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| C:\Users\s.kanakis\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\ACC Logo_L_rgb_lrg.jpg | **Aranmore Catholic College**  **Semester 1 Examination, 2012**  **Question/Answer Booklet** |

Please place your student identification label in this box

HUMAN BIOLOGICAL SCIENCE

**Stage 3A/3B**

Student Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student’s Teacher \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#### Time allowed for this paper

Reading time before commencing work: ten minutes

Working time for paper: three hours

**Materials required/recommended for this paper**

To be provided by the supervisor

This Question/Answer Booklet

Multiple-choice Answer Sheet

***To be provided by the candidate***

Standard items: pens, pencils, eraser, correction fluid, ruler, highlighters.

Special items: non-programmable calculators satisfying the conditions set by the Curriculum Council for this course.

**Important note to candidates**

No other items may be taken into the examination room. It is your responsibility to ensure that you do not have any unauthorised notes or other items of a non‑personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor before reading any further.

**Structure of this paper**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Section | Number of questions available | Number of questions to be answered | Suggested working time  (minutes) | Marks available | Percentage of exam |
| Section One:  [Multiple-choice] | 20 | 20 | 20 | 20 | 20 |
| Section Two:  [Short answer] | 13 | 13 | 100 | 100 | 50 |
| Section Three:  [Extended answer] | 3 | **2** | 60 | 60 | 30 |
|  | | | | | 100 |

**Instructions to candidates**

1. The rules for the conduct of examinations at Aranmore are detailed in the *Examination Information Handbook 2012.* Sitting this examination implies that you agree to abide by these rules.

2. Answer the questions according to the following instructions.

Section One: Answer all questions on the separate Multiple-choice Answer Sheet provided. For each question shade the letter to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Sections Two and Three: Write your answers in this Question/Answer Booklet.

3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.

4. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

* + Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
  + Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

MULTIPLE CHOICE QUESTIONS

1. When the membrane of a neurone’s axon is not transmitting an impulse it is said to be:
2. depolarised.
3. bipolarised.
4. polarised.
5. omnipolar.

2. The adrenal cortex secretes both:

a) adrenocorticotrophic hormone and cortisol.

b) adrenaline and luteinizing hormone.

c) noradrenaline and oestrogen.

d) aldosterone and cortisol.

3. Which ONE of the following would be brought about

by the sympathetic nervous system?

a) Decreased heart rate.

b) Decreased sweat secretion.

c) Increased movement of stomach and intestines.

d) Increased release of glucose from the liver.

4. Fred suffers from diabetes mellitus (sugar diabetes). Three times each day, he

must inject insulin into his body to ensure that the concentration of glucose in

his blood stays at a relatively constant level. Sometimes Fred’s blood glucose

levels fall, causing him to feel weak and dizzy.

Which of the following could cause a drop in blood glucose level?

1. Injection of too much insulin.

2. Injection of too little insulin.

3. Too much exercise.

4. Too little exercise.

5. Eating too much carbohydrate.

6. Eating too little carbohydrate.

a) 1, 3 and 5.

b) 1, 3 and 6.

c) 2, 4 and 5.

d) 2, 4 and 6.

5. The Dunkers are a small religious group that moved from Germany to Pennsylvania, in the United States of America, in the 1700s. They mostly choose to marry only the members of their own community. Today, the Dunkers are genetically different from other populations, including those in Germany.

