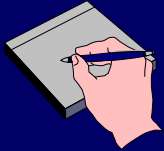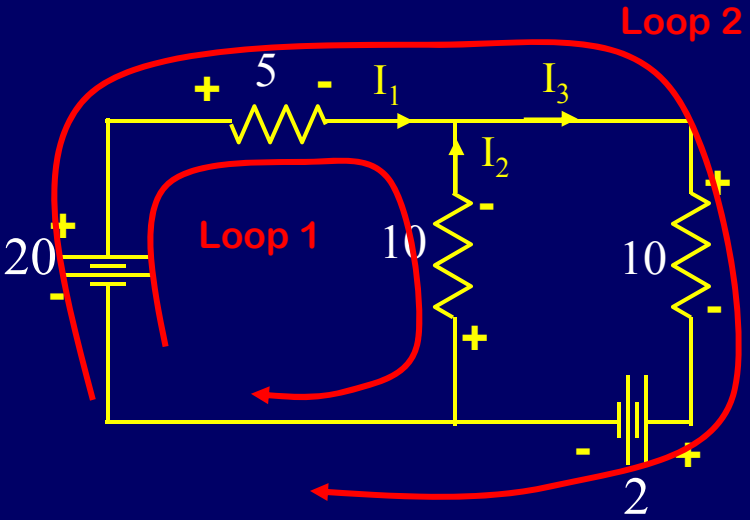# Let's put in real numbers

In the circuit below you are given $\mathcal{E}_1$, $\mathcal{E}_2$, R_1, R_2 and R_3. Find I_1, I_2 and I_3.

Loop 2

Loop 1

5   I_1 I_3

I_2

20

10

10

2

1. Loop 1: $20 - 5I_1 + 10I_2 = 0$
2. Loop 2: $20 - 5I_1 - 10I_3 - 2 = 0$
3. Junction: $I_3 = I_1 + I_2$

solution: substitute Eq.3 for I_3 in Eq. 2:
$20 - 5I_1 - 10(I_1 + I_2) - 2 = 0$
rearrange: $15I_1 + 10I_2 = 18$
rearrange Eq. 1: $5I_1 - 10I_2 = 20$

Now we have 2 eq., 2 unknowns.   Continue on next slide