

**HUMAN BIOLOGY**

**Units 1 & 2**

**2018**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Time allowed for this paper**

Reading time before commencing work: ten minutes

Working time: three hours

**Materials required/recommended for this paper**

***To be provided by the supervisor***

**Question/Answer Booklet One: Contains Sections One and three.**

**Multiple-choice answer sheet for Section One**

**Question/Answer Booklet Two: Contains Section Two**

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

* Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters
* Special items: non-programmable calculators approved for use in this examination

**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 material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

**BOOKLET ONE: SECTIONS 1 AND 3**

***Please place your multiple choice answer sheet inside this booklet at the end of the examination.***

**Structure of this paper**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Section | Number of questions available | Number of questions to be attempted | Suggested working time (minutes) | Marks available | Percentage of examination |
| Section One  Multiple-choice | 30 | 30 | 40 | 30 | 30 |
| Section Two  Short answers | 9 | 9 | 90 | 105 | 50 |
| Section Three  Extended answers | 3 | 2 | 50 | 40 | 20 |
|  |  |  |  | **Total** | 100 |

**Instructions to candidates**

1. The rules for the conduct of the Western Australian examinations are detailed in the *Year 12 Information Handbook 2018*. 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, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Section Two: Write your answers in **Question/Answer Booklet Two**. Wherever possible, confine your answers to the line spaces provided.

Section Three: Consists of three questions. You must answer two questions. Tick the box next to the question you are answering. Write your answers in **Question/Answer Booklet One**.

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

4. Supplementary pages for the use of planning/continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

5. Write all answers for **Section 2 in Booklet Two.** Write all answers for **Section 3 in Booklet One.**

**Section One: Multiple-choice 30% (30 Marks)**

This section has **30** questions. 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 then shade your new answer. Do not erase or use correction fluid/tape. No marks will be given if more than one answer is completed for any question.

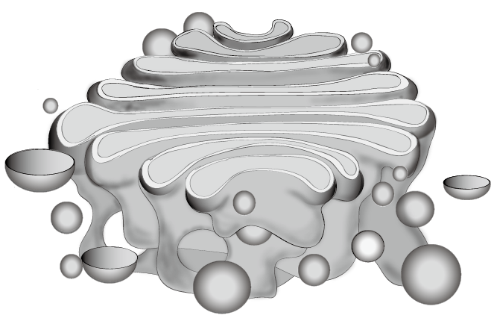
Suggested working time: 40 minutes.

1. Which of the following statements best describes the difference between random and systematic errors?
   1. Random errors are also known as human errors, whilst systematic errors are associated with the materials used.
   2. Random errors are predictable and can be avoided, whilst systematic errors are not predictable and therefore cannot be avoided.
   3. Random errors are based on the limitations of certain measurements, whilst systematic errors occur due to experimental design.
   4. Random errors require a change to the experimental method, whilst systematic errors can be reduced by taking averages.
2. Which of the following pairs best describes the definition of the associated nutrient?
   1. Lipids; main source of energy for cells
   2. Vitamins; can be broken down into fatty acids and glycerol
   3. Carbohydrates; broken down to amino acids and used as energy
   4. Minerals; can act as co-factors for enzymes in metabolism
3. Osteoporosis is a disease associated with the loss of bone mass. Doctors often prescribe
   1. Vitamin D, to assist in the absorption of calcium into bones.
   2. minimal exercise, to ensure patients do not break their bones.
   3. quitting smoking, to lower the amount of oestrogen in the body.
   4. biphosphanates, to increase the concentration of calcium in the blood.
4. When the cell is not dividing, the tangled network of DNA and proteins is known as
   1. chromatin.
   2. a chromosome.
   3. an epigenome.
   4. a nucleotide.
5. Upon falling pregnant, a couple choose to test the foetus for the Phenylketonuria (PKU) disorder. Which of the following would **not** be used to detect this genetic disease?
   1. Amniocentesis
   2. Chorionic Villus Sampling
   3. Fetoscopy
   4. Biochemical Analysis
6. Ventricular Septal Defect (VSD) is a common congenital disease of the heart associated with a hole in the septum between the two ventricle chambers.

