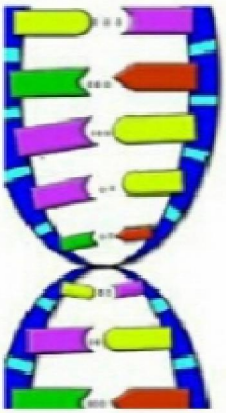
LIFE SCIENCES

ESSAYS

GRADE 10-12



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This document has been created from data available from the internet and DBE previous question papers

THIS DOCUMENT IS FOR FREE SUPPLY AS IT IS NOT MEANT FOR ANY BUSINESS PURPOSES BUT IT IS MEANT TO HELP ALL THE SOUTH AFRICAN LIFE SCIENCE LEARNERS AND TEACHERS.WE HAVE COMPILED THIS DOCUMENT WITH ALMOST ALL THE LIFE SCIENCES ESSAY FROM SOURCES AVAILABLE FROM THE INTERNET.

ACKNOWLEDGEMENT OF SOURCES

1) SOUTH AFRICAN DEPARTMENT OF BASIC EDUCATION

2) LIFE SCIENCE ACADEMICS

3) http://www,.testtakingtipa.com/study/

GOOD LUCK TO YOU AS YOU ARE PREPARING YOURSELF FOR THE EXAMS WE WISH YOU ALL THE BEST AND I HOPE THIS DOCUMENT WILL BE YOUR FRIEND TO ASSIST YOU PREPARING YOURSELF FOR YOUR EXAMS. AFTER USING THIS DOCUMENT WE HOPE YOU WILL GET THE SKILL OF WRITING LIFE SCIENCE ESSAYS.

J.F CHAVANGWANE

Published : 20 August 2015

Eastern Cape,Mtata (South Africa)

ALL PREVIOUS MATRIC PAPERS

Old exam papers are a great way to revise and prepare for the upcoming National Senior Certificate (NSC) examinations. In this way you can find out what you already know and what you don't. Working through past examination papers also helps you manage your time better and be familiar with the terminology and vocabulary used in the actual exam. A full range of past matric examination papers and corresponding memorandums (answer papers) can be downloaded from the National Department of Basic Education website at **www.education.gov.za** . Click on "LEARNERS" on top menu bar and when the new page has loaded, click on "PAST EXAM PAPERS" under the "ASSESMENT" banner on the right-hand side of the page. You will then find previous exam papers grouped by year. Alternatively Google "past matric papers" and click directly on the **www.education.gov.za** link provided. (Adapted from: I'solezwe lesiXhosa, 17 September, 2015 page 11)

IMPORTANT NOTICE

Some essays printed on this document are from NSC previous Examination Question papers and memorandums, as published on the Department of Basic Education's website. Other essays were adapted from Life Sciences Academics Facebook page. Please note that due to the new Curriculum and Assessment Policy Statements (CAPS), there have some changes in the subject curricula from 2014 to current (2015). These may affect some questions in the past exam papers in terms of relevance, emphasis and mark allocation. All learners using this document as study guide are advised to refer any queries to their relevant subject teacher for clarity.

LIFE SCIENCE ESSAY WRITING

Read the ESSAY title and find the key words in the title so you have an idea what it is all about.

Write down about FOUR or so sub-headings, then jot a few a few points. Don't spend more than 5 mins on this.

Re-read the ESSAY title again and work out what they want precisely from the title, then give a Heading to your essay. Write down your sub headings.

Under the sub headings make the important factual points, in sentence form. BUT only facts (no waffle). Make sure you have at least 17 points. The other 3 points the teacher/examiner will give you for the way you have put the essay together - the synthesis.

END OF THE YEAR NATIONAL SENIOR CERTIFICATE EXAMINATIONS : GRADE 12

The examination will consist of 2 examination papers of 2 ½ hours and 150 marks each. The weighting and assessment of topics in Paper 1 and Paper 2 will be as follows:

PAPER 1

TOPIC	TIME	WEIGHTING	
		%	MARKS
T 1 • Meiosis • Reproduction in Vertebrates • Human Reproduction	1 week ½ week 3 weeks	7 4 21	11 6 31
T2 • Responding to the environment (humans)	4 weeks	27	40
T3 • Human endocrine system • Homeostasis in humans • Responding to the Environment (plants)	1½ weeks 1 week 1 week	10 7 7	15 11 11
T4 • Human Impact (Grade 11)	"2 ½ weeks"	17	25
TOTALS	14 ½ weeks	100%	150

PAPER 2

TOPIC	TIME	WEIGHTING	
		%	MARKS
T 1 • DNA: Code of Life • Meiosis	2½ weeks 1 week	19 7	27 12
T 2 • Genetics and Inheritance	4 weeks	30	45
T3 • Evolution by Natural Selection	2 weeks	15	23
T 3/T4 • Human Evolution	4 weeks	29	43
TOTALS	13 ½ weeks	100%	150

GRADE 11 END OF YEAR EXAM

GRADE 11 END OF YEAR EXAM

PAPER 1 – 150 MARKS: 2.5 HOURS

Photosynthesis 18%
Animal Nutrition 18%
Respiration 10%
Gas Exchange 15%
Excretion 15%
Population Ecology 24%

PAPER 2 – 150 MARKS: 2.5 HOURS

Biodiversity and Classification of Microorganisms 20%
Biodiversity in Plants and Reproduction 20%
Biodiversity in Animals 13%
Human Impact on the Environment: Current crisis for human survival: problems to be solved within the next generation 47%

PAPER 3 – 60 MARKS: 1 HOUR – PRACTICAL

SUGGESTED TIME MANAGEMENT

The only way to pass your matric well is to manage your time effectively. Below are tips to help you get started.

1. FOCUS FOR 10 MINUTES
Take a subject and schedule 10 minutes of study time for it. Remove all distractions and focus on the work for the entire 10 minutes. This helps you to get the ball rolling and you may find that 10 becomes 30 or 60 minutes. This also helps tremendously with subjects that seem difficult and challenging at first.

2. BREAK UP YOUR WORK
Concentrate on doing small sections of work to the best of your abilities. The first tip amplifies the usefulness of studying smaller sections by increasing your focus. So instead of tackling an entire chapter or module start with a small sub section but do that section to the best of your abilities.

3. SETUP AND SHARE YOUR STUDY SCHEDULE
Let as many people know about your study times and tasks. This creates a self imposed pressure to get things done and ultimately removes the procrastination that befalls so many matric students.

4. RISE EARLY
Getting all your scheduled study time in early can give you a greater sense of achievement and freedom to enjoy the other things in your life. This is more important during the weekends and holiday periods, studying at midnight to catch up on your schedule will not help your concentration and retention.

5. REWARD YOURSELF
Give yourself time away from your studies but only if you deserve it. If you've studied consistently during the week then take a few hours off to relax with family or friends. Matric is tough and rest periods allow you time to recover and regain motivation to push through, so do not rob yourself - enjoy the year.

These five tips are very simple to implement and you may already be using a few of them but try to combine them all and see the results that you achieve. Studying for long hours on end will not guarantee success but concentrating fully during reasonable study time will.

STUDY SMART

Adapted from: Life Sciences Grade 11

Study Tips & Study Skills

-

Students with better study methods and strategies score higher on their exams.

Everyone is different. Different methods work for different people; the following are only suggestions on improving upon your current studying techniques.

It is best to review the material right after class when it's still fresh in your memory.

Don't try to do all your studying the night before the test. Instead space out your studying, review class materials at least several times a week, focusing on one topic at a time.

Have all of your study material in front of you: lecture notes, course textbooks, study guides and any other relevant material.

Find a comfortable and quiet place to study with good lighting and little distractions (try avoiding your own bed; it is very tempting to just lie down and take a nap).

Start out by studying the most important information.

Learn the general concepts first, don't worry about learning the details until you have learned the main ideas.

Take notes and write down a summary of the important ideas as you read through your study material.

Take short breaks frequently. Your memory retains the information that you study at the beginning and the end better than what you study in the middle.

Space out your studying, you'll learn more by studying a little every day instead of waiting to cram at the last minute. By studying every day, the material will stay in your long-term memory but if you try to study at the last moment, the material will only reside in your short-term memory

that you'll easily forget.

Make sure that you understand the material well, don't just read through the material and try to memorize everything.

If you choose to study in a group, only study with others who are serious about the test.

Test yourself or have someone test you on the material to find out what your weak and strong areas are. You can use the review questions at the end of each chapter, practice tests that the teacher may give out or other pertinent materials.

Listening to relaxing music such as classical or jazz on a low volume can relieve some of the boredom of studying.

Don't study later than the time you usually go to sleep, you may fall asleep or be tempted to go to sleep, instead try studying in the afternoon or early evening. If you are a morning person try studying in the morning.

Good luck I wish you all the best and I hope this will help you more!!!

Call 0746833042 and Email Chavangwane/@gmail. Com

TABLE OF CONTENTS

Use your Facebook Account to Search and Like the following *suggested* facebook academic pages for more Life Sciences assistance

1. CAPS : Grade 10,11 & 12 Life Sciences,Mathematics & Physical Sciences
2. Life Sciences Academics-2015 (The year changes every year)
3. Life Sciences Grade 11
4. Life Sciences Grade 10

HEARING AND REFLEX ACTION ESSAY

Explain how a person hears the sound of a dog growling and is able to respond rapidly to the touch of its nose on his or her leg

Content: 17
Synthesis: 3

HEARING

- When the person hears the sound of a dog growling,
- The pinna traps and directs the sound waves into the auditory canal
- The sound waves strike the tympanic membrane (eardrum) and cause it to vibrate.
- The vibrating membrane causes the ossicles, including the stirrup (stapes), to vibrate
- This sets up waves in the perilymph and endolymph
- The organ of Corti in the cochlea becomes stimulated
- The stimulus is converted to a nerve
- The nerve impulse is carried by the auditory nerve to the cerebrum where the sound is interpreted
- The pressure in the cochlea is then eased out though the round window into the Eustacian tube

REFLEX ACTION

- Reflex action may be defined as a rapid, automatic response to a stimulus received by an organ, in this case, the leg
- When the dogs nose touches the leg
- Receptors in the skin receive the stimulus
- The stimulus is converted into a nerve impulse
- The impulse travels along the sensory neuron
- towards the spinal cord along the dorsal root
- of the spinal nerve

- In the spinal cord, the sensory neuron makes synaptic contact with the connector
- and then the impulses are transmitted along the motor neuron along the ventral root of the spinal nerve to the effector organ/muscle which contracts and pulls the leg away

LAMARCKISM AND DARWINISM ESSAY

Charles Darwin and Jean Baptiste de Lamarck had different ideas to explain evolution. Describe how each of them would have explained the evolution of the long necks of giraffes. Justify whose idea is more acceptable in the science community today.

