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Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

SEPTEMBER 2013

LIFE SCIENCES P2

MARKS: 150

TIME: 2½ hours



This question paper consists of 14 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

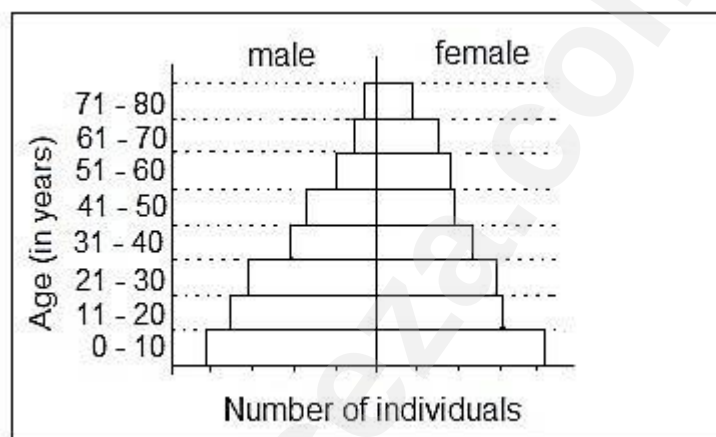
1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start EACH question on a NEW PAGE.
4. Number the answers correctly according to the numbering system used in this question paper.
5. If answers are NOT presented according to the instructions of each question, candidates will lose marks.
6. All drawings should be done in pencil and labelled in blue or black ink.
7. Draw diagrams and flow charts ONLY when requested to do so.
8. The diagrams in this question paper may NOT necessarily be drawn to scale.
9. The use of graph paper is NOT permitted.
10. Non-programmable calculators, protractors and compasses may be used.
11. Write neatly and legibly.

SECTION A

QUESTION 1

- 1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A – D) next to the question number (1.1.1 – 1.1.10), for example 1.1.11 D.

- 1.1.1 Which ONE of the following is a CORRECT interpretation of the age-gender graph below?



- A Rapidly growing population; characteristic of a developing country
 B Declining population; characteristic of a developing country
 C Stable population; characteristic of a developed country
 D Declining population; characteristic of a developed country
- 1.1.2 A population consists of ...
- A individuals of the same kind.
 B different ecosystems.
 C communities of different organisms.
 D different species.
- 1.1.3 The interaction between two organisms where one benefits and the other neither benefits nor is disadvantaged is known as:
- A Predation
 B Commensalism
 C Parasitism
 D Mutualism
- 1.1.4 The number of chromosomes in the primary spermatocyte is ...
- A half that in the spermatogonia.
 B half that in the secondary spermatocytes.
 C equal to that in the spermatogonia.
 D equal to that in the secondary spermatocytes.

1.1.5 Which ONE of the following functions as an exocrine gland?

- A Pancreas
- B Thyroid
- C Adrenal gland
- D Pituitary gland

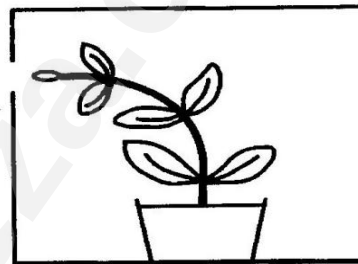
QUESTIONS 1.1.6 and 1.1.7 are based on the information and diagram below:

Two identical potted plants X and Y, of the same age and size were placed in the light, but plant Y was placed in a box with a hole on one side.

The diagram below shows the plants after 5 days.



PLANT X



PLANT Y

1.1.6 Which combination of the following statements is correct?

- i The shoots of both plants have grown towards moisture.
- ii The shoot of plant Y has grown more than the shoot of plant X.
- iii The shoot of plant Y has grown against the force of gravity but the shoot of plant X has not.
- iv The shoot of plant Y has grown towards light from one side but the shoot of plant X grew in response to uniform light.
- v The shoots of both plants have grown in the direction of the force of gravity.

- A (ii) and (iv)
- B (i) and (ii)
- C (iii) and (v)
- D (i) and (v)

1.1.7 The reaction of plant Y is caused by growth hormones that ...

- A form only in the presence of light.
- B cannot function in the dark.
- C stimulate cell elongation on the shaded side.
- D inhibits cell division on the lighted side.

