Name: _____ **Class:** _____ **Date:** _____ **ID: A**

Anatomy & Physiology Test Eastside Invitational Jan 26, 2013

Disorders Matching

Match the following disorders with their description (not all answers will be used)

a. Lactose Intolerance
b. Hepatitis
c. Glaucoma
d. Urinary Tract Infection
e. Renal Failure
f. Cerebral Palsy
g. Multiple Sclerosis
h. Seizures
i. Appendicitis
j. Duodenal Ulcer
k. Conjunctivitis
l. Alzheimer's Disease

____ 1. Causes usually by abnormally high pressure in the eye.

____ 2. More common in women, can occur in the urethra, bladder, ureters, or kidneys

____ 3. Inflammation of the outermost layer of the eye and the inner surface of the eyelids.

____ 4. Condition that causes abnormal changes in the brain mainly affecting memory and other mental abilities

____ 5. A chronic disease that affects the myelin that surrounds the nerves in the brain and the spinal cord

____ 6. Episodes of disturbed brain activity that cause changes in attention or behavior.

____ 7. caused by brain damage that occurs before or during a child's birth, or during the first 3 to 5 years of a child's life.

____ 8. Results when the small intestine does not make enough of the enzyme necessary to digest a certain dissaccharide.

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 9. Foods eaten by animals are most often composed largely of macromolecules. This requires the animals to have methods for which of the following?

a. elimination
b. dehydration synthesis
c. enzymatic hydrolysis
d. regurgitation
e. demineralization

____ 10. Which of the following describes peristalsis in the digestive system?

a. a process of fat emulsification in the small intestine
b. voluntary control of the rectal sphincters regulating defecation
c. the transport of nutrients to the liver through the hepatic portal vessel
d. a common cause of loss of appetite, fatigue, and dehydration
e. smooth muscle contractions that move food through the alimentary canal

____ 11. After ingestion, the first type of macromolecule to be worked on by enzymes in the human digestive system is
a. protein.
b. carbohydrate.
c. cholesterol
d. nucleic acid.
e. glucose.

____ 12. Which of the following statements is *true* of mammals?
a. All foods begin their enzymatic digestion in the mouth.
b. After leaving the oral cavity, the bolus enters the larynx.
c. The epiglottis prevents food from entering the trachea.
d. Enzyme production continues in the esophagus.
e. The trachea leads to the esophagus and then to the stomach.

____ 13. What part(s) of the digestive system have secretions with a pH of 2?
a. small intestine
b. stomach
c. pancreas
d. liver
e. mouth

____ 14. Without functioning parietal cells, which of the following would you expect for an individual?
a. not to be able to initiate protein digestion in the stomach
b. not to be able to initiate mechanical digestion in the stomach
c. only to be able to digest fat in the stomach
d. not to be able to produce pepsinogen
e. not to be able to initiate digestion in the small intestine.

____ 15. Which of the following is true of bile salts?
a. They are enzymes.
b. They are manufactured by the pancreas.
c. They emulsify fats in the duodenum.
d. They increase the efficiency of pepsin action.
e. They are normally an ingredient of gastric juice.

____ 16. Most nutrients absorbed into the lymph or bloodstream are in which form?
a. disaccharides
b. polymers
c. monomers
d. enzymes
e. peptides

The following questions refer to the digestive system structures in Figure 41.1.

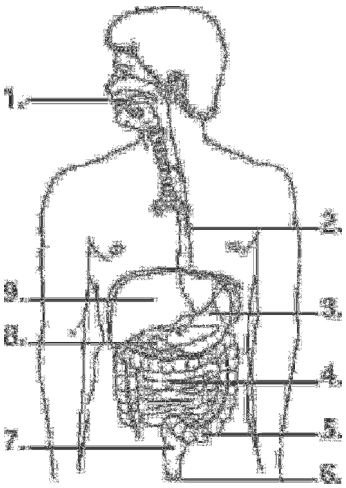


Figure 41.1

____ 17. Where does the complete digestion of carbohydrates occur?
a. 3 only
b. 4 only
c. 1 and 4
d. 3 and 4
e. 1, 3, and 4

____ 18. Where does the digestion of fats mostly occur?
a. 3 only
b. 4 only
c. 1 and 4
d. 3 and 4
e. 1, 3, and 4

____ 19. Which structure is home to bacteria that produce vitamins as by-products of their metabolism?
a. 3
b. 4
c. 5
d. 7
e. 8