Charles Darwin explanation

- As a result of genetic variation✓/ some giraffes have longer necks than others✓
- Environmental change✓/ when the leaves became scarce in short trees
- competition for resources occurred✓
- causing those with shorter necks to die✓
- and those with longer necks to survive✓
- This is natural selection✓/survival of the fittest
- The genes✓/genotype for longer necks
- were passed on to subsequent generations✓
- as a result now the population of giraffe have long necks✓

max

Jean Baptiste de Lamarck explanation

- All giraffes had short necks✓originally
- When the leaves became scarce in short trees✓ / lower parts of trees
- Giraffes stretched✓ / used their neck more often to reach to the taller trees
- As a result the neck became longer✓ /developed
- This acquired characteristic ✓was passed on to the offspring✓
- The next generation of giraffes had long necks✓

Max

An idea accepted in the science community today

Charles Darwin✓ - there is evidence✓ that genes are inherited from the parents,✓and is not the acquired characteristics✓

Max

MENSTRUAL CYCLE ESSAY

Describe the menstrual cycle and how it is influenced by different hormones.

- The menstrual cycle is a series of events that occur in the female body to prepare it for possible pregnancy✓
- Which involves ovarian cycle✓
- and the uterine cycle✓
- It takes an average of 28 days✓
- The pituitary gland✓/hypophysis
- secretes FSH✓
  which stimulates the development of a primary follicle✓ in the ovary
- The developing follicle✓/Graafian follicle
- secretes oestrogen✓
  which stimulates the thickening of the lining of the uterus✓/endometrium
- Around day 13 pituitary gland✓/hypophysis
- secretes LH✓
- which cause ovulation to occur✓
- The remains of the Graafian follicle develops into the corpus luteum✓
  which secretes the progesterone✓
  which continues to stimulate the thickening of the uterus✓
- High levels of progesterone✓
- inhibits the production of FSH✓
  so that the ovaries are no longer stimulated to produce another follicle✓
- If fertilisation does not occur, the corpus luteum degenerates✓
  and stops producing progesterone✓
- The pituitary gland/hypophysis is no longer inhibited in its production of FSH✓ and a new follicle develops
- The thick endometrium is no longer maintained✓/ it degenerates
  and is shed together with blood/menstruation takes place Any (17)

PROTEIN SYTHESIS AND MUTATION ESSAY

Describe the process of protein synthesis and also describe the impact that the two types of gene mutation may have on the formation of proteins.

Content (17)
Synthesis (3)
(20)

Possible Answer to Essay:

The process of protein synthesis occurs in two steps, namely transcription and translation.

TRANSCRIPTION

- Double stranded DNA unzips
- When the hydrogen bonds break
- One strand is used as a template
- To form mRNA
- Using free RNA nucleotides from the nucleoplasm

- The coded message for protein synthesis is thus copied onto mRNA
- mRNA moves from the nucleus to the cytoplasm and attaches to the ribosome Max 6

TRANSLATION
- tRNA collects amino acids
- tRNAs, with amino acids attached, become arranged on the mRNA
- The anticodons on the tRNAs match complementary bases on the codons of mRNA
- Amino acids become attached by peptide bonds to form the required protein
- Each tRNA is released to pick up more amino acids Max 6

IMPACT OF GENE MUTATIONS ON PROTEIN SYNTHESIS

- Errors/mistakes/changes may occur during DNA replication

- POINT MUTATION: replacing one base of a codon with another
- Small change that may possibly result in one amino acid changing in a protein

- FRAMESHIFT MUTATION: addition/ deletion of one or more bases of a codon
- Resulting in changing the order/sequence of all the bases of the codons
- Resulting in forming a different proteinwith different functions

Max 5

STEM CELL ESSAY

Describe TWO types of stem cell therapy and for each type, explain TWO advantages and TWO disadvantages of the process

EMBRYONIC STEM CELL THERAPY

The use of stem cells which can be extracted from the human foetus or the umbilical cord of the foetus to allow for the development of other types of cells / organs which may be required by the body
Max (2)

ADVANTAGE OF EMBRYONIC STEM CELL THERAPY:

Medical benefits in the field of therapeutic cloning / regenerative medicine
Discovery for treatments and cures for many diseases
Limbs/organs formed in the labs from stem cells can be used in transplants/ help treat illnesses
Transplant of cells done quickly with the minimal amount of invasion
Cells can differentiate into any type of cell / tissue / organ
Cells can be cultured relatively easily under lab conditions to produce a large number of the required type of cells
(Any other suitable answer) Any 2 x 2 = (4)

DISADVANTAGE OF EMBRYONIC STEM CELL THERAPY:: 18:38

The use of embryonic stem cells involves destructionof blastocyst which is unacceptable / immoral

Long term effects of such an interference with nature is unknown embryonic stem cells derived from embryos are not a patient's own and the body may reject them

Fertilization of embryo is done in vitro and then donated for research which is questionable

They may only be available for those individuals who can afford the treatment as it is expensive

(Any other suitable answer) Any 2 x 2 = (4)

ADULT STEM CELL THERAPY:

Undifferentiated cells among differentiated cells in tissues or organs that can renew itself to yield some or all of the major specialized cell types of tissues or organs

Max (2)

ADVANTAGE OF ADULT STEM CELL THERAPY: 18:38

Adult stem cells are able to generate new cells

They can be cultured to produce larger quantities of cells therefore able to treat injury or diseases

Your own cells are used therefore there will be no rejection by the body

(Any other suitable answer) 2 x 2 = (4)

DISADVANTAGE OF ADULT STEM CELL THERAPY:

Only a small number of stem cells can be removed therefore, generating a large quantity of cells will be difficult

Differentiation of cell type is limited to the type of cells of origin therefore no New type of cells can be differentiated

Undifferentiated cells are rare in mature tissue therefore to isolate these cells will be a difficult (a challenge)

Cells are pre - specialised therefore only specific types of cells will be made e.g. Blood stem cells will only make blood

DNA REPLICATION ESSAY

DESCRIBE THE SIGNIFICANCE OF DNA REPLICATION AND MEIOSIS IN FERTILISATION, AND HOW THE RESULTING FOETUS IS PROTECTED AND NOURISHED IN THE UTERUS

Content: 17
Synthesis: 3

THE SIGNIFICANCE OF DNA REPLICATION

Since DNA replication occurs just before cell division, it allows for a doubling of genetic material. This is to ensure that sufficient genetic material is available to form 4 haploid gametes from one diploid cell.

SIGNIFICANCE OF MEIOSIS 18:39

Meiosis leads to exchange of genetic material and adds to genetic variation. The reduction of chromosome number to haploid number keeps the chromosomes number constant form generation to generation. Meiosis forms four haploid cells, which function as gametes. Independent assortment adds to genetic variation

PROTECTION OF FOETUS

The foetus is protected from injury as well as against temperature changes by the amniotic fluid.

NOURISHMENT OF THE FOETUS

The foetus received nutrition via the placenta. Nutrients and compounds from the maternal blood pass into the foetal blood. These substances read the foetus via the umbilical vein

VERTEBRATES REPRODUCTIVE STRATEGIES ESSAY

Vertebrates have developed many strategies to ensure the success of reproduction and the survival of the offspring. In an essay, discuss the DIFFERENT REPRODUCTIVE STRATEGIES. Discuss how the different METHODS OF FERTILISATION and EMBRYO DEVELOPMENT contribute to the success of each strategy. Provide ADVANTAGES AND DISADVANTAGES for each method and provide EXAMPLES where possible. Any 17 Facts: (17) + Synthesis: (3)

METHODS OF FERTILISATION
There are two methods of fertilization and these are External Fertilisation and Internal Fertilisation

18:40

External Fertilisation
During external fertilisation, the sperm cell fertilises the egg outside the body of the female. The disadvantage there is less control over the fertilisation process. To overcome this, large numbers of male and female gametes (sex cells) are produced which requires more energy to be used. Water is necessary to allow for the motility of the male gamete and to prevent the dehydration of the gametes. Another disadvantage is that there is an increased chance of the gametes being eaten by predators. An advantage is that there is, however no need for a copulatory organ to deposit the male gametes. (Examples are frogs and fish)

Internal Fertilisation 18:40

During internal fertilisation, the male deposits its sperm cell inside the reproductive organs of the female. The advantage of this is that it is more controlled, which increases the chances of fertilisation. Another advantage is that both gametes are protected within the body of the adult and the embryo develops in a protected environment. (Examples are birds and mammals)

(Max 6)

DIFFERENT REPRODUCTIVE STRATEGIES

There are three different reproductive strategies: ovipary, vivipary and ovovivipary.

OVIPARY

With ovipary, the embryo develops outside the body of the female. The advantage of this is that large numbers of eggs are laid. The disadvantage is that the embryo has a small amount of protection and predators may prey on the eggs. Another disadvantage is that very few eggs become fertilised and fewer still survive to hatching. There is also a greater chance of succumbing to climatic conditions. Examples are frogs, birds and reptiles. (oviparous – giving birth by egg)

VIVIPARY

With vivipary, the young develop inside the uterus of the mother after the eggs are fertilised internally. The advantage is that the embryo is more protected and is provided with nourishment. For example, the placenta in mammals provides the developing embryo with nutrients. Waste products are removed and the body of the female provides gaseous exchange. Another advantage is that the internal fertilisation increases the chances of offspring being produced and surviving. Examples are humans, mice and elephants (viviparous, giving live birth)

OVOVIVIPARY

With ovovivipary, the development of a fertilised egg is retained (kept) in the mother's body. The advantage is that the developing young obtain nutrients from the yolk of the egg. The young hatch within the mother's body and are then born. Ovovivipary occurs in some insects, some fish and some reptiles. Specific examples are the puff adder, Cape chameleon. (ovo+vivi+parity (a noun), egg-live-birthing) (Max 6)

TYPE OF EMBRYO DEVLOPMENT AND PARENTAL CARE

There are two different types of embryo development, which are precocial and altrical

PRECOCIAL DEVELOPMENT

Precocial development allows the new offspring a greater chance at survival, since they are born ready to fend for themselves. It also reduces the need for a high degree of parental care. Although it is mostly the lower order vertebrates (fish, amphibians and reptiles) that display precocial development, many mammals and birds may also display precocial development, for example, giraffes, ground birds, turkeys and quails.

