

Level 1: remembering.

**Frequently used task words:** define, list, label, name.

Can the student recall or remember the information?

Q

Species abundance is heavily impacted by population growth rate.

Name TWO density dependent factors that can limit the growth rates of populations.

i

This question just asks you to provide two terms - you don't need to write an explanatory paragraph or put the answer into a sentence.

There are several options for this answer. Simply choose the terms that you know are definitely density dependent.

A

- Predation
- Competition

Level 2: understanding.

**Frequently used task words:** describe, explain, identify & example.

Can the student explain ideas or concepts?



Describe how **predation** and **competition** can limit the intrinsic growth rates of a population.



This question is asking for you provide a brief explanation of how predation and competition limit intrinsic growth rates of a population.

Your answer should address both terms.



Predation can limit the intrinsic growth rate of a population by direct means through killing of individuals and indirectly via behavioural changes in the prey that slow down growth rates.

Competition can limit the intrinsic growth rates of populations by decreasing the number of resources available per individual leading to slower average individual growth rates.

## Level 3: applying.

**Frequently used task words:** apply, illustrate, solve, use & demonstrate.

Can the student use information in a new way?

Q

Draw a phylogenetic tree that represents the ancestral relationship between the following organisms.

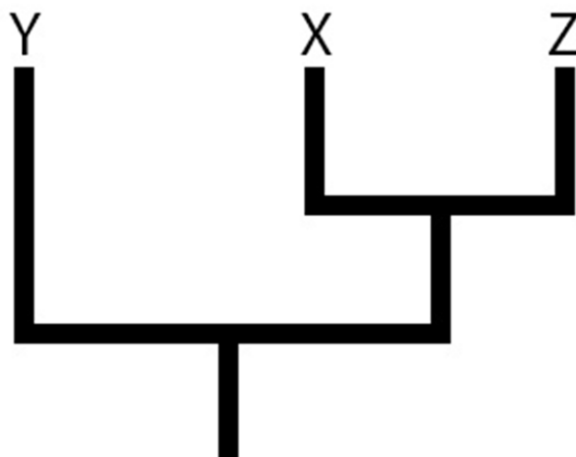
- Species X, Y and Z have all evolved from one common ancestor.
- Species X and Z have more characteristics in common with one another than they do with species Y.

i

This question requires you to use your knowledge and understanding of evolution and the structure of phylogenetic trees and apply it to a new situation.

There are several ways to construct phylogenetic trees – regardless of the style you should ensure it is neatly presented and clearly labelled.

A



## Level 4: analysing.

**Frequently used task words:** analyse, compare, contrast & examine.

Can the student distinguish between different parts?

Q

A new highly abundant species of fish is discovered off the Antarctic coast that offers huge numbers of individuals for human consumption at very low prices. This species lives for 20 years, reaches maturity at 12 years but has fast growth rates. Is it possible that this species be used for a sustainable fishery?

Provide reasons for your answer.

i

This question is asking you to analyse the scenario and determine whether the population of fish can be harvested in a sustainable way.

A simple yes or no answer will not suffice; you need to provide a clear explanation that refers to the biology of the fish species and probably economic reality of harvesting a fish species with these biological characteristics.

A

Yes, it could. Any species could be used for a sustainable fishery if the harvesting rate is appropriate to allow for the rate of natural reproduction (also known as recruitment or replacement of individuals). But given this hypothetical species takes so long to reach maturity then it is probably going to be very difficult to base an economically viable sustainable fishery on such a species because the number of fish harvested each year will be small, leading to high prices - but is possible.

## Level 5: evaluating.

**Frequently used task words:** justify, defend, argue, evaluate & assess.

Can the student justify a stand or decision?



Over large time scales, species can become evolutionarily distinct through geographic isolation or specialization.

What do *you* think - does it make sense to give highly specialized species higher conservation priority, even if they are not evolutionarily distinct as determined by their genetic uniqueness?

Explain the reason for your answer.



This question is asking you to provide your opinion on whether it is sensible to prioritize conservation efforts for species that are highly specialized.

A yes or no should only be part of the answer. You must also defend your stance.



Yes or no are both suitable answers. Obtaining full marks depends on the quality of your explanation.

For example:

**YES answer** – Highly specialised species are vulnerable to extinction as many are sensitive to even small environmental changes. Examples are panda and cheetah. Highly specialised species are usually already vulnerable to extinction and therefore deserve conservation priority.

**NO answer** – Highly specialized species may require conservation effort to protect their population numbers. However, usually their specialisation does not indicate their role within an ecosystem or functions they provide, nor does it give information about their interspecific interactions. Based on this, highly specialised species should not necessarily be given conservation priority and evolutionary distinctness should be considered in order to maintain high levels of biodiversity.

## Level 6: creating.

**Frequently used task words:** create, design, develop, formulate, construct.

Can the student create a new product or point of view?



Biologists conducted an experiment to determine the effect of a pesticide on the species diversity in a community of plants.

The experiment was done in the laboratory using soil with seeds mixed through it. Samples of soil were taken and seeds were grown under identical conditions (e.g., identical light, temperature, water, etc.), except that the treatment group was sprayed regularly with pesticide and the control group was not.

a) Write a hypothesis for this experiment.



Questions at this level will generally require you to use all of your knowledge and understanding of a specific field to develop something new. Critical thinking is essential when answering these questions. You may be able to create a hypothesis or experimental protocol quite easily but you need to be able to critically evaluate your own work to ensure you have considered all aspects and achieved the highest possible standard.

This question is asking you to create a hypothesis for an experiment. It requires you to make an educated assessment of the information you have been provided and, using your knowledge of the effect of pesticides on plants, create a suitable hypothesis. You should always endeavour to include technical terms to demonstrate your level of understanding of the topic. There are several different ways the hypothesis could be correctly worded.



The application of pesticide will reduce the species diversity of plants.