- 1.1.8 The ability of the lens to change its curvature is known as ...
- A astigmatism.
 - B binocular vision.
 - C pupillary mechanism.
 - D accommodation.
- 1.1.9 An ecological niche describes the position or role of a species or population ...
- A geographically.
 - B within a social hierarchy.
 - C globally.
 - D within an ecosystem.

- 1.1.10 The rate of change of a population can be calculated by the following formula:

$$\text{Rate of change} = (\text{birth rate} + \text{immigration rate}) - (\text{death rate} + \text{emigration rate})$$

Use the table below to determine the rate of change for week 2.

Population parameter (per week)	Week 1	Week 2
Birth rate	110	270
Immigration rate	10	30
Death rate	145	20
Emigration rate	10	70

- A -35
- B 30
- C 210
- D -30

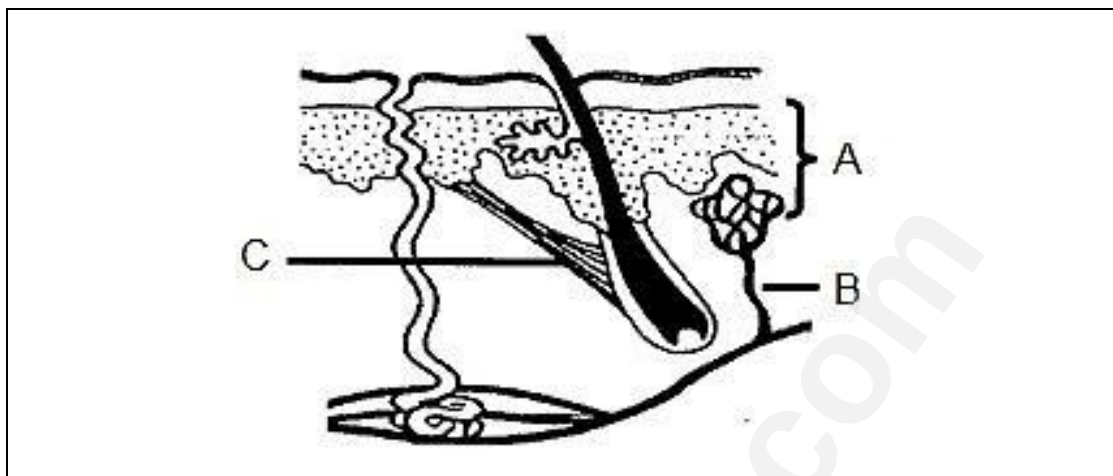
(10 x 2) (20)

- 1.2 Give the correct BIOLOGICAL TERM for each of the following descriptions. Write only the term next to the question number (1.2.1 – 1.2.10) in the answer book.
- 1.2.1 Kind of behaviour that animals use to identify mating partners
- 1.2.2 The one-way movement of individuals into the population area
- 1.2.3 Development characterised by the production of young with their eyes opened and bodies covered with soft feathers
- 1.2.4 The development of a community over time where species in one stage are replaced by other species
- 1.2.5 The process whereby a small amount of amniotic fluid containing foetal cells is withdrawn and analysed for genetic defects
- 1.2.6 Change in form of an animal during its life cycle
- 1.2.7 The jelly-like substance that fills the posterior part of the eye
- 1.2.8 The tube that connects the middle ear with the pharynx
- 1.2.9 Careful use of natural and human resources so that they will also be available to future generations
- 1.2.10 A phase of rapid growth in the logistic growth form (10 x 1) (10)
- 1.3 Indicate whether each of the statements in COLUMN I, applies to A ONLY, B ONLY, BOTH A and B, or NONE of the items in COLUMN II. Write A ONLY, B ONLY, BOTH A and B, or NONE next to the question number in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Eye defect caused by a lens that is too convex	A Hypermetropia B Astigmatism
1.3.2	Endocrine gland found directly under the hypothalamus	A Pituitary B Thyroid
1.3.3	The male reproductive structure of a plant	A Anther B Filament
1.3.4	The phase during population growth where animals adapt to their new environment	A Lag phase B Logarithmic phase
1.3.5	Part of the brain involved when picking up a school bag	A Cerebrum B Cerebellum
1.3.6	A membrane separating the outer and middle ear	A Round window B Oval window
1.3.7	All the plants and animals living in a defined area	A Population B Community

(7 x 2) (14)

- 1.4 Study the diagram that shows a section through the skin and answer the questions that follow.