Which of the following gives the best explanation as to why the concentration of oxygen leaving through the aorta would be low in someone with VSD?

* 1. Deoxygenated blood enters the right ventricle from the left ventricle
  2. Deoxygenated blood enters the left ventricle from the right ventricle
  3. Oxygenated blood enters the right ventricle from the left ventricle
  4. Oxygenated blood enters the left ventricle from the right ventricle

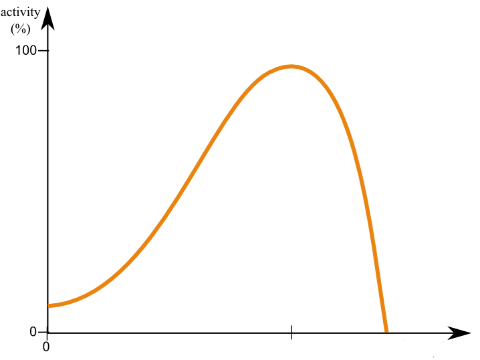
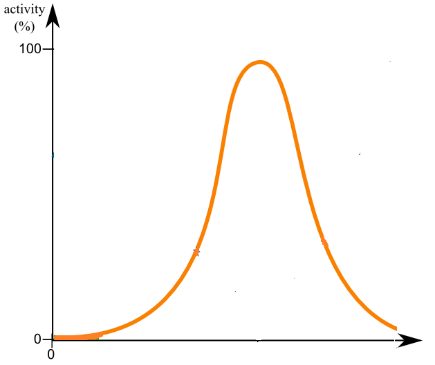
**Questions 7 and 8 refer to the diagram below.**

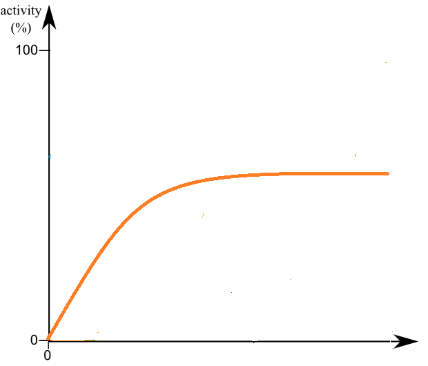
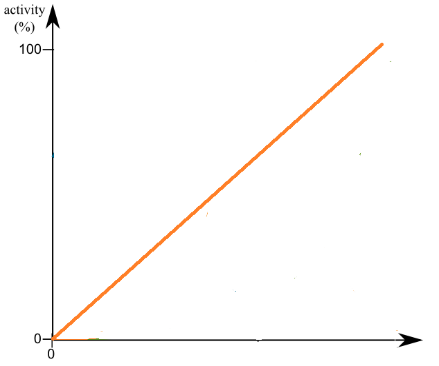


1. Where, in the cell, would you expect to find the cell organelle depicted above?
   1. Free in the cytoplasm
   2. Positioned near the nucleus
   3. As an extension of the nuclear membrane
   4. Attached to the cell membrane
2. The organelle above is associated with
3. modifying and packaging proteins.
4. cellular respiration.
5. digestion of large molecules.
6. storing and transferring molecules.

**Questions 9 and 10 refer to the table below that shows the percentage of 25 year olds with a sexually transmitted infection (STI) as compared to their alcohol consumption.**

|  |  |
| --- | --- |
| **Alcohol Consumption** | **Percentage (%)** |
| No Alcohol Consumption | 1.2 |
| Some Alcohol Use | 2.8 |
| Binge Drinking | 2.4 |
| Heavy Drinking | 3.1 |

