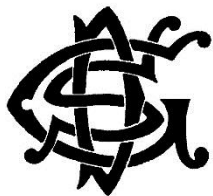




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GRADE 12 Syllabus

BLOCK TEST: Population Ecology

TOTAL: 50 MARKS

TIME: 50 minutes

Examiner: JDW Pienaar

Moderator: AM Redfern

Name: _____

Teacher's Initials: _____

INSTRUCTIONS

- Answer ALL questions on the sheet.
- This test consists of 7 pages – check that your paper is complete.

Question 1:

Question	1.1.	1.2	1.3	1.4	1.5
Answer					

1.1 A population is..... (1)

- A ...the number of individuals from a certain species in a defined area.
- B ...the number of different species in a defined area.
- C ...the number of individuals from a certain species in a defined area, who interbreed.
- D ...the number of different species in a community, form a defined area.

1.2 An age-sex graph is also known as a: (1)

- A population triangle.
- B population pyramid.
- C logistical curve.
- D pyramid of numbers

1.3 Less developed counties have an age-sex graph ... (1)

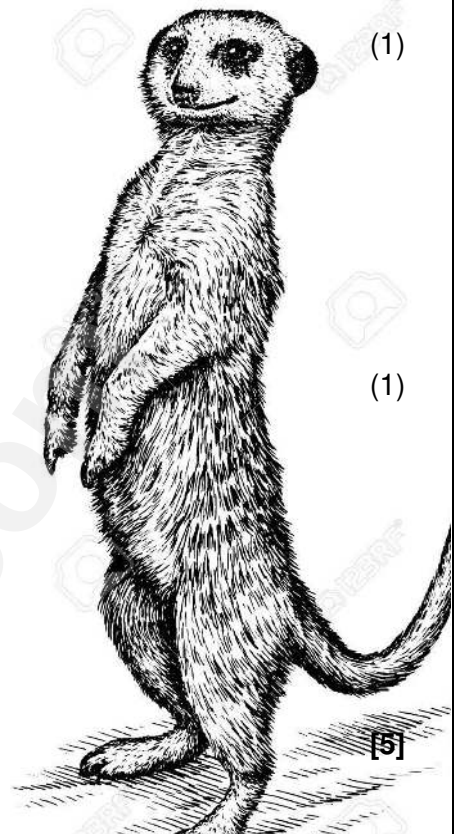
- A with a narrow base.
- B with very little height.
- C with a rectangular shape.
- D with a wide base.

1.4 Competition among individuals of the same species, is known as:

- A intra specific competition.
- B species specific competition.
- C interspecific competition.
- D survival of the fittest.

1.5 A census is an example of ...

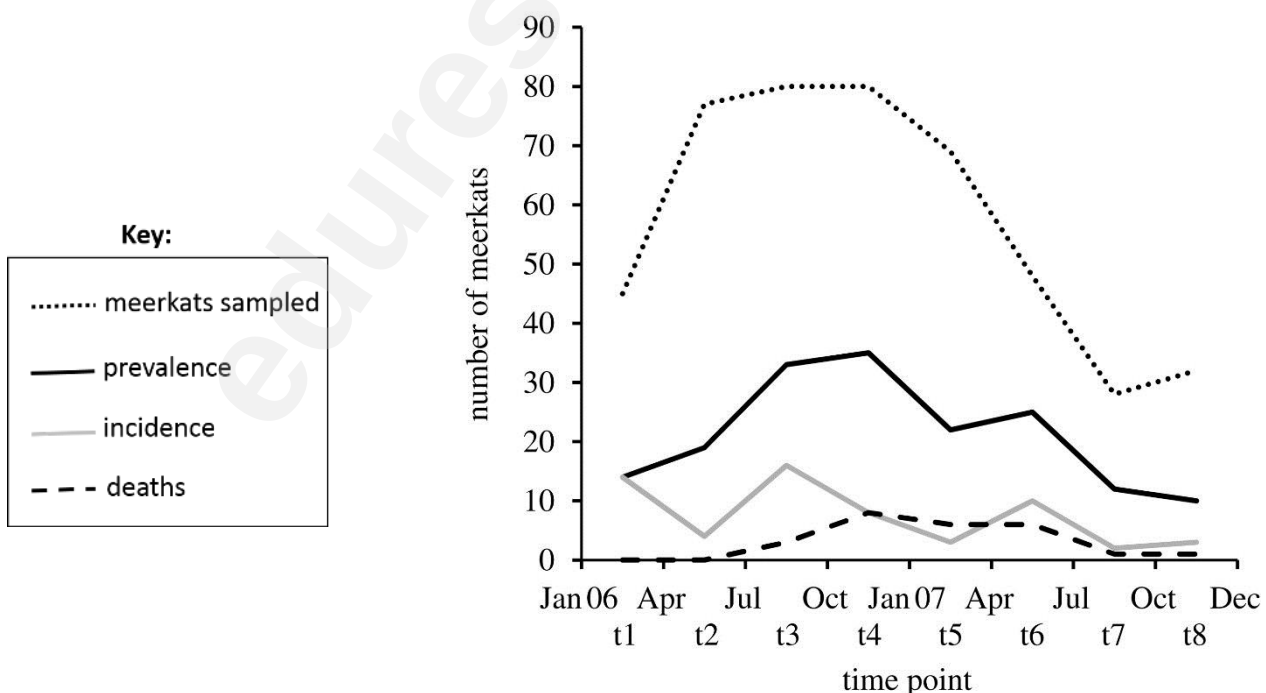
- A random sampling.
- B direct counting.
- C selective sampling.
- D indirect counting.