- 1.4.1 Identify parts A and C. (2)
- 1.4.2 What change will part B undergo if the environmental temperature suddenly rises? (1)
- 1.4.3 Name THREE advantages that the change in QUESTION 1.4.2 will have in the body. (3)

TOTAL SECTION A: 50

SECTION B**QUESTION 2**

2.1 A man and his wife (Mr and Mrs Abrahams) were in a car accident. Neither had any signs of having a brain injury. They were blindfolded and tested as follows:

- The fingertip of each patient was pricked with a pin.
- Each patient was asked to move his or her hand.

The results are recorded in the following table.

Patient	Observations
Mrs Abrahams	She felt pain from the pinprick but could not move her hand.
Mr Abrahams	He did not feel pain from the pinprick but could move his hand.

2.1.1 In relation to the observations made, explain what part of the nervous system was most likely to have been affected by the car accident in each case? Explain how you arrived at each of your answers. (6)

2.1.2 If either patient had serious damage to the spinal cord at the neck, what observations would you have expected? Explain your answer. (3)

2.1.3 Explain why patients in a vehicle accident should not be moved until they have been given a neck brace (device used to support a patient's neck and head). (3)

2.2 Read the article and answer the questions that follow.

The discovery of Alzheimer's Disease (AD)

Alzheimer's disease (AD) is an irreversible brain disease that slowly destroys brain cells, causing loss in memory and thinking skills serious enough to interfere with daily life. The symptoms first appear after age 60, making it the most common cause of dementia among older people.

It is a neurological brain disorder named after a German physician, Alois Alzheimer, who first described it in 1906. He noticed changes in the brain of a woman who had died after an unusual mental illness. Her symptoms included memory loss, language problems and strange behaviour. After she died he inspected her brain and found many abnormal clumps and tangled bundles of nerve fibres.

Abnormal clumps, tangled bundles of nerve fibres and the loss of connections between brain cells are all symptoms of the disease. AD gets worse over time, with death due to organ failure usually occurring two to eight years after the start. At present there is no cure.

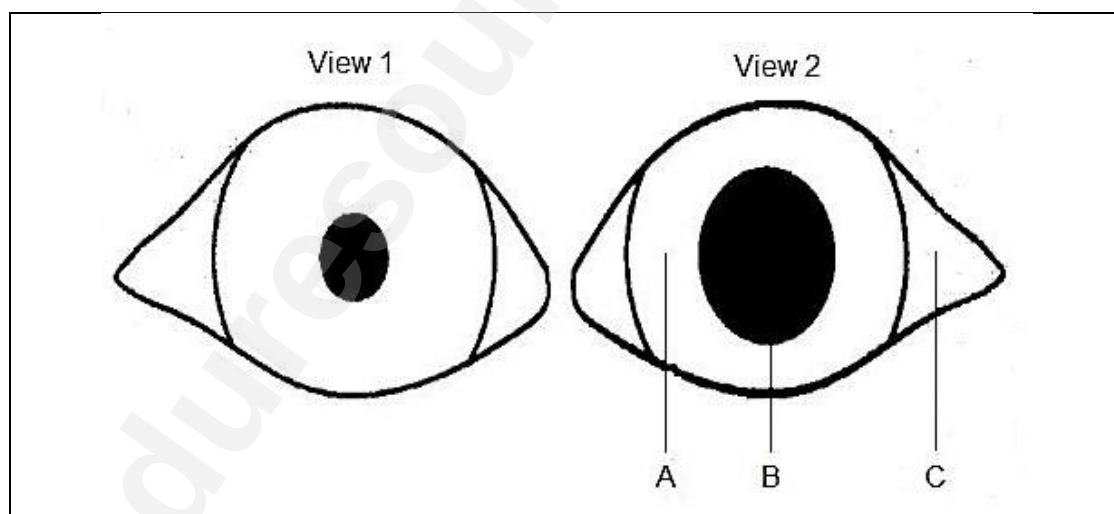
[Adapted from: www.ALZinfo.org. Fisher Centre for Alzheimer's Research foundation]

The table below presented by the World Health Organisation shows the percentage of people in the general western population affected by AD in different age groups.

