



# MACHAKOS UNIVERSITY

University Examinations for 2017/2018 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

2017/2018 Year SEPTEMBER - DECEMBER Semester Examination  
for Degree in Bachelor of AGRICULTURAL EDUCATION

CODE: SCB 120 UNIT NAME: INTRODUCTION TO GENETICS

Date----- Time -----

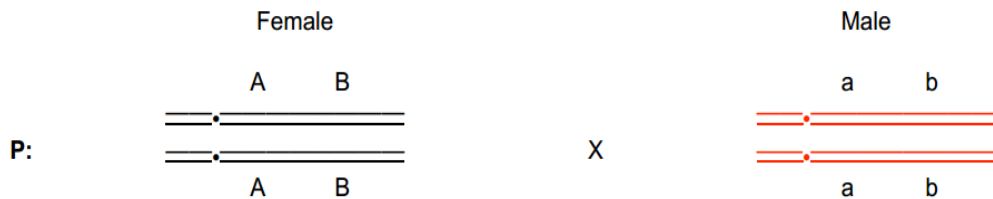
### Instructions

1. Answer Question 1 (**compulsory**) and **any two** questions in Section B.
2. Use clean well labelled diagrams wherever appropriate.

### SECTION A

Question 1. – Compulsory (30 marks) – This question should cut across the entire course content. It should have 10 subsections, each worth a maximum of 3 marks.

- a) Explain the importance of multiple allelism (3 marks)
- b) Explain how the light purple aleurone colour in maize comes about (3 marks)
- c) Using an example, explain pleiotropy (3 marks)
- d) Explain the following as used in genetics (3 marks)
  - a. Phenocopies
  - b. Linked genes
  - c. Discontinuous traits
- e) Using a relevant example, describe how interactions between nuclear and cytoplasmic genomes occur (3 marks)
- f) Consider a case where two genes A and B are linked. What gametes would be produced by F1 in case there's a crossing over



- g) Outline three sources of genetic variation (3 marks)
- h) Outline the causes of genetic drifts (3 marks)



- i) State the Hardy-Weinberg equilibrium (3 marks)  
 j) Draw a graph showing continuous variation of height in a population (3 marks)

SECTION B

**QUESTION TWO**

Discuss the mechanisms of gene interactions in organisms (20 marks)

**QUESTION THREE**

Discuss the theories of multiple allelism (16 marks)

Illustrate existence of multiple alleles in humans (4 marks)

**QUESTION FOUR**

Assess the ways in which genetic variance affects evolution of populations (20 marks)

**QUESTION FIVE**

Draw a genetic map of LGS genes (order unknown) which confer the following traits in maize?

Maize:

- l l - lazy or prostrate growth  
 g g - glossy leaves  
 s s - sugary endosperm

**Triple Heterozygote: L G S / l g s X Recessive homozygote: l g s / l g s**

Progeny Phenotype	Genotypes of offspring	Number
Wildtype	L G S / l g s	286
Lazy	l G S / l g s	33
Glossy	L g S / l g s	59
Sugary	L G s / l g s	4
Lazy, Glossy	l g S / l g s	2
Lazy, Sugary	l G s / l g s	44
Glossy, Sugary	L g s / l g s	40
Lazy, Glossy, Sugary	l g s / l g s	272
<b>Total</b>		<b>740</b>

20 marks

