63. ‖ What is the current through the 10 Ω resistor in FIGURE P31.63? Is the current from left to right or right to left?

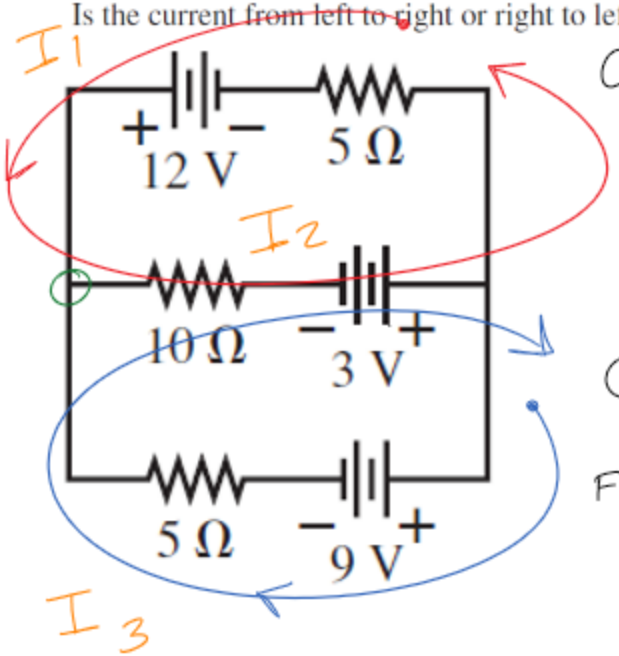

FIGURE P31.63

$R_{10} = 10\,\Omega$

CCW (1) $\sum V = 0 \longrightarrow +12 - I_2 R_{10} + 3 - I_1 R_5 = 0$

(2) $\sum V = 0 \longrightarrow +3 - 9 - I_3 R_5 - I_2 R_{10} = 0$

CW (3) $I_{IN} = I_{OUT} \longrightarrow I_1 + I_3 = I_2$

FIND I_2

$$(2) \longrightarrow I_3 = \frac{-6 - I_2 R_{10}}{R_5}$$

$$(1) \longrightarrow I_1 = \frac{15 - I_2 R_{10}}{R_5}$$

$$(3) \longrightarrow I_2 = \frac{15 - I_2 R_{10}}{R_5} + \frac{-6 - I_2 R_{10}}{R_5}$$

$$I_2 R_5 = 9 - 2 I_2 R_{10}$$

$$I_2 [R_5 + 2R_{10}] = 9 \rightsquigarrow I_2 = \frac{9}{5 + 2(10)} = \boxed{0.36\ A}$$

12. | The loop in FIGURE EX33.12 is being pushed into the 0.20 T magnetic field at 50 m/s. The resistance of the loop is 0.10 Ω. What are the direction and the magnitude of the current in the loop?

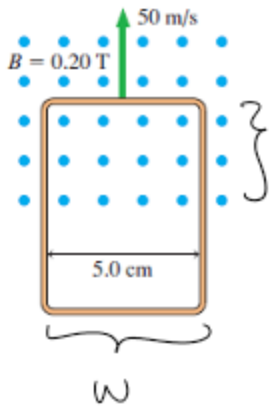

FIGURE EX33.12

FIND I

$$\Phi = \oint \vec{B} \cdot d\vec{A} \rightarrow BA = B(lw)$$

$$\mathcal{E} = -\frac{d\Phi}{dt} = -\frac{d}{dt}[Blw]$$

$$= -Bw\frac{d}{dt}[l]$$

$$= -BwV$$

$$V = IR \longrightarrow I = \frac{V}{R} = \frac{|\mathcal{E}|}{R} = \frac{BwV}{R}$$

$$= \frac{(0.20\,T)(0.05\,cm)(50\,m/s)}{(0.10\,\Omega)} = \boxed{5\,A}$$