



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

LIFE SCIENCES

ASSIGNMENT

AUGUST 2025

MARKS: 100

TIME: 2 HOURS

This question paper consists of 11 pages

INSTRUCTIONS AND INFORMATION

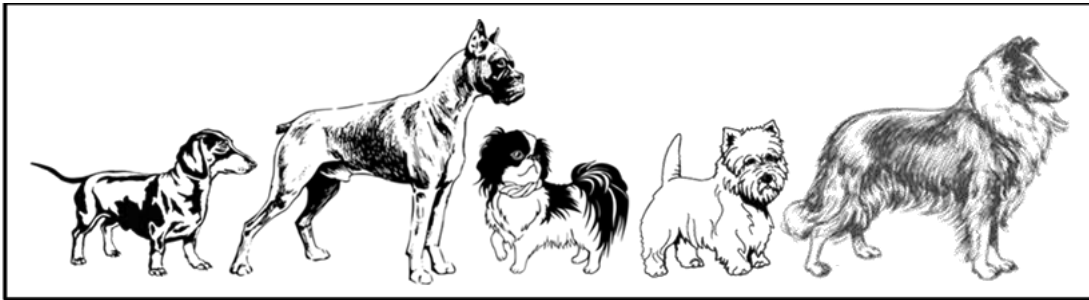
1. Answer ALL the questions
2. Write ALL the answers in the ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Present your answers according to the instructions of each question.
5. Do ALL drawings in pencil and label them in black or blue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

EVOLUTION BY NATURAL SELECTION: 50 MARKS**QUESTION 1:**

- 1.1. Since 1972, Peter and Rosemary Grant of Princeton University, USA, have studied finch populations in the Galápagos Islands. The table below shows data collected over seven years on a single finch population on Daphne Major.

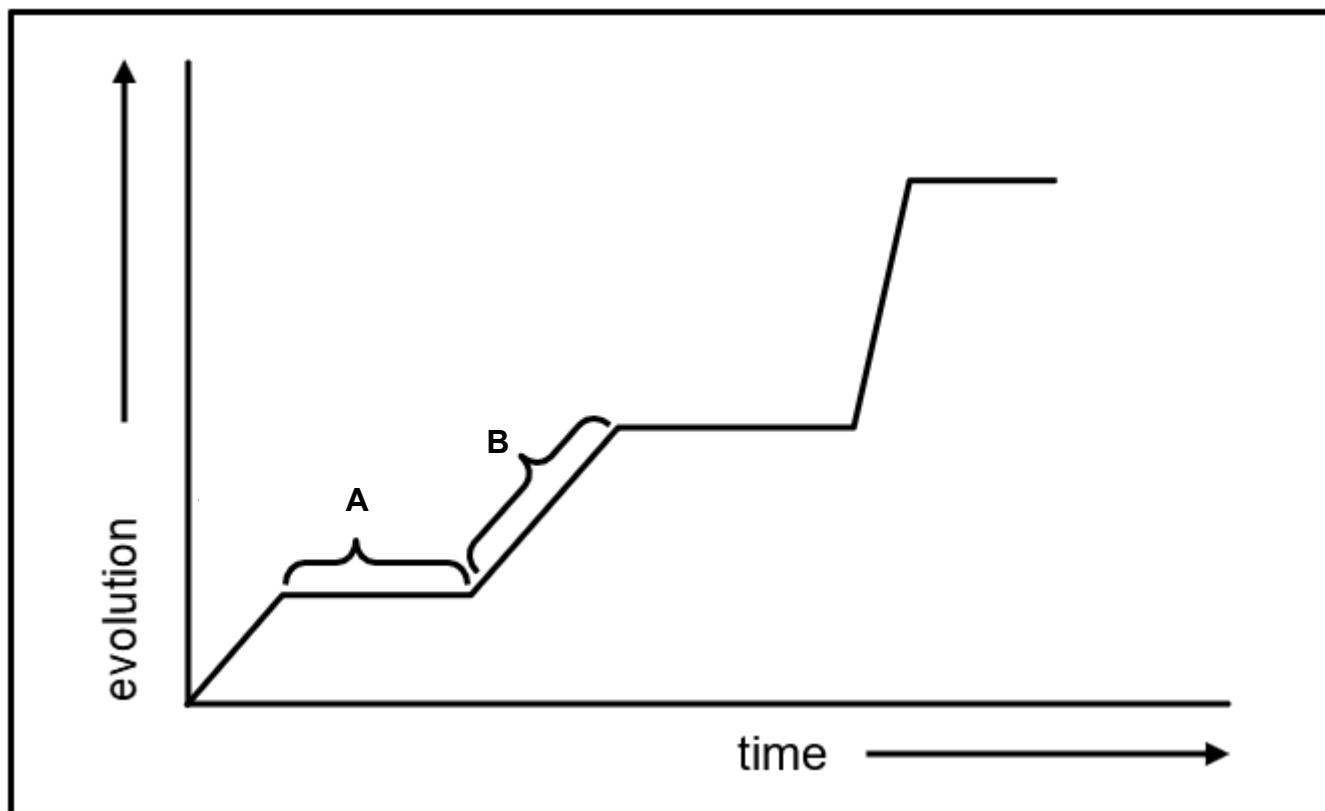
Year	1973	1974	1975	1976	1977	1978	1979
rainfall (mm)	-	-	130	20	130	70	50
number of finches	1100	1300	1100	200	350	300	250
small seeds (mg/m ²)	-	800	600	90	300	70	50

