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ST BENEDICT'S COLLEGE

SUBJECT	LIFE SCIENCES	DATE	26 JANUARY 2023
GRADE	12	MARKS	50
EXAMINER	MRS S. STEGMANN	MODERATOR	MRS B. ZAJAC
NAME		DURATION	50 MINUTES
CLASS			

INSTRUCTIONS:

1. This paper consists of 7 pages. Please check that your question paper is complete.
 2. Answer all questions on the folio paper provided.
 3. Write in blue or black pen only.
 4. Read all questions carefully and answer in as much detail as possible.
 5. All diagrams should have a clear heading.
 6. It is in your own interest to write legibly and to present your work neatly.
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QUESTION	POSSIBLE MARK	MARK ACHIEVED
1	12	
2	23	
3	15	
TOTAL: 50		

Question 1:

- 1.1. Various possibilities are suggested as answers to the following questions. Indicate the correct answer by writing the correct letter from the corresponding question in the space provided on your answer sheet.
- 1.1.1. Which of the following terms refers to 'two different plant species requiring different amounts of sunlight' in a forest ecosystem?
- A. Primary succession
 - B. Limiting factors
 - C. Social organization
 - D. Resources partitioning
- (1)
- 1.1.2. Which of the following best describes a community?
- A. All the organisms in an area interacting with the environment
 - B. An interacting group of many different species in a common area
 - C. The specific roles of members in a population
 - D. Populations that can interbreed with each other
- (1)
- 1.1.3. Social organization leads to an increase in the population size and in chances of survival. Which of the following best describes the phenomenon of social organization?
- A. A beehive made up of worker bees, a queen and drones
 - B. Elephants looking after their babies
 - C. An injured impala trying to keep pace with the rest of the herd
 - D. A hyena hunting for its prey
- (1)
- 1.1.4. Read the information in the textbox below.

A biologist sampled impala in a fenced game reserve using mark-recapture. In the first capture, 62 impalas were trapped and marked with ear tags.

A second capture of 56 impalas occurred two weeks later, of which 28 impalas had ear tags.

What is the estimated size of the impala population?

- A. 25
- B. 31
- C. 118
- D. 124

(2)

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- 1.2. Select the term in Column B that best matches the description in Column A. Write the letter of the term in the space provided on your answer sheet.

COLUMN A**COLUMN B**

- | | |
|---|-----------------------------------|
| i) A build up of limiting factors | A Environmental resistance |
| ii) Factors that produce environmental resistance as the density of a population increases. | B Ecological niche |
| iii) Population with no immigration or emigration. | C Species |
| iv) A group of closely related organisms that are capable of interbreeding and producing fertile offspring. | D Resource partitioning |
| v) A method involved in counting the number of clover weeds in small measured areas. | E Unstable population |
| vi) All the conditions necessary for an organism to survive and reproduce. | F Closed population |
| vii) Different species with similar requirements that use resources differently even though they have the same habitat. | G Carrying capacity |
| | H Limiting |
| | I Quadrat |

(7)

[12]

Question 2:

Read the information on a coastal bird, the African Black Oystercatcher, and answer the questions that follow.

Description

The African Black Oystercatcher is a black bird with pink legs and feet, a bright orange-red beak and red eyes surrounded by an orange eye ring. The African Black Oystercatcher is near endemic to the coast of southern Africa. It is found along the coast from Angola to Mozambique with breeding places from Namibia to KwaZulu-Natal, South Africa.

An African Black Oystercatcher



[Source: <https://en.wikipedia.org/wiki/African_oystercatcher>]

Habitat

These birds are found living on rocky and sandy coasts along the mainland and on islands off the coast. Nests are simple shallow holes in the ground excavated in sandy soil, lined with rocks and shells. The nests are typically placed near the highwater mark, hidden by rocks or kelp seaweed.

Food

Their main diet consists of marine organisms, e.g. mussels, limpets, whelks and crustaceans. Rocky coasts have a great variety of food for the birds. They forage exclusively during low tide in the intertidal zones.

Mussels growing on rocks



[Source: <<http://www.open.edu>>]

Breeding

These birds are monogamous slow breeders. Breeding takes place from October to April. Females will lay 1–2 well-camouflaged eggs in sand or rock depressions. Both parents incubate eggs for about 32 days before hatching. The chicks hatch simultaneously and are dependent on the parents for food and shelter. The larger chick will fledge earlier than the smaller chick and it will have a greater chance of survival. Adults are known to live for over 18 years.

Friends and Foes

These birds roost in flocks of up to 200 individuals during non-breeding season. These large numbers protect them from predators. Feral cats, house rats, kelp gulls, genets, foxes, jackals and snakes prey on the African Black Oystercatcher. Uncontrolled domestic dogs also prey on young chicks. These birds excrete nutrient-rich guano (faeces), which may land in the sea. Algae growing along the shore absorb this nutrient-rich guano. The algae therefore grow and reproduce faster and are consumed by limpets. The limpets also grow and reproduce faster increasing the food available for the African Black Oystercatcher. The role of the African Black Oystercatcher is to control the population of its prey within the marine ecosystem.

Threats to African Black Oystercatcher populations include human disturbances in the form of recreational cars on beaches, introducing predators at the breeding sites, degradation and destruction of breeding areas through urban developments, coastal diamond mining and pollution.

