

BINDURA UNIVERSITY OF SCIENCE EDUCATION  
BIOLOGICAL SCIENCES DEPARTMENT  
BScBZH/HBScBioTec  
GENETICS AND EVOLUTION BZH111/ GENETICS BTEC120

EXAMINATION  
2 HOURS (100 MARKS)

OCT 2024

**INSTRUCTIONS**

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 subdivisions, the mark value of each subdivision is given in brackets. Illustrate your answers where appropriate with large, clearly labelled diagrams. You should not spend more than thirty minutes on each question.

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**SECTION A**

1. Albinism (white body color) (w) is recessive to the presence of colour (W) in mice. A black coat colour gene (B) is dominant to a brown coat colour gene (b). A cross between two heterozygous parents at both loci produced 252 W-B-, 72 W-bb, 93 wwB- and 15 wwbb offspring.

(a) Determine whether the alleles follow Mendel's law of independent assortment.

(20 marks)

(b) Construct a Punnett square to show the cross of the heterozygous parents.

(5 marks)

**SECTION B**

2. (a) Describe the structure of eukaryotic DNA. (15 marks)

(b) Describe eukaryotic DNA packaging. (10 marks)

3. Describe the semi-conservative process of DNA replication.

4. (a) Describe the process of mitosis. (20 marks)

(b) Explain the significance of mitosis. (5 marks)

5. Write short notes on any **FIVE** of the following:

- (a) Sex determination in humans. (5 marks)
- (b) Codominance. (5 marks)
- (c) Extranuclear inheritance. (5 marks)
- (d) Eukaryotic DNA packaging. (5 marks)
- (e) Genetic code. (5 marks)
- (f) Cytokinesis. (5 marks)

6. Describe the process of translation.

### END OF EXAMINATION QUESTION PAPER

Chi-square distribution

df	<i>P</i> = 0.99	0.95	0.9	0.1	0.05	0.01
1	0.0002	0.004	0.016	2.706	3.841	6.635
2	0.020	0.103	0.211	4.605	5.991	9.210
3	0.115	0.352	0.584	6.251	7.815	11.345
4	0.297	0.711	1.064	7.779	9.488	13.277
5	0.554	1.145	1.610	9.236	11.070	15.086
6	0.872	1.635	2.204	10.645	12.592	16.812
7	1.239	2.167	2.833	12.017	14.067	18.475
8	1.646	2.733	3.490	13.362	15.507	20.090
9	2.088	3.325	4.168	14.684	16.919	21.666
10	2.558	3.940	4.865	15.987	18.307	23.209
15	5.229	7.261	8.547	22.307	24.996	30.578
20	8.260	10.851	12.443	28.412	31.410	37.566
25	11.524	14.611	16.473	34.382	37.652	44.314
30	14.953	18.493	20.599	40.256	43.773	50.892