- 1.1.1. In which year were the largest drop in rainfall, number of seeds and number of finches recorded? (1)
- 1.1.2. Explain how the THREE events mentioned in question 1.1.1 are related to each other. (3)
- (4)
- 1.2. Many dog breeds exist today as shown in the diagram below.



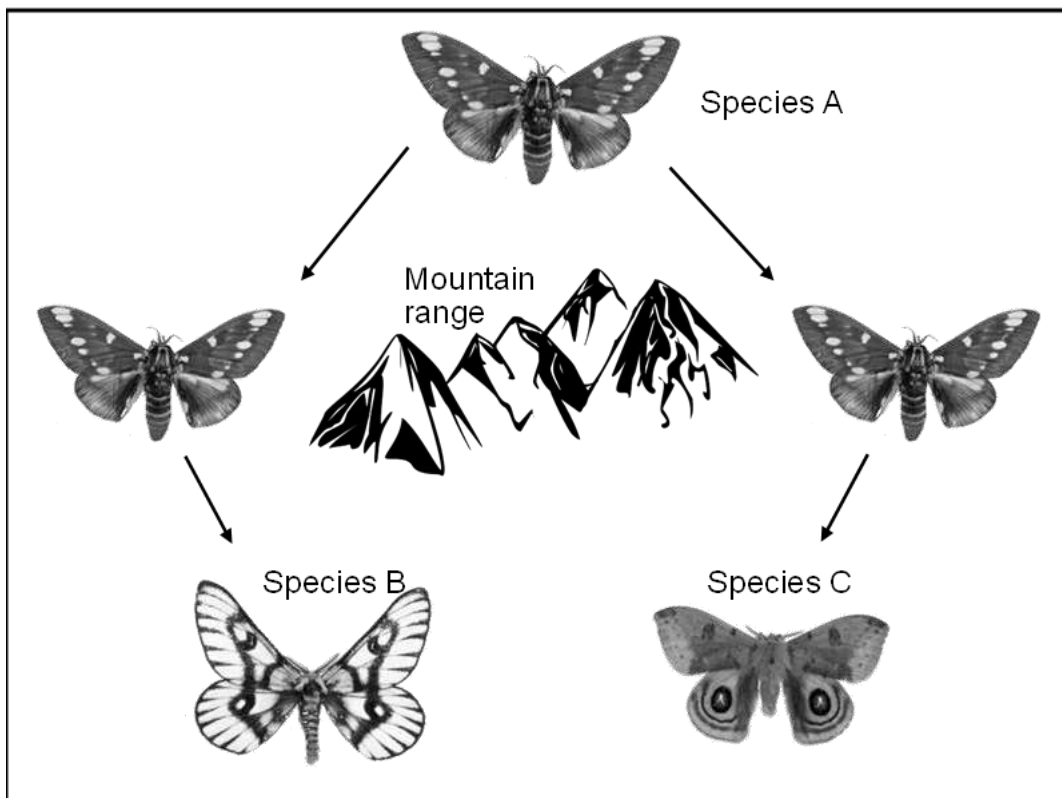
- 1.2.1. Explain why all breeds of domestic dogs belong to the same species. (2)
- 1.2.2. Describe how artificial selection has led to different breeds of domestic dogs. (3)
- (5)

