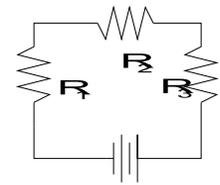


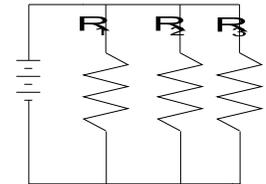
2. Fill out the table for the circuit diagramed at right. USE PROPER SIG FIGS

Circuit Position	Voltage (V)	Current (A)	Resistance (Ω)
1			10.0
2			20.0
3			30.0
Total	6.00		



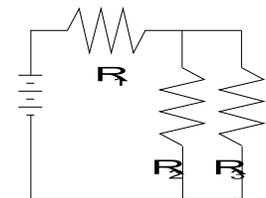
3. Fill out the table for the circuit diagramed at right. USE PROPER SIG FIGS

Circuit Position	Voltage (V)	Current (A)	Resistance (Ω)
1			10.0
2			20.0
3			30.0
Total	6.00		

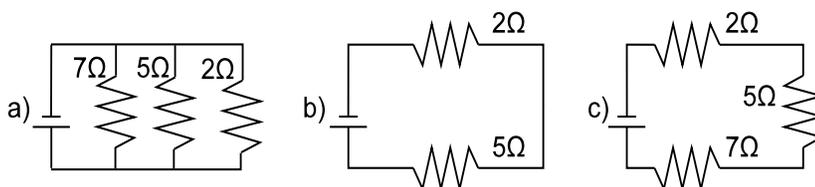


4. Fill out the table for the circuit diagramed at right. USE PROPER SIG FIGS

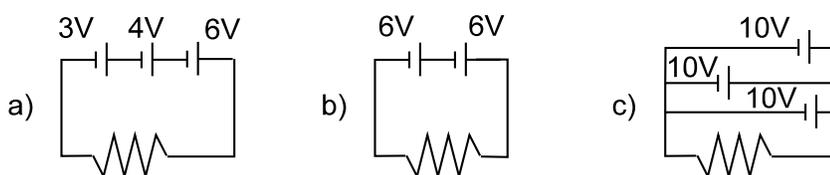
Circuit Position	Voltage (V)	Current (A)	Resistance (Ω)
1			10.0
2			20.0
3			30.0
Total	6.00		



_____ 5. If the cells are identical, which circuit would draw the most current from the cell?



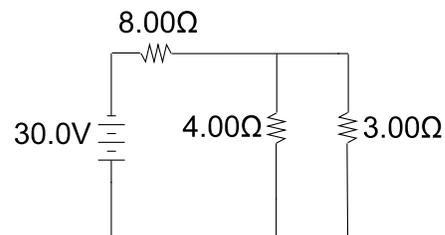
_____ 6. If the resistors are identical, which circuit would have the lowest overall change in electrical potential energy per unit charge?



KIRCHOFF'S LAWS:

7. Use the diagram of the compound circuit to answer the following questions. You must apply Kirchoff's Laws, showing all relevant equations and calculations in the spaces below, using proper signs.

- a) Draw labeled current arrows on the diagram at right for the currents I_1 , I_2 , and I_3 at the upper node.
- b) Using the node rule, write in the space below an appropriate expression for the relationship among I_1 , I_2 , and I_3 .
- c) Draw two labeled Kirchoff loops on the diagram at right.
- d) Using the loop rule and appropriate signs, write in the space below an expression for each loop in terms of the appropriate labeled currents and the voltage and/or resistance values (with units) shown in the diagram.
- e) Simultaneously solve the equations from parts b) and d) and solve for the value of the current through each resistor and the voltage across each resistor, showing your work in the space below.