Age Groups (years)	Percentage of patients with AD (%)
65 – 69	1,4
70 – 74	2,8
75 – 79	6,6
80 – 84	11,1
85+	23,6

- 2.2.1 What was the percentage increase of patients with AD, between the oldest two age groups? (1)
- 2.2.2 What seems to be the earliest symptoms of Alzheimer's Disease? (1)
- 2.2.3 Describe how the person's brain looked like when it was dissected. (2)
- 2.2.4 What is the main cause of death in a person with AD? (1)
- 2.2.5 Use the table to plot a histogram to show the occurrence of AD. (6)

- 2.3 The following diagram shows two frontal views of an eye. Study the diagram and answer the following questions.



- 2.3.1 Provide labels for parts **A**, **B** and **C**. (3)
- 2.3.2 What has caused the changes shown from view 1 to view 2? (1)
- 2.3.3 Describe how this change was brought about. (3)

[30]

QUESTION 3

3.1 Answer the following questions concerning the factors that influence population size.

3.1.1 Define the term *dispersal*. (3)

3.1.2 Name the THREE types of dispersal that may occur in animals. (3)

3.2 Read the article and answer the questions that follow.

African wild dog threats

Viable (capable of working successfully) populations of the African wild dog currently exist in South Africa, Botswana, Kenya, Mozambique, Tanzania, and Zambia. African wild dogs require large home ranges (geographic areas to which an organism confines its activity) to support successful populations, which are capable of normal growth and development and recent habitat fragmentation, has caused a population decline. African wild dogs traditionally have a reputation for attacking livestock, and despite this rarely occurring in practice, they are often persecuted (mistreated) wherever they encounter humans.

In addition, road accidents and incidental snaring (trapping device) have become an important cause of mortality. A final threat that keeps African wild dog populations low is competition and predation with the larger carnivores (canids) of the African savannah such as lions and spotted hyenas.

The current population of the African wild dog is estimated to be less than 5 500 and therefore under threat. Preventing persecution by humans through education is also a priority of the conservation action plan, in an effort to preserve this most intriguing and unique canid.

[Freely adapted from: www.arkive.org/African-wild-dog]

3.2.1 Define the terms:

(a) Habitat (2)

(b) Conservation (2)

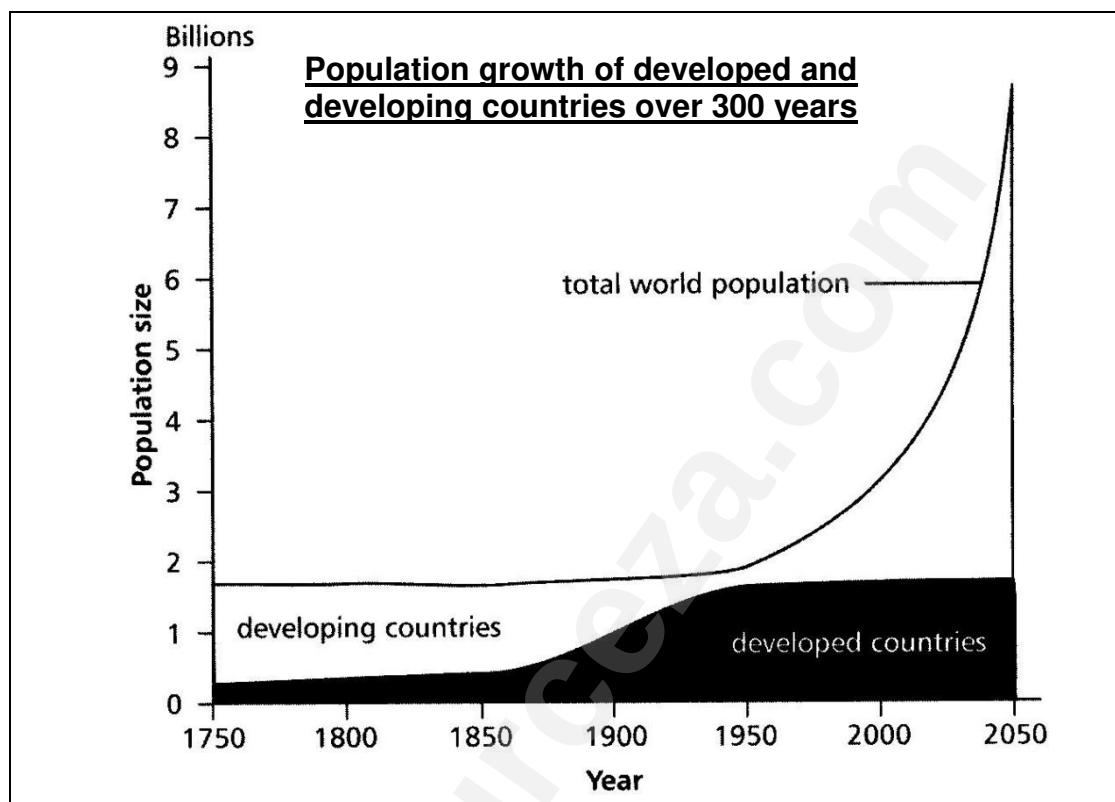
3.2.2 What is the main reason why humans kill these animals? (1)

