Multiple choice

|  |  |
| --- | --- |
| Number | letter |
| 1 | A |
| 2 | D |
| 3 | D |
| 4 | B |
| 5 | C |
| 6 | B |
| 7 | D |
| 8 | B |
| 9 | B |
| 10 | D |
| 11 | D |
| 12 | A |
| 13 | B |
| 14 | D |
| 15 | A |
| 16 | D |
| 17 | A |
| 18 | C |
| 19 | B |
| 29 | B |

2012 semester 1. Exam marking key

1. Complete the table below, describing key differences between how the endocrine and nervous system work to maintain homeostasis in the body.

|  |  |  |
| --- | --- | --- |
| Function | Endocrine | Nervous |
| Mode of Transmission | CHEMICAL | ELECTRO-CHEMICAL |
| Speed of reaction time | SLOWER | QUICKER |
| Duration time of changes caused | LONGER | SHORTER |

1 MARK EACH

2. An B(IBIB) blood group man marries an A(IAIO) blood group woman.

What proportion of their probable offspring could donate blood to their father?

Show all working that allowed you to make your prediction.

PARENT GENOTYPE

MALE FEMALE

BB AO

GAMETES

SPERM OVA

B OR B A OR O

1 MARK

|  |  |  |
| --- | --- | --- |
|  | A | O |
| B | AB | BO |
| B | AB | BO |

1 MARK

GENOTYPE

|  |  |
| --- | --- |
|  |  |
| AB | 50% |
| BO | 50% |

1 MARK

PHENOTYPE

|  |  |
| --- | --- |
|  |  |
| AB | 50% |
| B | 50% |

1 MARK

50% CAN DONATE BLOOD TO THE FATHER 1 MARK

(5 marks)

3.

1. Suggest a hypothesis for this experiment.

(1 mark)

The new drug will lower blood pressure.

1. Describe two(2) variables that were controlled in this experiment.

(2 marks)

Dosage. Time measurements taken. All patients had high blood pressure to begin with. Or any other sensible answer. One mark for each.

1. What is the purpose of the placebo?

It allows a comparison to be made.

(1 mark)

Graph the results

Each student starts with all 5 marks then we take one mark off for each of the following:

No heading

Not a line graph.

Axis not drawn with a ruler.

Independent not on the horizontal.

Axis not labelled.

Units of measure not given.

Dots not joined by a ruler.

1. What was the dependent variable in this experiment?

(1 mark)

The drug

1. What was the independent variable in this experiment?

(1 mark)

Blood pressure

1. For those taking the new drug, what might their systolic blood pressure be at 6pm?

(1mark)

1. In your answer for question 3 g, did you use extrapolation or interpolation? Give a reason for your choice of answer.

Interpolation(1 mark)

Answer was found within the range of data on the line of the graph.(1 mark)

1. What is the name of the process that is happening at point number 2 on the line on the line on the graph?

Depolarization

(1 mark)

1. Describe the changes that would be happening at the membrane of the axon during the process occurring at point 4.

Calcium gates close(1 mark)

Potassium ions move to outside of membrane(1 mark)

Membrane starts to repolarize. (1 mark)

(3 marks)

5. There has been much debate about the benefits and potential dangers of Hormone Replacement Therapy. List some of these benefits and potential dangers.

Benefits

Any two. Just two marks available.

Stops hot flushes, restores the vagina’s elasticity and natural lubrication, stops night sweats, eases depression, prevents headaches and migraines, feeling of wellbeing.

Potential dangers.

Any two. Just two marks available.

Increased risk of endometrial ,Slightly increased risk of breast ,

Increased breast density),

Slightly increased risk of ovarian cancer,

Slightly increased risk of blood clots,

Increased risk of gallbladder disease ,

Breast pain (often a temporary problem) ,

Nausea, associated primarily with oral oestrogens,

Bloating and fluid retention.

(4 marks)

6. Into the space below draw a feedback loop to show the body’s response to a sudden **drop** in blood glucose levels.

(6 marks)

1. Candice and Jenny are jogging in the park. Candice has a heart rate of 110(beats/min) and her stroke volume is 90(mL/beat). Jenny has a heart rate of 120(beats/min) and her stroke volume is 75(mL/beat). Who has the greatest cardiac output. Show all the working you used to calculate your answer.