POWER IN CIRCUITS:

8. Fluffy's shock collar (she meows too much) delivers a current of 0.0600 A and runs on a 9.00 V battery.
- What is the power of the collar circuit in watts?
 - Over a three month period the collar is in operation for a total of 600 seconds. How many joules of electrical energy were consumed during that period of time? SHOW THE EQUATION
 - A typical 9.00 V battery might cost \$2.40 and provide 19,250 J of energy. What is the cost of running the shock collar as described in parts **a** and **b**?

ELECTROSTATICS:**COULOMB'S LAW**

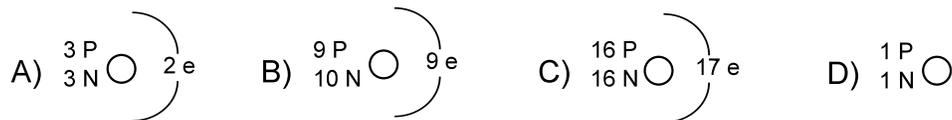
Two point charges q_1 and q_2 separated a distance d apart will attract or repel each other with a force given by the formula below, called Coulomb's law. The constant k is taken to be $9.00 \times 10^9 \text{ Nm}^2/\text{C}^2$.

$$F = \frac{kq_1q_2}{d^2}$$

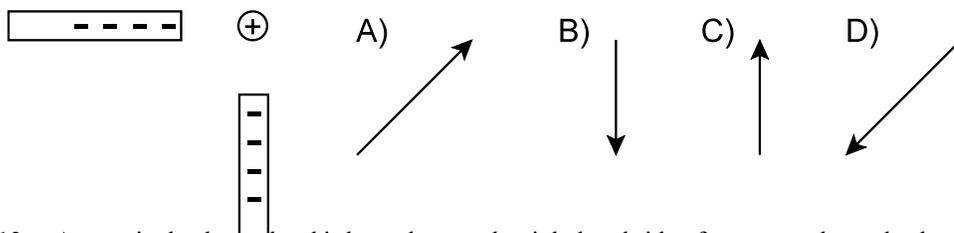
9. Two identical tiny metal balls carry charges of +3.00 nanocoulombs and -12.0 nanocoulombs. Their centers are 3.00 cm apart.
- Compute the amount of force between them and **specify its effect** (state if it is attractive or repulsive).
 - The balls are now touched together and then separated to 3.00 cm. What is the new charge on each ball?
 - Calculate the magnitude and also **specify the effect** of the forces on each ball, given what occurred in part b.

In the space to the left, write the letter of the answer to the question.

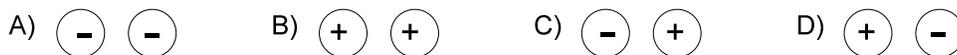
_____ 10. Which atom pictured below is electrically neutral?



_____ 11. Two negatively charged rods are brought near a positively charged ball. What is the direction of the net force on the ball due to the rods?



_____ 12. A negatively charged rod is brought near the right hand side of two neutral metal spheres that are touching one another while insulated from the ground. The spheres are then separated and the rod is taken away. Which pair of spheres shows the correct signs of each sphere's net charge?



_____ 13. Which of the following is NOT a possible net charge of an ion (an electrically charged atom)?
 A) $+1.6 \times 10^{-19} \text{ C}$ B) $-1.6 \times 10^{-19} \text{ C}$ C) $-2.4 \times 10^{-19} \text{ C}$ D) $-3.2 \times 10^{-19} \text{ C}$

_____ 14. Two objects exert an electric force of size F on each other. If the charge on each object is doubled and they are moved three times closer together, the electric force will now be...
 A) $36 F$ B) $18 F$ C) $12 F$ D) $3/4 F$

_____ 15. Two objects a certain distance apart each have a charge of positive four microcoulombs ($+4 \times 10^{-6} \text{ C}$ or $+4 \mu\text{C}$) which creates a repulsive force of size F on each object. If $+2 \mu\text{C}$ of charge is transferred from one object to the other, the repulsive force will now be...
 A) $4 F$ B) $2 F$ C) $3/4 F$ D) $1/2 F$