

Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Q1.

- (a) Vectors are used in the process of genetic engineering.

Which **two** statements are correct?

Tick (✓) **two** boxes.

Vectors are enzymes used to 'cut open' the DNA molecule.

☐

Vectors are used to insert genes into cells.

☐

Vectors are used to isolate the required gene.

☐

Vectors are used to stimulate cell division.

☐

Vectors are usually plasmids or viruses.

☐

(2)

- (b) Scientists have genetically engineered a variety of wheat to be resistant to herbicides.

The herbicide resistant variety of wheat will give a higher yield than the non-herbicide resistant variety.

Explain why.

(3)

- (c) Give **two** examples of genetic engineering in use today.

Do **not** refer to herbicide resistance in your answer.

1 _____

2 _____

(2)

- (d) Scientists working on the 'Human Genome Project' have now mapped the entire genetic code of humans.

Explain **one** way this could be important for people in the future.

(2)

(Total 9 marks)

Q2.

Animals have adaptations to survive in their environment.

These adaptations may be structural, behavioural or functional.

(a) Draw **one** line from each animal adaptation to the type of adaptation it is.

Animal adaptation	Type of adaptation
 Male palm cockatoos use sticks to beat on hollow branches to attract females.	Structural
 The harmless hornet moth has black and yellow stripes to look like a bee or wasp.	Behavioural
 Sea spiders have automatic muscle contractions that move oxygen around their bodies.	Functional

(2)

Plants also have adaptations.

There are more than 28 000 known species of orchid plants.

(b) Many orchid plants:

- grow attached to other types of plants
- have brightly coloured flowers
- produce large quantities of pollen
- produce thousands of tiny, light seeds.

Describe how these adaptations help orchid plants to survive and compete.

(4)

A rare orchid has been found in the mountains in China.

The orchid has pale yellow flowers.

DNA analysis of the genome shows that it is an ancestral species.

All other present day orchids evolved from this ancestral species millions of years ago.

(c) One present day species has bright purple flowers.

Describe how an orchid with bright purple flowers may have evolved from the ancestral species which has pale yellow flowers.

(4)

(d) The DNA code determines the sequence of amino acids which are joined together to form a specific protein.

The table shows part of the amino acid sequence for the colour pigment protein in five orchid species.

The rest of the amino acid sequence is the same for all the species.

Species	Amino acid sequence	Flower colour
Ancestral species	ala-leu-gly-isoleu-tyr-gly-ala-leu-gly-ala	pale yellow
Species A	ala-isoleu-gly-ala-tyr-gly-ala-tyr-gly-ala	pale yellow
Species B	ala-leu-ala-isoleu-tyr-gly-ala-tyr-gly-ala	pink
Species C	ala-isoleu-gly-ala-gly-tyr-gly-leu-gly-ala	pale yellow
Species D	ala-leu-gly-isoleu-tyr-tyr-ala-leu-gly-ala	purple

Key:

ala = alanine

gly = glycine

isoleu = isoleucine

leu = leucine

tyr = tyrosine

Suggest which orchid species is most closely related to the ancestral species.

Give a reason for your answer.

Species _____

Reason _____

(2)

(Total 12 marks)