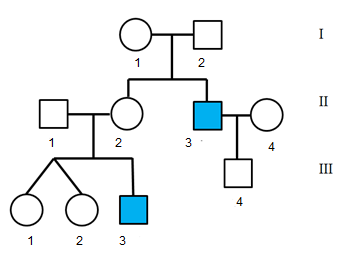
1. What is the independent variable in this study?
2. Percentage of 25 year olds
3. Total number of 25 year olds with STI’s
4. Blood alcohol levels
5. Alcohol consumption
6. Which of the following is a conclusion that could be drawn from the data table above?
7. Young adult drinkers are at least twice as likely as non-drinkers to have an STI
8. 18-25 year olds that are heavy drinkers have less chance than non-drinkers to have an STI
9. Having an STI is more common in people using both alcohol and illicit drugs
10. Drinkers are 23% less likely to use a condom during sexual intercourse when they were drunk
11. Muscle tissue that is multinucleated and contains striations is best described as
12. involuntary muscle.
13. smooth muscle.
14. cardiac muscle.
15. skeletal muscle.
16. Methylation of DNA in humans would usually result in
17. mutations.
18. cell growth.
19. reduced levels of gene expression.
20. activation of gene expression.
21. Which of the following graphs best depicts the effect of substrate concentration on enzyme activity?
22.  (b) 



(c) (d)

1. The role of the bulbourethral (Cowper’s) gland in males is to secrete
2. mucus that acts as a lubricant.
3. thick mucus containing high levels of sugar.
4. milky mucus with a high pH level.
5. clear mucus that has a high acidity.
6. The name given to the cells of the testes which produce sperm is
7. seminiferous cells.
8. Sertoli cells.
9. Leydig cells.
10. sperm cells.
11. A pap smear is a recent technology that tests for
12. syphilis.
13. chlamydia.
14. genital warts.
15. cervical cancer.

**Questions 17 and 18 refer to the X-linked recessive pedigree below.**

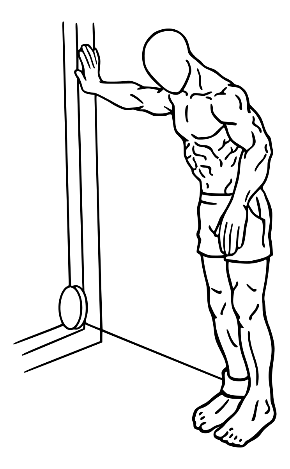
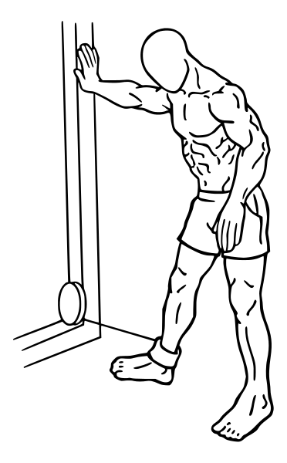
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1. Individual III-3 bred with a female carrier and gave birth to a daughter. What is the probability of the daughter inheriting this trait?
2. 0%
3. 25%
4. 50%
5. 75%
6. An example of an X-linked recessive disease would be
7. Haemophilia.
8. Huntington’s disease.
9. Phenylketonuria (PKU).
10. Fragile X Syndrome.
11. The cells of a human have a diploid number of 46.

Which one of the following combinations best identifies the number of chromosomes in a heart cell, spermatozoa and a fertilised egg?

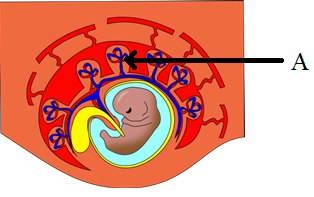
|  |  |  |  |
| --- | --- | --- | --- |
|  | Heart Cell | Spermatozoa | Fertilised Egg |
|  | 46 | 23 | 92 |
|  | 23 | 46 | 23 |
|  | 46 | 23 | 46 |
|  | 23 | 92 | 92 |

**Question 20 refers to the diagram below.**



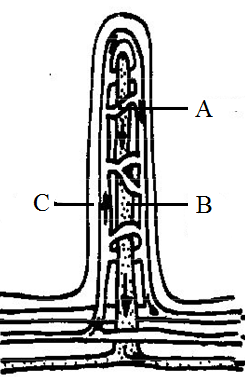
1. The movement depicted in the diagram above is best described as
2. flexion.
3. extension.
4. abduction.
5. adduction.
6. Which of the following sexually transmitted infections cannot be cured?
7. Herpes
8. Gonorrhoea
9. Syphilis
10. Trichomonas vaginalis
11. Ongoing exposure to asbestos fibres can increase the chances of a person developing
12. pneumonia.
13. asthma.
14. tuberculosis.
15. lung cancer.
16. ATP releases energy from its molecule when the bond between the
17. adenine and glucose is formed.
18. second and third phosphate is broken.
19. first and second phosphate is formed.
20. the adenine and ribose is broken.

