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WORKSHEET

Life Science 12

Week 12

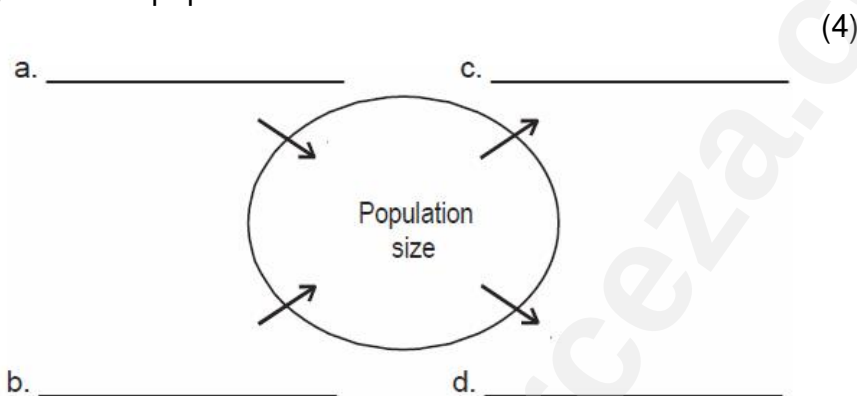
Once your work has been uploaded, I will choose a few questions at random, and it will be for marks.

Lesson 1-3

Question 1 [4]

{Adapted from: Mind Action Series}

Complete the following diagram to show the dynamic parameters affecting the growth of a population.



Question 2 [8]

{Adapted from: Mind Action Series}

A gardener wanted to find out how many snails there were in his garden which covered an area of 40 m². Using a 0.5 m² quadrat he randomly selected six sample areas and counted the snails in each. The following numbers were counted:

Quadrat sample	Number of snails
1	7
2	16
3	8
4	6
5	19
6	10

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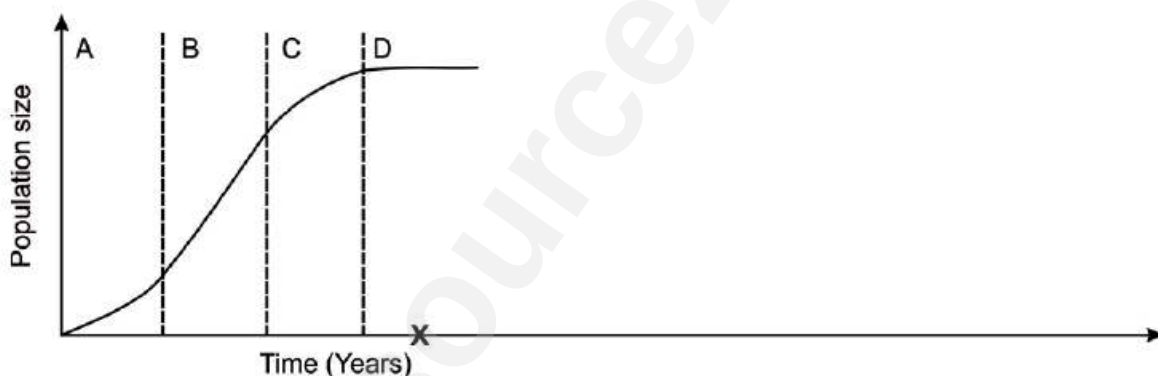
1. What is the average number of snails per quadrat? (1)
2. Calculate the estimated snail population of the garden?
Show your calculations. (3)
3. How would the estimate have differed if only quadrats 2 and 5 were counted? (2)
4. What could the gardener have done to make the estimate more valid? (2)

Question 3 [18]

{Adapted from: IEB Paper 2, 2012}

The following graph shows the population growth of a herd of springbuck over a period of time.

1. Draw and label a line onto the graph above that represents the carrying capacity of the environment. (2)



2. Define 'carrying capacity'. (2)
3. Give ONE reason why the initial phase A starts slowly. (1)
4. At which phase (A, B, C or D)
 - a) does environmental resistance start having an effect?
 - b) birth rate equal death rate?
 - c) birth rate greatly exceeds death rate? (3)
5. Name and explain ONE environmental factor which may cause the growth of the springbuck population to decrease. (2)
6. If a pride of lions moved into the same area as the springbuck in the year X on the graph:
 - (a) Continue drawing the expected graph line of the springbuck population showing the effect of the lions in the area over the time span of the graph above. (2)
 - (b) Draw in the expected line on the graph above to show the lion population over the time span. (3)
 - (c) What type of relationship exists between the springbuck and the lions? (1)

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- (d) Will the presence of the lions affect the carrying capacity of the area?
Justify your answer.

