MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER

SCHOOL OF NATURAL RESOURCE AND ANIMAL SCIENCES

BACHELOR OF SCIENCE IN ANIMAL HEALTH AND PRODUCTION

COURSE CODE AHP 1208-1

COURSE TITLE: PRINCIPLES OF GENETICS

DATE: 18/4/2023 **TIME: 1430-1630 HRS**

INSTRUCTIONS TO CANDIDATES

(i) Attempt ALL the questions
(ii) Label your answers clearly
(iii) Don't mix up answers
(iv) DO NOT WRITE anything on the question paper

QUESTION ONE

a. Define the following terms: (10 marks)
    a) Chromosome
    b) Gene
    c) Allele
    d) Mitosis
    e) Kinetochore
    f) Genotype
    g) Phenotype
    h) Translation
    i) Mutant
    j) Polygene

b. List the differences between mitosis and meiosis (10 marks)

QUESTION TWO

Describe the two types of linkages giving examples for each (20 marks)

QUESTION THREE

a) Describeescribe the factors that affect cross-over (10 marks)
b) Highlight the differences between linkage and cross-over (10 marks)

QUESTION FOUR

a) Define sex linked genes (5 marks)
b) Coat color in cats is determined by genes at several different loci. At one locus on the X chromosome, one allele (X^+) encodes black fur; another allele (X^o) encodes orange fur. Females can be black (X^+X^+), orange (X^oX^o), or a mixture of orange and black called tortoiseshell (X^+X^o). Males are either black (X^+Y) or orange (X^oY). Mercy has a female tortoiseshell cat named Kate. One night Kate escapes from Mercy's house, spends the night out, and mates with a stray male. Kate later gives birth to the following kittens: one orange male, one black male, two tortoiseshell females, and one orange female. Give the genotypes of Kate, her kittens, and the stray male with which Kate mated (15 marks).

QUESTION FIVE

a) State 5 characteristics of cytoplasmic inheritance (5 marks)

b) Give examples of cytoplasmic inheritance (5 marks)
c) In some goats, the presence of horns is produced by an autosomal gene that is dominant in males and recessive in females. A horned female is crossed with a hornless male. The F1 offspring are intercrossed to produce the F2. What proportion of the F2 females will have horns? (10 marks)

QUESTION SIX

a) State the the Hardy–Weinberg law (10 marks).
b) You have sampled a population in which you know that the percentage of the homozygous recessive genotype (aa) is 36%. Using that 36%, calculate the following:
    i. The frequency of the "aa" genotype (2 marks)
    ii. The frequency of the "A" allele (2 marks)
    iii. The frequencies of the two possible phenotypes if "A" is completely dominant over "a" (6 marks)

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