Question 2:

In the Kalahari Desert you find many “meerkat” (mongoose) populations. It might surprise you to learn that a meerkat can suffer and die from Tuberculosis (TB).

Below, find a graph indicating the TB dynamics over the study period. Meerkats were sampled at eight time points (t1–t8) throughout 2006 and 2007. The number of meerkats sampled at each time point varied owing to births and deaths. Prevalence refers to the total number of meerkats testing positive at each time point; incidence refers to new cases testing positive since the previous time point. Only deaths attributable to TB (confirmed by mycobacterial cultures) are shown.



(The Royal society publishing, 2009)

2.1 What was the duration of the study period? (2)

2.2 How many meerkats were sampled at t3? (2)

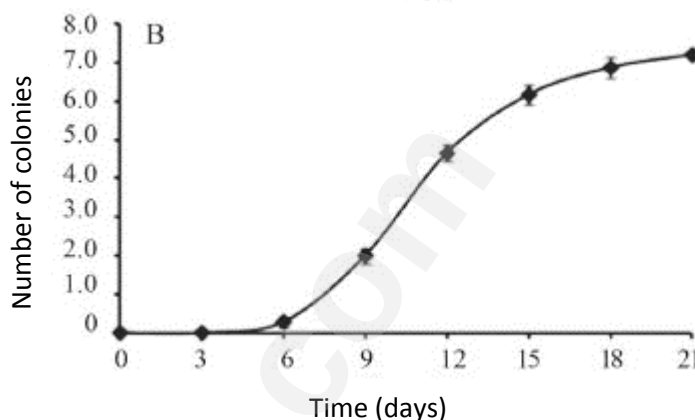
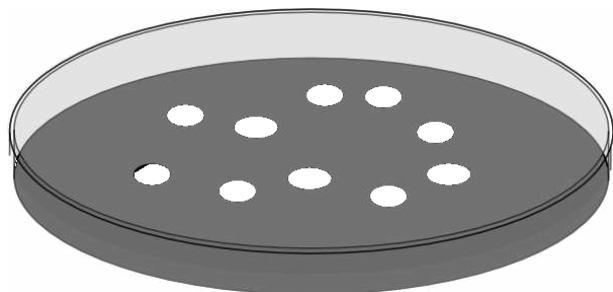
2.3 How many meerkats showed signs of TB at t1? (1)

2.4 Explain why “prevalence” and “incidence” are the same at t1. State the value. (4)

2.5 How many new cases of TB were recorded at t2? (1)



- 2.6 Below is a logistical growth curve/graph (graph B) representing the number of *M. tuberculosis* (bacterium that causes TB in meerkats) colonies observed over 21 days, after initial incubation on a nutrient rich agar. The petri dish was sealed after incubation. Consider it and answer the questions that follow.



