

SUGGESTED PAPER TWO QUESTIONS with answers

SECTION A QUESTION 1

1.1 Various possible options are provided as answers to the following questions. Choose the correct answer and write only the letter (A - D) next to the question number (1.1.1 - 1.1.4) in the answer book, for example 1.1.5 D.

1.1.1 A living organism found only in a particular region is referred to as being ...
A extinct. B endangered. C endemic. D alien.

1.1.2 Which of the following may be reasons for the exploitation of natural resources?
1. Poverty and shortage of food
2. Use of indigenous plants for medicinal purposes
3. Use of wood to generate heat energy
A 1 and 3 B 1 and 2 C 2 and 3 D 1, 2 and 3

1.1.3 Extinction of species cannot occur as a result of ...
A disease. B competition. C fossilisation. D volcanic eruptions

1.1.4 Study the food chain shown below:
algae snail fish human
Which of the following is most unlikely to happen if humans exploit the fish population?
**A An increase in algae and snail populations
B A decrease in fish as food for humans
C An increase in the snail population
D A decrease in the algae population** 4 x 2 (8)

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 - 1.2.6).

- 1.2.1 Range of different species found in an environment
1.2.2 The removal of vegetation in large quantities to create space for human use
1.2.3 Remains of organisms which are preserved in sedimentary rocks
1.2.4 The movement of continents relative to each other across the surface of the Earth
1.2.5 The ability of a substance to be broken down into simpler substances by decomposition
1.2.6 A method of using resources in such a way that they are available for future generations (6)

1.3 Match the statements in COLUMN A with the items in COLUMN B. Write only the letter (A - G) next to the question number (1.3.1 - 1.3.5), for example, 1.3.6 J (5)

COLUMN A	COLUMN B
1.3.1 The small scale changes resulting from genetic adaptations within a species	A Homologous
1.3.2 Factors in the environment such as soil, air and water	B Fossil fuels
1.3.3 Structures that evolve separately to perform a similar function	C Analogous
1.3.4 Structures that appear different but have similar evolutionary origin	D Abiotic
1.3.5 Chemical energy stored in organisms that lived in the past	E Micro-evolution
	F Macro-evolution
	G Biotic

1.4 Study the following table showing the relationship between the average level of pollution and number of respiratory diseases reported per week in a town.

Year	Average sulphur dioxide concentration per week ($\mu\text{g}/\text{m}^3$)	Average smoke concentration per week ($\mu\text{g}/\text{m}^3$)	Average number of respiratory diseases reported per week
1980	5	10	10
1985	10	12	20
1990	17	20	30
1995	40	50	70
2000	10	10	20
2005	15	20	20

- 1.4.1 List THREE main sources of smoke pollution. (3)
1.4.2 According to the table, in which year was the smoke concentration the Highest? (1)
1.4.3 Describe the relationship between the number of respiratory diseases reported, and the sulphur dioxide concentration in the air. (2)
1.4.4 Name THREE respiratory diseases caused by pollution. (3)
1.4.5 List THREE possible ways of decreasing air pollution. (3)

1.5 The different species of finches are found on different Galapagos islands and are thought to have originated from a seed-eating ancestral species from the mainland of South America. They resemble each other in their internal body structure but differ in the shape and sizes of their beaks and hence their feeding habits.

- 1.5.1 Explain what is meant by 'geographical isolation of a population'. (2)
1.5.2 Why do you think the different finch species became adapted to eat different food types? (1)
1.5.3 Explain the process by which the different species adapted and evolved to eat different food types. (5)

1.6 Study the passage below and answer the questions that follow.
The cheetah (*Acinonyx jubatus jubatus*) found in southern Africa is classified as a critically endangered species. Very small populations are also found in West, East and Central Africa and in Asia.

Research has shown that the gene pool of this kind of cheetah is extremely small. This means that the species has lost most of its variety of alleles. Two major events appear to be the cause of limiting this cheetah's gene pool. The first one is an ice age when most members of the species died out. The second one was about 120 years ago when cheetahs became popular targets for hunters and farmers.

Reduction of the gene pool led to inbreeding, passing on unfavourable characteristics such as the inability to adapt to new environments, difficulty of breeding in captivity and increased ability to contract diseases easily.

