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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, 2011**  **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] | 40 | 40 | 40 | 40 | 20 |
| Section Two:  [Short answer] | 17 | 17 | 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 2011.* 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 box 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. The receptors for the detecting the water level of the plasma are:

a) osmoreceptors in the posterior pituitary gland.

b) plasmoreceptors in the kidney.

c) plasmoreceptors in the posterior pituitary gland.

d) osmoreceptors in the hypothalamus.

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 a “fight or flight response” brought about

by the sympathetic division of the autonomic 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. Carotid and aortic bodies are important in regulating breathing rate as they:

a) act as the control centre, stimulating the breathing muscles to contract.

b) contain receptors that detect changes in levels of respiratory gases.

c) co-ordinate the increase of breathing with an increase in heart rate.

d) dilate the bronchial tubes, allowing for an increased breathing rate.

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.

7. Homeostasis:

a) maintains conditions at one set point.

b) maintains conditions within a narrow range of acceptable conditions.

c) maintains a static and non-fluctuating equilibrium.

d) is only seen in warm blooded animals.

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 O. This means that she can accept blood donated by

people who are blood type:

a) AB only.

b) O type only.

c) A type or B type.

d) Any blood type.

10. Water molecules cross a membrane by:

1. simple diffusion requiring a source of ATP.

b) simple diffusion against a concentration gradient via channel proteins.

c) active diffusion via carrier proteins.

d) simple diffusion via channel proteins.

11. Effector organs of the autonomic nervous system include all of the following EXCEPT:

a) medulla oblongata.

b) heart.

c) smooth muscles.

d) gland.

12. Sympathetic stimulation of the iris causes:

a) astigmatism.

b) pupil constriction.

c) pupil dilation.

d) glaucoma.

13. The percentage of adipose tissue in an adult’s body mass can be affected by:

a) genotype and childhood environmental conditions.

b) genotype and exposure to Ultra Violet radiation A in childhood.

c) genotype and exposure to Ultra Violet B radiation in childhood.

d) genotype and exposure to Ultra Violet B radiation in adulthood.

14. During the transcription of a certain protein, an extra cytosine was placed into a

gene region, throwing off the correct amino acid sequence. What type of

mutation occurred?

a) Transposon.

b) Insertion.

c) Base-pair substitution.

d) Deletion.

15. During protein synthesis, which type of molecule attaches particular amino acid

molecules and positions them in specific positions on the polypeptide chain?

a) Messenger RNA

b) Transport RNA

c) RNA transcriptase

d) RNA polymerase

16. Some events that take place during the synthesis of a specific protein are listed

below.

(A) Messenger RNA attaches to a ribosome.

(B) DNA serves as a template for RNA production.

(C) Transfer RNA bonds to a specific codon.

(D) Amino acids are bonded together.

(E) RNA moves from the nucleus to the cytoplasm.

The correct order of these events is \_\_\_\_\_\_\_\_\_?

a) A - B – C – D- E

b) B – A – E – C – D

c) B – C – D – E – A

d) C – D – A – E – B

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

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

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

18. Tay-Sachs disease is seen at high frequency in Jewish people from areas of

Eastern Europe. One reason for this is that it may give a resistance to:

1. tuberculosis.
2. sickle cell anaemia.
3. malaria.
4. small pox.

19. When Charles Darwin published his paper on the Origin of Species, the findings

of another scientist were published with Darwin’s work. This scientist was:

a) Wallace.

b) Linnaeus.

c) Huxley.

d) Lamarck.

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

a) Deletion.

b) Insertion.

c) Duplication.

d) Substitution.

21. 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.

22. Which of the following is NOT a symptom of hypothyroidism?

a) Fatigue.

b) Weakness.

c) Muscle aches.

d) Euphoria.

23. 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.

24. 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 an 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.

1. that all vertebrates have simple hearts.

25. The correct equation for an individual’s final appearance and body

function is:

a) Genotype + Natural selection = Phenotype.

b) Phenotype + Environment = Natural selection.

c) Genotype + Environment = Phenotype.

d) Genotype + Morphology = Phenotype.

26. Which of the following will NOT result in a person failing to reach their

genetic potential for intelligence?

a) Poor diet in childhood.

b) Lack of intellectual stimulation in early childhood.

c) Lack of primary education.

d) Lack of UV light exposure.