____ 20. How does the digestion and absorption of fat differ from that of carbohydrates?
a. Processing of fat does not require any digestive enzymes, whereas the processing of carbohydrates does.
b. Fat absorption occurs in the stomach, whereas carbohydrates are absorbed from the small intestine.
c. Carbohydrates need to be emulsified before they can be digested, whereas fats do not.
d. Most absorbed fat first enters the lymphatic system, whereas carbohydrates directly enter the blood.
e. Only fat must be worked on by bacteria in the large intestine before it can be absorbed.

____ 21. The outer layer of the intestines is the _____
a. mucosa
b. serosa
c. submucosa
d. muscularis

____ 22. The _____ layer of the alimentary canal contains loose connective tissue, glands, blood and lymphatic vessels, and nerves.
a. mucosa
b. submucosa
c. muscular layer
d. serosa

____ 23. After surgical removal of an infected gallbladder, a person must be especially careful to restrict dietary intake of
a. starch.
b. protein.
c. sugar.
d. fat.
e. water.

____ 24. If you were to jog a mile a few hours after lunch, which stored fuel would you probably tap?
a. muscle proteins
b. muscle and liver glycogen
c. fat stored in the liver
d. fat stored in adipose tissue
e. blood proteins

____ 25. The transfer of fluid from the glomerulus to Bowman's capsule
a. results from active transport.
b. transfers large molecules as easily as small ones.
c. is very selective as to which subprotein sized molecules are transferred.
d. is mainly a consequence of blood pressure in the capillaries of the glomerulus
e. usually includes the transfer of red blood cells to the Bowman's capsule.

____ 26. Which of the following would contain blood in a normally functioning nephron?
a. vasa recta
b. Bowman's capsule
c. loop of Henle
d. proximal tubule
e. collecting duct

____ 27. What substance is secreted by the proximal-tubule cells and prevents the pH of urine from becoming too acidic?
a. bicarbonate
b. salt
c. glucose
d. ammonia
e. NaOH

____ 28. Which structure passes urine to the renal pelvis?
a. loop of Henle
b. collecting duct
c. Bowman's capsule
d. proximal tubule
e. glomerulus

____ 29. Which of the following processes of osmoregulation by the kidney is the *least* selective?
a. salt pumping to control osmolarity
b. H^+ pumping to control pH
c. reabsorption
d. filtration
e. secretion

____ 30. Proper functioning of the human kidney requires considerable active transport of sodium in the kidney tubules. If these active transport mechanisms were to stop completely, how would urine production be affected?
a. No urine would be produced.
b. A less-than-normal volume of hypoosmotic urine would be produced.
c. A greater-than-normal volume of isoosmotic urine would be produced.
d. A greater-than-normal volume of hyperosmotic urine would be produced.
e. A less-than-normal volume of isoosmotic urine would be produced.

____ 31. What is unique about transport epithelial cells in the ascending loop of Henle in humans?
a. They are the largest epithelial cells in the body.
b. They are not in contact with interstitial fluid.
c. Their membranes are impermeable to water.
d. 50% of their cell mass is comprised of smooth endoplasmic reticulum.
e. They are not affected by high levels of nitrogenous wastes.

____ 32. Which one of the following, if present in a urine sample, would likely be caused by trauma?
a. amino acids
b. glucose
c. salts
d. erythrocytes
e. vitamins

____ 33. What would account for increased urine production as a result of drinking alcoholic beverages?
a. increased aldosterone production
b. increased blood pressure
c. inhibition of antidiuretic hormone secretion (ADH)
d. increased reabsorption of water in the proximal tubule
e. the osmoregulator cells of the brain increasing their activity

____ 34. How does ADH function at the cellular level?
a. ADH stimulates the reabsorption of glucose through channel proteins.
b. It triggers the synthesis of an enzyme that makes the phospholipid bilayer more permeable to water.
c. It causes membranes to include more phospholipids that have unsaturated fatty acids.
d. It causes an increase in the number of aquaporin molecules of collecting duct cells.
e. It decreases the speed at which filtrate flow through the nephron leading to increased reabsorption of water.