ALTRICIAL DEVELOPMENT

Altricial development necessitates a higher degree of parental care, since the new offspring are unable to fend for themselves. Examples of altricial development are prevalent amongst humans and some birds. (Max 5)

THREAT TO BIODIVERSITY ESSAY

The greatest threat to biodiversity is the destruction of habitats. Describe how various human activities may lead to habitat loss.

Content: 17
Synthesis: 3

URBANISATION – land is cleared for housing, industries and roads leading to habitat fragmentation which eventually lead to a decrease in genetic diversity causing populations to become extinct

POOR FARMING METHODS – monoculture allows only a few species of animals to survive, losing a large amount of plants and animals which would have been present if the crops were varied

OVERGRAZING of land leads to loss of topsoil/erosion decreasing spoil fertility

USE OF PESTICIDES which kills secondary consumers and fertilisers which when washed to rivers disturbs the ecosystem of the river leading to extinction of some populations

GOLF ESTATES require plenty of water and vast clearance of vegetation to make way for the lawn, in which only a few species will exist

MINING results in degradation of ground water as well as a change in the pH of the water around the area, emission of toxic gases into the atmosphere and also causes soil erosion. The environment is altered in such a way that organisms can no longer exist in the area

DEFORESTATION – the demand for wood products cause many trees to be cleared, this destroys the ecosystems within the forest area leading to extinction of some populations.

DESTRUCTION OF WETLANDS AND GRASSLANDS – these areas have been cleared for human inhabitation reducing the biodiversity of organisms surviving entirely on wetlands or grasslands

HOMEOSTASIS ESSAY

"Homeostasis is the maintenance of a constant internal environment, within narrow limits, despite a changing external environment."

Nomsa is sitting in class on a particular day and looks at the wall thermometer showing 43oC.

Discuss the processes and mechanisms that are involved in thermoregulation and osmoregulation in her body on that particular day.

Content: 17
Synthesis : 3

THERMOREGULATION

• When the environmental temperature is high, receptors in the skin detect this
• increased blood temperature is detected by the heat loss centre of the hypothalamus.

• The hypothalamus sends impulses to the skin causing the surface blood vessels to dilate/increase in diameter/vasodilation occurs.

• More blood flows to the skin and therefore more heat is lost to the environment.

The sweat glands are stimulated to produce more sweat thereby causing heat loss through evaporation

• Thereby causing the body to cool down

Any 8

OSMOREGULATION

• On a hot day a person loses water through sweating, thereby decreasing the amount of water in the blood.

• Osmoreceptors detect this and cause the hypothalamus to release more ADH (Antidiuretic hormone) into the blood.

• ADH cause an increase in the permeability of the renal tubules to water

• More water is reabsorbed in the kidneys

• Urine becomes more concentrated/decrease in volume

• Water levels are restored to normal

Any 9

BLOOD GROUPS ESSAY

Sandy has given birth to a baby girl. There are two men claiming to be the father of the child. Explain how the inheritance of blood groups and DNA testing could assist in establishing who the father is.

Content 17
Synthesis3

• Blood groups are controlled by three alleles IA , IB , i which in combination will provide four different phenotypes namely blood groups A, B, O and AB.

• An individual with blood group A ,will inherit one allele from each parent and will therefore inherit a genotype of either IAi or IA IA from his parents

• An individual with Blood group B will inherit one allele from each parent and will therefore inherit genotype of either IBi or IBIB ; and

• An individual with blood group AB will inherit one allele from each parent and will have both alleles IA and IB which are co - dominant, and

• An individual with blood group O will inherit i allele from both parents and will be homozygous recessive (ii)

• The blood of each male as well as the baby's blood must be tested.

• If the baby's blood group is O, then the father with blood group AB will be eliminated as he does not carry the recessive O(i) allele.

• Should the father have a blood group B with a IBIB genotype, then he will be eliminated as a potential father as he does not have the recessive O(i) allele.

• Should the father have a blood group A with a IAIA (homozygous) genotype , then he will be eliminated as a potential father as he does not have the recessive O(i) allele.

• The father who also has a blood group B but a genotype of IBi (Heterozygous),could be a possible father as he is carrying the i allele of which the baby inherited.

• If the father who has a blood group A with a genotype of IAi, could be a possible father as he is carrying the i allele of which the baby inherited. (any 12)

DNA testing can further confirm the father of the child by analysing and comparing the DNA genetic bands of each potential male parent with the genetic bands of DNA taken from the baby.

Should there be more genetic bands that are identical to that of the baby then that would confirm the male parent/father. (any 5)

SPECIATION ESSAY

Briefly explain how geographic isolation of a common ancestral species of finches has led to the development of 14 different species of finches on the Galapagos Islands

The Galapagos consists of a group of 13 main islands, 6 smaller islands, and 107 rocks and islets√. These islands are found in the eastern Pacific Ocean. 973 km off the west coast of Ecuador in South America √

Scientists think that a few million years ago, one species of finch√ with a variety of beak types√, migrated to the Galapagos Islands' from the mainland of Central or South America √ This species then spread across the many islands√.

The different populations were unable to mix and reproduce because they occurred on different islands√. Climatic conditions on the islands changed from year to year dramatically altering the food supply√ The food supplies on each island did not change in the same way√.

On some islands seeds became more abundant; in others there was a good supply of insects. Some of the finches died√ depending on whether the beak structure was adapted for the most abundant food on that particular island.

17:26

In other words, NATURAL SELECTION•√ occurred independently in each of the islands allowing only those that had beaks that were best adapted for feeding on the available food to survive.

Continued independent nature selection•√ on the islands has resulted in the formation of a total of 14 types of finches√. Three species live on the ground, eating seeds; three species live on cactuses and eat seeds; one lives on trees and eats seeds: and 7 species living on tree eating insects.

Since these 14 types of finches are unable to interbreed now even they are allowed to mix, each type is actually a different species√.

Max (17)

The NEW way that examiners assess your essays:

ESSAY ASSESSMENT (SYNTHESIS)

1 mark = RELEVANCE - All information provided is relevant to the topic

xm

1 mark = LOGICAL SEQUENCE - Ideas are arranged in a logical/cause-effect sequence

1 mark = COMPREHENSION - All aspects required by the essay have been sufficiently addressed

MEIOSIS AND NATURAL SELECTION ESSAY

Describe how meiosis and different types of mutations contribute to genetic variation and the role of this variation in natural selection.

Meiosis

- Crossing over✓
- occurs during prophase I✓
- Homologous chromosomes / chromatids overlap✓
- at points called chiasma✓/ chiasmata
- Genetic material is exchanged✓
- resulting in new combinations of genetic material ✓ Max 3

- Random arrangement✓of chromosomes
- occurs during metaphase✓
- so that they separate in a random✓/ independent manner
- resulting in new combinations of genetic material✓

Max 3

Mutations

- A gene✓/ (point and frameshift) mutation occurs
- as a result of a change in sequence of nitrogen bases✓ in the DNA molecule

- A chromosome✓mutation occurs as a
- result of a change in the structure of a chromosome✓/ number of chromosomes during meiosis

- Mutations that occur in sex cells✓
- are passed on to the new generations✓
- creating new characteristics✓

Max 5

Role of variation in natural selection

- Organisms of a particular species shows a great deal of variation✓
- Some individuals may have characteristics that are favourable✓ / any example
- Others may have characteristics/any example that are unfavourable✓
- If there is competition/changing environmental conditions✓/ Selective pressure by the environment
- organisms with favourable characteristics survive✓
- and reproduce✓
- and pass this favourable characteristics to their offspring✓
- while organisms with unfavourable characteristics will die out✓
- Over time the whole population will have this favourable trait✓

Max 6

REFLEX ACTION (EFFECTS OF ADRENALIN)

Role of Adrenalin

Explain how a person running and is suddenly frightened by the sound of a hissing snake responds

Reaction In An Emergency Situation

- The person hears or sees the hissing snake
- this provides the stimulus
- which is converted by the ear and eye into an impulse
- and is carried by the auditory and optic nerve
- to the brain
• where the impulse is interpreted
• The balance of the body is retained by the semicircular canals and proprioceptors

• The brain initiates a reflex action resulting in the following:

The adrenal glands
is stimulated by the autonomic nervous system
to secretes adrenalin
adrenalin increase the rate of the heart beat
and the blood pressure rises
Causing the blood vessels in the skin to constrict
hair to stand erect
blood vessels to the brain to dilate
It also increases the rate and depth of breathing
It causes the glycogen in the liver and muscles
to be converted to glucose
under the influence of glucagon
the glucose is released into the blood stream
which supplies additional energy
for the increased metabolic rate
the person can urinate
suffer from diarrhea
the mouth becomes dry
increased sweating on the forehead and hands
more energy is released for muscle activity
in order to run away faster / jumping / screaming

PREGNANCY ESSAY

- The zygote divides by mitosis✓
- to form a ball of cells✓
- called the morula✓
- More mitotic divisions of the morula occurs to form a hollow ball of cells✓
- called a blastocyst✓

- The blastocyst attaches to the endometrial lining✓
- The outer wall of the blastocyst, called the chorion✓,
- develops projections called villi✓ which
- embeds/implants✓ into the uterine wall

- The cells of the embryo continues to divide✓
- and differentiate✓
- to form the different organs and limbs✓
- and is now called a foetus✓
- The foetus is enclosed in a sac called the amnion✓
- filled with amniotic fluid✓
- which protects the foetus against temperature fluctuations✓
- protects the foetus against dehydration✓
- and protects the foetus against mechanical injury✓/acts as a shock absorber

- The chorionic villi and the endometrium form the placenta✓
- where the blood of both the foetus and the mother✓
- run close to each other✓
- allowing for nutrients to diffuse✓ into the blood of the foetus
- The umbilical vein✓
- carries the absorbed nutrients from the mother to the foetus✓

HORMONES ESSAY

Name the hormones produced by the testes and ovaries and describe the role of each

Hormone in human reproduction.

