

Model Answers: Hard

Q1

The correct answer is **D** because:

- The height of the plant is a **continuous** characteristic. Characteristics that are continuous are under the influence of both genetic factors and the environment.
- The graph shows a bell shaped curve in both groups, with intermediates in between.
- The graph does show **two distinct** groups, with one group taller than the other. These two groups show **discontinuous variation**, with continuous variation seen within each group.

Make sure that you really look at the graph. It is included in the question for a reason!
It is really easy to miss that there are two groups in this graph.

Q2

The correct answer is **A** because:

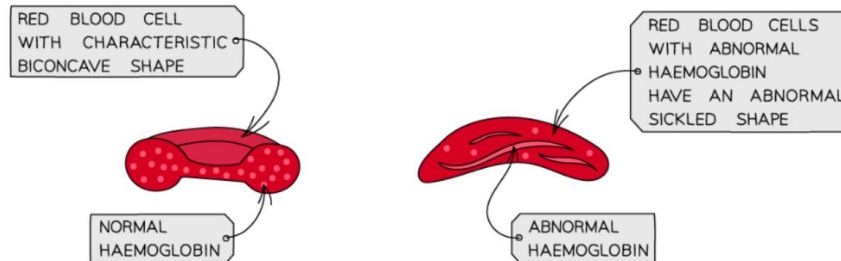
- Blood groups are controlled by a **genetic variation**.
- This is an example of **discontinuous variation**, there are distinct groups.
- These differences are due to differences in the **genetic code**.

B & C are incorrect as	the blood group characteristic is not an example of continuous variation , there are only four possible blood groups with no intermediates in between.
D is incorrect as	discontinuous variation is only under the influence of genetic factors, the environment doesn't influence the phenotype.

Q3

The correct answer is **D** because:

- An individual who has inherited a sickle-cell allele is unable to produce **haemoglobin** correctly all of the time (some of their red blood cells will be normal and some will be abnormal. **Red blood cells** containing incorrectly produced haemoglobin have an abnormal sickle shape:



- Carriers of a sickle cell **allele** are less likely to get **malaria** as the parasite that causes malaria lives in the red blood cells.
- Heterozygous carriers have a selective advantage as they are largely protected from malaria. They can however pass the allele sickle-cell anaemia onto the next generation.

A is incorrect as	sickle-cell sufferers still have two alleles of the gene.
B is incorrect as	they are heterozygous and sickle-cell anaemia is a recessive condition, only homozygous recessive individuals develop the disease (anaemia is the inability to transport enough oxygen to respiring tissues).
C is incorrect as	cholera is an infectious intestinal disease caused by a bacterium and does not affect the red blood cells.

Q4

The correct answer is **C** because:

- Selecting plants for their desirable characteristics is **selective breeding**.
- This is an example of **artificial selection** carried out by humans.

A is incorrect as	evolution is the change in adaptive features of a population over time as the result of natural selection .
B is incorrect as	adaptations are an inherited feature that helps an organism to survive and reproduce in its environment.
D is incorrect as	natural selection is the process by which organisms best suited to their environment (better adapted) are more likely to survive and reproduce.

Q5

The correct answer is **A** because:

- Blood group is a characteristic that is completely under genetic control and therefore the environment does not affect this characteristic.
- Blood group alleles show codominance - alleles I^A and I^B are both expressed if present in the genotype (they cannot mask each other), but both are dominant over the i (O) allele. There are therefore 4 possible phenotypes for blood type (A, B, AB and O).
- Blood groups therefore show discontinuous variation - there are distinct blood group categories and a person will fit into one of them; there are no intermediates. This is unlike height for example, this is a characteristic that shows continuous variation where individuals can be any height within a range.

B is incorrect as	blood groups are an example of discontinuous variation not continuous variation.
C & D are incorrect as	blood groups are not affected by the environment.