Candice

Cardiac output=pulse rate X stroke volume(1 mark)

110X90 (1 mark)

=9900mL/min (1 mark)

Jenny

120x75 (1 mark)

=9000mL/min (1 mark)

Candice has the greatest cardiac output. (1 mark)

**MAXIMUM OF 5 MARKS**

1. Emphysema is a disorder affecting some people. Describe the possible causes, the effects on body organs and any possible treatment.

(6 marks)

Causes= smoking(1 mark) and air pollution(1 mark)

Effects=the number of alveoli becomes less, but their size becomes bigger(1 mark) so there is less surface area for gas exchange(1 mark).

Treatment= Extra oxygen(1 mark). Bronchiodilation medication(1 mark).

1. Look at the diagram below. It is the Pituitary gland

Use the diagram to answer the questions that follow.

a) Which of the two lobes above is the Posterior lobe of the pituitary, A or B?

(1 mark)

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_A\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

b) Give a reason for you choice in question a).

(1 mark)

**Axons running from the hypothalamus into Lobe A.**

c) What is different about the production of the hormones released from Lobe A compared to those released from Lobe B.

(1 mark)

**Those released from A are made in the hypothalamus.**

**Those released from B are made in the lobe itself.**

1. Complete this table.

(4 marks)

|  |  |  |
| --- | --- | --- |
| Hormone | Target cells/organs | Function/s |
| Adrenocorticotrophic  hormone (ACTH) | **Adrenal cortex** | **Controls the release of cortisol.** |
| Luteinizing hormone  (LH) | **Males=teste**  **Female= ovaries or follicle** | **Males=stimulates the production of testosterone.**  **Female=ovulation** |

f) What is the name of the structure the pituitary is attached to?

(1 mark)

**Hypothalamus Or Neck of hypothalamus Or Infundibulum.**

g) Give an example of a gland that can act as both and exocrine and endocrine gland?

\_\_\_\_\_\_\_\_\_\_\_\_**Pancreas**

(1 mark)

1. Use the diagram below to answer

a) Structures C and D make up most of the membrane. What are they and how do they prevent water moving through the membrane?

(3 marks)

**Phospholipid molecule((1 mark)**

**Phosphate head and lipid tail(1 mark)**

**Lipid tils is hydrophobic repelling water( 1mark**)

b) Structure E is essential for transport of certain materials through the membrane. What is structure E and what is the type of transport it provides called?

**Transport protein( 1 mark)**

**Facilitated transport(1 mark)**

(2 mark)

c) Structure E can sometimes carry out passive transport and sometime it can carry out active transport. How do these two types of transport differ?

(4 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**Passive= no energy used(1 mark)**

**Moves with the concentration gradient(1 mark)**

**Active=Energy is used.(1 mark)**

**Moves against the concentration gradient.(1 mark)**

1. Use the diagram below to answer the questions that follow.

a) Onto this page label the major structures of the neuron above.

(4 marks)

**Dendrite, myelin sheath, schwann cell, node of Ranvier, cell body, axon. One mark each.**

b) What type of neurone is this and give a reason for your answer.

(2 mark)

**Motor(1 Mark). Ends in a muscle fibre/or cell body at one end(1 mark)**

1. The Autonomic nervous system has two main divisions. Question 12 will take a look at these two divisions.

a) Name the two divisions of the autonomic nervous system and state their respective functions into the table below.

(4 marks)

|  |  |
| --- | --- |
| Name of division | Function of division |
| **Parasympathetic**  **(1 mark)** | **Prepares the body for rest and repair.**  **(1 mark)** |
| **Sympathetic**  **(1 mark)** | **Prepares the body for emergency. Or fight or flight.**  **( 1 mark)** |

b) For each division state the effect it has on the body function or body part listed in the table below.

|  |  |  |
| --- | --- | --- |
|  | Name of division | |
| **Sympathetic**  **(1 mark)** | **Parasympathetic**  **(1 mark)** |
| Body part or function |  | |
| Saliva production | **decrease** | **Increase** |
| Iris | **dilate** | **constrict** |
| Heart rate | **increase** | **decrease** |
| Rate and depth of breath | **increase** | **decrease** |
| Rate of peristalsis | **decrease** | **increase** |

**1 mark for each**

1. **Gluconeogenesis** is an important process in the human body. Answer the questions that follow on the process of gluconeogenesis**.**

a) Where does it occur?

