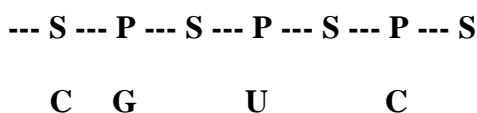


GENETICS

PAST KCSE QUESTIONS ON TOPICS

1. The figure below is a structural diagram of a portion from a nucleic acid strand.



(a) Giving a reason, name the nucleic acid to which the portion belongs.

(2 marks)

Name _____

Reason _____

(b) Write down the sequence of bases of a complimentary strand to that shown above

(1 mark)

2. State two structural differences between ribonucleic acid (RNA) and

deoxyribonucleic acid (DNA) (2 marks)

3. Name a disorder of human blood that is caused by mutation (1 mark)

4. State the function of deoxyribonucleic acid (DNA) molecule (1 mark)

5. Give a reason why it is only mutation in genes of gametes that influence

evolution (2 marks)

6. In an experiment, red flower were crossed with plants with white flower. All the plants in the F1 generation had pink flowers.

- (a) Give a reason for the appearance of pink flower in the F1 generation (1 mark)

- (b) If the plants from F1 generation were selfed, state the phenotype ratio of the F2 generation (2 marks)
7. State two characteristics that researchers select in breeding programmes. (2 marks)
8. Give an example of sex- linked trait in humans on; (2 marks)
Y chromosome _____
X chromosome _____
9. In an experiment, a variety of garden peas having a smooth seed coat was crossed with a variety with a wrinkled seed coat. All the seeds obtained in the F1 had a smooth seed coat. The F1 generation was selfed. The total number of F2 generation was 7324.
- (a) Using appropriate letter symbols, work out the genotype of the F1 generation. (4 marks)
- (b) From the information above, work out the following for the F2 generation
- (i) Genotype ratio (2 marks)
- (ii) Phenotype ratio (1 mark)
- (iii) Wrinkled number (1 mark)
10. In a certain plant species, some individual plant may have white, red or pink flower. In an experiment a plant with white parent plant were pure lines. All the plants from F1 generation were pink. Using letter R to represent the gene for red colour and letter W for white colour;

- (a) Work out the genotype of F1 generation (3 marks)
- (b) If the plants from F1 generation were selfed, what would be the

phenotypic ratio of the F₂ generation? (3 marks)

- (c) What is the genetic explanation for the absence of plants with red and white in the flower F₁ generation? (2 marks)

11. In a breeding experiment, plants with red flower were crossed. They produced 123 plants with red flowers and 41 with white flowers.

- (a) Identify the recessive character. Give a reason
- (b) What were the genotypes of the parent plants that give rise to the plants with red and white flowers?
- (c) If the white flowers were selfed, what would be the genotypes of their offspring?

12. (a) Name two disorders in humans caused by gene mutation (2 marks)

- (b) Describe the following chromosomal mutations

- (i) Inversion (2 marks)
- (ii) Translocation

- (c) In mice the allele for black fur is dominant to the allele for brown fur. What percentage offspring would have brown fur from a cross between heterozygous black mice and brown mice? Show your working. Use letter B to represent the allele for black colour.

(4 marks)

13. (a) What is meant by the term allele? (1 mark)

- (b) Explain how the following occur during gene mutation

(i) Deletion

(1 mark)

- (ii) Inversion (1 mark)
- (c) What is a test- cross? (1 mark)
14. In maize the gene for purple colour is dominant to the gene for white colour. A pure breeding maize plant with purple grains was crossed with a heterozygous plant.
- (a) (i) Using letter G to represent the gene for purple colour, work out the genotypic ratio of the offspring (5 marks)
- (ii) State the phenotype of the offspring (1 mark)
- (b) What is genetic engineering? (1 mark)
15. Define the following terms as used in genetics.
- (i) Alleles
- (ii) Genotype
- (iii) Phenotype
16. A farmer mated his dark red cow with a white bull. The cow gave birth to a light red calf
- (a) State why the calf is light red and not dark red or white
- (b) If a light red bull is mated with a dark red cow, work out using appropriate letter symbols the probability of getting a light offspring
17. (a) What is meant by linked genes?
- (b) (i) In fruit flies (*Drosophila*) the gene for red eyes ® is dominant over

the one for white – eye (r). If a true breeding white – eyed male, all the offspring will be red eyed. However, if a true – breeding white- eyed

female is mated with a true- breeding red- eyed male, all the female offspring will be red – eyed. Explain this apparent contradiction.

- (ii) Work out the ratio of the expected phenotypes if a red- eyed female offspring from the cross- described in (i) above is mated with red- eyed males.
18. (a) Explain the term variation with reference to the study of genetics.
- (b) Using relevant examples distinguish between discontinuous variation and continuous variation
- (c) What is the importance of genetic variation?
- (d) Describe one example where genetic variations has helped a species to survive
19. The diagram below shows the base sequence of part of a nucleic acid stand. Observe it and answer the questions that follow
- G T T A G C T G A
- (a) What do the letters G, T , C and A represent?
- (b) Giving your reasons state whether it is part of DNA or an RNA strand.
- (c) Show the complementary DNA strand
- (d) Show the complimentary RNA strand
20. In human couples the sex of a baby is determined by the man. Explain this statement.