3.2.3 Other than your answer given in QUESTION 3.2.2, name TWO other causes for the decline in the African Wild dog population. (2)

3.2.4 What can be seen as the best way to conserve these carnivores? (1)

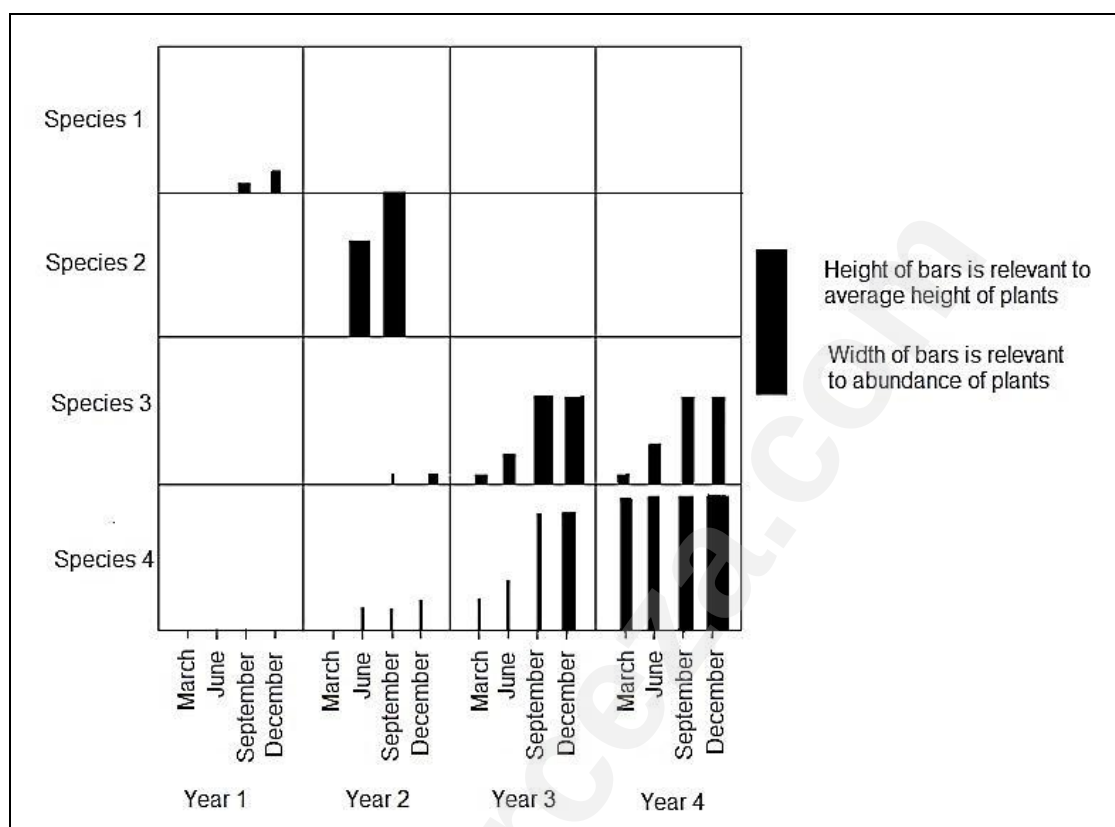
3.2.5 What evidence from the paragraph shows that the answer given in QUESTION 3.2.2 is not a valid reason for humans to kill these animals? (1)

- 3.3 Study the graph below which shows population change over time for developed and developing countries. The bottom black panel reflects the change for developed countries, while the top white panel reflects changes for developing countries.