Testosterone✓

Produced by seminiferous tubules✓ in the testes

During puberty testosterone stimulates:

- The deepening of the voice as vocal cords elongate in the larynx✓
- The development of muscles✓
- The growth of facial, pubic and body hair✓
- Development of the penis and testes✓
- The production of sperm in the testes✓ max

Oestrogen✓

Produced by the Graafian follicles✓ in the ovaries

- Causes the lining of the uterus✓/endometrium
- to become thicker/more vascular ✓
- in preparation for a possible implantation of the embryo and development of the foetus✓

During puberty oestrogen stimulates:

- The widening of the pelvis/hips✓
- The growth and development of the breasts✓
- The growth of the female sex organs✓
- The start of the menstrual cycle, ovulation and menstruation✓ max

Progesterone✓

Produced by the corpus luteum✓ and placenta✓

- Progesterone causes further thickening of the endometrium✓
- so that it is ready for implantation of the embryo should fertilisation occur✓
- High levels of progesterone✓
- inhibits the secretion of FSH✓
- by the pituitary gland✓
- which in turn prevents the further development of any new ovum in the ovary✓ max

SPECIATION AND EVOLUTION ESSAY

It is thought that modern humans evolved gradually from ape-like beings over millions of years through speciation.

Describe how a single species can form new species, and explain how the differences in the skulls and other parts of the skeleton of primitive ape-like beings and modern humans support the idea that the general trend in human evolution has been towards bipedalism and a change in diet from raw food to cooked food.

The development of a new species

- If a population splits into two populations✓.
- There is now no gene flow between the two populations. ✓
- Since each population may be exposed to different environmental conditions✓,
- Natural selection occurs independently in each of the two populations✓
- such that the individuals of the two populations become very different from each other✓
- genotypically and phenotypically✓.
- Even if the two populations were to mix again✓,
- they will not be able to reproduce with each other✓, thus becoming different species (any 5)

The development of bipedalism

- The backward position of the foramen magnum on the skull✓,
- the narrow pelvis✓
- and the less-curved spine✓
- indicates that the ape-like beings were quadripedal✓ (any 3)

- The forward position of the foramen magnum on the skull✓,
- the wider pelvis✓
- and the curved spine✓
- indicates that modern humans are bipedal✓ (any 3)

Change in the diet from raw food to cooked food

- The large teeth, especially the canines✓
- as well as the large and long jaws✓
- which makes the skull prognathous✓
- as well as cranial/brow ridges associated with large muscles that operate the jaws✓
- indicate that the ape-like beings ate raw food that required a great amount of processing✓/tearing, biting and chewing. (any 3)

- The smaller teeth, including the canines✓
- as well as the smaller jaw size✓
- which makes the skull less prognathous✓
- as well as the absence of cranial/brow ridges due to the presence of smaller muscles for chewing✓
- indicate that modern humans rely on a diet of cooked food that does not require the same amount of processing✓/tearing, biting and chewing. (any 3)

ACCOMODATION, HEARING AND BALANCE ESSAY

A goalkeeper in a soccer match prevented a goal from being scored when he dived to his right after the ball was kicked towards him. Just before he dived, he heard his team-mate shout, 'your ball'.

Describe how his eyes adjusted to see the ball as it travelled towards him and describe how he heard his team-mate and maintained his balance as he dived to save the ball.

As the ball moved towards the goalkeeper:

- Accommodation✓ took place
- Ciliary muscles contracted✓
- Suspensory ligaments became slack✓
- This reduced the tension on lens✓
- Lens became more convex✓/round
- Refractive power of the lens increased✓
- Image of the ball fell on the retina✓ Any

Hearing
The shout of his team-mate was heard by the goal keeper as follows:

- The sound waves were directed by the pinna✓
- through the auditory canal✓
- to the tympanic membrane✓/eardrum
- causing it to vibrate✓
- The vibrations of the tympanic membrane were transferred to the ossicles✓ in the middle ear
- which eventually caused the oval window to vibrate✓
- This set up pressure waves in the cochlea✓
- This stimulated the Organ of Corti✓ in the cochlea
- to convert this stimulus into a nerve impulse✓
- which was then transmitted along the auditory nerve✓
- and interpreted in the cerebrum✓ Any

Balance and equilibrium
As he dived:

- A change in the direction and speed✓of the body
- causes the movement of fluid in the semicircular canals✓
- which stimulates the cristae✓
- A change in the position of the head✓
- stimulated the maculae✓in the utriculus and sacculus
- The stimuli were converted into impulses✓
- which were transported along the auditory nerve✓
- and interpreted in the cerebellum✓
- which then sent impulses to the muscles✓
- to restore balance and equilibrium✓ Any Content

EVOLUTION ESSAY (LAMARKISM, DARWINISM, GRADUALISM VS PUNTCUATED EQULIBRIUM)

4.1 Evolution according to Lamarck

Lamarck explained evolution using the following two 'laws':

The law of use and disuse: ✓
- As an organism uses a structure or organ more regularly✓, it becomes better developed or enlarged in that organism✓.
- If an organism does not use a structure or organ frequently✓, it becomes less developed or reduced in size and may disappear altogether in that organism✓

The inheritance of acquired characteristics: ✓
- Characteristics developed during the life of an individual✓
- (Acquired characteristics) can be passed on to their offspring. ✓ (Max 5) (5)

Evolution according to Darwin

- Organisms produce a large number of offspring✓
- There is a great deal of variation✓ amongst the offspring
- Some have favourable characteristics✓
- and some do not✓
- When there is a change in the environmental conditions✓/or
- there is competition
- Then organisms with characteristics which are more favourable survive✓
- Whilst organisms with less favourable characteristics die✓
- This is called natural selection✓
- The organisms that survive reproduce✓
- And thus pass on the favourable characteristics to their offspring✓
- The next generation will therefore have a higher proportion of individuals with the favourable characteristics✓ (Max 8) (8)

Darwin's ideas about gradualism compared to Punctuated Equilibrium

- Darwin believed that evolution takes place through an
- accumulation of small✓
- gradual changes that occur over a long period of time✓
- supported by transitional forms in fossil record✓
- Punctuated equilibrium suggested that evolution sometimes involves long periods of time where species do not change✓/very little change occurs
- This alternates with short periods of time where rapid changes occur✓
- New species are formed in a short period of time✓/relative to the long period of no/little change
- supported by the absence of transitional forms✓ (Max 4) (4)

Content: **(17)**
Synthesis: **(3)**

NATURAL SELECTION VS ARTIFICIAL SELECTION ESSAY

One of the observations Darwin made during his study of pigeons was about artificial selection. In 1859 Darwin and Wallace jointly proposed that new species could develop by a process of natural selection.

Using examples, describe natural and artificial selection and also highlight the differences between these two processes.

Natural selection e.g. Finches*✓/or any other example

- Organisms of a particular species shows a great deal of variation✓
- Some individuals may have characteristics /any example that are favourable✓ /some individuals may be adapted to the environment
- Others may have characteristics/any example that are unfavourable✓
- Selective pressure by the environment✓ due to competition✓/changing environmental conditions
- Organisms with favourable characteristics survive✓ and reproduce✓
- to pass favourable characteristics to their offspring✓
- while organisms with unfavourable characteristics will die out✓
- Over time the whole population will have this favourable trait✓
- Over time these organisms might develop genotypically and phenotypically independently✓
- into different species✓ which cannot interbreed

Compulsory mark
Max 7 + 1 for example* (8)

Artificial selection e.g. Production of improved fruit/ meat production*✓

- Organisms of a particular species/any example show a great deal of variation✓
- Humans✓ select organisms
- with a particular desirable characteristic✓
- and interbreed✓them
- with other organisms that also✓ have the same desirable characteristic
- to improve this characteristic further✓ in the offspring
- They may also choose organisms with different✓ desirable characteristics
- to get offspring with a combination✓ of these desirable characteristics

Compulsory mark
Max 4 + 1 for example*

Differences between Natural and Artificial selection (5)

Natural selection	Artificial selection
Selective pressure by the environment✓	Humans select the desirable characteristic✓
Selection is in response to suitability to the environment✓	Selection is in response to satisfying human needs✓
Organisms can survive on their own✓ in the environment (since they were selected on the basis of their suitability to the environment)	Organisms may often not survive on their own✓ in the environment (since they were selected on the basis of human needs and not on suitability to the environment)
No human effort/cost involved✓	Could be labour intensive✓/expensive

any 2x2 (4)

PROTECTION OF THE HUMAN BODY ESSAY

The nervous and endocrine systems help to protect the human body. Use suitable examples to describe how this is achieved through a reflex action and by the hormone adrenalin.

Mechanism of reflex action

Example: withdrawal of hand after being pricked by a pin✓/from hot surface/ (any other suitable example) (1)

- Receptors in the skin✓
- receive the stimulus✓
- Stimulus is converted into a nerve impulse✓
- The impulse travels along the sensory neuron✓
- towards the spinal cord✓
- along the dorsal root✓ of the spinal nerve✓
- In the spinal cord, the sensory neuron makes synaptic contact✓
- with the connector✓/ interneuron
- and then the impulses are transmitted along the motor neuron✓
- along the ventral root✓ of the spinal nerve
- to the effector organ✓/muscle
- which contracts ✓and pulls the hand away✓
- The reflex action provides a quick response to the stimulus so injury is minimised✓ max (10)

Action of adrenalin

Example: chased by a ferocious dog✓/(any other suitable example) (1)

Adrenalin prepares the body to cope with the emergency, danger and stress in the following ways:

- Brain becomes aware of danger✓/emergency situation
- through impulses from the sense organs✓
- Adrenal gland✓ is stimulated to secrete adrenalin
- Messages are then sent to various parts of the body✓ (blood vessels, heart)
- Blood vessels of the skin✓/digestive system constrict✓,
- but the blood vessels to the heart muscles and brain✓ (important vital organs during an emergency) dilate✓
- The heart rate also increases✓
- Rate and depth of breathing increases✓
- The conversion of glycogen to glucose is promoted✓ in the liver
- Vital organs receive more blood✓/oxygen/glucose
- to raise metabolic activities of cells ✓to release more energy
- muscle tone increases✓
- pupil dilate✓
- to allow a rapid response✓ to ensure safety

max	(5)
Content	(17)
Synthesis	(3)

SOLID WASTE MANANGEMENT ESSAY

Explain FOUR strategies you would use to manage solid waste if you were appointed as the head of the waste disposal division of your town/city.