1.3. The graph below shows the speed at which evolution occurs in a species of butterfly



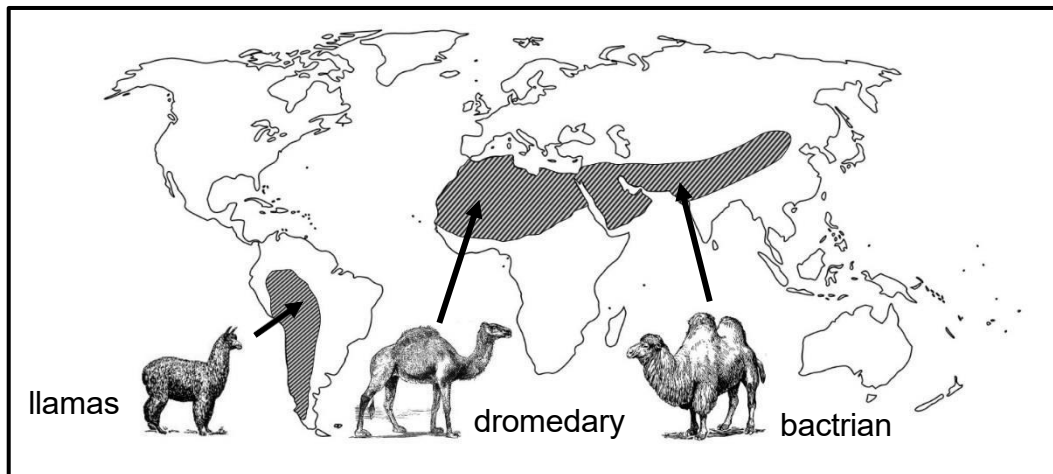
- 1.3.1. Based on the trends shown by A and B, describe the type of evolution represented in the graph (1)
- 1.3.2. Explain the trend in evolution represented by: (2)
- (a) Phase A (2)
- (b) Phase B (2)
- 1.3.3. Explain why the probability of speciation is high during phase B. (5)
- (10)

- 1.4. Study the diagram below showing a moth species that originally formed a single population but was later divided into two groups by the formation of a mountain.



- 1.4.1. Name the process which is illustrated in the diagram above. (1)
- 1.4.2. Explain the importance of the process you identified in question 1.4.1 above. (2)
- 1.4.3. Explain why species A is regarded as the ancestor of species B and C? (2)
- (5)

- 1.5. The diagram shows the distribution of various camels on the different continents. The arrows indicate the current distribution of the animals.



(Adapted from <http://www.ck12.org>)

Explain how speciation of camels may have occurred

(6)

(6)

QUESTION 1: 30 MARKS

QUESTION 2

2.1. Lizards of a certain species on an island are usually brown in colour. A mutation in one gene for body colour results in red or black lizards. Black lizards camouflage well against the dark rocks and warm up faster on cold days which will give them energy to avoid predators. Scientists investigated the relationship between the colour of lizards in a population and their survival rate on an island. They conducted the investigation as follows:

- They selected a group of lizards of a certain species in a habitat.
- They recorded the percentage of each colour (brown, red or black) in the selected group.
- They repeated the investigation over a period of 30 generations counting the numbers offspring per colour.