____ 35. The high osmolarity of the renal medulla is maintained by all of the following *except*
a. diffusion of salt from the thin segment of the ascending limb of the loop of Henle.
b. active transport of salt from the upper region of the ascending limb.
c. the spatial arrangement of juxtamedullary nephrons.
d. diffusion of urea from the collecting duct.
e. diffusion of salt from the descending limb of the loop of Henle.

____ 36. Most of the neurons in the human brain are
a. sensory neurons.
b. motor neurons.
c. interneurons.
d. auditory neurons.
e. olfactory neurons.

____ 37. Which part of the vertebrate nervous system is most involved in preparation for the fight-or-flight response?
a. sympathetic
b. somatic
c. central
d. visceral
e. parasympathetic

____ 38. Which system controls smooth and cardiac muscles of the digestive, cardiovascular, and excretory systems?
a. central nervous system
b. peripheral nervous system
c. autonomic nervous system
d. parasympathetic nervous system
e. sympathetic nervous system

____ 39. What controls the heart rate?
a. neocortex
b. medulla
c. thalamus
d. pituitary
e. cerebellum

____ 40. Which of the following produces hormones that are secreted by the pituitary gland?
a. cerebrum
b. cerebellum
c. thalamus
d. hypothalamus
e. medulla oblongata

____ 41. Which of the following coordinates muscle actions?
a. cerebrum
b. cerebellum
c. thalamus
d. hypothalamus
e. medulla oblongata

____ 42. The motor cortex is part of which part of the nervous system?
a. cerebrum
b. cerebellum
c. spinal cord
d. midbrain
e. medulla

____ 43. Cerebral palsy, which disrupts motor messages from brain to muscle, is usually due to damage of
a. the cerebellum.
b. basal nuclei of gray matter.
c. basal nuclei of white matter.
d. the corpus callosum.
e. the neocortex.

____ 44. If you were writing an essay, which part of the brain would be most active?
a. temporal and frontal lobes
b. parietal lobe
c. Broca's area
d. Wernicke's area
e. occipital lobe

____ 45. Patients with damage to Wernicke's area have difficulty
a. coordinating limb movement.
b. generating speech.
c. recognizing faces.
d. understanding language.
e. experiencing emotion.

____ 46. The cerebral cortex plays a major role in all of the following except
a. short-term memory.
b. long-term memory.
c. circadian rhythm.
d. foot-tapping rhythm.
e. breath holding.

____ 47. For a neuron with an initial membrane potential at -70 mV, an increase in the movement of potassium ions out of that neuron's cytoplasm would result in
a. depolarization of the neuron.
b. hyperpolarization of the neuron.
c. the replacement of potassium ions with sodium ions.
d. the replacement of potassium ions with calcium ions.
e. the neuron switching on its sodium-potassium pump to restore the initial conditions.

____ 48. The operation of the sodium-potassium "pump" moves
a. sodium and potassium ions into the cell.
b. sodium and potassium ions out of the cell.
c. sodium ions into the cell and potassium ions out of the cell.
d. sodium ions out of the cell and potassium ions into the cell.
e. sodium and potassium ions into the mitochondria.

____ 49. The "threshold" potential of a membrane
a. is the point of separation from a living from a dead neuron.
b. is the lowest frequency of action potentials a neuron can produce.
c. is the minimum hyperpolarization needed to prevent the occurrence of action potentials.
d. is the minimum depolarization needed to operate the voltage-gated sodium and potassium channels.
e. is the peak amount of depolarization seen in an action potential.

____ 50. Action potentials move along axons
a. more slowly in axons of large than in small diameter.
b. by the direct action of acetylcholine on the axonal membrane.
c. by activating the sodium-potassium "pump" at each point along the axonal membrane.
d. more rapidly in myelinated than in non-myelinated axons.
e. by reversing the concentration gradients for sodium and potassium ions.

____ 51. Action potentials are normally carried in only one direction: from the axon hillock toward the axon terminals. If you experimentally depolarize the middle of the axon to threshold, using an electronic probe, then
   a. no action potential will be initiated.
   b. an action potential will be initiated and proceed only in the normal direction toward the axon terminal.
   c. an action potential will be initiated and proceed only back toward the axon hillock.
   d. two action potentials will be initiated, one going toward the axon terminal and one going back toward the hillock.
   e. an action potential will be initiated, but it will die out before it reaches the axon terminal.

