

Exam I
(100 pts)

Multiple-choice (3 pts each)

- 1) Which of the following is a true statement about tissues?
 - A) In biological organization, they lie between organs and systems.
 - B) There are 5 types.
 - C) Blood and fat both fall in the connective tissue category.
 - D) All of the above.
 - E) None of the above.

- 2) A non-polar molecule...
 - A) would have a harder time crossing the membrane than a similar-sized polar molecule.
 - B) is strongly attracted to water molecules.
 - C) is very charged.
 - D) is hydrophobic.
 - E) None of the above.

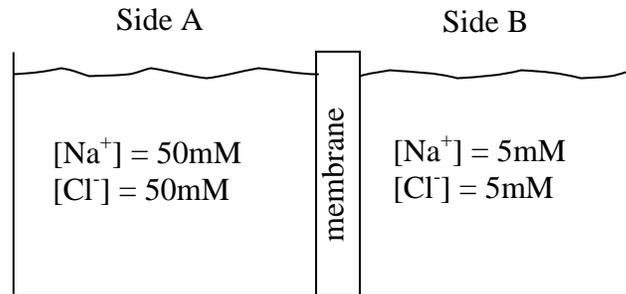
- 3) Homeostasis...
 - A) is when water no longer crosses a cell membrane.
 - B) is when there is no net movement of an ion across a membrane.
 - C) is when the resting membrane potential doesn't change.
 - D) is when the body maintains its internal environment at steady values.
 - E) uses positive feed-forward mechanisms.

- 4) Which of the following is true about cell membranes?
 - A) They allow most large polar molecules to pass through them.
 - B) They are constructed mainly of a phospholipid bilayer.
 - C) Every cell membrane has the same kinds of proteins in them.
 - D) All of the above.
 - E) None of the above.

- 5) Which of the following is true?
 - A) GABA binds to GABA receptors, increasing the permeability of Cl^- .
 - B) GABA is the most common excitatory neurotransmitter in your body.
 - C) Synaptic vesicles in the axon terminal fuse with the membrane when Mg^{2+} levels increase.
 - D) All of the above.
 - E) None of the above.

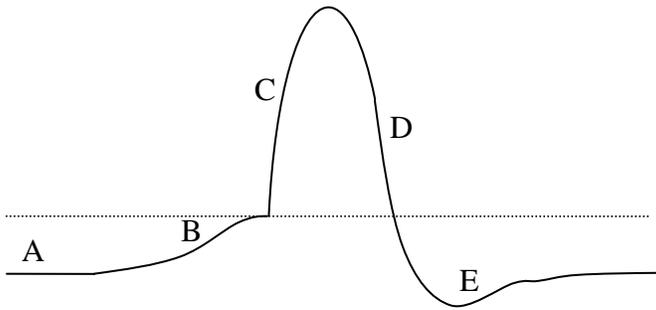
- 6) Which of the following is true?
 - A) The lumbar enlargement is not found in people without back problems.
 - B) Grey matter is made up mostly of axons while white matter is made up mostly of cell bodies.
 - C) Afferent neurons enter the front part of the spinal cord and efferent leave the back part.
 - D) All of the above.
 - E) None of the above.

Figure 1.
Both solutions
contain only water,
 Na^+ and Cl^- ions



- 7) In figure 1. above, if Na^+ is the only thing permeable to the membrane...
- water will move from Side A to Side B.
 - Na^+ ions will move until the concentrations on both sides are equal.
 - Na^+ ions will move from Side A to B until equilibrium is reached.
 - Na^+ ions won't move at all.
 - None of the above is true.
- 8) If a cell were placed in the solution on Side A, the solution would be...
- iso-osmotic.
 - isotonic.
 - hypo-osmotic.
 - hypertonic.
 - None of the above is true.
- 9) If water was the only thing permeable to the membrane...
- the level of the solution on Side A would go up.
 - the level of the solution on Side B would go up.
 - the level of the solution on Side A would not change.
 - Na^+ would move to Side B from Side A.
 - None of the above is true.
- 10) True or False? In figure 1, if the permeability of Na^+ is changed, its equilibrium potential will also change.
- True.
 - False.
- 11) The cerebellum...
- acts as a relay station, filtering all sensory information before it reaches higher brain areas.
 - is mainly responsible for processing smell information.
 - is part of the peripheral nervous system.
 - is used to store motor programs for repetitive movements like typing.
 - is where logic, reason, and decision making take place.
- 12) Which of the following neurons would conduct action potentials at the fastest speed?
- A long neuron with a small axon diameter.
 - A short neuron with a small axon diameter.
 - A myelinated neuron with a small axon diameter and very large dendrite diameter.
 - A neuron with a large axon diameter.
 - A myelinated neuron with a large axon diameter.

