Homeostasis Test A

Knowledge and Understanding (18 marks)   
Answer the following questions on the scantron provided (start at number 83)

**Renal Patient Blood Test Results**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Urea** | **Uric Acid** | **Glucose** | **Amino Acid** | **Proteins** |
| Normal Person | 0.03 | 0.004 | 0.10 | 0.05 | 8.00 |
| Patient I | 0.030 | 0.004 | 0.50 | 0.05 | 8.00 |
| Patient II | 0.030 | 0.005 | 1.70 | 0.05 | 8.00 |
| Patient III | 0.03 | 0.050 | 0.10 | 0.05 | 8.00 |
| Patient IV | 0.03 | 0.004 | 0.10 | 0.06 | 4.00 |

1. From the above table, which patient has probably just eaten some sugar?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Patient I | c. | Patient III |
| b. | Patient II | d. | Patient IV |

1. A bus driving through the desert in Arizona breaks down. After walking three hours in the hot sun, which person(s) described below makes (make) the appropriate choice(s) to restore body fluid volume?

I. reabsorbing more water

II. drinking a quantity of alcoholic beverage

III. excreting more salt to make water more isotonic

IV. reabsorbing more salt so that water follows

|  |  |  |  |
| --- | --- | --- | --- |
| a. | I only | d. | I, II and III only |
| b. | I and IV only | e. | I, II and IV only |
| c. | II and III only |

1. The Ossciles, found in the ear, contain 3 small bones that are responsible for amplifying and transferring sound waves. In what order are these bones found? (outer ear to inner ear)  
   a) Malleus 🡪 Stapes 🡪 Incus d) Incus 🡪 Stapes 🡪 Malleus  
   b) Incus 🡪 Malleus 🡪Stapes e) Malleus 🡪 Incus 🡪 Stapes  
   c) None of the above
2. In an emergency situation,  
   a) digestions of sugars is accelerated  
   b) glycogen is converted into glucose  
   c) glucose is converted into glycogen  
   d) endocrine suppression of glucose metabolism is experience
3. Which part of the neuron receives sensory information?
4. sheath c) axon e) dendrite
5. node of Ranvier d) soma
6. Which of the following statements about hormones is incorrect?  
   a) they are produced by glands such as the thyroid  
   b) they travel to different areas of the body  
   c) the are used to communicate between different individuals  
   d) they are carried by the blood  
   e) none of the above
7. Protein hormones exert their effect by  
   a) interacting with receptors on cell membranes  
   b) a direct effect in the nucleus of a cell  
   c) initiating formation of cyclic GMP  
   d) all of the above
8. Friends of Phineas Gage claimed that he was "no longer Gage," after he lost his incident with the railroad spike. The biggest difference (aside from losing his eye), was a complete change in his emotions. What was this caused by?  
   a) loss of motor control due to damage to his Cerebellum  
   b) a change in personality due to damage to his temporal lobe  
   c) loss of motor control due to damage to his medulla oblongata  
   d) a change in personality due to damage to his frontal lobe
9. When an image is focused in front of the retina, the condition is termed:   
   a) astigmatism c) presbyopia  
   b) myopia d) hyperopia
10. Hearing difficulties are primarily associated with which lobe of the brain?  
    a) frontal c) temporal  
    b) occipital d) parietal
11. Which of the following is not an effector cell?  
    a) muscles c) brain  
    b) organs d) glands
12. The part of the eye that gives each individual a unique eye colour is the same part that controls how much light can enter the eye. What is this area called?  
    a) pupil c) retina  
    b) iris d) rods, cones
13. Respiration is controlled by which of the following?  
    a) pons, hypothalamus c) pons, medullar oblongata  
    b) cerebrum, hypothalamus d) pituitary gland, frontal lobe
14. The sodium potassium pump works to get nerve cells to resting potential (-70mV). How is this achieved?  
    a) by pumping negative sodium ions out of the cell and positive potassium ions in  
    b) by pumping positive sodium ions out of the cell and positive potassium ions in  
    c) by pumping negative potassium ions out of the cell and positive sodium ions in  
    d) by pumping positive potassium ions out of the cell and positive sodium ions in
15. In a hypothetical experiment, human subjects were placed in a room, the temperature of which was higher than body temperature (37 degrees Celsius). At the same time, blood, cooler than 37 degrees Celsius, was infused into the subjects. Choose the correct effect of this experiment on the subjects.  
    a) skin blood vessels dilate  
    b) no effect is noticed by the subjects  
    c) perspiration evaporates from the skin  
    d) subjects begin to shiver and hair elevates  
    e) subjects remove their clothing
16. The term used to describe the ability of a living organism to adjust to a changing environment regulating their internal processes is:  
    a) regulation d) feedback  
    b) inhibition e) homeostasis  
    c) metabolism
17. The main active transport mechanism in the kidney is the:  
    a) sodium pump c) calcium pump  
    b) filtration process d) osmotic pressure
18. The Thyroid and Parathyroid gland are involved in metabolism, but also play a vital role in growth of bones and amount of calcium in the blood. Which hormone is responsible for lowering calcium levels in the blood?  
    a) PTH c) calcitonin  
    b) vitamin D d) thyroxine (t4)