Conservation status and importance of the African Black Oystercatcher

The global population of the African Black Oystercatcher is 6 670. Due to the small population size of less than 10 000 individuals, the International Union for Conservation of Nature regards the African Black Oystercatcher as "Near Threatened".

The African Black Oystercatcher population is currently stabilising due to improved management plans that were put in place to protect these birds as well as the additional food source in the form of the alien Mediterranean Mussel. This bird has played a vital role in reducing and controlling the population of the alien invasive Mediterranean Mussel within the marine ecosystem, thus reducing competition between the native and alien mussels and increasing the population of native mussels along the coast of South Africa.

The Oystercatcher Conservation Programme was established to increase the conservation of this species, raise public awareness and get local communities involved in the conservation of these birds. In 2000, a national ban of recreational vehicles along the beaches of South Africa was put in place. This ban reduced the level of disturbance along South Africa's coasts, thus increasing the bird's breeding success and populations along the coastal areas.

2.1. Provide the correct biological terms for the following descriptions:

- A. An organism unique to a specific region. (1)
- B. A group of oystercatchers that interbreed, living in the same areas of coastland (1)

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C. The relationship between domestic dogs and young African Black Oystercatcher chicks. (1)

2.2. Describe the ecological niche occupied by the African Black Oystercatcher. (4)

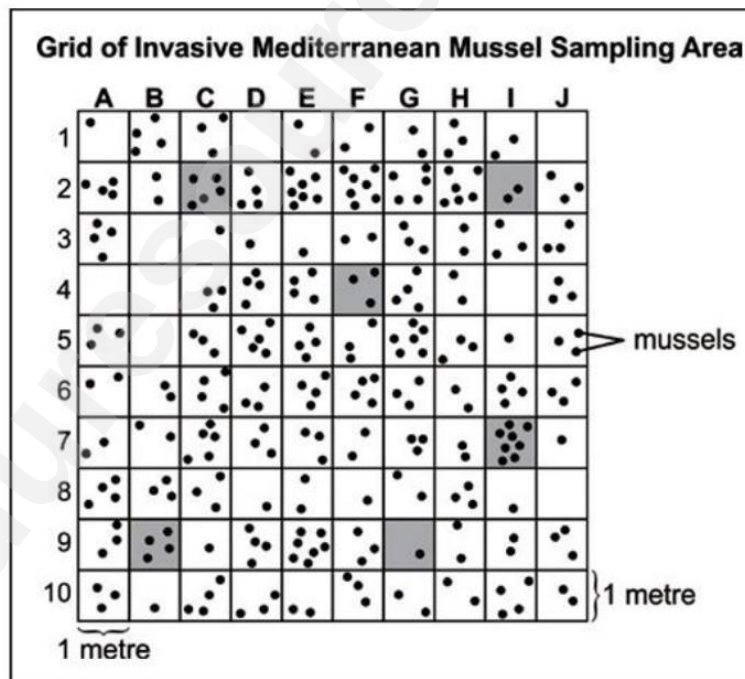
2.3. What is the conservation status of the African Black Oystercatcher? (1)

2.4. List THREE threats posed by humans that influence the survival of the African Black Oystercatcher. (3)

2.5. Beaches are there to be enjoyed by all for recreation. In your opinion, is it correct to ban humans from beaches where the African Black Oystercatcher is found? Give a reason for your answer. (2)

2.6. Suggest and explain an alternative way to protect the African Black Oystercatcher other than banning people from breeding sites. (2)

2.7. Ecologists wanted to gain an idea of how many invasive alien mussels were growing on the rocks at a breeding site. They marked out an area as seen below and counted the mussels in a number of random samples.



[Source: <<http://www.oocities.org>>]

2.7.1. Why is it important to take random samples in the given area? (2)

2.7.2. Areas where quadrats were placed are shaded on the diagram above. Use these quadrats to estimate the number of mussels in the marked-out area. Show all working. (4)

- 2.7.3. Describe ONE other precaution that could be taken to ensure the accuracy of estimating the size of the population. (2)

[23]

Question 3

- 3.1. The hunting successes of a pack of wild dog were studied. The table below shows the number of hunts carried out and the percentage of hunts that resulted in a kill.

Wild dog hunts and kills

Prey species	Number of hunts	% of hunts resulting in one kill
Zebra	50	10
Impala	70	30
Wildebeest calves	70	25

- 3.1.1. Which of the following conclusions could be supported by the data in the table and your own knowledge? Write down the letter/s of all the correct statements.
- A. Wild dogs killed more impala than any other prey species shown in the table.
 - B. Cooperative hunting allowed the wild dogs to hunt successfully.
 - C. Zebra successfully used social organisation as a defence mechanism.
 - D. More wildebeest calves escaped than any other prey species shown in the table. (3)
- 3.1.2. How many wildebeest were hunted successfully? (2)
- 3.1.3. What phenomenon allows zebra, impala and wildebeest to occupy the same habitat given that they are all herbivores? (1)
- 3.1.4. Provide another example, other than the one shown in the table, of the phenomenon mentioned in QUESTION 3.1.3. (1)
- 3.1.5. In what way do zebra use social organisation to increase their chance of survival? (3)
- 3.1.6. What method would be used to calculate the population number of wild dogs in a certain area? (1)
- 3.1.7. Sketch a graph showing the relationship between wild dogs and impala. No Heading is required. (4)

[15]

TOTAL: 50 MARKS