- 2.6.1 How many colonies were there after nine days? _____ (1)
- 2.6.2 Which growth phase is represented from day 0-6? _____ (1)
- 2.6.3 Mention any factor that could be responsible for the deceleration of growth at 12 days. (1)
- _____
- 2.6.4 Compare the two biological parameters to each other on day 9. (2)
- _____
- _____
- 2.7 Meerkats are considered to be socially organised. Describe two advantages of social organisation in meerkats. (4)
- _____
- _____
- _____
- _____
- 2.8 Eusocial organisms operate under a strict caste system. True or False? (1)
- _____

[20]

Question 3:

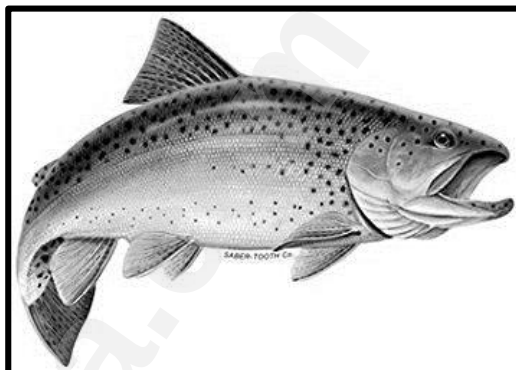
Below you will find a worked example of a mark-recapture estimate. It is for one of six (equally sized and stocked) dams on a trout farm in the Eastern Cape.

e.g of capture recapture method

- By using the formula

$$\frac{57}{177} = \frac{109}{\text{Total pop size}}$$

$$\begin{aligned}\text{Total pop size} &= \frac{(109 \times 177)}{57} \\ &= 338 \text{ trout}\end{aligned}$$