____ 52. Saltatory conduction is a term applied to conduction of impulses
   a. across electrical synapses.
   b. an action potential that skips the axon hillock in moving from the dendritic region to the axon terminal.
   c. rapid movement of an action potential reverberating back and forth along a neuron.
   d. jumping from one neuron to an adjacent neuron.
   e. jumping from one node of Ranvier to the next in a myelinated neuron.

____ 53. The surface on a neuron that discharges synaptic vesicles is the
   a. dendrite.
   b. axon hillock.
   c. node of Ranvier.
   d. postsynaptic membrane.
   e. presynaptic membrane.

____ 54. Neurotransmitters are released from axon terminals via
   a. osmosis.
   b. active transport.
   c. diffusion.
   d. transcytosis.
   e. exocytosis.

____ 55. An inhibitory postsynaptic potential (IPSP) occurs in a membrane made more permeable to
   a. potassium ions.
   b. sodium ions.
   c. calcium ions.
   d. ATP.
   e. all neurotransmitter molecules.

____ 56. The steps below refer to various stages in transmission at a chemical synapse:
1. Neurotransmitter binds with receptors associated with the postsynaptic membrane.
2. Calcium ions rush into neuron's cytoplasm.
3. An action potential depolarizes the membrane of the axon terminal.
4. The ligand-gated ion channels open.
5. The synaptic vesicles release neurotransmitter into the synaptic cleft.

Which sequence of events is correct?

a. $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5$
b. $2 \rightarrow 3 \rightarrow 5 \rightarrow 4 \rightarrow 1$
c. $3 \rightarrow 2 \rightarrow 5 \rightarrow 1 \rightarrow 4$
d. $4 \rightarrow 3 \rightarrow 1 \rightarrow 2 \rightarrow 5$
e. $5 \rightarrow 1 \rightarrow 2 \rightarrow 4 \rightarrow 3$

____ 57. When several EPSPs arrive at the axon hillock from different dendritic locations, depolarizing the postsynaptic cell to threshold for an action potential, this is an example of
a. temporal summation.
b. spatial summation.
c. tetanus.
d. the refractory state.

____ 58. Neurotransmitters affect postsynaptic cells by
a. initiating signal transduction pathways in the cells.
b. causing molecular changes in the cells.
c. affecting ion-channel proteins.
d. altering the permeability of the cells.
e. Choices A, B, C, and D are all correct.

____ 59. How would your nervous system respond if you encountered a bear on a hiking trail?
a. The sympathetic nervous system would send signals to increase the heart rate, decrease salivation, and increase respiration.
b. The autonomic nervous system would send signals to the somatic nervous system to increase respiration and heart rate.
c. The parasympathetic nervous system would send signals to increase the heart rate, decrease salivation, and increase respiration.
d. The somatic nervous system send signals to the central nervous system to increase heart rate and respiration.

____ 60. How does caffeine affect coffee drinkers?
a. It prevents the reuptake of dopamine receptors which causes prolonged excitation.
b. It causes dopamine to bind to receptors until the caffeine is broken down.
c. It binds adenosine receptors in the brain to cause epinephrine release.
d. It acts on the hypothalamus to increase heart rate and vasoconstriction.

____ 61. Which of the following describes symptoms that would likely accompany a drug-induced increase in dopamine?
a. anxiety, increased heart rate, increased blood pressure
b. pupil constriction, decrease in blood pressure, paranoia
c. anxiety, decreased heart rate, increased saliva flow
d. increased peristalsis, increased saliva production, increased heart rate

Short Answer

For the following questions, refer to the graph of an action potential in Figure 48.1 and use the letters to indicate your answer.

