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DEPARTMENT OF
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

LIFE SCIENCES

ASSIGNMENT

13 AUGUST 2024

MARKS: 100

DURATION: 2 HOURS

This paper consists of 8 pages.

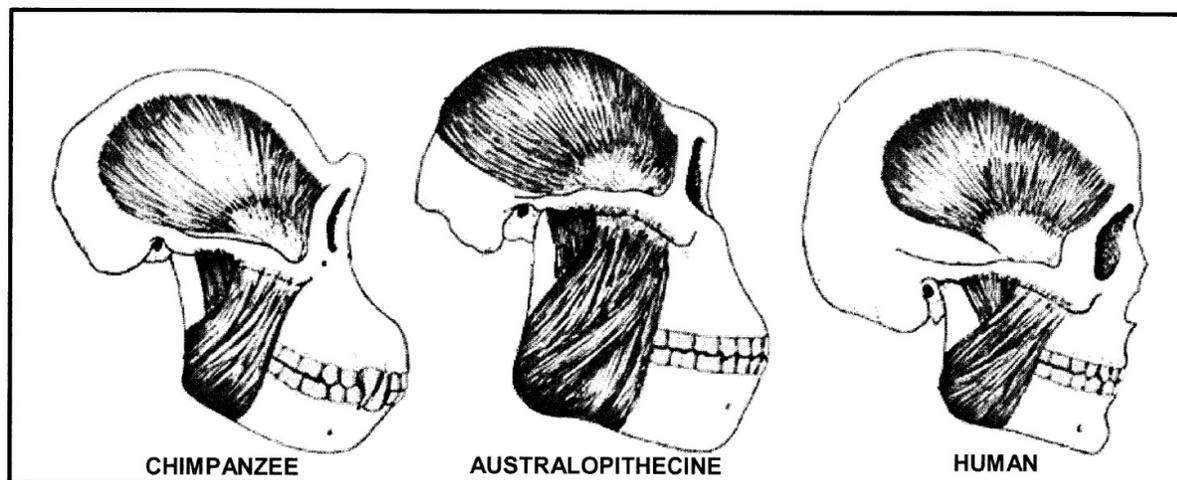
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your ANSWER BOOK.
3. Start the answers to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. ALL drawings should be done in pencil and labelled in blue or black ink.
7. Draw diagrams, flow charts or tables only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You may use a non-programmable calculator, protractor and a compass where necessary.
11. Write neatly and legibly.

QUESTION 1

- 1.1 Study the following diagrams of the skull of a chimpanzee, an Australopithecine and a modern human.



- 1.1.1 Compare the difference between the size of the teeth of the human and the chimpanzee AND explain the reason for this development. (4)
- 1.1.2 Apart from the difference in teeth size, tabulate THREE other differences between the skull of the chimpanzee and human that are visible in the diagram. (7)
- 1.1.3 In all three skulls the eyes are facing forward. Explain the significance of this characteristic. (3)
- 1.1.4 Humans and Apes share many characteristics, yet each is distinct species. Name four characteristics that Apes share with humans. (4)
- 1.1.5 Hominids have different average brain volumes. Account for the bigger brain volume in humans. (4)
- 1.1.6 Using the diagram above, give the sequence in which the genus and organisms appeared on earth. (2)
- 1.1.7 Explain why the following statement is NOT true: "Humans evolved from chimpanzee". (2)
- [26]**
- 1.2 Name and explain the THREE skeletal structures that contributed to bipedalism in humans. (9)
- TOTAL QUESTION 1: [35]**

QUESTION 2

- 2.1 Mustard plants, of the genus *Brassica*, have hairs/trichomes on their leaves to reduce transpiration. The number of hairs on the leaves vary from plant to plant.

An investigation was conducted to determine whether artificial selection could increase the number of plants with more hairs on the leaves.

The students carried out the following procedure:

- 180 mustard plants were grown. This is the first generation.
- The number of hairs present on the edge of each mature leaf was counted per plant and an average calculated.
- The number of plants, with their averages, was counted and recorded.
- The plants with the most hairs, i.e. 25 or more hairs on the leaves were separated from the rest of the group and cross pollinated with one another.
- The seeds produced by these crosses were germinated and allowed to grow into plants. 180 of these plants were selected to represent the second generation.
- The number of hairs present on the edge of a mature leaf from each of the second generation of plants was recorded.

