The Nervous System: Membrane Potential

1. Record the intracellular and extracellular concentrations of the following ions (mM/L):

	Intracellular	**Extracellular**
Sodium (Na^+)		
Potassium (K^+)		
Chloride (Cl^-)		

2. Excitable cells, like neurons, are more permeable to _____ than to _____.

3. How would the following alterations affect the membrane permeability to K^+?
Use arrows to indicate the change in permeability.

   a. An increase in the number of passive K^+ channels _____

   b. Opening of voltage-gated K^+ channels _____

   c. Closing of voltage-gated K^+ channels _____

4. a. What acts as a chemical force that pushes K^+ out of the cell? _____

   b. What force tends to pull K^+ back into the cell? _____

5. When the two forces listed above are equal and opposite in a cell permeable only to K^+, this is called the _____ potential for K^+ which is _____ mV.

6. In an excitable cell, also permeable to Na^+ and Cl^-, the gradients mentioned in question 4 would both tend to move Na^+ _____ the cell.

7. Would the gradients in question 4 promote or oppose the movement of Cl^- into the cell?

   a.

b.

8. Since the neuron is permeable to Na^+ as well as K^+, the resting membrane potential is not equal to the equilibrium potential for K^+, instead it is _____ mV.

9. What compensates for the movement (leakage) of Na^+ and K^+ ions? _____

10. What will happen to the resting membrane potential of an excitable cell if: (Write pos or neg to indicate which way the membrane potential would change.)

    a. ↑ extracellular fluid concentration of K^+ _____

    b. ↓ extracellular fluid concentration of K^+ _____

    c. ↑ extracellular fluid concentration of Na^+ _____

    d. ↓ number of passive Na^+ channels _____

    e. open voltage-gated K^+ channels _____

    f. open voltage-gated Na^+ channels _____