(2)

Question 4 [22]*{Adapted from: IEB Paper 1, 2017}*

Read the article below and answer the questions that follow:

South Africa's great white shark population is heading for extinction

That's the bleak assessment of a team of researchers from Stellenbosch University. Their findings are based on six years of fieldwork in the waters around Gansbaai – the largest great white research study undertaken in South Africa.

"The numbers in South Africa are extremely low," confirmed Sara Andreotti of Stellenbosch University. "If the situation stays the same, South Africa's great white sharks are heading for possible extinction." Using mark-recapture techniques, the study indicates a population estimate of between 353 and 522 individuals. According to Andreotti, this is 52% fewer than what was estimated in previous mark-recapture studies.

Andreotti thinks a number of factors are behind the species's rapid decline. These include the shark nets and baited hooks used to protect bathers and surfers along South Africa's eastern seaboard. Between 1978 and 2008, these culling mechanisms killed 1,063 great white sharks.

Poaching for trophies like shark jaws is another issue, the study says. This is despite the fact that in 1991, South Africa became the first country to make great-white-shark fishing illegal. Also overfishing is adding to the problem. As fish stocks continue to dwindle, it is possible that there are fewer Cape fur seals. These make up the bulk of the sharks' diet.

A key reason for the decline of South African great whites in particular, is their limited genetic diversity. Results from the analysis of Andreotti's biopsy samples show that South African great whites have the lowest genetic diversity of any white shark population.

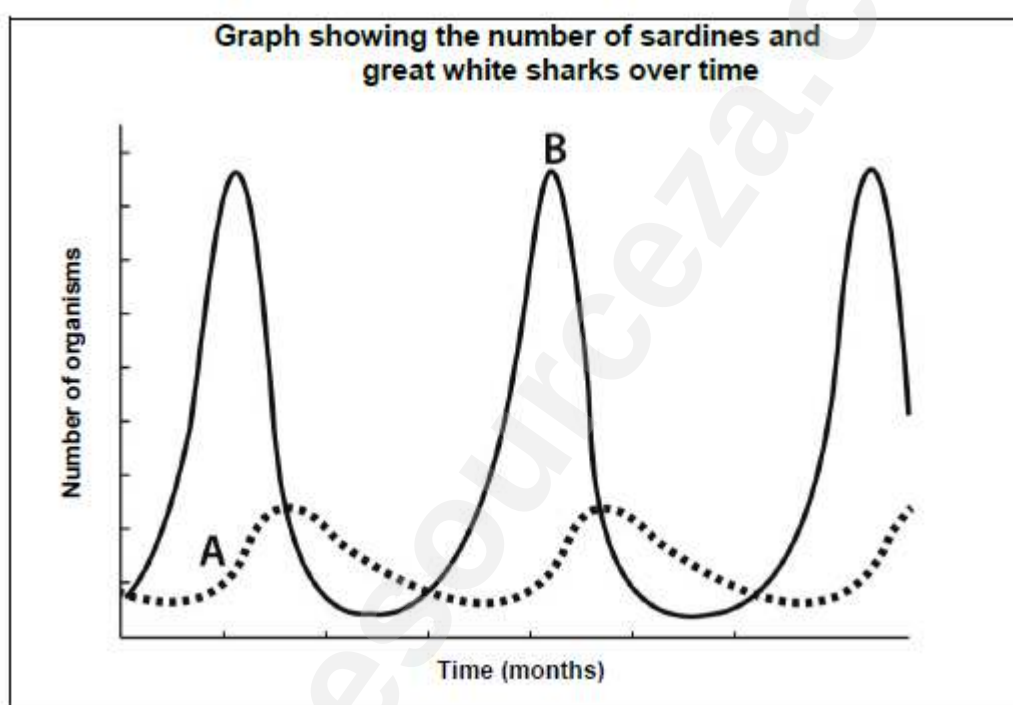
Andreotti believes that urgent management measures are the South African population's only hope — and the only hope that future generations have of experiencing their magic.

[Adapted from: <<http://scubadiverlife.com/south-african-great-whites-verge-extinction>>]

1. Define the term "population". (3)
2. Using information from the article above, identify FOUR factors that have led to the declining numbers of great white sharks in South African waters. (4)
3. Explain the indirect link between overfishing and declining numbers of great white

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- sharks. (3)
4. Explain how "limited genetic diversity" could be seen as a threat to population survival. (3)
5. The mark-recapture method of population measurement is an indirect method. Explain why this method is a better method than a census to establish the size of the great white shark population. (3)
6. Suggest TWO "urgent management measures" that could be put in place to protect the great white shark from possible extinction. (2)
7. The following graph shows the relationship between numbers of great white sharks and numbers of sardines (type of fish):



- a) What type of relationship exists between the great white shark and the sardine? (1)
- b) Which line represents the great white shark population? (1)
- c) Explain how you arrived at your answer to Question (b) above. (TWO reasons) (2)

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Question 5 [10]

{Adapted from: IEB Paper 1, 2017}

Read the following information on sable antelope. Use this information and your own knowledge and answer the questions that follow:

Sable antelope are grazers (feeding on grasses). They live in herds of up to 25 members. Young sable antelope are vulnerable to predation by lions, hyenas, leopards and crocodiles. Sable antelope prefer to feed during the day because of a high risk of predation at night. Sable antelope also have better access to water during the day.