Which of the following are the most likely explanations for the genetic uniqueness of the current Dunker population?

a) natural selection and mutation

b) natural selection and genetic drift

c) barriers to gene flow and genetic drift

d) barriers to gene flow and speciation

6. Scientists link mutations to the process of natural selection very closely.

Mutations:

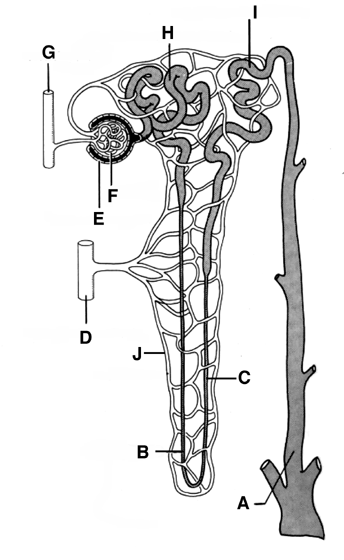
a) are usually related to the environment in which they appear.

b) are of importance to natural selection only if they can pass from one

generation to the next.

c) usually cause species to become extinct.

d) are usually beneficial to the organism in which they appear

Use the diagram below to answer question 7

.

7. In the diagram to the left which structure does the active reabsorption of amino acids occur in?

1. E
2. I
3. C
4. H

8. Here are a number of possible genotypes for skin colour.

I. AaBBCC

II. AaBbCc

III. AABBCC

IV. AABbCC

Which genotypes will give the same phenotype?

a) I and II.

b) I and IV.

c) II and III.

d) III and IV.

9. Mandy is blood type A(IAIA). This means that she can accept blood donated by

people who are blood type:

a) AB and O.

b) O and A type.

c) A type or B type.

d) Any blood type.

10. Which of the following is a series of events that leads to the formation of two separate species?

a) Variation, natural selection, isolation, speciation

b) Natural selection, isolation, speciation, variation

c) Isolation, variation, speciation, natural selection

d) Variation, isolation, natural selection, speciation

.

11. The autonomic nervous system:

a) Regulates the activities of skeletal muscles and glands.

b) Is consciously controlled by the cerebral cortex.

c) Is primarily an afferent system.

d) Is made up of two neurone pathways.

12. Rejection of blood form a donor to a recipient can be due to:

a) the recipient’s immune system recognising the antigens on the surface of the donor blood cells as foreign.

b) The donor’s immune system recognising antigens on the surface of the recipient’s blood cells as foreign

c) The donor’s white blood cells attacking the recipient’s white blood cells.

d) both answers a) and b).

13. Solutions having a lower concentration of solutes than the surrounding

environment are \_\_\_ to the environment.

1. isotonic
2. hypotonic
3. hypertonic
4. polar

14. Which of the following point mutations will cause the LEAST genetic alteration?

a) Deletion.

b) Insertion.

c) Duplication.

d) Substitution.

15. Which of the following hormones are used in Hormone Replacement

Therapy medications used with post menopausal women?

a) Oestrogen and progesterone.

b) Oestrogen and Follicle stimulation hormone.

c) Follicle stimulating hormone and luteinising hormone.

d) Progesterone and follicle stimulating hormone.

16. The study of homologous structures in mature organisms provides evidence for

the evolutionary relationships among certain groups of organisms. Which field

of study includes this evidence of evolution?

a) Comparative cytology.

b) Biochemistry.

c) Geology.

d) Comparative anatomy.

17. Though it does not explain the mechanism of evolution, the study of

embryos and their development reveal that, at the embryonic stages, there

are features that are absent in the adult form. These features are common to a

group of organisms. For example, at a particular stage, all the vertebrate embryos possess a single circulation with a two-chambered heart showing no separation into right and left halves. This allows us to see:

a) that some organism may share a common evolutionary ancestor .

b) that all organisms have the same type of embryo.

c) that an embryo has the ability to develop into a number of different

vertebrates.

d) that all vertebrates have simple hearts.

18. Experiments were carried out on three groups of laboratory animals to determine the changes in blood calcium levels over a 24 hour period after the administration of hormones. At the beginning of the experiment, Group A was given calcitonin and Group B was given an equivalent amount of parathyroid hormone. Group C was the control group. Blood samples were taken over the next 24 hours and the blood calcium levels were determined.