The results of the investigation are shown in the table below.

Colour of lizards	Percentage (%) of each colour In the population			
	Initial population	10th generation	20th generation	30th generation
Brown	80	80	70	40
Red	10	0	0	0
Black	10	20	30	60

(adapted from <https://hhmi.org/biolInteractive>)

2.1.1. State:

- (a) the independent variable (1)
- (b) the dependent variable (1)

2.1.2. Explain the effect of the mutation on the survival of red lizards. (2)

2.1.3. Explain why the scientists had to conduct this investigation over 30 generations. (2)

2.1.4. State two ways in which the scientists could have improved the validity of the investigation (2)

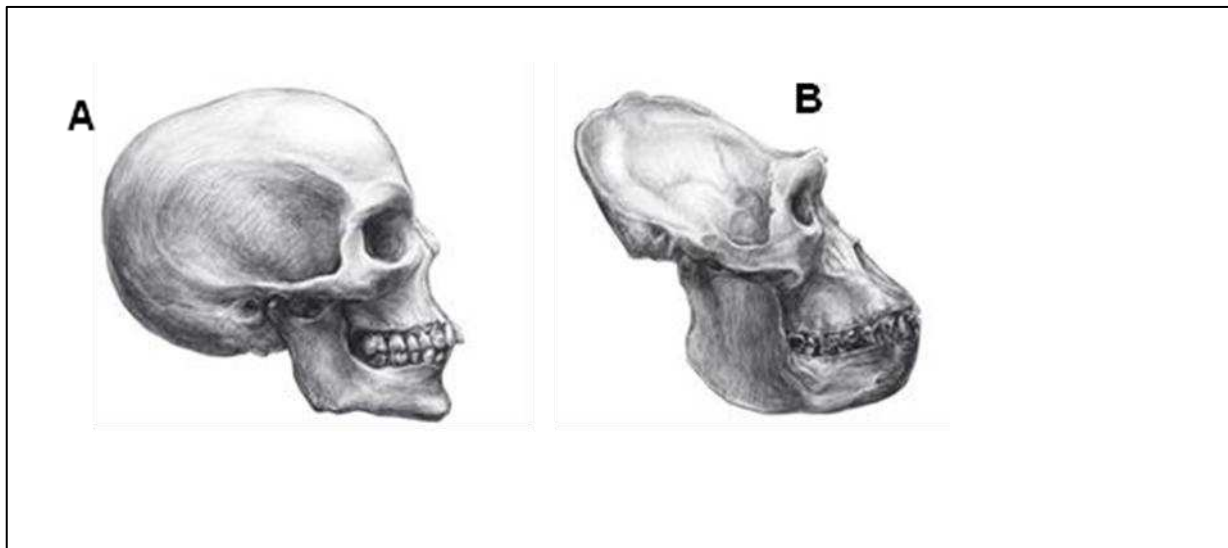
2.1.5. Use the theory of natural selection to explain the higher percentage of black lizards in the population of the 30th generation. (6)

2.1.6. Draw a bar graph to compare the percentage of the brown and the black lizards in the initial population and the 30th generation. (6)

QUESTION 2: 20 MARKS

TOTAL FOR EVOLUTION BY NATURAL SELECTION: 55 MARKS**HUMAN EVOLUTION: 50 MARKS****QUESTION 3**

3.1. The diagram shows the skulls of two organisms; a human and a gorilla.



- 3.1.1. Which organism (A or B), is bipedal for most of its adult life? (1)
- 3.1.2. Tabulate two observable differences between the skull of organism A and B. (5)
- 3.1.3. Name and explain THREE possible advantages of bipedalism for an organism. (6)
- (12)