**Question 24 refers to the diagram below.**



1. Once implanted, small finger-like projections, identified by the letter A, develop from the outer layer of cells of the blastocyst. These projections are known as
2. umbilical veins.
3. umbilical arteries.
4. chorionic villi.
5. amniotic sac.
6. The primary germ layer associated with the formation of the nervous system is
7. ectoderm.
8. endoderm.
9. mesoderm.
10. chorion.
11. The role of the gall bladder in the digestive system is to
12. produce bile that is deposited into the liver.
13. produce pancreatic juices that are deposited into the small intestine.
14. store and release bile into the small intestine.
15. store and release pancreatic juice into the pancreas.
16. Which of the following best identifies the process of deamination?
17. Amino Acid + Oxygen 🡪 Urea + Water
18. Carbon Dioxide + Amino Acid 🡪 Ammonia + Carbohydrate
19. Carbon Dioxide + Ammonia 🡪 Urea + Water
20. Amino Acid + Oxygen 🡪 Ammonia + Carbohydrate

**Question 28 refers to the diagram below, which shows a structure found within the human small intestine.**



1. Which of the following statements is **incorrect**?
2. Short distance between structures A and C increases diffusion rate
3. Microvilli on structure C increases surface area
4. Glucose molecules move into C through diffusion and active transport
5. Structure B is part of the lymphatic system and is used to transport lipids
6. Which of the following terms best describes a teratogen?
7. A life-support system that aids in protecting the foetus
8. A chemical that stimulates the formation of organs
9. An environmental factor that causes birth defects
10. A substance that causes mutations
11. Although cell shape varies, all cells in the human body are small. The best explanation for this is that as the size of the cell increases
12. volume and surface area increases.
13. volume increases at a greater rate than the surface area.
14. surface area and volume increase.
15. surface area increases at a faster rate than the volume.

**Section Three: Extended answer 20% (40 Marks)**

This section has **three (3)** questions. You must answer **two (2)** questions. Write your answers on the lined pages provided.

Supplementary pages for the use of planning/continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Responses could 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: 50 minutes.

Answer any **two (2)** questions from Questions 40 to 42.

Indicate the questions you will answer by ticking the box next to the question. Write your answers on the pages that follow.

**Question 40 (20 marks)**

1. Hormones released from the pituitary gland and ovaries regulate the menstrual and ovarian cycles. State the name of **two** of these hormones and describe the effect they have on the reproductive cycles.

(6 marks)

1. Prolactin, a lactogenic hormone, is a protein that has a direct effect on the breasts of pregnant women to produce and maintain milk.

Describe the process of protein synthesis that would result in the production of the hormone prolactin. (14 marks)

**Question 41 (20 marks)**

1. The probability of any one person being born has been calculated to be approximately 1 in 400,000,000,000. Explain how the genetic (DNA) variation seen in humans can arise due to meiosis and reproduction. (8 marks)
2. Explain how the lungs are specifically structured and function to ensure that cells are constantly supplied with oxygen and have their waste product, carbon dioxide, removed. (12 marks)

**Question 42 (20 marks)**

1. For the cells of a body to function normally, they must remain in a stable environment. Describe the structure of the cell membrane and explain how it allows the exchange of ions to occur. (14 marks)
2. Some chemical processes occurring in the body produce toxic waste products, such as urea. The excretory system is involved in removing metabolic wastes. Briefly describe the main processes involved for the kidneys to produce urine. (6 marks)

Question number: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Question number: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**ACKNOWLEDGMENTS**

**Question 7-8** DataBase Center for Life Science (DBCLS) [Generalised Cell Organelle Image]. (n.d.) Retrieved November, 2017, from: https://commons.wikimedia.org/wiki/File%3A201601[...]

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