Management strategies to manage solid waste

Landfill and burning with energy recovery✓

- Utilise the heat generated ✓from the burning of landfill sites to generate electricity✓ thus saving on the electricity bill✓
- Investigate methods to collect and utilise methane gas as a fuel✓

Recovery and recycling✓

- Encourage citizens of the city to put different types of waste✓ into different waste containers✓/bins of different colours
- Partnership with recycling companies for improved collection of different wastes✓
- Fines✓ for people that do not separate the waste into different bins
- This could generate income✓ and reduce the transport cost ✓
- Educate people to use organic waste✓ for example to make compost✓ which could fertilise soil, they can plant vegetables

Educate citizens and companies to reuse✓ waste

- Glass✓ containers for milk, cold drinks and alcohol etc.
- This will reduce the need to produce more of these items✓
- thus saving energy and money✓

Reducing waste✓

- Charge/penalties people extra if they generate more waste✓
- Encourage citizens to manage waste more efficiently✓/renewable

CONTRACEPTIVE METHODS ESSAY (PREGNANCY PREVENTION)

Write a mini-essay in which you explain how any THREE contraceptive methods prevent human pregnancy. You should also explain ONE way in which contraception can influence the quality of human life.

Contraceptive methods and the effect on human reproduction

Method	Affect on human reproduction
Condom✓	Acts as a barrier✓/stops sperm getting into the vagina✓
Loop/IUD✓	It prevents fertilised eggs✓/embryos from becoming attached to the uterine wall✓
Femidom✓	Acts as a barrier✓ /stops sperm getting into the uterus✓/Fallopian tubes
Diaphragm✓	It covers the cervical opening✓ and prevents sperm from entering the uterus✓
Contraceptive pill✓	Contains artificially produced hormones✓ which prevents the production of eggs✓/ovulation
Spermicides✓	It contains a chemical substance that kills sperm✓ and acts as a barrier✓/prevents sperm from entering the Fallopian tubes.
Contraceptive injections✓	It contains progesterone✓/combination of oestrogen and progesterone which stops ovulation✓
Male sterilisation✓ - vasectomy	The sperm ducts are cut✓ and tied. Semen without sperm is produced✓
Female sterilisation✓ - tubal ligation	The fallopian tubes are cut✓ and tied during a small surgical operation preventing the fusion of sperm and egg✓
Withdrawal✓	The penis is removed✓ from the vagina before ejaculation✓
Rhythm✓	Sexual intercourse is avoided✓ during ovulation✓

The influence on the quality of human life

Limits family size✓/unwanted pregnancies
- which allows better care for the children✓ higher standard of living✓/ less dependant on debt/ more psychologically stable children

Prevents the transfer of STDs✓
- the use of e.g. condoms can increase life span✓ and decrease✓ the spread of diseases to other people

Might cause conflict✓
- e.g. the use of IUD could be seen by some people as a form of abortion✓ which may not be acceptable to some religions✓

Might promote promiscuity✓
- no danger of falling pregnant✓ and affects the morality✓

AIR POLLUTION ESSAY

Explain SIX strategies to reduce the amount of air pollution entering the atmosphere from human activity.

Strategies to reduce air pollution

- **Introduce legislation**✓S to force societies to reduce air pollution✓R/ change behaviour
- **Monitor emissions from industries**✓S to ensure that legislation is being followed✓R
- **Impose heavy fines**✓S to discourage repeated acts of pollution✓R
- **Implementation of tax**✓S **on CO_2 emissions** to encourage the use of smaller cars✓R
- **Provide incentives to companies**✓S **/subsidise the purchase and use of clean energy** to encourage them to reduce air pollution✓R
- **Educate**✓S **people about the ill effects of air pollution** so that they behave responsibly✓R
- **Research new technologies**✓S to find more efficient methods of energy production✓R without releasing greenhouse gases for example solar panels, wind turbines
- **Increase/improve the use of public transport**✓S so that fewer people use private vehicles✓R
- **More fuel efficient cars/bicycles**✓S so that less fuel is burnt✓R
- **Increasing the efficiency of electricity use**✓S **at home/industries** which will decrease the amount of coal burnt✓R in electricity production
- **Reduce, re-use and recycle**✓S to conserve energy✓R to lower pollution
- **Switch from fuels**✓S **that produce a lot of greenhouse gases (coal)** to those that produces less (natural gas) as alternative energy source✓R
- **Preventing deforestation**✓S **/loss of other functioning ecosystems** will prevent carbon stored in vegetation of being released in the environment✓R
- **Restoring forests**✓S **/wetlands/other ecosystems** will remove carbon dioxide from the air because plants absorb carbon dioxide✓R
- **Methods to break down**✓S **toxic waste** before it is released into the atmosphere✓R
- **Regulate smoking/use of fires**✓S because it produces smoke which contributes✓R to pollution
- **More landfill sites for waste material**✓S instead of using incinerators✓R

(***Mark any SIX x 2 only and not random points)*** maximum 6 x 2

OVERFISHING ESSAY

State FOUR consequences of overfishing to humans and to the environment and explain FOUR management strategies that the government could employ to prevent overfishing.

Consequences of over fishing to humans and the environment
Species can become extinct✓
Loss of biodiversity✓
Fish start to decline✓
Decrease in products using fish✓
People will lose their jobs✓
Shortage of food✓/leading to starvation
Reduced opportunities for ecotourism✓
Upset the balance of ecosystems✓/Food chains/webs can be destroyed
(Mark first FOUR only) any

Management strategies to prevent overexploitation
Limit the size of fish caught✓only catch those that have already reproduced✓
Limit the number/quotas of fish caught✓to prevent the population from decreasing rapidly✓
Limit the fishing area✓to protect some areas so that the population does not die out✓
Limited fishing /minimal or no fishing ✓during breeding season✓
License to fish✓ to be able to monitor✓
Develop legislation✓to regulate fishing✓/heavy penalties for flouting the legislation
Scientific research✓ to inform legislation✓
Education and awareness✓ of role fish play in the ecosystem✓/ endangered species
Encourage mariculture✓for food/prevent extinction✓
Discouraging illegal market✓ by government selling it at lower price✓/ subsidy

CONTRACEPTIVES ESSAY (PREVENTION OF STD'S)

Name any FOUR methods of contraception used by men. For EACH method, explain how effective it is and explain its role in the prevention of sexually transmitted diseases.

NATURAL✓/Abstinence/behavioural

Completely prevents pregnancy✓/has no side-effects
Protects against sexually transmitted diseases (STDs) ✓

NATURAL ✓/withdrawal ✓
Is not a 100% reliable ✓
Does not protect agaist STDs ✓

RHYTHM METHOD✓

Not 100%✓/females may ovulate at unpredictable times
does not protect against STDs✓

CHEMICAL✓ /Spermicides

On their own, they are not reliable✓
Does not protect against STDs ✓

MECHANICAL✓ /Condom

Very reliable✓
Protects against STDs✓

SURGICAL✓ /Vasectomy

Completely prevents pregnancy✓/very reliable
Does not protect against STDs✓

WATER QUALITY ESSAY

Explain FOUR management strategies to improve the quality of drinking water. Your description must also include TWO sources of water pollution and TWO effects of water pollution on human health. Content (12)
Synthesis (3)

Management strategies to improve the quality of water

- Legislation✓ / monitoring of emissions from industries to discourage water pollution✓
- Provide adequate sewage systems✓ so that people do not urinate or pass faeces near a source of water✓
- Provide clean containers to collect water ✓so that pollutants do not contaminate the water✓
- Educate people✓ on the importance of caring for our environment✓
- Reduce the use of pesticides ✓so that less run off to our rivers ✓
- Provide purified✓/safe water to everyone to avoid use of contaminated water✓.
- Conduct research✓ to find ways of reducing pollution✓

(Mark first FOUR only) (4 x 2) (8)

Sources of water pollution

- Sewage✓
- Waste from factories✓
- Dumping of rubbish/waste✓
- Soap and chemicals entering the water✓

(Mark first TWO only) (2)

Effects on human physiology and health

- Gastroenteritis✓
- Cancer✓
- Typhoid✓
- Allergies✓
- Cholera✓
- Diarrhoea✓
- Infections/rashes✓

(Mark first TWO only) (2)
Content (12)

GONORRHEA AND HIV/AIDS ESSAY

Gonorrhoea and HIV/Aids are common sexually transmitted diseases (STDs) which infect a relatively high percentage of young sexually-active people worldwide.

Write a mini-essay in which you state the causes, THREE symptoms and the possible treatment and prevention for each of these STDs.

Causes:

Gonorrhoea

Bacterium✓

AIDS

HIV✓

Symptoms:

Gonorrhoea

- Pain or burning when passing urine✓
- Abnormal discharge from the genital openings✓
- Inflammation of the testicles✓
- Sores✓
- Painful/swollen joints✓

(Mark first THREE only)

AIDS

- Flu✓ like symptoms in early stages
- Failure of the immune system✓ which results in
- e.g. fungal infection of the lungs✓/any other correct disease
- Weight loss✓
- Sores✓ (any)

(Mark first THREE only)

Possible treatment:

Gonorrhoea

Antibiotics✓/ Penicillin

AIDS

No cure✓/Anti-retroviral treatment slows down the progression/ARV's/ nutrition

Prevention:

- Abstain✓ from sexual activity/promiscuous behaviour
- Use of condoms✓ can reduce the risks of STDs
- Be faithful to your partner✓
- Cautious handling of body fluids✓
- Know your status✓ (any)

OVER-EXPLOITATION OF IDEGENEOUS PLANTS ESSAY

Write a mini-essay in which you describe at least FOUR ways in which over-exploitation of indigenous plants impacts on the environment. Explain FOUR appropriate management strategies that can reduce such over-exploitation.

