

APRIL HOLIDAY ASSIGNMENT, 2026

FORM 4 BIOLOGY

Genetics

1. Differentiate between continuous and discontinuous variations
2. Members of the same species of organism tend to differ due to variation. State **three** causes of variation in organisms.
3. Identify the type of gene mutations represented by the following pairs of words: -
 - (a) Shirt instead of skirt
 - (b) Hopping instead of shopping
 - (c) Eat instead of tea
4. Wekesa and Wanjiku who are siblings are both normal as their parents but have a hemophilic brother. Give the Genotype of their parents.
 - a) i) What do you understand by the phase a test cross?
5. There are at least 205 known sex – linked recessive disorder
 - a) Name **any two** of them.
 - b) State a reason why sex – linked recessive why traits tend to effect the male child.
 - c) State why if a mother has the trait all her sons will have it
6. State the meaning of the following terms giving an example in each case:
 - (a) Sex-linked genes
 - (b) Multiple alleles
7. Give an example of a sex-linked trait in human on:
 - (a) **Y** – Chromosome
 - (b) **X** – Chromosome
8. Explain why growth of long hair on the pinnae of the ears in human occurs in males only
9. Explain why **prophase 1** of meiosis contributes towards genetic variation in living organisms.
10. A pure Red flowered plant was crossed with a pure white flowered plant. All the F₁ generation plants had pink flowers.
 - (a) Give an explanation for the absence of Red and white flowered plants in the F₁ generation.
 - (b) If the F₁ generation pea plants were selfed, state the phenotypic ratio of the F₂ generation plants.
11.
 - (a) Name a genetic disorder due to gene mutation that affects the malpighian layer of the skin in man.
 - (b) Give **two** functions of the fluid produced by sebaceous glands.
12.
 - (a) Define the term “Gene mutation.”
 - (b) Name the genetic disorders that result from gene mutation in human beings.
13.
 - (a) What are mutations
 - (b) Name **two** mutagens
14. In a certain bird species, red flight feathers is controlled by gene **R** while white flight feathers is controlled by gene **r**. The heterozygous condition **Rr** results into pink flight feathers. The two genes are also sex linked and transmitted on X-chromosome.
 - a) By use of fusion lines, find the genotypes of across between a male with pink flight

feathers and a female with white flight feathers

b) Which type of dominance is illustrated here?

c) i) Identify the nucleic acid whose base sequence is shown below:

G-A-C-U-A-G-A-C-G

ii) Give a reason for your answer in **c (i)** above

iii) If the nucleic acid was involved in protein synthesis, how many amino acids would be present in the protein synthesized? Give a reason

15. A cross between a red-flowered and a white flowered plant produced only pink –flowered F₁ plants

(a) There was neither a red nor white –flowered F₁ plants. Explain

(b) The F₁ offspring were selfed to get F₂ generation. Using appropriate letter symbols, work out the genotypes of F₂ generation

(c) Give the genotypic and phenotypic ratios of F₂ generation

(d) Distinguish between dominant and recessive genes

16. In man blood group inheritance is controlled by multiple alleles in which allele **A** is co dominant to allele **B**. a woman heterozygous for blood group **A** married a man heterozygous for blood group **B**

a) State the genotype of both parents

b) Using a punnet square, show the genotypes of F₁ generation

c) State **one** application of knowledge of blood group inheritance in man

d) The nitrogenous bases in nucleic acids are Adenine (A), cytosine(C), Guanine (G),Thiamine (T) and uracil (U). Input of a molecule of DNA the sequence of bases is CTT. Using the letters **A, C, G, T, U** where appropriate, write down the base sequence in;

i) Corresponding part of the complementary strand of DNA molecules

ii) Corresponding part in mRNA

iii) A change in the DNA molecules caused the base sequence in the triplets to change

from CTT to CAT. State **one** factor which could have caused the change

(c) (i) What is non— disjunction?

(ii) Give **one** example of a genetic disorder associated with non-disjunction .