Name (Please print) _____

Temple ID number _____

D-277 Dental Physiology, Summer 2011, Quiz 1,
Monday, April 25, 2011

There are 4 questions. Each is worth 0.5 points. Please write the letter of the correct answer in the box provided by each question.

1. Which of the following solutions would be isotonic, relative to a normal blood cell?

   A. *290 mM sucrose ($\sigma = 1$) plus 290 mM urea ($\sigma = 0.2$)
   B. 580 mM sucrose
   C. 580 mM urea
   D. 145 mM sucrose + 145 mM urea

2. Which best describes how solutes cross the cell membrane by carrier mediated transport?

   A. Solutes move through a selective hydrophilic passageway across the membrane that is always open.
   B. Solutes move through a selective hydrophilic passageway across the membrane that continually opens and closes.
   C. *Solutes bind to a binding site on an integral membrane protein, which then changes its shape, exposing the solute and the binding site to the solution on the other side of the membrane.
   D. Solutes bind to a binding site on a highly mobile carrier protein, and the mobile carrier protein diffuses across the phospholipid bilayer and deposits the solute on the other side of the membrane.

3. Use the chord conductance equation to calculate the membrane potential (E_m) of a cell that is only permeable to Na^+ and K^+ ions, and has the following properties. (Note: these are <u>not</u> normal values of E_K and E_{Na}.) gNa = 400 nanoSiemens, gK = 600 nanoSiemens, E_K = -70 mV, E_{Na} = +40 mV.

   A. E_m = + 40 mV
   B. E_m = - 4 mV
   C. E_m = - 52 mV
   D. *E_m = - 26 mV

4. Which are the correct values for E_{Na} and E_K in normal cells?

   A. *E_{Na} = + 60 mV and E_K = - 90 mV
   B. E_{Na} = + 125 mV and E_K = - 30 mV
   C. E_{Na} = + 90 mV and E_K = - 125 mV
   D. E_{Na} = + 0 mV and E_K = - 125 mV