Impact on environment

- Plants can become extinct✓/lead to loss in biodiversity
- Food chains/webs can be destroyed✓
- Shortage of food✓
- Could lead to degradation of the environment✓
- Erosion of ground surface if too many plants are removed✓
- Increase run-off of water✓
- Destroy habitats of many organisms✓
- Alien plant invasion✓
- Upset the balance of oxygen and carbon dioxide✓/global warming

any (4)

Management practices to reduce over-exploitation

- Sustainable harvesting✓ – over-exploitation must not be allowed✓
- Research✓- done to look at reproductive cycle✓/alternative source of active ingredient /cloning
- Legislation✓- control harvesting✓
- Penalties ✓for breaking legislation✓
- Education✓/campaign - impact and consequences of over-exploitation✓
- Establish nurseries✓/seed banks - to replace plants harvested✓
- Establish more nature reserves✓ - to conserve indigenous plants✓
- Controlling exploitation✓- of indigenous plants by international companies✓
- Provision of free✓/cheaper food - to reduce dependence on indigenous plants✓ any 4 x 2 (8)

(12)

MEIOSIS ESSAY (GENETIC VARIATION,DOWN SYNDROMME AND POLYPLOIDY)

Describe the mechanisms by which meiosis contributes to genetic variation and describe how abnormal meiosis leads to Down's syndrome and polyploidy. Also describe the advantages of polyploidy in agriculture.

Crossing – over ✓

- Homologous chromosomes✓/bivalents pair up
- Each chromosome has 2 chromatids✓
- Chromatids overlap/cross over✓
- Points at which crossing-over takes place are referred to as chiasmata✓
- Genetic material is exchanged✓ between non-sister chromatids✓
- After the process of crossing-over chromosomes have genes from its homologous partner ✓
- This means that each gamete formed will have a mix of genes from maternal and paternal parents✓
- Brings about variation in the gametes ✓formed and also the offspring **Max**

Random arrangement of chromosomes at the equator ✓

- Each pair of homologous chromosomes ✓may line up either way on the equator of the spindle ✓
- Independently of what the other pairs are doing✓/ independent assortment
- This means that gametes will have differing number/mix of maternal and paternal chromosomes✓ **Max**

Down's syndrome

- In meiosis 1✓ the chromosome pair 21 does not separate ✓ or
- In meiosis II ✓ the chromatids of chromosome 21 do not separate✓/ centromere does not divide
- Referred to as non-disjunction✓
- One gamete will have an extra copy of **chromosome number 21** ✓/ two copies of chromosome number 21
- If this gamete fuses with a normal gamete✓ /gamete with 23 chromosomes
- The resulting zygote will have 3 copies ✓of chromosome number 21 instead of 2 / zygote has 47 chromosomes leading to Down's syndrome

ACID MINE DRAINAGE ESSAY

Water used in various mining processes, results in it becoming acidic and can contain dangerous chemicals such as sulphides, toxic cyanides and heavy metals.

Recently, water pumped from the mines has also been found to be radioactive and therefore carcinogenic (causing cancer)

CAUSES

Many mines use vast quantities of water during their daily operations, including: washing the ore and for chemical processing.

In the Witwatersrand Gold Mining area alone, an estimated 500 Mega litres (500 million litres) per day is consumed by mining.

The used water has to be continually pumped out of the mines to prevent flooding underground.

THE EFFECT ACID MINE DRAINAGE HAS ON THE ENVIRONMENT

Mine dumps release acids and heavy metals into rain water runoff. This runoff then poisons livestock and people as well as organisms in rivers, dams, lakes and the ocean.

Mines have changed the landscape, reduced the drainage ability of soil and caused soil erosion and compaction to a stage that cannot be rehabilitated.

PUNCTUATED EQUILIBRIUM VS GRADUALISM

GRADUALISM

Based on Geology and the findings of James Hutton and Charles Lyell, gradualism is the idea that large changes are actually the culmination very small changes that build up over time.

This is seen often in geologic processes and when Charles Darwin first began formulating his Theory of Evolution, he adopted this idea for how evolution happens over very long time periods.

The fossil record is a piece of evidence that supports this view. There are many transitional fossils that show structural adaptations of species as they transform into new species. The geologic time scale helps show how the species have changed over the different eras since life began on Earth.

PUNCTUATED EQUILIBRIUM

The other generally accepted hypothesis for the rate of evolution is called punctuated equilibrium.

Punctuated equilibrium is based on the idea that we cannot see changes in a species, so there must be very long periods of no changes of species. That is the equilibrium part of punctuated equilibrium.

However, we do know that species do change, so there has to be a period of time where those changes occur.

Punctuated equilibrium asserts these changes over a relatively short amount of time "punctuating" the long periods of equilibrium.

EUTROPHICATION (WATER QUALITY) ESSAY

Eutrophication is one of the most important water quality problems in South Africa. Describe Eutrophication, what causes it and its effects on the environment.

(20 Marks)

EUTROPHICATION

Eutrophication is a process, which starts with the addition of excess nutrients to water (a river, lake or pond) and ends with the collapse of the aquatic ecosystem.

CAUSES

The causes are sewers, abattoirs, farm animal holding pens and runoff of fertilisers from crops. These all add excess nitrates and phosphates into river systems.

THE EFFECT EUTROPHICATION HAS ON THE ENVIRONMENT

The increase of nutrients in the water causes pants such as alga to flourish to such an extent that the whole surface of the dam can become covered with them.

Owing to the ALGAL BLOOM, light can no longer penetrate below the surface of the water, which causes deeper dwelling aquatic plants to die.

With their death, oxygen is no longer released during photosynthesis and so the oxygen supply for aquatic animals declines. The animals then die.

As the dead plants and animals decompose, further oxygen is used up and methane gas is released, giving the dam a strong smell of putrification (rotting).

The end result of eutrophication is that the dam is no longer a healthy ecosystem and its aquatic food webs and pyramids collapse.

GENETIC VARIATION AND MUTATION ESSAY

Describe how POINT MUTATIONS, FRAMESHIFT MUTATIONS and MEIOSIS contribute to Genetic Variation

GENE MUTATIONS

Gene mutations are errors (or mistakes or changes) that may occur during transcription and/or DNA replication

- POINT MUTATIONS: replacing/substituting one base of a codon with another
- Small change that may possibly result in one amino acid changing in a protein

- FRAME-SHIFT MUTATIONS: addition/deletion of one or more bases of a code
- Resulting in changing the order/sequence of all the bases of the codons J
- Resulting in forming a different protein with different functions'
- Lead to different phenotypes

MEIOSIS

CROSSING-OVER
- Homologous chromosomes/bivalents pair up
- Each chromosome has 2 chromatids·
- Non-sister chromatids overlap/cross over
- Points at which crossing-over takes place are referred to as chiasmata
- Genetic material is exchanged between non-sister chromatids
- After the process of crossing-over chromosomes have alleles from its homologous partner
-This means that each gamete formed will have a mix of alleles from both parents
- Brings about variation in the gametes formed and also the offspring

RANDOM ARRANGEMENT OF CHROMOSOMES AT THE EQUATOR

- Each pair of homologous chromosomes may line up either way up on the equator of the spindle
- Independently of what the other pairs are doing·
-This means that gametes will have differing number/mix of both parental chromosomes

FOETUS ESSAY

An unicellular zygote undergoes many developmental changes until it becomes a multicellular foetus, nourished and protected by the mother.

Describe the changes that allow the ZYGOTE TO EVENTUALLY DEVELOP INTO A FOETUS and how the FOETUS IS NOURISHED AND PROTECTED DURING THE PERIOD OF PREGNANCY.

DEVELOPMENT OF AN UNICELLULAR ZYGOTE

Just after the fertilisation, a zygote is formed. The zygote passes down the fallopian tube and undergoes cell division by mitosis.

The zygote develops into a ball of cells called morula and thereafter it becomes a blastocyte (blastocyst). In the uterus it will further divide by mitosis and form an embryo, which becomes attached to the endometrium wall of the uterus. This is called implantation. During this time two membranes develop around it.

They are called extra-embryonic membranes. The membranes are the chorion which form the chorionic villi and the amnion. After 12 weeks, the embryo is called a foetus.

NOURISHMENT OF THE FOETUS

The foetus is nourished by the mother through the placenta. Nutrients and compounds from the maternal blood pass into the foetal blood. These substances feed the foetus via the umbilical vein

PROTECTION OF THE FOETUS

The foetus is protected by the amnion filled with an amniotic fluid which prevents temperature changes as well as against injury – it acts as a shock absorber.

SKULL ESSAY

(F = a tick)

Describe the structural changes to the skull that characterise the evolution of modern humans from their ape-like ancestors, and explain the significance of these changes.