Thinking & Inquiry (15 marks)  
Answer the following questions in full sentences, on lined paper

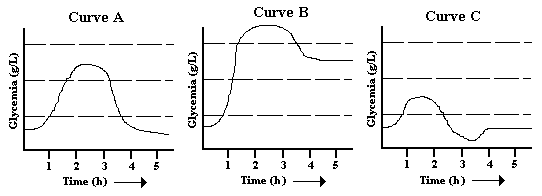
1. Three individuals below were injected with an equal amount of glucose

i. Ms. X is hyperglycemic

ii. Ms. Y is in good health

iii. Ms. Z suffers from hyperactivity of her cancerous pancreas beta cells

Every hour, for a period of 5 hours, a blood sample is taken so the glycemia of each individual in function with time can be analyzed.



Associate each curve to a specific person. Justify your choice. (6 marks)

1. **Composition (g/100 mL)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Component** | **Plasma** | **Filtrate** | **Urine** |
| I | Urea | 0.030 | 0.030 | 2.00 |
| II | Uric acid | 0.004 | 0.004 | 0.05 |
| III | Glucose | 0.100 | 0.100 | 0.00 |
| IV | Amino acids | 0.050 | 0.050 | 0.00 |
| V | Salts | 0.720 | 0.720 | 1.50 |
| VI | Proteins | 8.000 | 0.036 | 0.00 |

a) A patient's test results are shown in the table above. According to the table above, which items are completely reabsorbed into the plasma? According to the above table, which items are excreted? (2 marks)

b) Why do urea and salt levels increase in the urine? (2 marks)

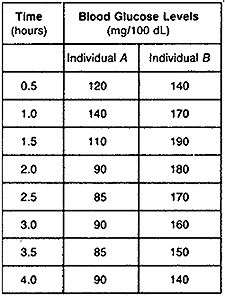
1. If neurons follow the ‘All or nothing law’, how does our nervous system differentiate between a tap on the shoulder and a hard punch? (3 marks)
2. Describe how negative feedback is preferable to positive feedback in most situations. ( 2 marks)

Application (10 marks)  
Answer the following questions in full sentences, on lined paper

1. You are walking within a forest with a group of friends. Suddenly, a bear appears, letting out a roar that makes you think he/she is hungry. Your thought is confirmed as the bear charges towards you and your friends. Outline 3 different things that your Sympathetic nervous system will do to prepare you for your fight (or flight) from the bear. OR 3 different things your Parasympathetic nervous system will do to bring your body back to a homeostatic state, assuming you survive. (3 marks)
2. Two people you know need eye transplants. Both are lucky enough to find donors, however while one transplant goes smoothly, the other has difficulties. You later find out that one friend needed a cornea transplant, while the other needed a sclera transplant.  
   a) Which friend had which transplant? (which transplant is more likely to be successful) (1 mark)   
   b) Why would one be successful while the other isn’t? (1 mark)
3. a) Why do we experience pain? Is it necessary in our lives? Why or why not? (2 mark)  
   b) Give an example (could be one used in class) of how pain could save your life. (1 mark)
4. Alcohol consumption decreases the release of ADH. Predict how this homeostatic change may contribute to a ‘hangover’. (2 marks)

Communication (7 marks)

1. Graph the data provided below on one graph. Be sure to label and title the graph and create a legend. (5 marks)



Based on your graph, which individual is ‘normal’ and which is not? (note: the individuals ate the same meal at time 0) (2 marks)