3.2. Read the following passage, then answer the questions based on it.

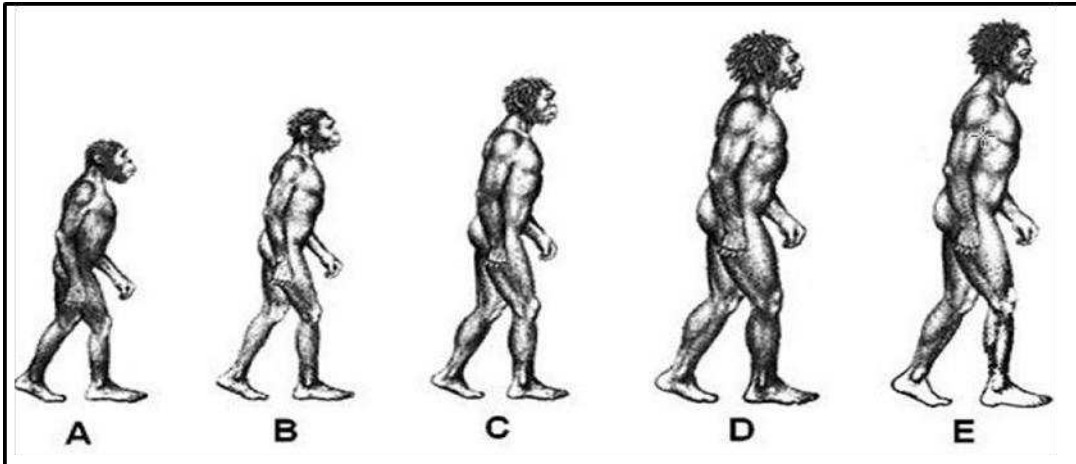
Australopithecus sediba

According to those who discovered the fossil remains of *Australopithecus sediba*, this species shared many characteristics with *Australopithecus africanus*, from which it descended. The species however also reveals a number of early *Homo* features, more so than any other *Australopithecus* species. This suggests that *A. sediba* is possibly ancestral to *Homo*, though it may also be an evolutionary dead end.

Like other species from the genus *Australopithecus*, *A. sediba* had a relatively small brain size. The length of the legs, arms adapted for climbing trees, and details of the teeth also resemble earlier *Australopithecines*. On the other hand, the species' hand with the precision grip of a toolmaker, and its facial features closely resemble those of early *Homo* species. Remarkably, *A. sediba* had a more human-like pattern of movement than a fossil attributed to *Homo habilis*. The pelvic structure of *A. sediba* suggests this species walked upright on a regular basis. The legs and feet however point to a previously unknown way of walking upright. With each step, *Australopithecus sediba* turned its foot inward with its weight focused on the outer edge of the foot.

- 3.2.1. Who discovered *Australopithecus sediba*, and where? (2)
- 3.2.2. *A. sediba* is described as having adapted for climbing trees. What is the evidence from the passage that suggests that? (1)
- 3.2.3. Define the term 'transitional fossil'. (2)
- 3.2.4. **A. sediba** is described as possibly an "evolutionary dead end". What is an evolutionary dead end? (3)
- 3.2.5. According to the passage, *Australopithecus sediba* had a previously unknown way of walking upright. What does this suggest for the evolution of bipedalism? (2)
- 3.2.6. Is bipedalism and standing upright the same thing? (5)
Use examples to explain. (15)

3.3. The diagram above shows the progression of human evolution. Study the diagram of some early hominin A, B, C, D and E which represent *Homo erectus*, *Homo sapiens*, *Australopithecus*, *Homo habilis* and *Homo Neanderthalensis*, in no particular order.