Foramen magnum

- The foramen magnum was in a backward position in the ape-like beingsF but in a forward/ central/ ventral position in modern humansF

Significance

- This represents a change from quadrupedalism in ape-like beingsS
- To bipedalism/(walking upright) in modern humansS, leading to the following in modern humans:

• Increased awareness of the environmentS in sensing danger/food
• Freeing of the hands to use implementsS/ carry objects/ weapons/ offspring
• Exposure of a large surface area for thermoregulationS/losing body heat to surroundings in hot conditions/reducing overheating
• Display of sex organs /breasts as part of courtship behaviourS

Cranium

- Modern humans have a larger craniumF than the ape-like beingsF
- Modern humans have a less sloping foreheadF than the ape-like beingsF
- Modern humans have a cranium that is more roundedF than the ape-like beingsF

Significance

- This allowed space for a larger brainS in humans than in ape-like beingsS, making the following possible:

o Better co-ordination of movementS
o Processing of a large amount of informationS
o Processing information fasterS
o Development of spoken and written languages to communicateS

Jaws

- Humans have smaller jawsF than the ape-like beingsF
- Humans have jaws that are non-prognathousF/ flat face compared to the jaws of ape-like beings which are prognathousF/sloping face
- Humans have C-shaped jawsF /jaws that are gently curved compared to the U shaped jawsF in the ape-like beings

Significance

- This corresponds with a change in diet from hard, raw foodS in the ape-like beings
- To softer, cooked foodS in humans

Dentition/Teeth

- In ape-like beings there are gapsF/diastema between incisors and canines
- but no gapsF between the teeth in humans
- Humans have smaller teethF/incisors and canines than the ape-like beingsF
- Humans have flatter molars and pre-molarsF than the ape-like beingsF

Significance

- This corresponds with the decreased need to bite and tearS and an increased need to grind and chewS in humans in view of the change in diet to soft, cooked food

Eyebrow ridges

- Humans have eyebrow ridges that are smallerF than those of the ape-like beingsF

Significance

- There is a decreased need to strengthen the skullS of humans due to the smaller size of the jawsS

Chin

- In humans the chin is more developedF compared to the ape-like beingsF

Significance

- Developed chin assists with speechS in humans (space in mouth for movement of tongue for the development of complicated language)

Zygomatic arch

- In humans the zygomatic arch/cheek bone is less developedF than in the ape-like beingsF

Significance

- This corresponds with the decreased need for attachment of strong musclesS due to the decreased jaw sizeS in humans. Also, jaw muscles not as big and strong which indicates omnivorous diet. They eat more refined food (cooked meat and vegetables)

GENETIC ENGINEERING ESSAY

Write a mini essay on genetic modification of crops, explaining what genetic modification is. Discuss FOUR advantages, FOUR disadvantages opposition to genetic modification of food

GENETICALLY MODIFICATION is 'the introduction of new genes into a living organism in order to produce desired characteristics and eliminate undesirable traits

ADVANTAGES OF GENETIC MODIFICATION

Improve taste and the nutritional value
Become resistant to drought, cold, heat or alkaline conditions.
Enable plants to grow healthier, larger and to become mature quicker than the ordinary plants (increased growth rate)
To increase the shelf-life of fresh produce. ·
Achieve higher yields from limited resources. ·
Increase resistance to diseases. ·
Obtain more predictable results'
Provide resistance to herbicides and pesticides. ·
To give ability to survive in nitrogen poor soils'
To develop frost resistance crops.
To develop resistance to natural pests.
Enable crops to grow in any season of the year.
To manufacture specific drugs or vitamins for human consumption. ·

DISADVANTAGESOF GENETIC MODIFICATION

Genetically modified crops:
Can be costly as it involves modern biotechnology which requires highly skilled people and sophisticated and expensive equipment
May cause allergic reactions in humans. ·
Could reduce biodiversity in a specific habitat.
Can easily be destroyed by new diseases. ·
Can interbreed with wild plants and spread to future generation.
May include a pesticide resistant gene that spread to wildlife with bad results.

FOOD SECURITY ESSAY

Write a mini essay to explain the Growth Pattern of Humans and some challenges and strategies in ensuring Food Security for this growing population

Content: 17 marks
Synthesis: 3 marks

GROWTH OF HUMAN POPULATION

The human population is following a geometric growth form
The population size is increasing at a very fast pace
The time taken for the population to double, is decreasing
A very high birth rate in many countries contributes to the increase in the human population size
In such countries, a lack of education in terms of the value of limiting family size and the use of contraceptives have led to this.
In Developed Countries improvements in medical technology had decreased the incidence of infant mortality as well as increase the life expectancy of people

ENSURING FOOD SECURITY

"FOOD SECURITY means having access to enough food, on a regular basis, so as to ensure healthy living"

The increased population means an increase demand for food
As a result of CLIMATE CHANGE, rainfall patterns are expected to change
Some areas will receive little rain, thus reducing crop production
Other areas will receive a lot of rain leading to flooding causing the washing away of valuable topsoil, this reducing crop production

An increase in PEST population due to monoculture may wipe out the crop growth in monoculture

The use of PESTCIDES to kill pests sometimes also kills their predators so the pest population grows rapidly still
The pesticides may get into the soil
The concentration of the pesticide increases as we move up the food chain killing off our food resources higher up the food chain

The solution may be planting a variety of crops together, that is, in mixed species culture (intercropping)
The mixed species culture and controlled use of chemicals (pesticides) will ensure the survival of the natural enemies of the pest
Sometimes the natural enemy may have to be artificially introduced – this is referred to as BIOLOGICAL CONTROL

CROP ROTATION allows the soil to recover from one crop before the next type of crop is planted. This is important since different crops use up slightly different minerals from the soil

FERTILISERS are often used to replenish the nutrients in the soil for effective crop growth
Over use of fertilisers may also have negative effects such as decreasing the oxygen content in the soil which could reduce crop production in future years

The increased demand for livestock leads to OVERGRAZING causing SOIL EROSION, thus reducing the usefulness of the land for crop production

Alien invasive plant species usually out-compete indigenous species

Alien plants use up land that could otherwise be used to crop production

Many attempts are being made to remove alien vegetation through mechanical and chemical means.

Humans have been able to increase food production though selective breeding and genetic engineering

Desirable characteristics are introduced into organisms, such as resistance to drought and pests, increased yield and larger fruit and seeds

Food wastage occurs in all stages for the food supple chain, namely, harvesting, production and processing, as well as in retail. It also occurs at the consumption stage, that is, when it is eaten

In Developing Countries, most wastage occurs during production. In Developed Countries, most wastage is at the consumption stage – about 100 kilogrammes per person each year.

There are TWO ways we can reduce food waste: Firstly, we can discourage consumers form throwing away huge amount of food as waste; Secondly, we can also encourage farmers and other producers from producing more than is required

CLONNING ESSAY

Clones are a group of Genetically Identical Organisms. Explain
THREE advantages and THREE disadvantages with reasons of cloning

Content: (17)
Synthesis: (3)

from LIFE SCIENCE ACADEMICS - 2015

CLONING allows an individual animal or plant with desirable features, (eg such as a cow that produces a lot of milk or to increase the yield of fruit), to be duplicated several times (1)

ADVANTAGES OF CLONING

Producing individuals with desired traits eliminate unwanted characteristics
Better yield to increase the amount of food for a large population
Resistant to diseasesto save on the use of pesticides and herbicides
Organisms produced in a shorter timeto increase yield
Saving endangered speciesthen there is no need for mating partners or looking for partners
Producing body partsreducing rejection of transplanted parts
Produce offspring for organisms that are infertile and cannot have their own offspring
Reproduction is not seasonally dependent
(4 x 2) (8)

DISADVANTAGES OF CLONING

Reducing the gene pool by reducing variation/reduces genetic diversity
Cloned organisms may have developmental/morphological problems and not survive long
Costly process not all farmers/people/government's can afford it
May generate more experimental wastecausing ethical issues around disposal of waste
May lead to the killing of clones to obtain spare body parts
Objection/religious beliefs to interfering with God's/Supreme Being's creation/nature

PHOTOSYNTHESIS ESSAY

Describe the process of photosynthesis from the time light is absorbed until carbohydrates are formed.

The Light Phase*

The Light Phase takes place in the grana */ thylakoids of the chloroplast*
Light (radiant) energy* is absorbed by chlorophyll molecules* and converted into potential chemical energy*
The energy is used to:

split water*/photolysis into hydrogen*and oxygen*
forms ATP*/ photophosphorylation
Oxygen is released* to the atmosphere and
the energy-rich hydrogen combines with a co-enzyme/NADP*

The Dark Phase*/Calvin Cycle/Light-independent phase

The Dark Phase takes place in the stroma*
Carbon dioxide* from the atmosphere combines* with hydrogen* from the light phase using energy from ATP formed in the light phase*
to form carbohydrates*, such as glucose*/fructose/sucrose/starch
Reactions are controlled by enzymes*

NUTRITION ESSAY

Describe the digestion, absorption and assimilation of food that contains carbohydrates only.

Content: (17)
Synthesis: (3)
Total: (20)
The Perfect Answer

Mechanical breakdown
- Carbohydrates are broken down to a smaller size by the teeth
- The teeth grind the food and then the broken down further in the stomach.
- The small size of food in the stomach becomes a liquid called chyme max (3)

Chemical Digestion
- Carbohydrases in the saliva, pancreatic juice and intestinal juice
- break down the polysaccharides to disaccharides
- and eventually to monosaccharides
- in an alkaline medium max (6)

Absorption
- Absorption mainly takes place in the small intestines
- Glucose (monosaccharide) moves by diffusion
- through the columnar epithelial cells of the small intestine
- into the blood capillaries
- of a villus
- The capillaries all join to form the hepatic portal system max (4)

Assimilation
- Assimilation is where the digested food is taken to the liverand muscles
- where it can be stored as glycogen
- and from there to the rest of the body through the hepatic vein
- to the cells
- to produce energy through cellular respiration
- or to synthesise other polysaccharides for growth/repair max (4)

Facts: (17)
Synthesis: (3)
(20)

CELLULAR RESPIRATION ESSAY

Describe The Phase Of Cellular Respiration That Releases Carbon Dioxide And How This Gas Is Then Taken To The Lungs And Released Into The Atmosphere

RELEASE OF CO_2 FROM KREBS CYCLE
CO_2 is released during the Kreb's cycle of cellular respiration
Which occurs only if oxygen is present
The pyruvic acid produced during glycolysis enters the mitochondrion where it is used in a cyclic series of reactions
Energised hydrogen atoms and CO_2 are released during these reactions
any (4)

TRANSPORT OF CO_2 THE LUNGS
As it is produced from cellular respiration the CO_2 concentration in the cells increase
This creates a concentration gradient with the blood CO_2 diffuses into the blood
It is transported in the blood in three ways:
1. Dissolved in the plasma
2. Combined with haemoglobin to form carbhaemoglobin
3. Combined with water to form bicarbonate ions
The blood reaching the lungs accumulate CO_2 from other cells along the way
Creating a concentration gradient with the air in the lungs
CO_2 diffuses
through the squamous epithelium
of the alveolus into the lung
any (8)

RELEASE OF CO_2 FROM THE LUNGS
The CO_2 is then exhaled from the lungs
During exhalation the diaphragm relaxes and becomes arched.
The length of the thoracic cavity (i.e. top to bottom distance) is decreased
The external intercostal muscles relax and the rib cage is lowered
This causes the side-to side and back-to-front distance of the thoracic cavity to decrease
The total volume of the thoracic cavity decreases and pressure on the lung (interpleural pressure) increases
Air rich in carbon dioxide is forced out of the lungs
any (5)

