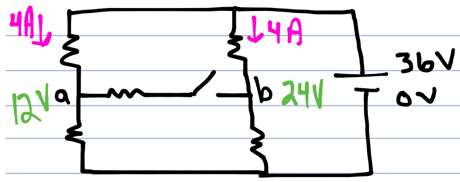
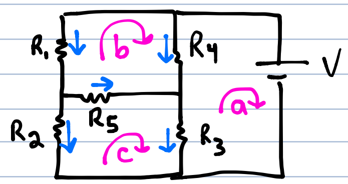


$R_{eq} = \left((6+3)^{-1} + (3+6)^{-1}\right)^{-1} = 4.5\,\Omega$

$\rightarrow I_{\text{thru battery}} = \frac{36V}{4.5\,\Omega} = 8A$

$V_{ab} = V_a - V_b = 12V - 24V = -12\,V$

now close switch



a) $I_3R_3 + I_4R_4 - V = 0$

b) $I_1R_1 - I_4R_4 + I_5R_5 = 0$

c) $I_2R_2 - I_5R_5 - I_3R_3 = 0$

i) $I_1 = I_2 + I_5$

ii) $I_5 + I_4 = I_3$

We have 5 unknowns (the currents)

→ need 5 eqns

$I_5 = -1.71\,A$ ⇒ I assumed the incorrect direction

$I_4 = 5.14\,A$

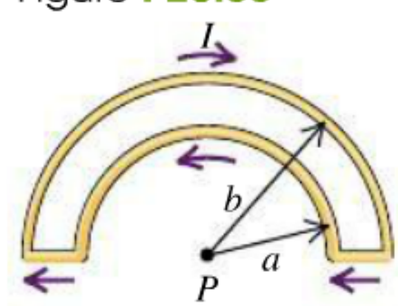
$I_1 = 3.42\,A$

c) what is R_{eq}?

$I_{battery} = I_4 + I_1 = 8.57A \Rightarrow R_{eq} = \frac{\varepsilon}{I_{battery}} = 4.2\,\Omega$

28.66 • The wire semicircles shown in **Fig. P28.66** have radii *a* and *b*. Calculate the net magnetic field (magnitude and direction) that the current in the wires produces at point *P*.

Figure **P28.66**



There are two semi-circles that produce B fields (at P) in opposite directions

$B(\text{at } P)_{\text{due to inner}} = \frac{1}{2}\frac{\mu_0 I}{2a}\hat{k} - \frac{1}{2}\frac{\mu_0 I}{2b}\hat{k}$

the factors of $\frac{1}{2}$ account for the semi-circles