

You and your genes – 2022 GCSE 21st GCSE Biology B**1. May/2022/Paper_J257/03/No.5**

- (a) Complete the sentences to explain how individuals in the same family can have different phenotypes.

Use words from the list.

alleles	chromosomes	DNA	gene	genomics
genotype	mutations	phenotype	protein	variants

..... are long molecules of DNA that store genetic information.

A is a small section of this DNA.

You inherit two copies of a gene, one from your father and one from your mother. These different copies are called

There can be many different versions of a gene, which are referred to as genetic

A is the collection of alleles that an individual has.

An individual's is the result of their genotype interacting with the environment.

[5]

- (b) Genes code for proteins that are made by cells.

Put sentences **A–D** in the correct order to describe protein synthesis.

A mRNA leaves the nucleus.

B mRNA enters the cytoplasm and joins to a ribosome.

C The ribosome 'reads' the mRNA and joins the amino acids together in the right order.

D The gene is copied and mRNA is formed.

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[2]

2. May/2022/Paper_J257/03/No.11

Scientists have used genes from jellyfish to genetically engineer Zebra fish to glow in the dark.

(a) Describe how the scientists genetically modify the Zebra fish eggs.

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(b) The Zebra fish were modified because their embryos are very sensitive to water pollutants. When water pollutants are present, the fish glow.

Suggest how scientists use Zebra fish to determine if an area of water is polluted **and** describe one limitation of this method.

Method

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Limitation

..... [2]

(c) Oestrogen is an example of a pollutant that can be detected by the Zebra fish.

(i) Describe **two** roles that oestrogen has in the human body.

Role 1

Role 2

[2]

(ii) Suggest why oestrogen may be found in rivers and oceans.

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..... [1]

- (d) The genetically engineered Zebra fish are now sold as pets that glow under UV light.

Suggest why this concerns some scientists.

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..... [1]

3. May/2022/Paper_J257/04/No.7

Scientists are developing new vaccines against human diseases such as influenza.

(a) New vaccines must be tested before they can be approved for widespread use in the population.

(i) New vaccines are tested in pre-clinical trials before they are tested in humans.

Describe **two** ways in which a new influenza vaccine could be tested in **pre-clinical** trials.

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(ii) The next stage of testing involves clinical trials in human volunteers.

A new **medicine** is usually tested in two groups of people. First, it is tested in:

- Group 1: Healthy people who do **not** have the disease.

Then it is tested in:

- Group 2: People who have the disease.

Suggest why a new **vaccine** is tested in group 1 but **not** in group 2.

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..... [3]

(b) One new type of vaccine against influenza is made of mRNA. The vaccine contains mRNA taken from the influenza virus.

- When a person is vaccinated, influenza mRNA from the vaccine enters some of the person's cells.
- These cells use the mRNA to make influenza protein.

(i) Describe how the person's cells will use the influenza mRNA to make influenza protein.

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(ii) Explain how the person's body will react to the influenza protein **and** how this could protect them from catching influenza in the future.

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4. May/2022/Paper_J257/01/No.1

Complete the sentences about DNA and the production of proteins in cells.

Put a **ring** around each correct answer.

The shape of DNA is called a **double helix / nucleotide / nucleus**.

Sections of DNA called **genes / nucleotides / sugars** tell the cell how to make proteins.

A protein is a polymer made of **amino acids / fatty acids / sugars** joined together in a particular order.

Carbohydrates / enzymes / fats are examples of proteins found in cells.

[4]

5. May/2022/Paper_J257/01/No.9

This question is about genetics.

(a) Draw lines to connect each **genetic term** to its **definition**.

Genetic term	Definition
Alleles	A different version of a gene
Chromosome	The two copies of a gene in a pair of chromosomes
Genetic variant	The characteristic that results from a gene and interaction with the environment
Phenotype	A long thin structure made from DNA

[4]

(b) Sickle cell anaemia is an inherited disease. The disease is caused by a recessive allele.

The recessive allele is represented with an **a**, and the dominant allele is represented with an **A**.

Complete the table to show whether the person with each genotype will have sickle cell anaemia.

Tick (✓) **one** box in each row.

Person's genotype	The person will have sickle cell anaemia	The person may or may not have sickle cell anaemia	The person will not have sickle cell anaemia
AA			
Aa			
aa			

[3]

(c) Amaya and Jack do **not** have sickle cell anaemia.

They want to have a baby. They decide to both have a genetic test.

Explain why Amaya and Jack decide to have a genetic test.

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