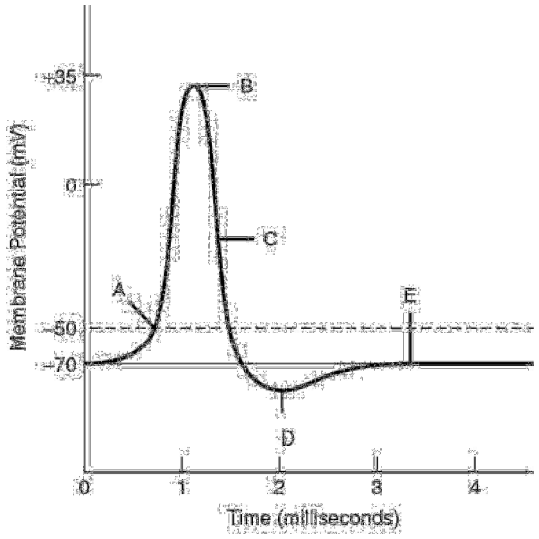


Figure 48.1

62. The membrane potential is closest to the equilibrium potential for potassium at label _____

63. The membrane's permeability to sodium ions is at its maximum at label _____

64. The minimum graded depolarization needed to operate the voltage-gated sodium and potassium channels is indicated by the label _____

65. The cell is not hyperpolarized, but repolarization is in progress, as the sodium channels are closing or closed, and many potassium channels have opened, at label _____

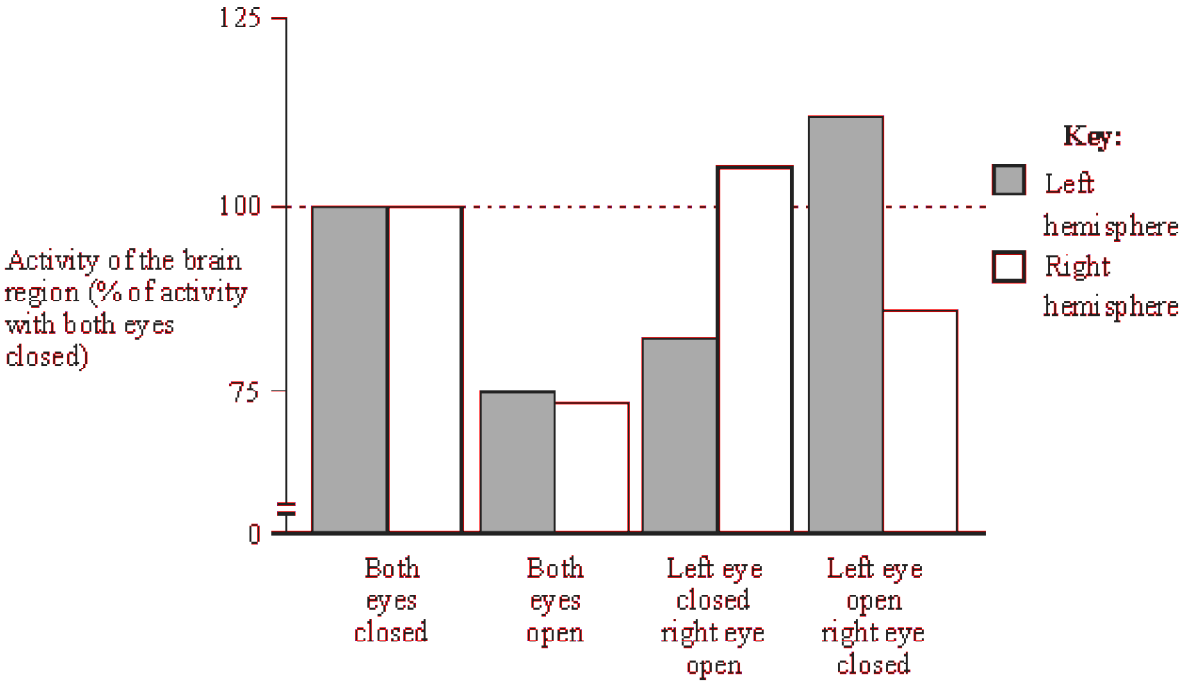
66. The neuronal membrane is at its resting potential at label _____

Essay

67. Outline the behavioral effects of cannabis and alcohol. (4 points)

68. When birds are in danger of attack by predators, they sometimes sleep with one eye open and one eye closed. Neurobiologists investigated this behaviour pattern using mallard ducks (*Anas platyrhynchos*). Video recordings were made of groups of four sleeping birds, arranged in a row. The birds at the ends of the row were more vulnerable to predator attacks and kept one eye open 150% more of the time than the two birds in the centre of the row.

Electroencephalograph (EEG) recordings were made to monitor the brain state of the birds at the ends of the rows. A region of the brain which indicates whether the bird is asleep or awake was monitored in each of the left and right cerebral hemispheres. EEG recordings were made when the birds were sleeping with both eyes closed, when the birds had both eyes open and also when they had one eye open. These results are shown in the bar chart below, as a percentage of the activity of the brain region when the birds were sleeping with both eyes closed.