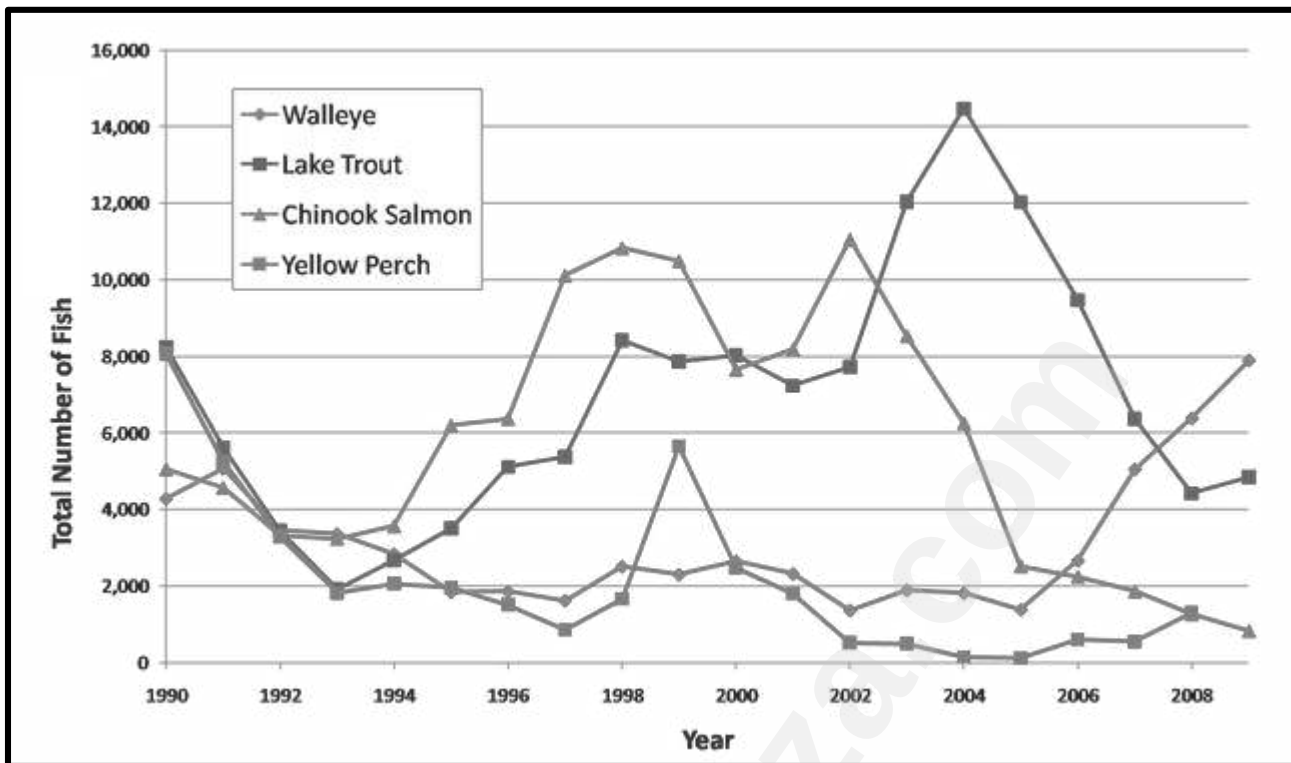


3.1 How many trout caught in the second sample were marked? (1)

3.2 When using the mark-recapture method, which precautions should be considered when **marking** the fish? Identify any two precautions and explain why these precautions should be taken. (4)

3.3 What is the total estimated number of trout on the farm? (2)

3.4 Considering the graph overleaf, and assuming the estimate is accurate, in which year was the mark-recapture performed? (1)



- 3.5 Using the graph above, in which year does it become evident that trout and salmon are competing for the same resource? Give a reason for your answer. (2)

- 3.6 Give an example of a resource for which they could be competing. (1)

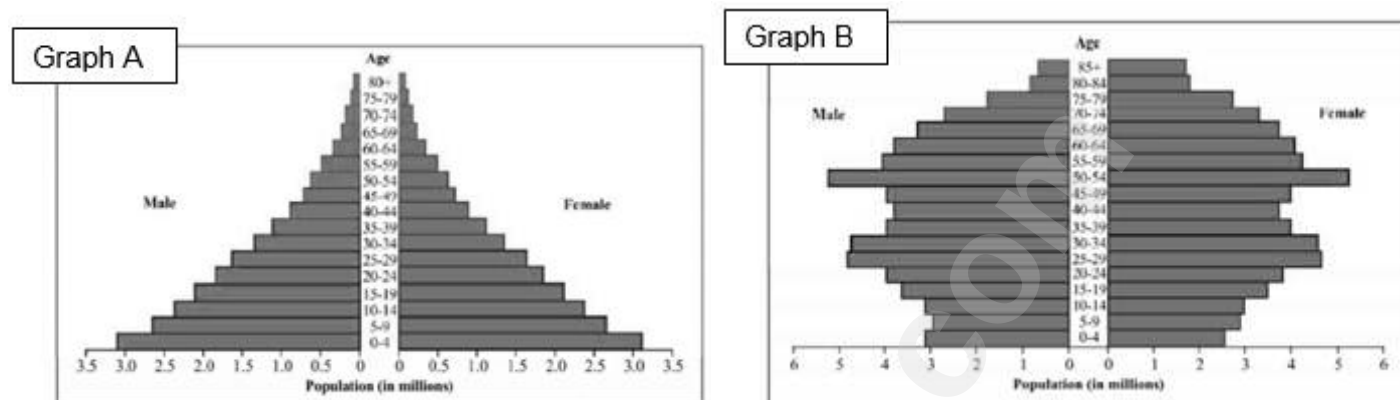
- 3.7 Do you consider your answer in 3.6 a density-dependent or density independent factor? Why? (2)

- 3.8 What evidence is there that the resource they compete for has been depleted and is not recovering? (2)

[15]

Question 4:

Below, find the age-gender distribution graphs of two countries. Consider them and answer the questions that follow.



4.1 Which of these two graphs more likely represents a less developed country? (1)

4.2 Is the mortality rate higher or lower for a less developed country? Give two possible reasons for this. (3)

4.3 How many people are there in the 0-4 age group in graph B? Show all working. (3)

4.4 Most people in Graph B are in the 16-65 age group. Why is this an advantage to the country? (2)

4.5 Give a possible reason for the higher survival rates of females in Graph B. (1)
