 = \boxed{12.572\text{V}}$