

**BINDURA UNIVERSITY OF SCIENCE EDUCATION  
SCIENCE & MATHEMATICS EDUCATION DEPARTMENT DipScEdSc/DipScEd  
HEREDITY AND GENETICS (DB004/BZ005)**

**EXAMINATION  
2 HOURS (100 MARKS)**

JUN 2023

**INSTRUCTIONS TO CANDIDATES**

Answer **FOUR** questions. You **MUST** answer QUESTION 1 (Section A) and any **THREE** questions from Section B. Each question carries **25 MARKS**. Where a question contains sub-divisions, the mark value of each sub-division is given in brackets. Illustrate your answer where appropriate with large clearly labelled diagrams. You should not spend more than thirty minutes on each question.

**SECTION A (COMPULSORY)**

1. In a certain type of plant, green fruit colour is dominant to red and round fruit shape is dominant to square fruit shape. Assuming independent assortment:
  - a. Using suitable symbols, state the genotypes produced by heterozygous green, round plant. (4 marks)
  - b. State the genotypes and their proportions produced if two such heterozygous plants are crossed. (12 marks)
  - c. Outline a test that can be carried out to differentiate a heterozygous and a homozygous phenotype showing the expected outcomes considering the two genes. (9 marks)

**SECTION B**

2. Write short notes on any **FIVE** of the following:
  - (a) Differences between DNA and RNA. (5 marks)
  - (b) Extra-nuclear inheritance. (5 marks)
  - (c) Lethal alleles. (5 marks)
  - (d) Quantitative traits. (5 marks)
  - (e) Chromosomal basis of inheritance. (5 marks)
  - (f) Down's Syndrome. (5 marks)
3. Give a detailed account of DNA replication.
4. Write an essay on mechanisms of sex determination among different species.
5. Describe the Hershey and Chase Bacteriophage experiment that proved that DNA is the genetic material.
6. (a) Describe the main stages of mitosis. (15 marks)  
(b) In tabular form, list the differences between mitosis and meiosis (10 marks)

**END OF EXAMINATION QUESTION PAPER**