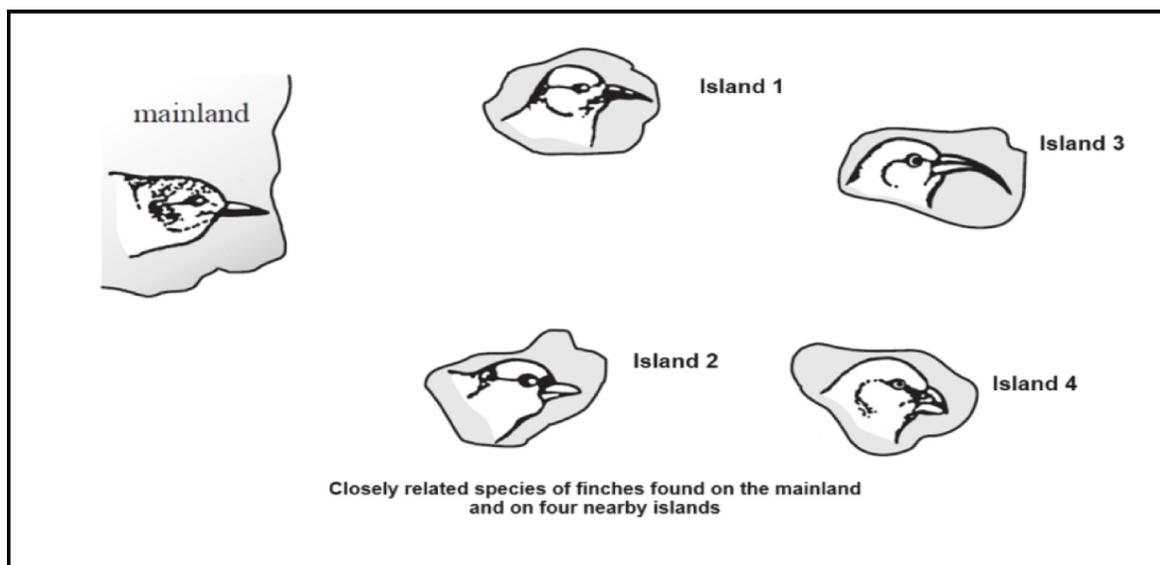
The results of the investigation are shown below:

WITHOUT ARTIFICIAL SELECTION		WITH ARTIFICIAL SELECTION	
Average number of hairs	Number of plants	Average number of hairs	Number of plants
0 – 5	50	0 – 5	8
6 – 10	35	6 – 10	5
11 – 15	24	11 – 15	18
16 -20	20	16 -20	25
21 – 25	25	21 – 25	35
26 - 30	12	26 - 30	45
31 – 35	8	31 – 35	30
36 - 40	6	36 - 40	14

[Adapted from: www.media.collegeboard.com]

- 2.1.1 Identify the:
- (a) Independent variable (1)
- (b) Dependent variable (1)
- 2.1.2 State TWO ways in which the students ensured that this investigation was valid. (2)
- 2.1.3 Give a conclusion for this investigation. (2)
- 2.1.4 Draw a histogram showing the results with artificial selection. (6)
- [12]**

- 2.2 The diagram below shows five closely related species of finches found on the mainland and on four nearby islands.



Describe how the different species on the four islands evolved over many generations from the original ancestor on the mainland.

(8)
[8]
[20]

- 3.1 Read the following articles carefully and answer questions below.

Article 1

TB is killing of thousands in the Eastern Cape

It is estimated by the end of next year some 50 000 people in the Eastern Cape will have to be treated for Tuberculosis. Already there are at least 275 000 cases in the province of which 31 000 are extremely ill.

Traditionally, one of the biggest problems regarding TB, is that patients stop taking their medication, when they feel better, and do not complete the full course. This has resulted in patients not being cured and they are often struck with the disease again. The Directly Observed Treatment (DOTS) is a new short-course treatment system which focuses on ensuring that TB patients adhere to their treatment regimen. It is now the only globally recognized method for effectively controlling the disease.

(From The Port Elisabeth Express, 3 March 1999)

Article 2

TB pandemic evolving?

According to the World Health Organization (WHO), between now and the year 2020, nearly one billion more people will be affected with TB, 200 million will get sick, and 70 million will die if control is not strengthened. Unfortunately, with long-term prescribed courses of medication, there is a tendency among patients to discontinue treatment when they feel better. The treatment must be completed to be effective.