Use the following figure of an action potential to answer the questions 12-16.
 (Note: letters can be used more than once or not at all).



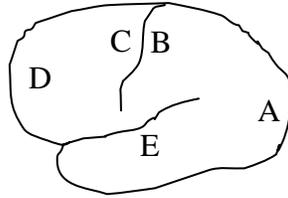
- 13) Both gates of the voltage-gated Na^+ channels are open.
- 14) The voltage-gated Na^+ channels activation gates are closed but the inactivation gates are open.
- 15) The neuron is depolarizing without using voltage-gated channels.
- 16) K^+ is leaving the neuron through voltage-gated channels.
- 17) Which letter is lies closest to potassium's equilibrium potential?
- 18) Eric licks the back of a new species of toad (Ooooo, not smart). Within minutes, all of his body's voltage-gated calcium channel are blocked and can't open. Which of the following are true?
- A) A sensory neuron for touch can still fire an action potential.
 - B) Inhibitory neurons would not be able to release GABA from their axon terminals.
 - C) He's going to die pretty quickly.
 - D) All of the above are true.
 - E) None of the above is true.
- 19) If a glutamate neuron fires multiple action potentials onto a postsynaptic neuron...
- A) EPSPs will occur in the postsynaptic neuron.
 - B) GABA will be released onto the postsynaptic neuron.
 - C) Na^+ will leave the postsynaptic neuron through glutamate channels.
 - D) it can be called spatial summation.
 - E) an action potential will occur in the dendrites of the postsynaptic neuron.
- 20) Neurons for nociception in your leg...
- A) will always make you feel pain if they fire.
 - B) are called efferent neurons.
 - C) can be stimulated by chemoreceptors, thermoreceptors and/or mechanoreceptors.
 - D) have their cell bodies in the grey matter of the spinal cord.
 - E) enter the front (ventral) side of the spinal cord.
- 21) Which of the following is a true statement?
- A) The iris controls the amount of light entering the eye through the pupil.
 - B) Cones are more sensitive to light than are rods.
 - C) Cones are found mostly outside of the fovea.
 - D) Images are focused on the optic disk.
 - E) People with retinas farther away from the lens than normal are far-sighted.

22) Which of the following is a true statement?

- A) The ossicles are found in your inner ear.
- B) The ossicles are tiny bones that amplify movement caused by sound waves.
- C) The ossicles (little calcium crystals on a gelatinous mound) help with proprioception.
- D) If a high frequency pitch is heard the wide floppy portion of the basilar membrane moves.
- E) None of the above is true.

Use the following figure to answer the questions 12-16.

(Note: letters can be used more than once or not at all)



23) Is the parietal lobe.

24) Is where visual information goes to.

25) Is responsible for sending out motor signals.

26) Is where auditory information is received.

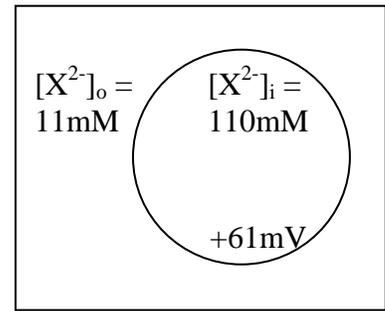
27) Is in the temporal lobe.

Short answer

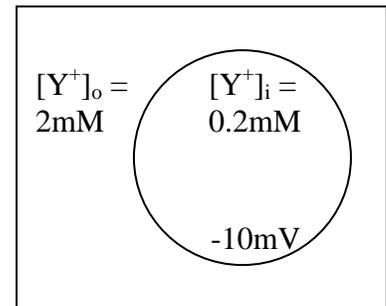
28) (5 pts) While forging in the woods, Rick eats a colorful bug (Ooooo, not smart). The bug has a chemical in it that quickly spreads throughout Rick's body and prevents any of his mechanoreceptors from firing? What would you expect to happen to Rick?

29) (4 pts) Why would it be impossible to read Braille using your back instead of your fingertips?

30) (6 pts) For the cell in the figure to the right, draw both the chemical and electrical forces acting on the ion X^{2-} . If a channel for the ion is opened, in which direction with X^{2-} flow? (into the cell, out of the cell) (show your work).



29) (4 pts) For the cell in the figure to the right, draw both the chemical and electrical forces acting on the ion Y^+ . If Y^+ is permeable, what would be the charge inside the cell when Y^+ stopped moving across the membrane?



Extra credit (4 pts) If Cl^- equilibrium potential is -20mV, is there more of it inside or outside of the cell?