- 1.6.1 Suggest TWO reasons why the cheetahs were almost wiped out during one of the ice ages. (2)
1.6.2 Explain why farmers, and hunters would want to kill cheetahs. (2)
1.6.3 What suggestion would you give to conservationists to decrease the problems of inbreeding as described in the passage above? (2)

ANSWERS - Questions 1

- 1.1
1.1.1 C 1.1.2 D 1.1.3 C 1.1.4 A
1.2 1.2.1 Biodiversity 1.2.2 Deforestation 1.2.3 Fossils
1.2.4 Continental drift 1.2.5 Biodegradable
1.2.6 Sustainable use/sustainability/conservation

1.3 1.3.1 E 1.3.2 D 1.3.3 C 1.3.4 A 1.3.5 B

1.4 1.4.1 - factories - refineries - motor vehicles
- burning - cigarette smoking any 3

1.4.2 1995
1.4.3 - When the SO_2 concentration increases - the number of respiratory diseases reported per week increases OR
- When the SO_2 level is low - the number of respiratory diseases per week is also low

1.4.4 asthma bronchitis allergies emphysema
lung cancer coughing shortness of breath any 3

1.4.5 - Reduce the burning of wood and coal
- Use public transport reduce number of vehicles on the road reduce SO_2 , CO, CO_2 , etc
- Use vehicles which don't require fossil fuels/electric cars
- Use unleaded petrol decrease amount of lead in Atmosphere
- Use catalytic converters on cars and in factories
- Monitor emission from industries so that they comply with government regulations
- Educate people (school/community) on importance of caring for our environment any 3

1.5
1.5.1 When a geographical barrier e.g. mountain, river, sea, etc. separates a subpopulation of breeding individuals from the parent population

1.5.2 (Less) seeds available on the island/competition for seeds available/availability of different sources of food
1.5.3 - There was a great variety within the species because of genetic variation
- leading to natural selection
- Many seed-eating finches died
- Those finches that were able to eat different foods/non-seed food survived in greater numbers
- to pass on their genes to their offspring
- Species became distinct and adapted to the specific food on that island any 5

1.6
1.6.1 - Shortage of food/suitable habitat
- Cheetahs are endotherms and could not survive the cold
1.6.2 - Farmers kill cheetahs because they prey on their livestock
- Hunters kill cheetah for a trophy/skin/sport
1.6.3 Increase the gene pool by introducing individuals from breeding populations from the different parts of the world any 2

SECTION B QUESTION 2

2.1 A group of Grade 12 learners wanted to investigate the oxygen level in a nearby river. A low oxygen level indicates that the water is polluted. They carried out the following steps:

Using a rope, bucket and protective gloves, they collected some water from the river, before and after a sewage outflow pipe (which pumps out human waste including faeces into the river). They labelled the samples of the water A and B. The learners then added a few drops of methylene blue to each sample, A and B.

Note: Methylene blue is an indicator which changes colour as follows:
A low level of oxygen will be indicated by a loss of the blue colour
A high level of oxygen will be indicated by a darker blue colour
Their results are shown in the table below.

Sample	Colour change of methylene blue
A	Darker blue
B	Loss of blue colour

- 2.1.1 Suggest a caption for the table above. (2)
2.1.2 State a hypothesis for the above investigation. (2)
2.1.3 Suggest why the learners used a rope for the bucket and wore protective gloves when collecting the samples of water. (2)
2.1.4 Why did the learners take two samples of water, A and B? (1)
2.1.5 Which one of the samples (A or B) was taken after the sewage outflow pipe? (1)
2.1.6 Explain your answer in QUESTION 2.1.5 above. (3)
2.1.7 How will the oxygen levels affect the fish in the river at point B? (2)
2.1.8 Suggest TWO ways in which the learners could improve the investigation. (2)

2.2 Read the following passage on natural pesticides and answer the questions that follow.

THE USE OF NEEM LEAVES TO CONTROL INSECT PESTS IN VEGETABLES

Insects are a hindrance to farmers. For the battle against insects, chemical pesticides are too expensive and have negative side effects. In Tanzania farmers are now making use of a natural pesticide that is locally available at nearly no cost. The leaves of the neem tree (*Azadiracta indica*) are crushed and the liquid is brushed onto plants three times a week. The remains of the crushed neem leaves can be spread in the soil to increase fertility.

- 2.2.1 List THREE advantages of using neem leaves instead of chemical pesticides. (3)
2.2.2 List TWO possible disadvantages of using neem. (2)
2.2.3 Describe TWO strategies that the South African government can use to encourage the use of local plants and animals in the control of pests. (4)

2.3 Read the following paragraph and answer the questions that follow:

PERLEMOEN

Abalone, a type of shellfish commonly known as perlemoen, is found on rocks near the sea. Since it is thought to improve sexual ability, especially by people in countries where it does not naturally occur, it is sold at very high prices. Because of this it is being collected by poachers in large numbers

- 2.3.1 Describe TWO consequences of perlemoen exploitation. (4)
2.3.2 Suggest TWO ways in which the population of perlemoen can be managed. (2)

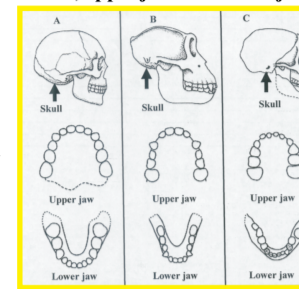
QUESTION 3

- 3.1 Briefly outline Lamarck's theory of evolution. (5)
3.2 The following questions are based on mutation:
3.2.1 Define a gene mutation. (2)
3.2.2 List TWO factors that can cause mutations. (2)
3.2.3 Differentiate between neutral and lethal mutations. (4)

Good Luck!