(From Sunday Independent, 21 March 1999)

- 3.1.1 What does the DOTS approach to the treatment of TB comprise of? (2)
- 3.1.2 Why do you think, is DOTS a more effective method of treating TB than previous methods? (3)
- 3.1.3 What is the marked rise of TB cases in Africa attributed to? (2)
- 3.1.4 Both articles mention the importance of completing the course of treatment, and not to stop taking the medication once you feel better. Explain why this is so very important. (6)
- [13]**
- 3.2 Study the diagram below and answer questions that follow:



- 3.2.1 State ONE characteristic of the black mice which allows it to avoid predators. (1)
- 3.2.2 Explain, using your knowledge of natural selection, how the development of the allele for black fur helped black mice survive in a dark environment.

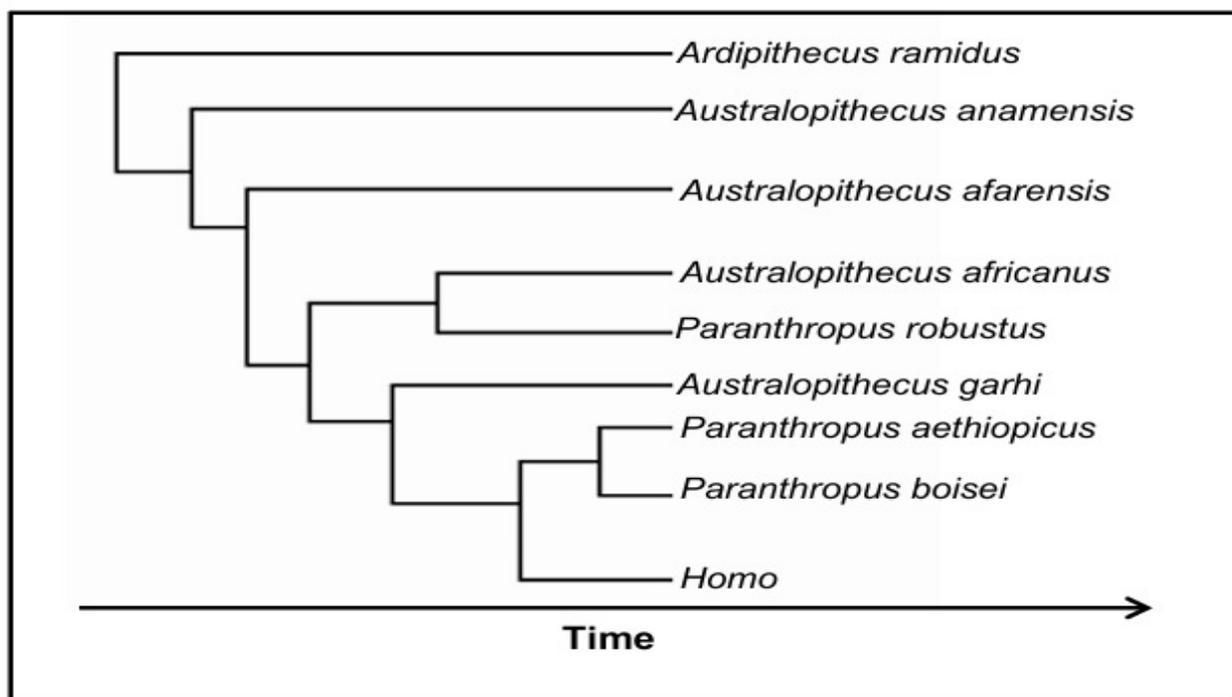
(6)
[7]

- 3.3 Plants require water from soil to produce their own food and are adapted through evolution to survive in their environment.



- 3.3.1 Describe how Jean Baptiste de Lamarck would have explained the evolution of long roots of plants. (6)
- 3.3.2 Explain the impact of Mendel's laws of heredity on Lamarck's hypothesis. (2)
- [8]**

3.4 The diagram below shows possible evolutionary relationship between hominids



[Source: <http://tolweb.org/tree>]

- 3.4.1 What is this type of the diagram called? (1)
- 3.4.2 How many genera are shown in the diagram above? (1)
- 3.4.3 According to this diagram, which:
- (a) Genus has most recently evolved. (1)
 - (b) Genus is the oldest. (1)
 - (c) Hominid share a common ancestor with *Australopithecus africanus*. (1)
- 3.4.4 Give one example of an *Australopithecus africanus* found in South Africa. (1)
- 3.4.5 Name TWO homo species besides *Homo Sapiens*, that were found in Africa. (2)
- 3.5 Fossils of the bipedal primates *Ardipithecus*, *Australopithecus* and early *Homo species* are used to support the 'Out of Africa' hypothesis.
- 3.5.1 State the 'Out of Africa' hypothesis. (3)
- 3.5.2 Describe TWO lines of evidence besides cultural evidence that support the 'Out of Africa' hypothesis. (6)

[9]
(45)

TOTAL MARKS

100