The table below shows the average blood calcium levels for the three groups.

|  |  |  |  |
| --- | --- | --- | --- |
| **Time**  **(hours)** | **Blood Calcium Level**  **(mg/100mL of blood)** | | |
|  | *Group A (calcitonin)* | *Group B (parathyroid hormone)* | *Group C (control)* |
| *0* | 12 | 12 | 12 |
| *2* | 8 | 17 | 12 |
| *4* | 7 | 14 | 12 |
| *8* | 4 | 12 | 12 |
| *12* | 3 | 12 | 12 |
| *24* | 1 | 12 | 12 |

A logical interpretation of this data would be:

a) parathyroid hormone decreases blood calcium levels.

b) calcitonin has no effect on blood calcium levels.

c) calcitonin has a longer-lasting effect than parathyroid hormone.

d) parathyroid hormone cause the same change.

19. Emphysema has the following effects:

a) a decrease in the number and size of alveoli, which decreases the

area available for gas exchange.

b) a decrease in the number of alveoli, but an increase in the size of the alveoli, which leads to a decrease in the area available for gas exchange.

c) an increase in the number of alveoli, but a decrease in the size of the alveoli, which increases the area available for gas exchange.

d) the alveoli remain unchanged, but their walls become thicker and less able to exchange gasses.

20. An example of a hormonal disruption to homeostasis is:

a) emphysema.

b) diabetes.

c) fever.

d) eating habits such as bulimia.

**Section Two: Short Answer**

1. **Marks**
2. 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 |  |  |
| Speed of reaction time |  |  |
| Duration time of changes caused |  |  |

* + 1. marks)

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.

(5 marks)

3.

One of the major risk factors in cardiovascular disease is hypertension (high blood pressure). It has been controlled by the use of various drugs and by the maintenance of a healthy lifestyle. A method of prevention has now been trialled using a new drug called CYT006-AngQb. A clinical trial was carried out with 72 patients suffering from hypertension. Half of the patients were injected with 300μg of the new drug and half were injected with 300μg of a placebo. Three months after the injection, the blood pressure of the patients was taken over a 24-hour period, from 8am one day to 8am the next day.

Below is a table comparing the average systolic blood pressure for both groups of patients over the 24-hour period.

|  |  |  |
| --- | --- | --- |
|  | Systolic Blood Pressure (mmHg) | |
| Time (24 hours) | Patients treated with the new drug | Patients treated with the placebo |
| 8 am | 145 | 160 |
| 12pm (midday) | 138 | 150 |
| 4pm | 142 | 150 |
| 8pm | 140 | 150 |
| 12 am (midnight) | 125 | 130 |
| 4am | 132 | 135 |
| 8am | 140 | 160 |

1. Suggest a hypothesis for this experiment.

(1 mark)

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

(2 marks)

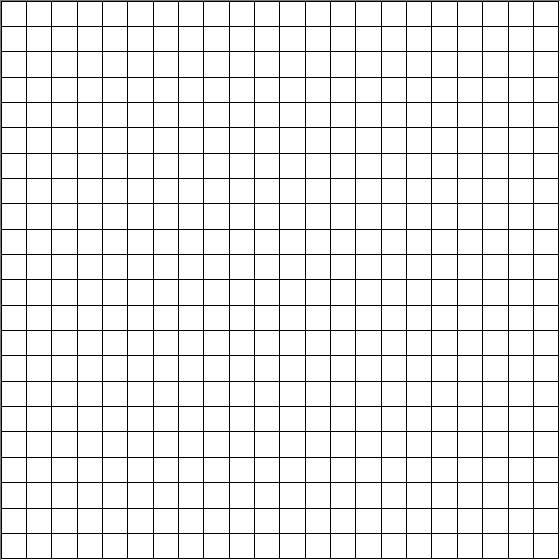
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1. What is the purpose of the placebo?

