

Candidate Name

Candidate Number

Centre Name

Centre Number

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Paper 3: Biology
(1 hour 15 minutes)**For Examination December 2023**

It is necessary to respond on the answer sheets provided alongside this question paper. Additionally, you must have a soft pencil (preferably of type B or HB), a clean eraser and a dark blue or black pen.

INSTRUCTIONS:

- You must write your name, candidate number, centre name and centre number on the answer sheets in the designated spaces.
- Attempt all the questions from subjective section using a dark blue or black pen.
- It is important to follow the instructions provided on the answer sheets.
- Do not use correction fluid.
- Avoid writing on any bar codes.

Comprehension task:



1 Captive breeding programs for rhinos have emerged as a vital conservation strategy to
2 combat the alarming decline in their populations worldwide. Rhinos, known for their iconic
3 horns and impressive stature, have faced severe threats. Captive breeding programs involve the
4 careful selection of healthy and genetically diverse rhinos to form the foundation of a captive
5 population.

6
7 Creating suitable enclosures for captive rhinos is crucial to their well-being. These
8 enclosures aim to replicate their natural habitat as closely as possible, with ample space,
9 appropriate vegetation, and environmental enrichment. Rhinos are given opportunities to
10 engage in natural behaviours, such as wallowing, grazing, and socializing, promoting their
11 physical and psychological health.

12
13 Breeding in captive environments can be challenging, as rhinos have specific
14 reproductive requirements. Rhino experts employ various techniques, including assisted
15 reproductive technologies, to increase the chances of successful breeding. Careful monitoring of
16 the rhinos' reproductive cycles, hormone levels, and behavioural cues helps determine the ideal
17 time for mating.

18
19 Once successful breeding occurs, captive breeding programs often result in the birth of
20 rhino calves. These young rhinos play a crucial role in conservation efforts, representing hope
21 for the future of the species. They are carefully raised and provided with a nurturing
22 environment until they reach an appropriate age and size for reintroduction into the wild.

23
24 Reintroduction into natural habitats is a crucial aspect of captive breeding programs for
25 rhinos. Extensive planning and coordination with local communities, conservation organizations,
26 and government agencies are essential to ensure the safety and successful integration of the
27 reintroduced rhinos.

28
29 Captive breeding programs have yielded significant successes in rhino conservation. By
30 bolstering rhino populations, these programs provide a buffer against the threats faced in the
31 wild and help restore the balance of ecosystems. Furthermore, they contribute to raising public
32 awareness about the importance of conserving rhinos and their habitats, inspiring communities
33 to actively participate in conservation efforts.

34
35 While captive breeding programs offer hope for the survival of rhinos, they are not a
36 standalone solution. The goal is to ensure that rhinos can thrive in their natural habitats, free
37 from the constant threat of extinction.

Q1a) Explain two potential threats faced by Rhino's in the wild that have led to population decline? [2 marks]

1b) Name the type of selection observed in captive breeding? [1 mark]

1c) Why is it important to have genetic variability in the population of rhinos? (line 4-5) [2 marks]

1d) Recommend a suitable method of assisted reproductive technologies mentioned in line 13-14? [3 marks]

All Rhinos in a captive breeding program including offspring are subject to genetic fingerprinting, often calves could have many potential fathers. Faeces samples are collected in the wild contains DNA.

1e) Describe how genetic finger printing is carried on sample of rhino DNA? [6 marks]

1f) Explain how genetic finger printing allows program operators to identify the father of calves. [2 marks]

1g) Explain how genetic fingerprinting is used to ensure unrelated rhinos breed? [1 mark]

1h) Suggest why rhino DNA is found in faeces? [1 mark]

1i) DNA samples from faeces need to undergo PCR before genetic finger printing, explain why? [1 mark]

1j) Samples of rhino blood could be collected instead of faeces to obtain DNA from individual rhinos. Suggest 2 advantages of using faeces rather than blood? [2 marks]

1k) One of the main advantages of collecting blood is that DNA can be analyzed for mutations that cause a change in the base sequence of DNA from fresh samples. This altered DNA may lead to cancer, using your knowledge describe how altered DNA may lead to cancer. [4 marks]

[End of Comprehension total 25 marks]

Essay: Question:

Answer ONLY 1 of the following titles:

1. Write an essay on the importance of water and the regulation of water to organisms. [25 marks]

OR

2. Write an essay on the importance of cycles in biology? [25 marks]