- 3.3.1 Calculate the difference in population size between developing and developed countries for the year 2050. (2)
- 3.3.2 Name the growth curve shown by developing and developed countries respectively. (2)
- 3.3.3 Developing countries like India and Brazil tend to have higher fertility rates (the expected number of children born per woman in her childbearing years). How does the population growth curve support this statement? (3)

- 3.4 Study the diagram showing succession and answer the questions that follow.



- 3.4.1 Is this diagram showing primary or secondary succession? Give reasons for your answer. (3)
- 3.4.2 Which TWO species are present in the climax community? (2)
- 3.4.3 Which species is the pioneer species? (1)
- 3.4.4 In which year was there the greatest species diversity? (1)
- 3.4.5 Species 4 is present from year 2, but at low abundance (number of species) and as a small plant. What is a possible reason for its increased size and abundance by year 4? (1)

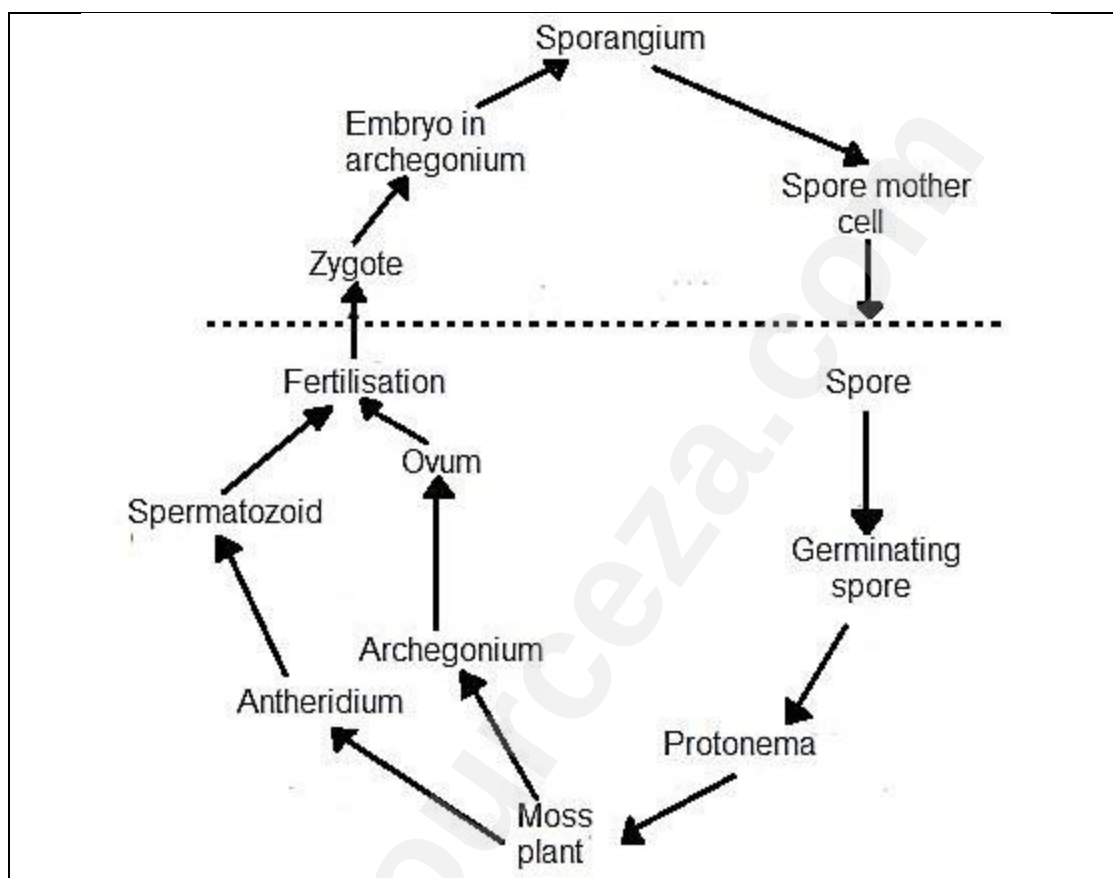
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TOTAL SECTION B: 60