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

(1 mark)

1. Graph the results in the table onto the graph provide below. If you need to redraw your graph, there is a spare graph grid at the end of the exam.
   * 1. marks)



1. What was the dependent variable in this experiment?

(1 mark)

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

1. What was the independent variable in this experiment?

(1 mark)

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

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

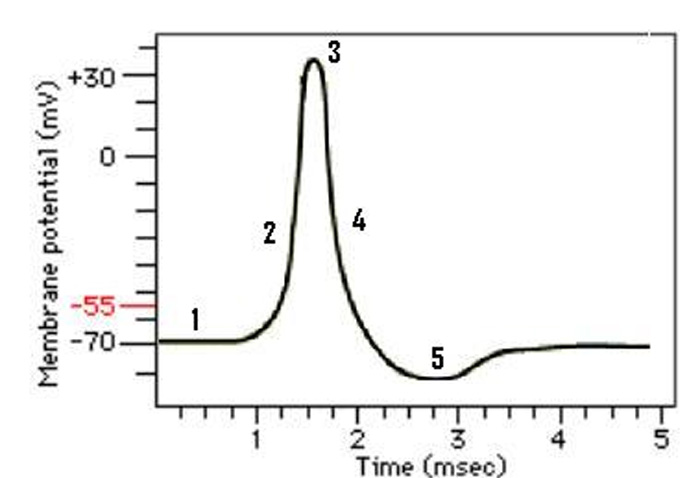
(1mark) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

(2 marks)

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

4. The graph below refers to change in charge at the membrane of a neurone axon during transmission of a nerve impulse. Use it to answer the questions that follow.



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

(1 mark)

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

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

(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.

(4 marks)

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

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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.

(5 marks)

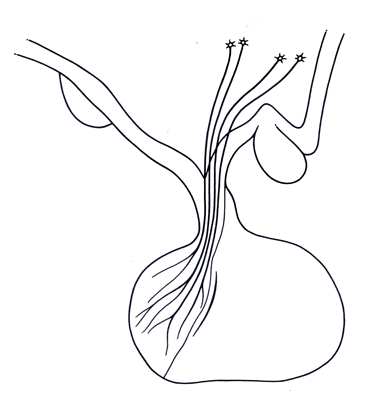
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1. Emphysema is a disorder affecting some people. Describe the possible causes, the effects on body organs and any possible treatment.

(6 marks)

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

Lobe A

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)

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

(1 mark)

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

(1 mark)

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1. Complete this table.

(4 marks)

|  |  |  |
| --- | --- | --- |
| Hormone | Target cells/organs | Function/s |
| Adrenocorticotrophic  hormone (ACTH) |  |  |
| Luteinizing hormone  (LH) |  |  |

1. What is the name of the structure the pituitary is attached to?

(1 mark)

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

1. Give an example of a gland that can act as both and exocrine and endocrine gland?

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

(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 memebrane?

(3 marks)

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

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?

(2 mark)

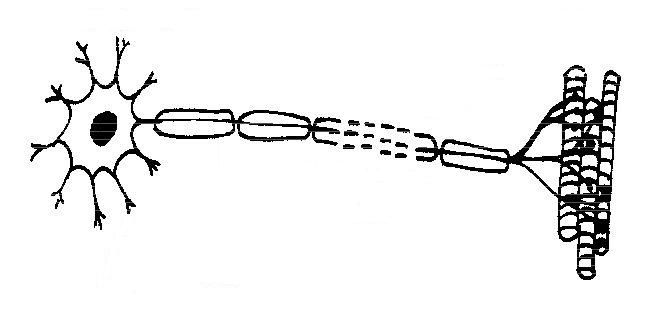
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c) Structure E can sometimes carry out passive transport and sometime it can carry out active transport. How do these two types of transport differ?

(4 marks)

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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)

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

(2 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 |
|  |  |
|  |  |

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

|  |  |  |
| --- | --- | --- |
|  | Name of divison | |
| \_\_\_\_\_\_\_\_\_\_\_\_ system | \_\_\_\_\_\_\_\_\_\_\_\_ system |
| Body part or function |  | |
| Salivar production |  |  |
| Iris |  |  |
| Heart rate |  |  |
| Rate and depth of breath |  |  |
| Rate of peristalsis |  |  |

(12 marks)

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)

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

b) What does it produce?