[Source: <<http://www.krugerpark.co.za>>]

[Adapted: <<http://animaldiversity.org>>]

1. Suggest TWO strategies that can be used by sable antelope to provide them with protection against predators. (2)
2. What type of competition is evident amongst the predators of the sable antelope? (1)
3. Sable antelope population numbers vary from year to year. List THREE density-dependent factors that would limit their population size. (3)

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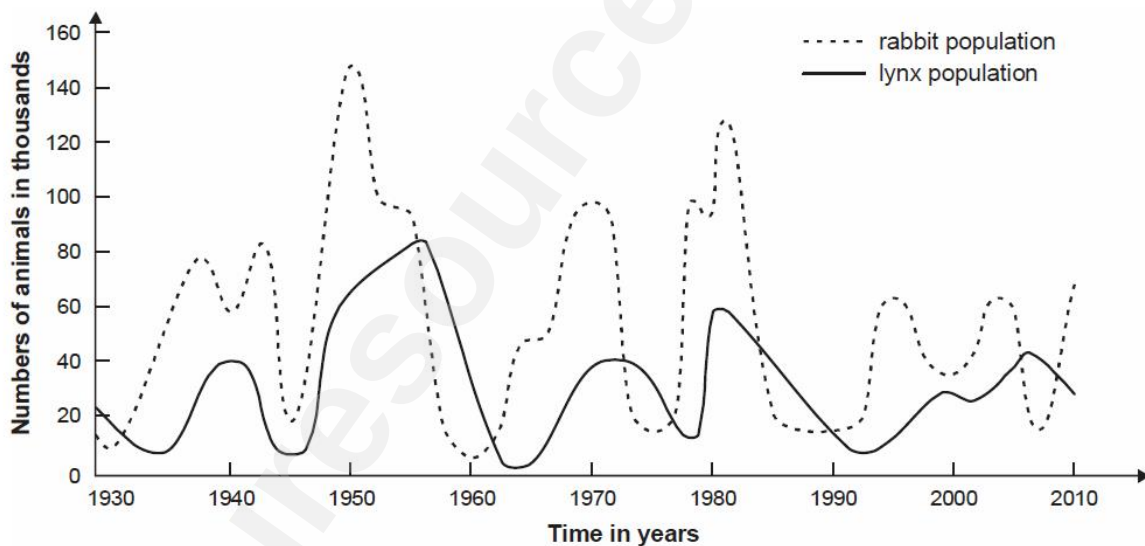
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4. Research has shown that human activity such as hiking, hunting and agriculture has forced animals such as the sable antelope to avoid humans by becoming more nocturnal (active at night).
- (a) Explain the impact of the change to a more nocturnal routine on the size of a sable antelope population. (2)
- (b) Provide TWO suggestions that could be put in place by officials managing natural areas to limit human disturbances of sable antelope. (2)

Question 6 [6]

{Adapted from: IEB Paper 1, 2017}

The following graph shows the variations in two populations of animals, bat-eared fox and grasshoppers, in a very large area over a period of 80 years.



By writing down the sentences, using the correct word from between each bracket, many observations and conclusions can be drawn from looking at the above graph. Write down the correct words.

- There will always be (one/two) wavy lines, one indicating prey population and one predator population.
- The line that peaks first and is higher is always the (prey/predator).
- The peaks of predator and prey population density (don't/do) overlap.
- Predators can only survive if the number of prey (is less than/exceeds) the number of predators.

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5. An (increase/decrease) in number of predators results in number of prey decreasing.
6. With a decline of predators there is an (increase/ decrease) in prey. (6)

Question 7 [8]

{Adapted from: Mind Action Series}

- A farmer needed to know how many fish he had in his farm dam.
 - He caught 20 fish and marked them by clipping out a small section of their tail fins.
 - He then released them back into the dam.
 - A few days later he caught 30 fish, of which five had been marked.
1. Estimate the total number of fish in the farm dam, showing your calculations. Do this by using the formula you learnt. (4)
2. What precautions should this farmer take when using this mark-recapture technique to make sure that the results are as accurate as possible? (2x2 = 4)

[Total: 76 Marks]