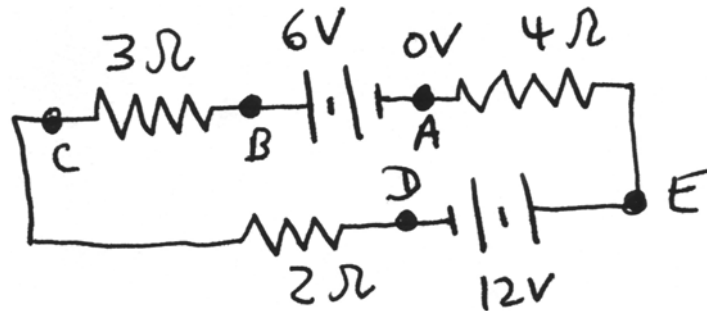


CLASS EXERCISE #8 - 28 June 2005



(a) What is the equivalent voltage of this circuit?

The two batteries face the same way, so the equivalent voltage is the sum of their voltages: $6\text{ V} + 12\text{ V} = 18\text{ V}$.

(b) What is the equivalent resistance of this circuit?

The equivalent resistance of the circuit is the sum of the resistances:

$$3\ \Omega + 4\ \Omega + 2\ \Omega = 9\ \Omega.$$

(c) What is the current in this circuit?

$$I = \Delta V / R = (18\text{ V}) / (9\ \Omega) = 2\text{ A. It flows counterclockwise.}$$

(d) Construct the $R - I - \Delta V$ table for this circuit. Include a separate line for each battery; leave the R column of the battery lines empty.

R	I	ΔV
$2\ \Omega$	2 A	4 V
$3\ \Omega$	2 A	6 V
$4\ \Omega$	2 A	8 V
	2 A	6 V
	2 A	12 V

(e) Point A is 0 volts. What is the potential at each of the points B, C, D, and E?

Going counterclockwise from A, the potential increases across each battery and decreases across each resistor:

$$\text{At B: } 0\text{ V} + 6\text{ V} = 6\text{ V} \qquad \text{At C: } 6\text{ V} - 6\text{ V} = 0\text{ V}$$

$$\text{At D: } 0\text{ V} - 4\text{ V} = -4\text{ V} \qquad \text{At E: } -4\text{ V} + 12\text{ V} = 8\text{ V}$$

Then it drops 8 V back to 0 V (this is a check).