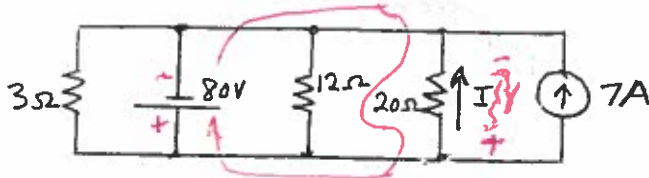


HINT: All the answers are integers. (except 5b)

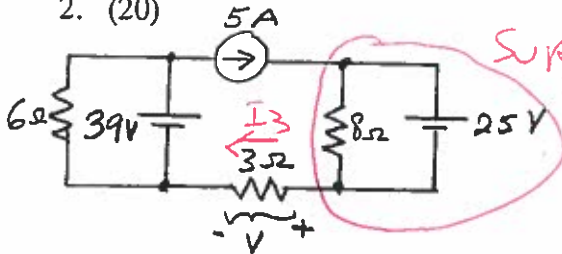
1. (20)



KVL:  
 $+80 - V = 0$   
 $V = 80V$   
 $I = V/R = 80/20 = 4A$

$I = \underline{4A}$

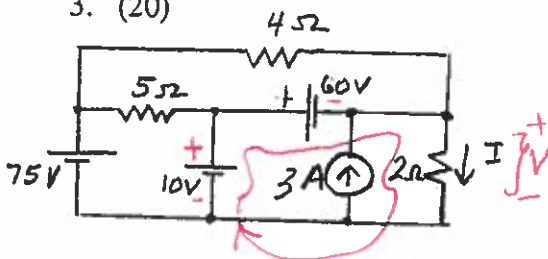
2. (20)



KCL at supernode:  
 $-5 + I_3 = 0$   
 $I_3 = 5A$   
 $V = IR = 5(3) = 15V$

$V = \underline{15V}$

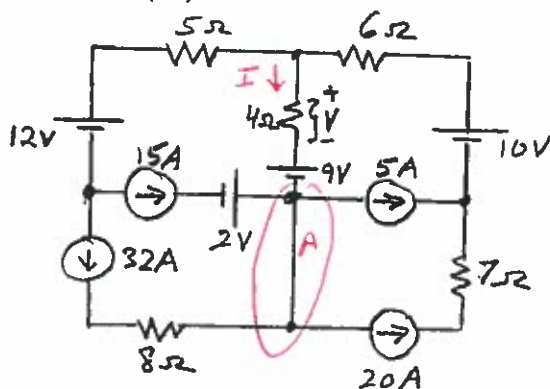
3. (20)



KVL:  $-10 + 60 + V = 0$   
 $V = 10 - 60 = -50V$   
 $I = \frac{V}{R} = \frac{-50}{2} = -25A$

$I = \underline{-25A}$

4. (20)



KCL at circled node:  
 $-15 - I + 5 - 32 + 20 = 0$   
 $I = -15 + 5 - 32 + 20 = -22A$   
 $V = IR = -22 \times 4 = -88V$

$V = \underline{-88V}$

5. (20)

A total of 180 coulombs flows (at a constant rate) through a battery in one minute. a) What is the current in the battery? b) How many electrons went through the battery in one minute?

a)  $I = Q/t$   
 $= 180/60s$   
 $= \underline{\underline{3A}}$

b) Charge on electron =  $-1.6022 \times 10^{-19}$   
 $N = 180C / 1.6022 \times 10^{-19}$   
 $= \underline{\underline{1.1235 \times 10^{21} \text{ electrons}}}$