27. Which of the following is produced in the adrenal medulla?

a) Male sex hormones.

b) Aldosterone.

c) Cortisol.

d) Adrenalin.

28. Calcium/Phosphate levels in the blood are regulated by:

1. aldosterone.
2. Cortisol.
3. ACTH.
4. PTH & calcitonin.

29. Which of the following shows the correct order for the stimulation of the heart in response to exercise?

a) Sympathetic nerves, sino atrial node, cardiac muscle, atrio ventricular node.

b) Parasympathetic nerves, sino atrial node, atrio ventricular node,

cardiac muscle.

c) Sympathetic nerves, sino atrial node, atrio ventriclular node, cardiac muscle.

d) Parasympathetic nerves, atrio ventricular node, sino atrial node, cardiac muscle.

30. Hyperventilation can be dangerous because:

1. it increases Carbon Dioxide concentration in the blood.
2. it decreases Carbon Dioxide concentration in the blood.
3. it increases Oxygen concentration in the blood.
4. it decreases Oxygen concentration in the blood.

31. Low core body temperature receptors are located in:

1. abdomen and hypothalamus.
2. carotid artery and hypothalamus.
3. carotid artery and abdomen.
4. thermo receptors of the skin.

32. 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.

33. A red forget-me-not flower is crossed with a white forget-me-not flower. All of the offspring are pink. This shows an example of:

1. co-dominance.
2. polygenic inheritance.
3. dominant and recessive alleles.
4. no definite interpretation can be made.

34. An example of a behavioural disruption to homeostasis is:

a) emphysema.

b) diabetes.

c) fever.

d) eating habits such as bulimia.

35. Two stands of material were removed from a cell. The first strand was described as a long polymer with a deoxyribose and phosphate backbone

and four different bases: adenine, guanine, cytosine and thymine.

Another strand was found and described as a polymer with a ribose and

phosphate backbone and four different bases: adenine, guanine, cytosine,

and uracil. Which of the following statements about the two strands would

be true?

1. The first strand could be found at the ribosome only.
2. The second strand could be found at the ribosome only.
3. The first strand could be found at the nucleus only.
4. Both strands could be found at the ribosome.

36. Over the past 50,000 years the human population has suffered a number of catastrophes, where the majority of the population were killed. This causes which of the following?

1. Genetic drift.
2. Founder effect.
3. Genetic bottle necks.
4. Natural selection.

37. Which of the following occurs in the distil convoluted tubule of the kidney

nephron?

1. Active secretion of creatinine and facultative reabsorbtion of amino

acids.

1. Active reabsorbtion of creatinine and facultative reabsorbtion of water.
2. Active secretion of amino acids and obligatory reabsotbtion of water.
3. Active secretion of creatinine and facultative reabsorbtion of water.

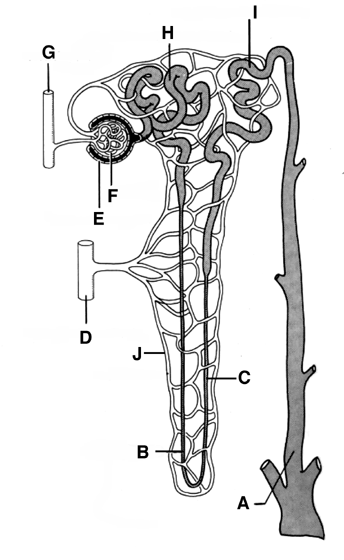
38. In the kidney the correct sequence of formation of urine involves the following processes.

1. Glomerular filtration, reabsorption, tubular secretion.
2. Reabsorption, filtration, secretion.
3. Filtration, secretion, reabsorption.
4. Reabsorption, secretion, filtration.

39. The plasma is similar in its composition with the filtrate produced in glomerulus except for the presence of:

1. amino acids.
2. glucose.
3. proteins.
4. urea.

Use the diagram below to answer question 40.