(1 mark)

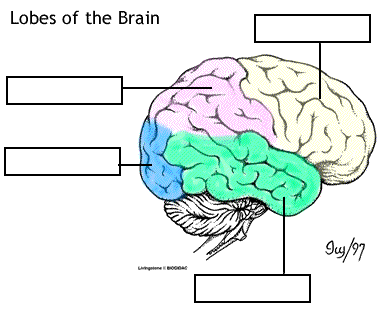
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c) Under what conditions does occur?

(2 mark)

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

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



|  |  |
| --- | --- |
| Name of Lobe | Function |
|  |  |
|  |  |
|  |  |
|  |  |

(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.

Responses could, if appropriate, include clearly labelled diagrams with explanatory notes; lists of points with linking sentences; clearly labelled tables and graphs; and annotated flow diagrams with introductory notes.

Suggested working time for this section is 60 minutes.

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

**Question 1**

(30 marks)

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

(13 marks)

b) Fly sprays sometimes contain chemicals, that stop the enzyme cholinesterase functioning. In the body of a fly, the enzyme Cholinesterase breaks down acetylcholine after a nerve impulse has been sent. When a pesticide is introduced at a lethal dosage for a fly, the cholinesterase is affected, keeping it from binding with the acetylcholine. Why would this kill the fly?

(2 marks)

c) Botox is used by some people to make themselves look younger. When Botox is injected into the muscles of the forehead it weakens the muscles that cause frowning. Botox contains the toxin Botulinum. Botulinum toxin works to block the release of acetylcholine at the neuromuscular junction. So why are these muscles weakened?

(2 marks)

d) The neurotransmitter dopamine is part of the brain's system of motivation. Some drugs stimulate the production of dopamine, leading to increased dopamine levels and a corresponding euphoric feelings or “high”. Cocaine stops the re-uptake of dopamine after its release. What would happen as a result?

1. marks)
2. 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)

**Question 2**

1. Allele frequency can be changed by random genetic drift and genetic

bottle necks.

1. What is meant by allele frequency?

(1 marks)

1. Give a brief description of random genetic drift and state what type of populations it can have the greatest impact on?

(2 marks)

1. Give a brief description of genetic bottle necks and give one possible cause.

(3 marks)

1. Natural selection can also alter allele frequency. Briefly describe natural selection.

(4 marks)

b) In recent years protein analysis and DNA analysis have been used

to investigate evolution.

I. Explain how both of these methods can be used.

1. marks)

II. Darwin did not have these two methods of analysis available to him. State and briefly explain the two sources of evidence that were available to him.

1. marks)
2. State one more source of evidence for evolution and describe it.
3. marks)

c) Darwin’s theory of evolution was based on three observations

from which he made two interpretations. List and explain these observations and interpretations.

(10 marks)

**Question 3**

1. The three-spined stickleback is a fish that was originally a salt water fish living in oceans and estuaries. After the last ice age, different groups of stickleback were physically separated into isolated lakes and streams. After an estimated 10,000 generations, the different populations of sticklebacks show structural differences. Also when sticklebacks from some of these lakes and ponds are brought together with the original saltwater sticklebacks they were found not to be able to reproduce successfully with the original group.

Name and explain the process that has occurred here.

(10 marks)

1. If a person’s core body temperature increases slightly due to an increase in air temperature, a number of changes will occur to bring the core temperature back within acceptable limits. Describe these changes.

(10 marks)

1. Sickle Cell Anaemia is a blood disorder. Briefly describe this disorder, its means of inheritance and possible reasons for its prevalence in areas such as West Africa.

(10 marks)

**End of questions.**

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Spare graph grid.