(1 mark)

**Liver or liver and muscles**

b) What does it produce?

(1 mark)

**Glucose**

c) Under what conditions does occur?

(2 mark)

**When the supply of carbohydrates(or glycerol) is low(1 mark) due to exercise or fasting(1 mark)**

15. Label the diagram below and use it to complete the table that follows.

**Frontal, parietal, occipital and temporal. One mark for each labelled correctly**.

|  |  |
| --- | --- |
| **Name of Lobe** | **Function** |
| **Frontal** | **Voluntary movement, thought, reasoning, emotions, behaviour, memory, problems solving. Personality.** |
| **Parietal** | **Special awareness, sensation, reading.** |
| **Occipital** | **Vision and colour** |
| **Temporal** | **Hearing, language, memory** |

**One mark for the correct lobe, one mark for every two correct functions given for that lobe up to 2 marks per lobe.**

(8 marks**)**

**End of Section 2**

**Section 3: Extended Answer Questions. 60 Marks**

This section contains three (3) questions. Select and **attempt any two (2) questions** from questions 1, 2 and 3. Write your answers on the lined pages provided. Answers should be written in a blue or black pen.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 1**

(30 marks)

1. Using a simple labelled diagram, with supporting notes, explain how a nerve impulse is transmitted at a synapse.

|  |  |  |
| --- | --- | --- |
| Aspect |  |  |
| Diagram | Is a synapse | 1 |
| Following structures labelled:  Calcium ions  Synaptic end bulb(knob or Plate)  Synaptic cleft.  Vesicles  Neurotransmitters  Receptors on post synaptic membrane(or neurone) | 2  For each 2 parts labelled give one mark. There are no half marks |
| Point form notes | Nerve impulse reaches end of axon | 1 |
| Depolarisation of end bulb | 1 |
| Calcium ions enter through membrane | 1 |
| Synaptic vesicles move to membrane | 1 |
| Exocytosis of neurotransmitters into synaptic cleft | 1 |
| Neurotransmitters diffuse across cleft | 1 |
| Neurotransmitters bind to receptors on membrane of post synaptic neurone(or they can just say next neurone) | 1 |
| Causses depolarisation of membrane in post synaptic membrane | 1 |
| If threshold depolarisation met | 1 |
| Nerve impulse transmitted down next neurone | 1 |
| Total | | 13 |

(13 marks)

b). Acetylcholine remains in the synapse (1 mark). Impulses across the synapse would not stop (1 mark). The nerves would remain constantly transmitting impulses (1 mark). Can cause paralysis and death (1 Mark). Any two points.

c) If acetylcholine is not released so the impulse cannot pass across the synapse (1 mark). So the muscle cannot be stimulated to contract. (1 mark)

d) The amount of dopamine in the synapse remains high (1 mark). Sensation of Euphoria (1 mark). People can become addicted to this (1 mark)

1. marks)

Part e.

Neurones can be classified according to function and morphology. Using 3 simple diagrams show the 3 main types of Neuron classified by **morphology**.

(10 marks)

**The students can only get marks for Morphology.**

Unipolar(1)

One extension leading from the cell body(1)

Suitable diagram, with extension labelled(2 marks)

Bipolar(1)

Has two extensions leading from the cell body(1)

One extension acts as the dendrite and one acts as the axon(1)

Suitable diagram with extensions labelled(2 marks)

Multipolar(1)

Has multiple extensions(dendrites) leading to cell body(1)

Suitable diagram with extensions(dendrites) labelled.(2)