40. In the diagram above which structure brings about active reabsorbtion of amino acids occur?

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

**Section Two: Short Answer**

1. **Marks**
2. For the hormones listed in the table below, state where they are produced,

their target organs/cells/tissues and their effect.

|  |  |  |  |
| --- | --- | --- | --- |
| Hormone | Place of production | Target organs/cells/tissues | Effect |
| Follicle stimulating hormone |  |  |  |
| Oxytocin |  |  |  |
| Glucagon |  |  |  |
| Oestrogen |  |  |  |
| Adrenalin |  |  |  |

1. marks)

2. An A blood group man(homozygous) marries an AB 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)

1. Germ line mutations are mutations that can be passed on to \_\_\_\_\_\_\_\_\_\_. When such a mutation is passed on, it is seen in \_\_\_\_\_\_ cells of the offspring. Though if you examined the parent’s DNA the mutation would be \_\_\_\_\_\_\_\_\_.

Somatic mutations are seen in cells other than \_\_\_\_\_\_\_\_ cells. They are thought to be the cause of some \_\_\_\_\_\_\_\_\_\_. If you sequenced the DNA all the cells of a tissue produced as a result of somatic mutation, you would see a \_\_\_\_\_\_\_\_\_ but if you sequenced other tissues from the same person it would appear \_\_\_\_\_\_\_\_\_\_\_\_.

1. marks)

4. a) Into the space below draw a labelled diagram of a cell membrane.

(4 marks)

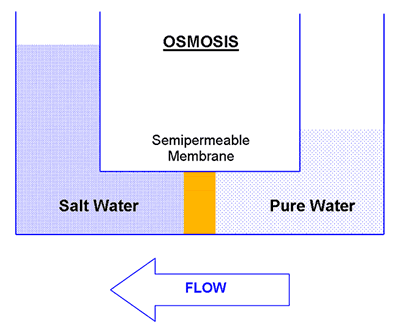
b) Using a simple diagram and written explanation describe **facilitated**

transport through the cell membrane and list situation where this form of

transport would occur.

1. marks)

5. Using the correct terms, explain what is happening in the following diagram.



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

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1. marks)

6. 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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1. Into the space below draw a feedback loop to show the body’s response to a sudden **rise** 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. List two sources of caffeine and its effect on three body organs.

(5 marks)

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1. Protein synthesis involves two main stages, transcription and translation. In the table below outline the key points associated with each stage.

(6 marks)

|  |  |  |  |
| --- | --- | --- | --- |
| Description | | | Marks |
|  | Transcription | Translation |  |
| Where it occurs in the cell |  |  |
| Main event that occurs during the stage |  |  |
| Type/s of RNA involved in the stage |  |  |
|  |  |  | Total 6 |

1. Compare and contrast the nervous and endocrine systems.

(8 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. In 2007, during an investigation into the killing of cats in the City of Perth, it was found that someone had been killing cats by injecting them with large doses of insulin. Why might this kill the cats?

(3 marks)

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1. Kevin Smith tried to hold his breath for as long as possible. After two minutes he could hold his breath no longer and started to take very deep breaths. His deep breathing did not stop for 2 minutes. Explain the events that happened in Kevin’s body during this time.

(7 marks)

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1. The menstrual cycle prepares the body of a woman for possible pregnancy. It also helps to bring about female Secondary Sex Characteristics. What are these characteristics and which hormones are involved?

(4 marks)

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1. What is fever, why does it occur and what can be done to treat it?

(5 marks)

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1. What is meant by the term epigenetic change?

(2 marks)

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**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.

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**Question 1**

1. Multiple drug resistant bacteria are becoming a problem in treating some bacterial infections. Bacteria that have evolved resistance to antibiotics cannot be controlled or treated.

Researchers have suggested that the overuse of antibiotics in the community has caused the evolution of generations of multiple drug resistant bacteria. Explain this process using as examples antibiotics A, B and C.

(10 marks)

1. Skin colour can be altered by both genetic and environmental factors. Using the correct terms explain how skin colour is altered by genotype and environment.

(10 marks)

1. Eastern Pennsylvania is home to beautiful farmlands and countryside, but it's also a gold mine of information for geneticists, who have studied the region's Amish culture for decades. Because of their closed population stemming from a small number of German immigrants -- about 200 individuals -- the Amish carry unusual concentrations of gene mutations that cause a number of otherwise rare inherited disorders, including forms of dwarfism.
2. Explain what is causing the increased allele frequency of unusual gene mutations.
3. Explain what is causing an increase in recessive allele expression in this population.
4. What type of genetic isolation is occurring in this population?

(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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