- 3.3.1. Identify each of the above hominid members (A – E) correctly from the list given above. (5)
- 3.3.2. Mention any three common characteristics which are shared by the members represented in the above diagram. (3)
- 3.3.3. Supply any three characteristics that make the organism, labelled E different from other primates. (3)

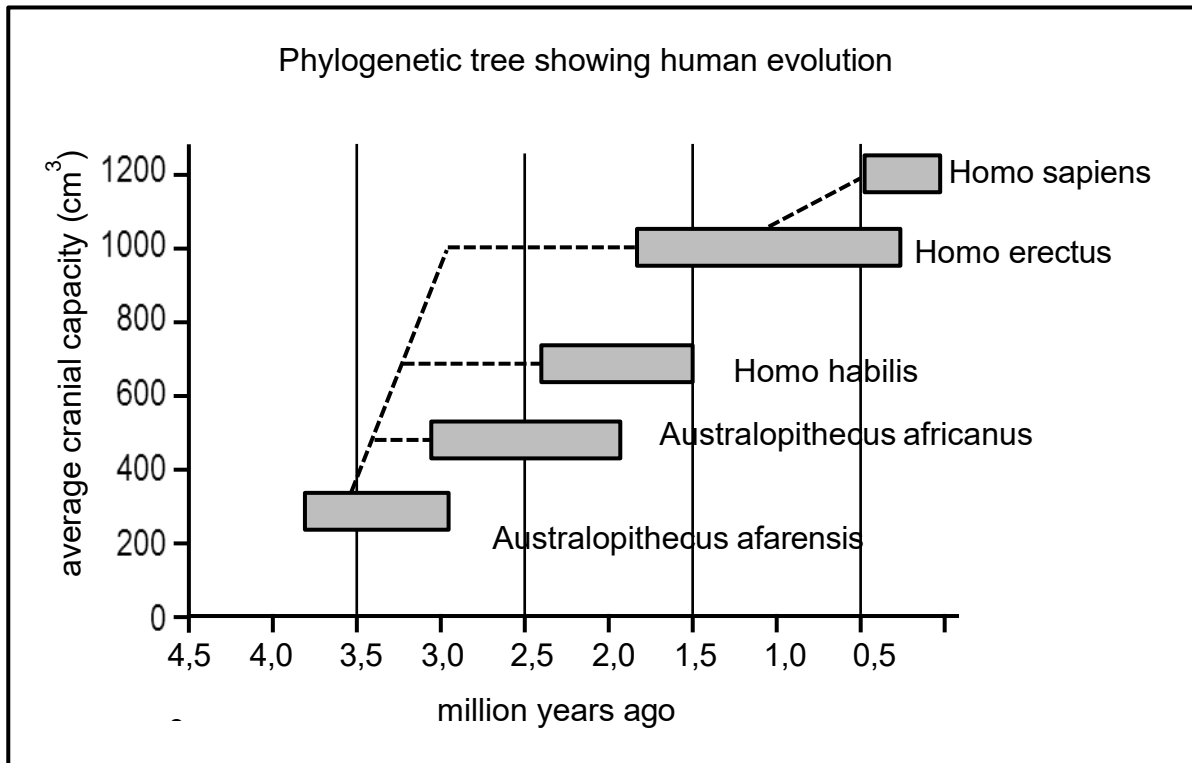
(11)

QUESTION 3: 33 MARKS**QUESTION 4**

- 4.1. A larger brain size is often associated with a greater intelligence. Accordingly, *Homo neanderthalensis*, with a larger brain than *Homo sapiens*, should have been more intelligent, and thus better able to adapt to climate changes. Yet *H. neanderthalensis* is extinct, while *H. sapiens* flourishes.
- 4.1.1. What other factor related to the brain could explain this? (2)
- 4.1.2. Explain the relationship between the decrease in the jaw size of evolving hominin species and their increasing brain size. (3)

(5)

4.2. Study the phylogenetic tree below and answer the questions that follow



4.2.1. Define a phylogenetic tree. (2)

4.2.2. Which organism is considered to be the common ancestor of all species shown above? (1)

4.2.3. Which organism has the biggest cranial capacity? (1)

4.2.4. Calculate the time difference between the evolution of *Homo erectus* and *Homo sapiens*. (3)
(Show your working.)

QUESTION 4: 12 MARKS

TOTAL FOR HUMAN EVOLUTION: 50 MARKS

GRANDTOTAL: 100 MARKS