Content (17)
Synthesis (3)
Total (20)

MUTATION ESSAY (HARMFUL AND USEFUL MUTATION)

"Describe how a harmful mutation on DNA may lead to sickle cell anaemia and how useful mutations contribute to natural selection and hence evolution"

FACTS: 17
SYNTHESIS: 3

Sickle cell anaemia is caused by a mutant allele on chromosome number 11
The mutant allele is responsible for the production of haemoglobin S instead of haemoglobin A
Haemoglobin S causes the red blood cells to become sickle shaped
The sickle shaped celled block the small blood vessels and they carry a limited amount of oxygen
The genotypes or genetic codes of individuals (even from the same family) are different form each other because:

- The gametes produced by meiosis are different from each other
- There is chance fertilisation of egg cells by sperm cells
- Mutations also results in new genotypes as we move from one generation to the next

All three of the above ensure that the offspring of the same species show a great deal of variation
Only those individuals that have characteristics that are favourable to enable it to compete successfully for resources in the environment and protect it from other organisms in the environment are able to survive
These organisms reproduce to form offspring who also have the favourable characteristics
Organisms that do not possess these favourable (advantageous) characteristics will die
Charles Darwin called this Natural Selection, implying that Nature selected only those that were the best adapted to the environment to live and reproduce
As Natural Selection occurs from generation to generation, there is a continual, gradual change in populations
Sometimes the populations that results are so different for the earlier populations that they cannot reproduce any more
This leads to SPECIATION (the evolution of new species)

Adapted from: Life Sciences Academics-2015

EXCRECTION ESSAY

EXCRETION

The THREE main excretory organs of humans are the Lungs, Skin and the Kidneys – we will study the kidneys:

Controlling Body Water
We have two kidneys, which are in your lower back just where your belt goes. Their job is to clean the blood by filtering out unwanted material such as urea, excess water, salt and ions. They are wonderfully constructed organs and do some amazing work.

THE KIDNEY
One job that they are involved in is reabsorbing excess water so that we don't dry out. But how do they do it?

Blood enters the kidney through the renal artery. It is filtered and the 'clean' blood leaves via the renal vein. Any waste material leaves through the ureter, then to the bladder and the world outside!

If you cut into a kidney you see two distinct parts, the dark red outer zone called the cortex and the lighter inner zone, the medulla.

NEPHRONS
If you then use a microscope and look at the cortex you begin to see lots of structures called nephrons. There are about 750,000 of them in each kidney (call it a million!).

ULTRAFILTRATION
At one end is a cup-like structure called the Bowman's capsule. It encloses a knot of capillaries called the glomerulus. These capillaries are leaky and small molecules get filtered out and end up inside the Bowman's capsule. This process is called ultrafiltration.

If nothing else happens then the materials, such as water and urea, will end up going all the way through the nephron, down the ureter, through the bladder and into the toilet!

RE-ABSORPTION
However, sometimes the body needs to grab back chemicals such as water and glucose which are still useful. This happens when they move out of the fluid in the nephron back into the capillary network that twists around the nephron. This process is called re-absorption.

Reabsorption means that the useful chemicals are taken back into the blood out of the nephron. They do not end up in the urine and are not lost from the body

Adapted from: Life Sciences Grade 11

CARRYING CAPACICTY,COMPETION AND PREDATION ESSAY

Discuss the role that carrying capacity, competition and predation play in regulating the size of a population.

Content: 17
Synthesis: 3

Population size is regulated by natality (births), immigration, mortality (deaths) and emigration.

CARRYING CAPACITY
The carrying capacity is the maximum population size that can be supported over a period of time ion a particular habitat.
(6)
PREDATION
A predator captures and kills other animals (prey) for its food
Example: Lions that capture and feed on antelopes
Prey population will decrease and the predator population will increase·
(3)

COMPETITION
There are two main types of competition, interspecific and intraspecific

INTERSPECIFIC COMPETITION
Interspecific competition happens when large numbers of organisms of different species depend on same resources.
Example: Flour beetles
One species will decrease in population size while the other will increase·
(5)

INTRASPECIFIC COMPETITION
Intraspecific competition happens between organisms of SAME species that share the same available resource.
Example: Owls competing for same resources. Stronger owls will survive
The owl population will decrease
(3)

Adapted from : Life Sciences Grade 11

KIDNEY ESSAY

The kidney is mainly responsible for maintaining the balance of water and useful substances in the human body rather than getting rid of it. Write an essay to explain the above mentioned statement with reference to the following:

Glomerular filtration
Tubular reabsorption
Diseases affecting kidney function

GLOMERULAR FILTRATION
Blood in the glomerulus is separated from the capsular space in the Bowman's capsule by two thin cellular layers (glomerular endothelium cells and podocytes), which form an ultra-fine filter for filterable plasma constituents

These include useful substances (e.g. water inorganic substances, glucose, amino acids) , waste substances (e.g. urea, uric acid and creatinine) as well as normal blood constuents (blood plasma, proteins, RBC and WBC).

Molecules that can't be filtered are plasma proteins and blood cells. Filterable plasma constituents then move from the glomerulus to the Bowman's capsule because of high blood pressure in the glomerulus and the highly permeable glomerular membrane

TUBULAR RE-ABSORPTION
Useful substances like glucose, amino acids are usually completely reabsorbed in the proximal convoluted tubules through re-absorption

Water is re-absorbed mainly in the medulla of the kidney where the loops of Henle are. Through these processes the kidney is mainly responsible for maintaining the balance of water and useful substances in the human bodyThis is called osmoregulation

DISEASES AFFECTING KIDNEY FUNCTION

- Kidney Stones
- Bilharzia

Kidney stones can form in the ureter leading to a lot of discomfort and pain. The overuse of certain drugs can also lead to kidney failure

Bilharziais another disease that effects people due to infected water is the bilharzia parasite which can lead to kidney damage

The Treatment of Kidney Failure is either Dialysis or a Kidney transplant

Adapted from : Life Sciences Grade 11

BREATHING AND GASEOUS EXHANGE ESSAY

Describe how the gas required during aerobic respiration enters the body and arrives at the muscles from the atmosphere

INHALATION

The gas required during aerobic respiration is oxygen (02)

The diaphragm contracts and becomes flattened
The external intercostals muscles contract
Ribs and sternum are moved upwards and outwards
The volume of the thoracic cavity increases
Interpleural pressure (pressure between the two layers of the pleura) decreases
Pressure inside the lungs now becomes less than atmospheric pressure
The oxygen-laden air is drawn into the lungs through the air passages (nostrils/trachea/bronchi)
The lungs inflate
(max 7)

GAS EXCHANGE IN THE LUNGS (AT THE LUNG SURFACES)

Capillaries branching from the pulmonary artery carry deoxygenated blood to the lungs
The oxygen content of the inhaled air is greater in the alveolus than in the capillaries
Oxygen dissolves in the moisture lining the alveolus and diffuses through the squamous epithelium of the alveolus wall

TRANSPORT OF O2

Oxygen is transported through the endothelial wall of the capillary into the blood plasma
Most of the oxygen combines with haemoglobin of erythrocytes (the red blood cells) to form oxyhaemoglobin and is transported in this form to the tissues
(max 4)

GAS EXCHANGE IN TISSUES (AT THE TISSUE SURFACES)

Oxygenated blood coming from the lungs enter the tissues through capillaries which penetrate between the cells
In the cells, the oxygen concentration is lower than in the capillaries
Since 02 is constantly used up during cellular respiration
Oxyhaemoglobin in the blood of the capillaries releases the oxygen which diffuses through the capillary wall
Into the tissue fluid and from there into the cells

(max 4)

Adapted from : Life Sciences Grade 11

MESSAGE TO THE LIFE SCIENCES LEARNERS FROM FRANCE CHAVANGWANE

I believe that it all begins from a dream, immediately you start dreaming about it, it is the time you start achieving it. This words keeps me going, so to you also start dreaming about what you want to achieve in your life and start working towards your dream. The world that we are now living in it requires education, so you have to value the importance of education. Make sure you become friends with your books and not waste most of your time doing things that won't benefit you in your life.

Know very well that you won't stay at a high school level forever there will be time where you have to leave and face the real world out there. You cannot defeat the world without your powerful spear which is education that can fight the battle for you. Respect and appreciate your teachers because they are trying to shape your future to become a better and an independent individual tomorrow. In my life I believe that everyone was born capable so the way you think it is the way you will do things, that means when you think Life Sciences is a difficult subject to you definitely it will be difficult to you. So you have to change the way you think and develop a positive attitude towards all your subjects for positive results. Associate yourself with people who will add value to your life and encourage you to do good things for good benefits. One of the motivational speakers while I was still doing my matric (Grade 12) told me about the 5Ps and explained the meaning of each P to me which I would like also to share with you. He said that the first P means **PROPER**, second P means **PLANNING**, third P means **PREVENTS**, forth P means **POOR** and fifth **PERFOMANCE** which in overall meant that Proper planning prevents poor performance that means when you plan/study in time you minimize your chances of performing poorly on your studies.

Avoid studying for exams a night before the actual exam because it will give you depression and cause you to perform poorly because you failed to do the proper planning for your exams. The choice about your life is yours so you know what you want in your life words can be told but at the end you are the one to decide about your life. I just wish you all the best in your studies, you are the future of South Africa. We are all looking forward for a better tomorrow in you so make the country proud of you.

JF CHAVANGWANE

Acknowledgement

I hope by using this document you will gain the necessary skills that are needed when writing a Life Sciences Essay. The document provides a clear structure on how to write the essays. This document has been created from information available from the internet and it is not meant for any business purposes (FREE SUPPLY) but to help South African Life sciences Learners by gathering all the important information together.

Sources

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2. Life Sciences Academics (Facebook page), Marian Ross
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"Education is the most powerful weapon that can be used to change the world" Nelson Mandela

GOOD LUCK WITH YOUR EXAMS AND I HOPE THIS DOCUMENT WILL HELP!

THE END....