3.3 The following diagrams represent the skull, the upper jaw and lower jaw of three organisms, the Taung child (*Australopithecus africanus*), a modern human (*Homo sapiens*) and a gorilla (*Gorilla gorilla*). The arrow indicates the position of the foramen magnum (the opening that allows the spinal cord to connect with the brain). Study the diagrams and answer the questions that follow:
Skulls, upper jaws and lower jaws of three organisms



- 3.3.1 Identify the organisms that are represented by each of A, B and C. (3)
3.3.2 Assuming that the diagrams were drawn to scale, list TWO observable differences between the skulls of organisms A and B. (4)
3.3.3 Which organisms A, B or C represents a carnivore? (1)

- 3.3.4 Explain your answer in QUESTION 3.4.3 above using features visible in the diagram. (2)
3.3.5 By looking at the position of the foramen magnum (indicated by the arrows) state which TWO organisms are best adapted for walking on two legs rather than four legs. (2)

ANSWERS - Questions 2 & 3

- 2.1
2.1.1 Change in colour of methylene blue indicator at two places, A and B, along a river
2.1.2 Oxygen level is higher before the sewage outflow pipe and lower after the sewage outflow pipe OR
Oxygen level is lower before the sewage outflow pipe and higher after the outflow pipe OR
Oxygen levels are the same before and after the sewage outflow pipe OR
Oxygen levels differ before outflow pipe and after the outflow pipe
2.1.3 - The water in the river may have been fast flowing or very deep. It is much safer to lower a bucket into the water than risk drowning
- Sewage is potentially harmful so protective gloves prevent sewage getting onto the skin
2.1.4 To see if sewage had any effect on oxygen level/one with sewage and one without sewage/the first one serves as the base/the control/oxygen levels differ before and after the out flow pipe
2.1.5 B
2.1.6 - The loss of blue colour shows low levels of oxygen
- because bacteria and other decomposers are abundant in the water - because of the sewage - and therefore use up the oxygen any 3
2.1.7 Low oxygen levels will decrease the fish numbers
2.1.8 They could collect several samples and over many days of water from before and after the sewage outflow pipe and test them for oxygen levels

- 2.2
2.2.1 - Neem leaves are cheaper than chemical pesticides
- Using neem leaves prevents any side effects which chemical pesticides cause/not toxic to the environment
- Neem leaves are easy to use
2.2.2 - Brushing plants three times a week is labour intensive
- The neem trees could be exploited/over-used
2.2.3 - The government can fund research into the use of the indigenous knowledge which could benefit the population
- Disseminate information to everyone so that usage of chemical pesticides is reduced or stopped
- Increase tax/price of chemicals pesticides so that environmental friendly resources are used OR any other acceptable answer

- 2.3
2.3.1 - Perlemoen could be in danger of becoming extinct/endangered
- Disturbing the food chain/web so that other organisms are also affected
2.3.2 - Limit number caught - Only licensed fishermen catch perlemoen
- Heavy penalties/fines for those who contravene regulations - Stipulate minimum size of perlemoen that can be caught to minimize the impact on the population
- Patrol all those beaches where perlemoen is found to ensure compliance with regulations any 2

3.1 Lamarck believed that structures of individuals in a population became better or less adapted to the environment depending on the frequency of their use and that these adaptations could be inherited from generation to generation. He suggested that change was driven by living things themselves as they strove to perfect their way of life. More complex organisms developed from less complex organisms. He supported the idea of common descent and linked diversity with adaptation to the environment. He supported the idea of the inheritance of acquired characteristics

- 3.2
3.2.1 A mutation is a mistake/alteration due to a change in the composition of DNA OR Sudden change in the structure of a gene
3.2.2 - by accident during meiosis
- some chemicals/mutagens/high energy radiation
3.2.3 Neutral mutation - these are of no benefit to the organism and they are not harmful to the organism and are not affected by natural selection any 2
Lethal mutation - they are harmful/ cause the death of the individuals that inherit them because natural selection selects against them any 2

- 3.3
3.3.1 A - Modern human (*Homo sapiens*)
B - Gorilla (*Gorilla gorilla*)
C - Taung child (*Australopithecus africanus*)
3.3.2

Organism A	Organism B
Flat face	Protruding jaws
Chin prominent	Chin not prominent
Foramen magnum occurs towards middle of skull	Foramen magnum occurs towards back of skull
No central ridge on the cranium	Central ridge on the cranium
Eye sockets in front of skull	Eye sockets on top front part of skull
Less pronounced eyebrow ridge	Pronounced eyebrow ridge