

Grade 9 Natural Sciences Worksheet

Desert island ecology

Part One: Animals on a deserted island

Imagine a deserted island far out to sea. The climate is temperate and there are warm seas around the island. There are sand dunes as well as bare rocky outcrops on the island. There are some rocky pools around the island that have large populations of crabs. The island is small and it has a small spring which supplies tiny amounts of fresh water. There are a few coconut palm trees, banana palm trees and other small shrubs producing nutritious berries.

In your group, invent your own imaginary species of animal to inhabit this island. A very small population of this animal, which is unique to this island, has evolved to adapt to the island's environment.

1. What are some of the questions relating to adaptation and ecology that you need to ask before thinking about designing your animal? [20 marks]
2. Draw and describe this animal and its life style. [20 marks]
3. Present your animal to the class together with your detailed description. [20 marks]

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Rubric to assess drawing and description

Criteria	4	3	2	1
Diagram	Well organised spatially, creative, well labelled.	Fairly well organised spatially, fairly creative, well labelled.	Not very well organised spatially, creativity is limited, labels need attention.	No attention at all given to spatial organisation, no creativity, no labels.
Description of ideas and concepts	Logical, related ideas described meaningfully.	Mostly logical and meaningful description.	Some errors, in description, not always logical and meaningful.	Many errors in logic and meaning.
Questions and thought processes	Learners have asked thought provoking questions to arrive at the invention of the animal.	Learners have asked good questions to arrive at the invention of the animal.	Learners have asked fair questions to arrive at the invention of the animal.	Learners have asked poor questions to arrive at the invention of the animal.
Attention to understanding of ecology and adaptation	Learners able to apply the concepts learned in ecology and adaptation to this exercise completely.	Learners able to apply the concepts learned in ecology and adaptation to this exercise fairly well.	Learners able to apply the concepts learned in ecology and adaptation to this exercise in a limited fashion.	Learners unable to apply the concepts learned in ecology and adaptation to this exercise.
Neatness of overall presentation	Excellent.	Good.	Fair.	Untidy.

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Rubric to assess presentation

Criteria	Excellent [4]	Good [3]	Meets requirements [2]	Does not meet requirements [1]
Group co-operation and discipline in planning stages				
Group contribution during presentation				
Content accuracy and depth of thought				
Use of resources or aids to enhance presentation				
Success of communication during presentation				

Part Two: The consequences of overpopulation

A certain deserted island in a warm temperate climate contains a natural community of plants and animal species. Answer the following questions:

- The island has an area of $2\,500\text{ m}^2$. Of this area 700 m^2 is sandy, semi-fertile soil. If a tree requires 9 m^2 to grow, how many trees could this island support?
- The remainder of the island is covered by sand dunes. What percentage of the island is covered by sand dunes?
- Each adult animal on the island needs approximately 36 m^2 to live a balanced life. How many animals can live on this island?
- Approximately $\frac{1}{3}$ of the animal population is female. If each female produces an average of five offspring in two years, how many animals will there be after two years?
- In the same two year period, 13 males die. What will the total population now be?
- Given the information in (3), can this island support this population?

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7. A tidal wave kills approximately 33% of the animals on the island. How many animals die as a result of the disaster? Has the disaster returned the population to a stable condition?
8. What do you think the consequences will be of overpopulation on this island?

[20 marks]

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Suggested Solutions

Question number	Possible marks	Solution
1.1	20	<p>Learner questions will differ but some ideas are given:</p> <p>How does the animal obtain water? What kind of body covering does it have? What is its food source? What special adaptations does it have to enable it to obtain food? How does the animal breed? What kind of shelter does the animal have? Award 2 marks per innovative and thought-provoking question that will assist the learners in inventing their animal.</p>
1.2 and 1.3	40	See rubrics in Appendix of Assessment Tools.
2	20	<ol style="list-style-type: none"> 1. 77 trees ✓✓ 2. 72% ✓✓ 3. 71 animals ✓✓ 4. 189 animals ✓✓✓✓ 5. 176 animals ✓✓ 6. No✓ 7. 117 animals ✓✓ no ✓ 8. Insufficient food, ✓ lack of shelter, ✓ unhealthy undernourished offspring, ✓ increased disease, ✓ death. ✓

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