For Supervisor's use only

2

90459

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 2 Biology, 2006

90459 Describe genetic variation and change

Credits: Three
2.00 pm Thursday 30 November 2006

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–8 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

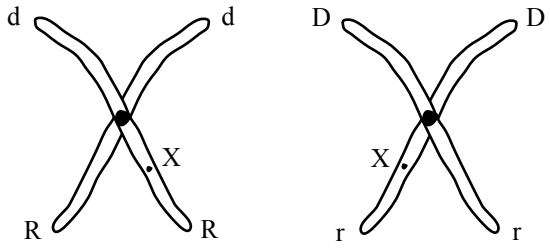
For Assessor's use only	**Achievement Criteria**		
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Describe biological concepts and processes that relate to genetic variation and change.	Explain biological concepts and processes that relate to genetic variation and change.	Discuss biological concepts and processes that relate to genetic variation and change.
Overall Level of Performance		

You are advised to spend 40 minutes answering the questions in this booklet.

Assessor's use only

QUESTION ONE: MEIOSIS

(a) The diagram below represents a replicated pair of homologous chromosomes, during meiosis.



Draw diagrams to represent the chromosomes in the **gametes** produced at the end of meiosis when crossing over occurs at point X.

(b) Explain why crossing over can be an advantage to a population.

QUESTION TWO: BREEDING BUDGIES

Assessor's use only

Budgies are small birds kept as pets. There are many colourful varieties.

The *Spangle* (A) colour pattern was first seen in 1974 and is caused by a dominant allele. The recessive allele is *Saddleback* (a).

The *Dutch Pied* (D) variation appeared in 1934. The recessive allele is *Danish Pied* (d).

(a) Describe how these new variations have arisen.

(b) Determine the genotype **and** phenotype of the possible offspring from a mating of a pure breeding *Spangle/Danish Pied* budgie with a pure breeding *Saddleback/Dutch Pied* budgie. You may use a Punnett square to help you.

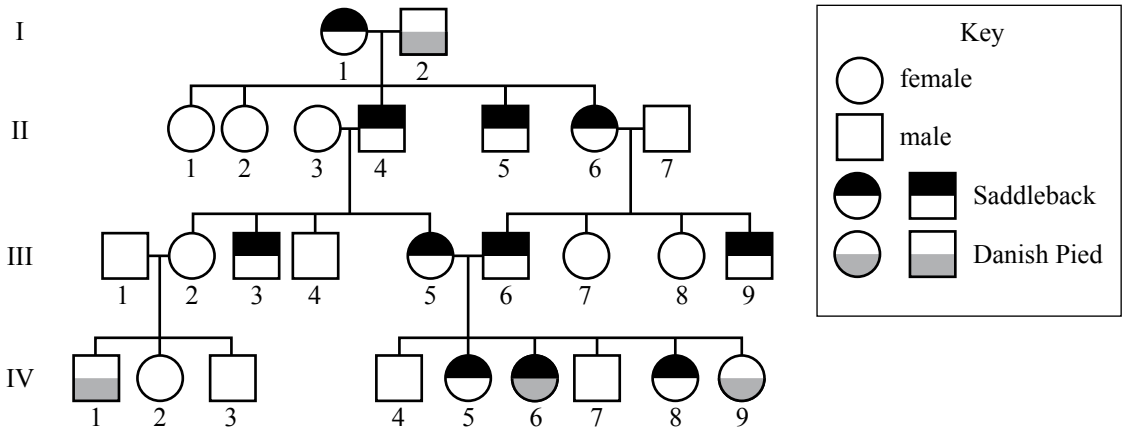
genotype:

phenotype:

The pedigree below shows the pattern of transmission of alleles from the mating of a *Saddleback* (a) and *Danish Pied* (d). Saddleback individuals are indicated by a solid upper half of the symbol: those showing Danish Pied are indicated by a shaded lower half.

Assessor's use only

GENERATION



(c) (i) What is the **genotype** of I-2?

(ii) Explain your answer to (i) above.

(d) A breeder has a *Spangled / Danish Pied* budgie. Discuss which individual in the cross on the previous page could be used to determine the genotype of this budgie.

Assessor's use only

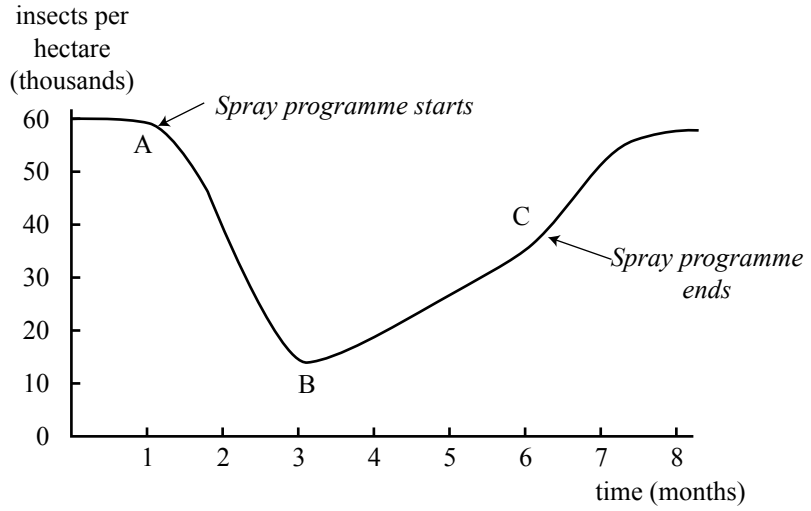
Individual: _____

Discussion for your choice above:

QUESTION THREE: INSECT SURVIVAL

Assessor's use only

A farmer has a crop heavily infested with an insect species. The farmer sprays his crop regularly with an insecticide, which kills the insect species. Daily estimates of the insect population were made over several months, during which time many generations of insects were produced. The data from the sprayed crop is represented on the following graph.



Using the letters at areas A, B, C on the graph, **discuss** reasons for the changes that occurred to the number of insects per hectare.

QUESTION FOUR: BLACK ROBIN

Assessor's use only

The recovery of the black robin from near extinction is an internationally renowned conservation success story.

In 1980 there were only 5 black robins in New Zealand, with just a single breeding pair left. Today the population is over 250. This has caused changes in the black robin gene pool.

(a) Define the term **gene pool**.

(b) Discuss how this near-extinction affected the gene pool of the black robin **and** why it is still classified as **endangered**.

Extra paper for continuation of answers if required.
Clearly number the question.

Assessor's use only

Question number	