**Maximum of 10 marks**

**Question 2**

|  |  |  |  |
| --- | --- | --- | --- |
| a | I | Allele frequency=how often an allele appears in a particular population | 1 |
| II | Random genetic drift=where chance events alter allele frequency.  Most impact on small populations(or isolated populations) | 1  1 |
| III | Genetic bottle necks=Where a large part of the population is killed off reducing the genetic variation.  Causes=(any of the following) natural disasters, disease, war,famine. | 2  1 |
| IV | Natural selection= alleles(traits) that increase chances of survival(1) live long enough to reproduce and pass these advantageous(or word like that, e.g. favourable) alleles on to their offspring(1). As a result the frequency of the advantageous alleles increases(1). Less favourable alleles reduce in frequency.(1) | 4 |
| b | I | All living things use DNA to store genetic information, this implies shared evolutionary ancestors(1)  Organisms with similar Nitrogen base sequences in their DNA may share a common evolutionary ancestor(1)  The sequence of amino acids in the proteins of an organism is controlled by their DNA(1). So.  Organisms with similar amino acid sequences in their proteins may share a common evolutionary ancestor(1) | 4 |
| II | Fossils(1)  Shows change in organisms over long periods of time(1). Or. Shows a sequence of change from simpler common ancestors in the past to modern organisms. Or something similar.  Homologous structures/comparative anatomy(1)  Organisms with similar anatomical structures may share a common evolutionary ancestor(1) | 4 |
| III | One mark for source.  One mark for description  Things like embryology. | 2 |
| c |  | Note depending on the text used the wording will be different so be flexible with how the terms used.  Observations. Also some references will state heritability of characteristics as one of the observations. Pay this the mark.  Variation(1) all members of a population vary(1) in structure and function(1)  Rate of reproduction(or fertility)(1). Is greater than the rate that resources needed for survival increase(1)  Natural (natures)balance(1). The population numbers remain relatively stable(1)  Interpretations  Struggle for survival(existence)(1). Organisms must compete for finite resources(1)  Survival of the fittest.(1) Individuals with characteristics that help them survive will live to pass these characteristics onto their offspring.(1)  Maximum 10 marks. | 10 |

**Question 3a**

|  |  |
| --- | --- |
| Stage | mark |
| Speciation | 1 |
| **variation** | 1 |
| There is variety in the genetic make up(alleles) of members of a populations | 1 |
| **Isolation** | 1 |
| The population is split in two | 1 |
| The two separated populations can no longer interbreed to exchange genetic information. | 1 |
| There is a barrier to gene flow. | 1 |
| Isolation can be physical(1). Here things like mountains or oceans separate the two groups.(2) | 2 |
| If they state and explain ethno/cultural/religious isolation, pay this also | 2 |
| **Selection** | 1 |
| As the two groups are exposed to different environmental conditions, different alleles(characteristics/traits) are selected for. | 1 |
| The allele frequencies of the two groups change and sub-species develop. | 1 |
| **speciation** | 1 |
| The two groups become genetically so different they can no longer interbreed to produce fertile(viable) offspring | 1 |

**Maximum 10 marks**

b. Give one mark overall if correct step names given(stimuli etc.).(1)

|  |  |  |
| --- | --- | --- |
|  | **Stimuli**  Drop in core temperature | **Receptors**  Core temperature receptors in hypothalamus(1), gut(1), spinal cord(1) |
|  |  |  |
| **Feedback**  Core temperature increases(1) |  | **Modulator**  Hypothalamus(1) |
|  |  |  |
|  |  | **Effectors**  Blood vessels leading to skin.(1 mark)  muscles(1) |
| **Response.**  Physiological: Constriction of blood vessels leading to skin(1).  Shivering.(1)  Increase in metabolic rate(1)  Behavioural. Any sensible statement( e.g. put on coat)(1) |  |  |

Maximum 10 marks

If the student explains how the increase in metabolic rate is brought about also pay one mark.

c. Sickle cell anaemia is a disorder where in conditions of low oxygen the red blood cells collapse forming sickle shaped structures.(1). This reduces a person’s ability to carry oxygen around the body(1).

It is inherited as a recessive allele.

A person who is homozygous dominant for the normal allele(SS) does not suffer from sickle cell anaemia.(1)

A person who is homozygous recessive(ss) for the defective allele will suffer sickle cell anaemia in low oxygen concentrations(1) and this can reduce their chances of survival(1) and therefor the chances of passing this defective allele onto further generations(1).

A person who is heterozygous for the recessive allele(Ss) will only suffer sickle cell anaemia under conditions of VERY low oxygen(1). So there chances of survival are not as low as person who is homozygous for the defective allele(1).

Being heterozygous for the sickle cell anaemia allele is thought to make people more resistant to the disease Malaria(1).

So being heterozygous for the sickle cell anaemia allele will give a survival advantage in areas where malaria is a common disease(endemic)(1)

As a result of the advantage places such as West Africa, where malaria is endemic, have a higher allele frequency for the sickle cell anaemia allele(1).

**Maximum of 10 marks**

**End of questions.**