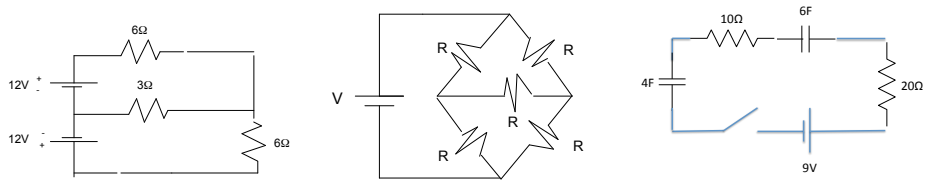

FIG. 1: A, B and C; respectively

1B quiz 2 version A

1. Gold has one electron per atom available as charge carriers. The mass density of gold is $19.3kg/m^3$ and its atomic weight is 197. Find the drift speed of the electrons in a wire with circular cross section of radius $.3mm$ and which is carrying a current of carrying $.1A$.

   - a. 1.4×10^{-4} m/s
   - b. 3.7×10^{-2} m/s
   - c. 5.9×10^{-1} m/s
   - d. 2.7×10^{-3} m/s

2. An aluminum wire of length L and a copper wire of length $5L$ have precisely the same resistance. The resistivity of the two materials are: aluminum, $2.8 \times 10^{-8}\Omega - m$ and copper $1.7 \times 10^{-8}\Omega - m$. What is the ratio of the radius of the copper wire to the aluminum wire?

   - a. 3.7
   - b. 3.0
   - c. 1.74
   - d. .44

3. A heater uses nichrome wire with resistivity $1.0 \times 10^{-6}\Omega - m$ and generates $1250W$ of heat when connected across a potential difference of $110V$. How long must the wire be, if its cross-sectional area is $.2 \times 10^{-6}m^2$?

- a. .025m
- b. .37m
- c. 1.94m
- d. 23.5m

4. A resistor with $R = 5 \times 10^6 \Omega$ and a capacitor with $C = 120 \mu F$ are connected in series to a $800V$ power supply. Find the current when the capacitor is charged to 90% of its final charge.

   - a. 3 μ A
   - b. 16 μ A
   - c. 30 μ A
   - d. 160 μ A

5. One month's electric bill for an apartment is \$25.33 and the cost of electricity is \$.08/kilowatt-hour. All appliances run at $120V$. How many electrons passed through the house that month?

   - a. 1.8 $\times 10^{20}$
   - b. 7.4 $\times 10^{21}$
   - c. 9.5 $\times 10^{23}$
   - d. 5.9 $\times 10^{25}$

6. Find the current in the middle resistor in the circuit shown in Fig A

   - a. 1.0 A
   - b. 1.33 A
   - c. 2.0 A
   - d. 4.0 A

7. Find the total current out of the battery in the circuit shown in Fig B (hint: you do not need to write down all the Kirchoff law equations; think about symmetry and the role of the middle resistor?)

- a. $\frac{V}{5R}$
- b. $\frac{V}{2R}$
- c. $\frac{V}{R}$
- d. $\frac{2V}{R}$

8. Consider the circuit in Fig C with two resistors and two capacitors connected in series with a $9V$ battery. Calculate the potential between the upper-left and upper-right corner points both immediately after the switch is closed and after waiting a time long compared to the circuit's time constants.

   - a. 3V; 3.6V
   - b. 3V; 5.4V
   - c. 6V; 5.4V
   - d. 6V; 0V