How to better answer Test Questions

Let's focus on the terms Describe, Discuss, and Explain.

How to better answer Test Questions

In fifteen minutes, write answers to the questions below.

Then compare your results with the model answers and suggested mark schemes.

1. Describe the consequences of a gene mutation with respect to sickle cell disease.

2. Explain how Sickle cell disease can be caused by a gene mutation.

3. Discuss the possible harmful effects and the potential benefits of a gene mutation

Here are typical student responses. How do your answers compare?

1. Describe the consequences of a gene mutation with respect to sickle cell disease.
   - A gene mutation is an altered mRNA after transcription change to amino acid sequence this changes the shape of the hemoglobin.

2. Explain how Sickle cell disease can be caused by a gene mutation.
   - A gene mutation is a mutation in a single gene, a base can be deleted.
   - This causes the DNA codon to be altered.
   - The structure of the protein is not the same as usual and the person has Sickle cell anemia

3. Discuss the possible harmful effects and the potential benefits of a gene mutation
   - A gene mutation which has harmful effects is the mutation which causes sickle cell disease.
   - It can also have a benefit that it protects the sufferer from malaria.
   - The harmful effects are a change to the shame of red blood cells caused by a change in the red blood molecule.

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What improvements could be made?

For a Describe, answer in this pattern:

- Definition
- Explanation
- Another Detail
- Consequence

For a Explain, answer in this pattern:

- Definition
- Starting Point
- Effect(s)
- Consequence
- Outcome

For a Discuss, answer in this pattern:

- First Claim/First Point of View *with supporting pieces evidence*
- Counterclaim/Other Point of View *with supporting pieces evidence*

This is a suggested exam answer mark scheme. How many of the points did you include?

1. Describe the consequences of a gene mutation with respect to sickle cell disease.

- ***Definition***: A mutation is a change in DNA sequence;
- ***Explanation***: this changes the mRNA made by transcription; which changes the amino acids in the protein made; a substitution mutation / changes to one codon;
- ***Another Detail:*** glutamic acid is changed to valine / GAG to GTG;
- ***Consequence***: this changes the shape / function of hemoglobin / red blood cells form a sickle shape; sickle cell anemia caused by two mutated recessive alleles;

2. Explain how Sickle cell disease can be caused by a gene mutation.

- ***Definition***: Sickle cell disease is a blood disorder due to a gene mutation for hemoglobin, causing a change in shape of red blood cells.
- ***Starting Point***: one codon/base in the DNA/gene is altered;
- ***Effect***: mRNA made from the DNA has one altered base/codon; GAG becomes GUG in mRNA / CTC becomes CAC in DNA / GAG becomes GTG in DNA;
- ***Consequence***: a different amino acid inserted into the polypeptide/protein; glutamic acid replaces valine in the protein;
- ***Outcome***: the structure of the polypeptide/protein is altered; the altered hemoglobin may cause red cells to become sickle shaped;

3. Discuss the possible harmful effects and the potential benefits of a gene mutation

- ***First Claim*** : example of a harmful gene mutation e.g. base substitution in sicle cell anaemia; possible harmful effect (e.g. sickle cell disease); Then detail of possible harmful effect (e.g. change in the structure of hemoglobin); another possible harmful effect (e.g. red blood cells have a sickle shape); detail of another possible harmful effect (e.g. RBCs get stuck in capillaries)
- ***Second Claim:*** potential benefit of a gene mutation e.g. resistance to malaria in Sickle Cell Trait (heterozygous); detail of possible benefit; e.g. malaria symptoms are less severe; another possible effect; e.g. malaria parasite is unable to reproduce in RBCs