[Source: Rattenborg, *et al., Nature*, 1999, **397**, pages 397–398]

(a) State the effect of opening both eyes on activity in the region of the brain that was being monitored. **(1 pt)**

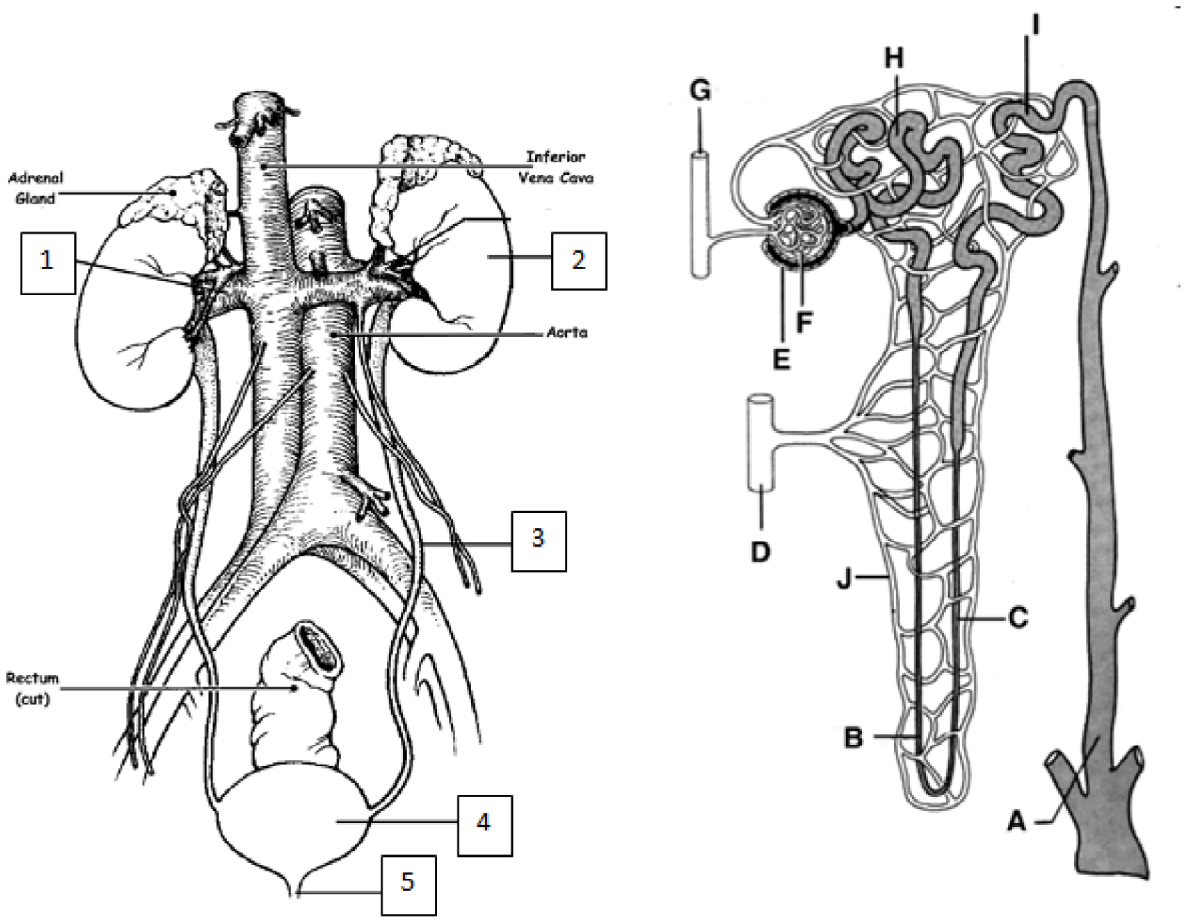
(b) (i) Using the data in the bar chart, deduce the effect on the two cerebral hemispheres of opening only the right eye. **(2 pts)**

(ii) Determine which hemisphere is more awake when the right eye is open. **(1 pt)**

(iii) Using the data in the bar chart, deduce how the left and right eyes and left and right hemispheres are connected. **(1 pt)**

Completion
Complete each statement.

