COLLATED QUESTIONS – Variation and survival

2020:3

Avian malaria is a parasitic disease affecting hoiho (yellow-eyed penguins), which can lead to death.

(a) Describe genetic variation in hoiho.

(b) Explain how sexual reproduction causes genetic variation in the hoiho population. In your answer you should consider: • the processes of gamete formation (meiosis) and fertilisation. You may use labelled diagrams, with notes, to support your answer.

(c) Discuss how genetic variation could lead to increased survival of the hoiho population when faced with avian malaria.

2019:3

The kauri dieback disease damages the tissues that carry nutrients within the kauri tree. This means some trees survive and others starve to death.

(a) Describe genetic variation in kauri trees.

(b) Explain how the sexual reproduction of kauri trees causes genetic variation AND how this could lead to increased survival of the species when faced with kauri dieback disease.
In your answer you should consider:

- the processes of gamete formation (meiosis) and fertilisation
- how sexual reproduction leads to variation in the population
- the link between genetic variation and the survival of kauri trees as a species.

2018:2

Herbicides are chemicals that are used to kill weeds. Over many years, Italian ryegrass (a common weed) has developed a resistance to some herbicides (it is no longer killed by them).

(a) Explain how variation in the Italian ryegrass population can help the population develop herbicide resistance.

(b) Explain how sexual reproduction increases variation in the Italian ryegrass population. Your answer should include gamete formation and fertilisation.

2017:3

Wild banana showing seeds

Banana pups

Wild bananas have large seeds, and reproduce sexually. Farmed bananas are produced asexually, from suckers called “banana pups”.

(a) How does the production of gametes result in variation for the wild banana plants?

(b) Suggest a possible problem that may arise with farmed bananas (produced from suckers), and explain why this problem would not occur in wild bananas (produced sexually)?

2016:3

Venus flytraps (*Dionaea muscipula*) are plants that live in poor quality soils. They have specially adapted leaves that snap shut to catch insects.

The plants reproduce sexually, involving the production of flowers.

(a) Discuss the advantages of sexual reproduction.
In your answer you should:
- define sexual reproduction
- explain how ONE important process in sexual reproduction helps to produce variation in offspring
- explain how variation as a result of sexual reproduction can benefit the Venus flytrap plant population over generations.

(b) The Venus flytrap plants come in a number of different types, such as the “B-52” with a red leaf. A teacher brought two identical plants to class and put them in different parts of the classroom. The Venus flytrap put near a window grew short leaves and the Venus flytrap in the shade grew long leaves.
Colour variation in the leaves of the Venus flytraps can be passed on to a plant’s offspring, but the different leaf length cannot. Explain why.
In your answer you should:
- define inheritable and non-inheritable variation
- explain what causes inheritable and non-inheritable variations

2015:3

The photograph below shows a large number of plants that are all the same species.

(a) The yellow-brown colour in some of the plants has been caused by a disease. The disease is present throughout the field, but affects only some plants. This is because of variation in the plants.

Explain why variation means not all the plants get the disease.

(b) The plants in the photograph were grown from seeds. Seeds are the result of sexual reproduction.

(i) Name one process that occurs during sexual reproduction, and explain how it results in variation.

(ii) Discuss the advantages of sexual reproduction for a species when the environment changes.
In your answer you should:

- give examples of a changing environment
- explain the impact of changing environments on a population
- consider the importance of variation in a population in a changing environment.

2014:1 *(Part question)*

(c) Variation within a species can be inheritable or non-inheritable.

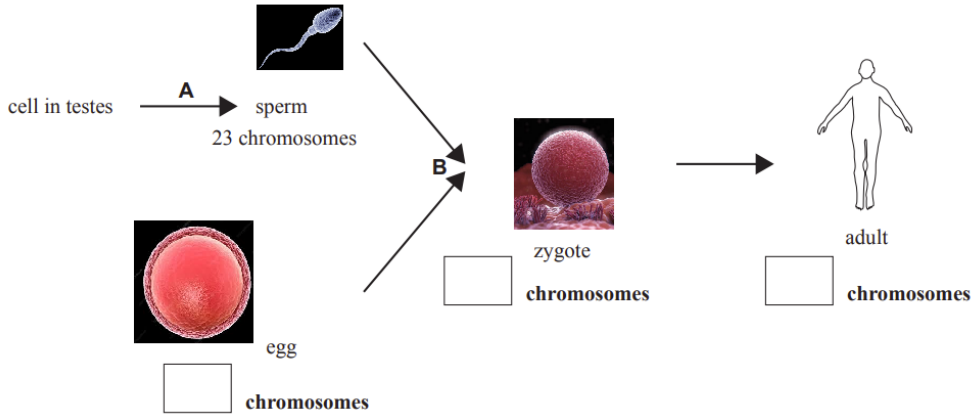
(i) Give two examples of environmental factors that can lead to non-inheritable variation in plants.

(ii) The pictures below show two plants of the same species.

Discuss how BOTH inheritable and non-inheritable factors can result in the variation of these plants, AND explain the importance of this variation within a large population of the plants growing in a changing environment.

2014:2 *(Part question)*

The diagram below shows the relationship between gametes (sex cells), zygotes, and chromosome number in humans.



(d) Two brothers, who have the same parents and are not identical twins, will have different genotypes and phenotypes.

(i) Define the term genotype.

(ii) Define the term phenotype.

(iii) Explain how the two brothers with the same parents can have different genotypes.

In your answer you should explain:

- the importance of meiosis
- the role of fertilisation.