SECTION C

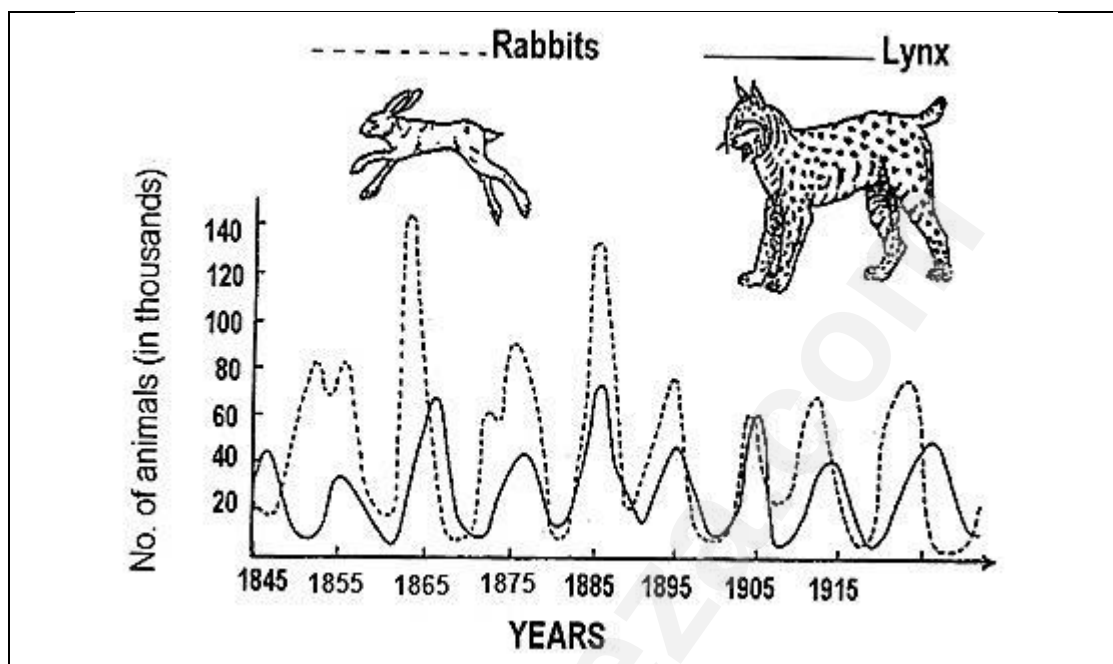
QUESTION 4

4.1 Study the life cycle of a moss plant and answer the questions that follow.



- 4.1.1 Is it the gametophyte- or sporophyte generation which is dominant in the moss? (1)
- 4.1.2 Is the mature sporophyte dependent on the gametophyte? (1)
- 4.1.3 State whether each of the following are haploid (n) or diploid (2n). (1)
- (a) Spores (1)
 - (b) Eggs (1)
 - (c) Protonema (1)
 - (d) Sporangium (1)
- 4.1.4 Does the dominant generation reproduce sexually or asexually? (1)
- 4.1.5 Name the environment factor that the gametophyte depends on for reproduction. (1)

- 4.2 The graph below shows changes in population numbers of rabbits and lynx (member of the cat family) over 80 years. Study the graph carefully and then answer the questions, which follow.



- 4.2.1 State the term that is used to describe the relationship between the rabbit and the lynx. (2)
- 4.2.2 How many of the following animals were present in 1885? (1)
- (a) Rabbits (1)
- (b) Lynx (1)
- 4.2.3 What happens to the number of lynx when the rabbit population increase? (1)
- 4.2.4 Explain your answer to QUESTION 4.2.3. (2)
- 4.2.5 What effect did the large number of lynx have on the rabbit population? (1)
- 4.2.6 Define the term *predator*. (2)
- 4.2.7 In an energy pyramid with three trophic levels (producers, primary consumers and secondary consumers, which trophic level will represent the lynx? (1)
- 4.2.8 In which year was the rabbit population the highest? (1)
- 4.3 Write a mini-assay describing the hormonal control of the menstrual cycle. (17)

Content (17)

Synthesis (3)

NOTE: NO marks will be awarded for answers in the form of flow charts or diagrams.

TOTAL SECTION C: 40

GRAND TOTAL: 150

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