69. Label the parts of the Excretory System AND Nephron pictured below.



70. On your answer sheet, draw the structure of a motor neuron AND label its structures. (5)

TIE BREAKERS:

71. Identify TWO conditions that can be diagnosed though an EEG (or encephalographic wave form)

72. Compare the lining of the esophagus, stomach, small intestine and large intestine.

Anatomy & Physiology Test Eastside Invitational Jan 26, 2013
Answer Section

MATCHING

1. C
2. D
3. K
4. L
5. G
6. H
7. F
8. A

MULTIPLE CHOICE

9. C
10. E
11. B
12. C
13. B
14. A
15. C
16. C
17. B
18. B
19. C
20. D
21. B
22. A
23. D
24. B
25. D
26. A
27. D
28. B
29. D
30. C
31. C
32. D
33. C
34. D
35. E
36. C

37. A
38. C
39. B
40. D
41. B
42. A
43. C
44. A
45. D
46. C
47. B
48. D
49. D
50. D
51. D
52. E
53. E
54. E
55. A
56. C
57. B
58. E
59. A
60. C
61. A

SHORT ANSWER

62. D
63. B
64. A
65. C
66. E

ESSAY

67. *Award **[2 max]** for cannabis.*
affects ability to concentrate;
loss of muscle control;
impairs perception / painkiller / loss of time sense;
memory loss;
relaxed attitude;
increased appetite;
depression;

*Award **[2 max]**for alcohol.*

lowers inhibitions / relaxed attitude / increased aggression;

impairs reaction times;

reduces fine motor control / loss of muscle control;

memory loss;

slurred speech;

balance problems;

depression;
increased appetite;

68. (a) activity reduced / drops from 100% to 75%;

(b) (i) left hemisphere becomes less active than with both eyes closed;

left hemisphere is more active than with both eyes open;

right hemisphere remains more active than with both eyes closed;

right hemisphere becomes more active than the left hemisphere;

(ii) left hemisphere;

(iii) left eye to right hemisphere <u>and</u> right to left;

COMPLETION

69. 1 - Renal Vein
    2 - Kidney
    3 - Ureter
    4 - Bladder
    5 - Urethra

    A - Collecting Duct
    B - Descending Loop of Henle
    C - Ascending Loop of Henle
    D - Renal Vein
    E - Bowman's Capsule
    F - Glomerulus
    G - Renal Artery
    H - Proximal Convoluted Tubule
    I - Distal Convoluted Tubule
    J - Vasa Recta
70. Dendrites
    Cell body
    Nucleus
    Axon
    Myelin Sheath
    Axon terminals
    Schwann Cells

OTHER

71. EEG is used to look at your brain activity. It can help diagnose seizures. It may also be used to diagnose or monitor the following health conditions:

    Abnormal changes in body chemistry that affect the brain
    Brain diseases such as Alzheimer's disease
    Confusion
    Head injuries
    Infections
    Tumors
    EEG is also used to:

    Evaluate problems with sleep (sleep disorders)
    Investigate periods of unconsciousness
    Monitor the brain during brain surgery
    An EEG may be done to show that the brain has no activity, in the case of someone who is in a deep coma. It can be helpful when trying to decide if someone is brain dead.

    EEG cannot be used to measure intelligence.

72. Although the same four tissue coats form all organs of the alimentary tract, their structures vary in different organs. The mucosa of the esophagus is composed of tough, stratified abrasion-resistant epithelium. The mucosa of the remainder of the tract is a delicate layer of simple columnar epithelium designed for absorption. In the stomach region, the mucosa is lined with thousands of microscopic gastric glands that secret gastric juice and hydrochloric acid. When the stomach is empty, its mucous lining lies in folds called rugae. The mucous lining of the small intestine, like that of the stomach, contains thousands of microscopic glands. These are called intestinal glands, and they secrete intestinal digestive juice. The intestinal lining is made up of multiple circular folds called plica. These folds are covered with thousands of tiny "fingers" called villi. Inside each villus lies a rich network of blood capillaries that absorb the products of digestion. No villi are present in the mucosa of the large intestine. As a result, less surface area is available for absorption and the efficiency and speed of movement of substances through the wall of the large intestine is much lower than in the small intestine.