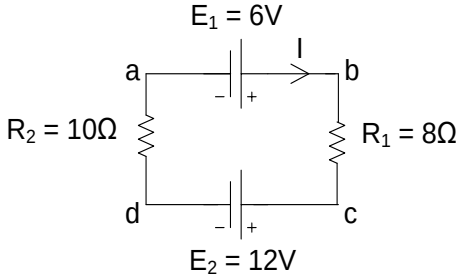
Q- Consider the circuit below.



(a) Neglecting the internal resistances of the batteries, find the current in the circuit.

Applying loop rule $\left(\sum E = \sum R * I\right)$ for Clock wise direction as positive we can write

$E_1 + E_2 = R_1*I + R_2*I =$

Or $6 + (-12) = 8*I + 10*I$

Gives $I = - (1/3) = -0.333$ A

(The negative sign shows that the direction of current is CCW opposite to the shown in diagram)

(b) What power is delivered to each of the resistors?

The power dissipated in the resistance is given by

$P = I^2R$

Hence power dissipated in R_1 will be

$P_1 = (1/3)^2*8 = 8/9 = 0.889$ W

And in resistance R_2 will be

$P_2 = (1/3)^2*10 = 10/9 = 1.111$ W

(c) What power is delivered by the 12V battery?

The power delivered by a battery is given by E*I where E is the EMF of the battery and I is the current through it. Hence power delivered by 12 V battery will be

$P_{12} = 12*(1/3) = 4$ W.

d) What power is delivered by 6V battery?

The power delivered by batteries is dissipated in resistors thus we get

$P_{12} + P_6 = P_1 + P_2$

Or $4 + P_6 = 0.889 + 1.111 = 2$ W

Or $P_6 = -2$ W

Negative sign means power is given to the battery. Hence 2 W power is required to flow current in 6V battery from positive to negative terminal against its EMF.