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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Level 1 Science, 2013

90948 Demonstrate understanding of biological ideas relating to genetic variation

9.30 am Monday 18 November 2013
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of biological ideas relating to genetic variation.	Demonstrate in-depth understanding of biological ideas relating to genetic variation.	Demonstrate comprehensive understanding of biological ideas relating to genetic variation.

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 attempt 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 2–12 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.

TOTAL

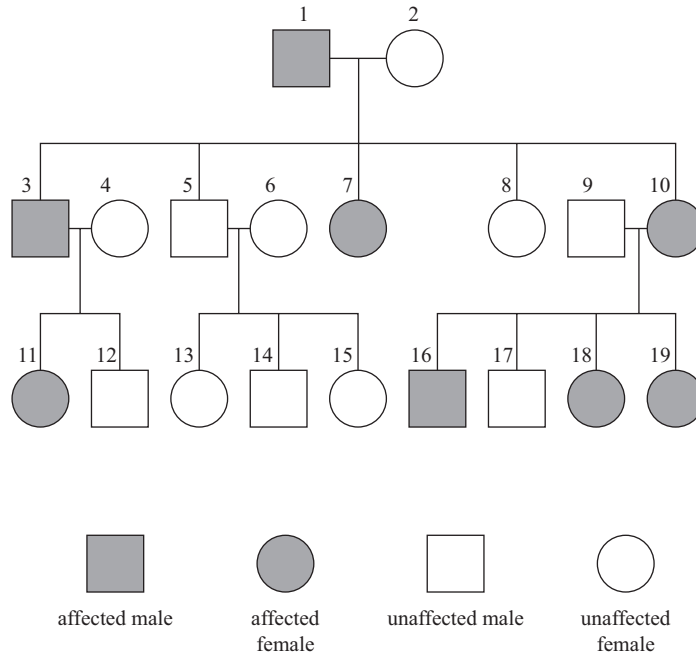
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You are advised to spend 60 minutes answering the questions in this booklet.

QUESTION ONE: PEDIGREES AND PUNNETT SQUARES

Huntington's disease is a genetic disorder in humans. It is caused by a dominant allele (H). The normal allele is recessive (h).

Pedigree chart



- (a) Using H and h, give the two possible genotypes for an individual who has Huntington's disease:

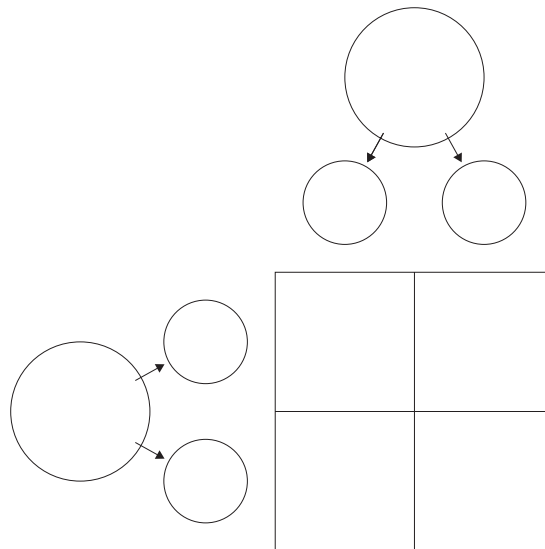
- (b) State the genotype of individual 9 in the pedigree chart above.

State the genotype of individual 10 in the pedigree chart above.

Explain how you worked out the genotype for individual 10.

You should support your answer using evidence from BOTH the parents AND children of individual 10.

- (c) Draw a Punnett square to show the **possible** genotypes of the children from parents 9 and 10.



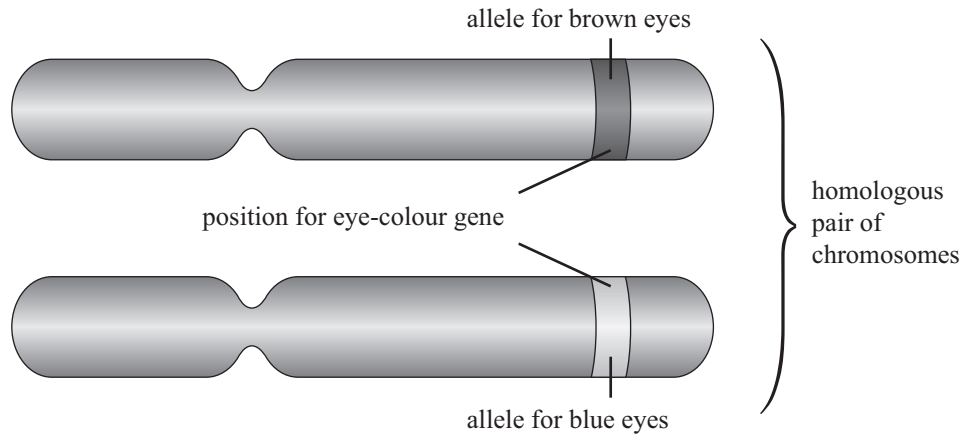
- (i) From **your** Punnett square, predict what fraction of the children would have Huntington's disease and what fraction would not have Huntington's disease.

Fraction of children with Huntington's disease: _____

Fraction of children without Huntington's disease: _____

- (ii) Using your Punnett square, complete the box below to show the expected phenotype ratio for the children.

	Huntington's disease : Without Huntington's disease
Phenotype ratio from Punnett square	:

QUESTION TWO: THE ROLE OF DNA IN INHERITANCE

- (a) Use the diagram above to help you explain the relationship between chromosomes, genes, alleles, phenotype, genotype, and the molecule DNA.

A labelled diagram may assist you.

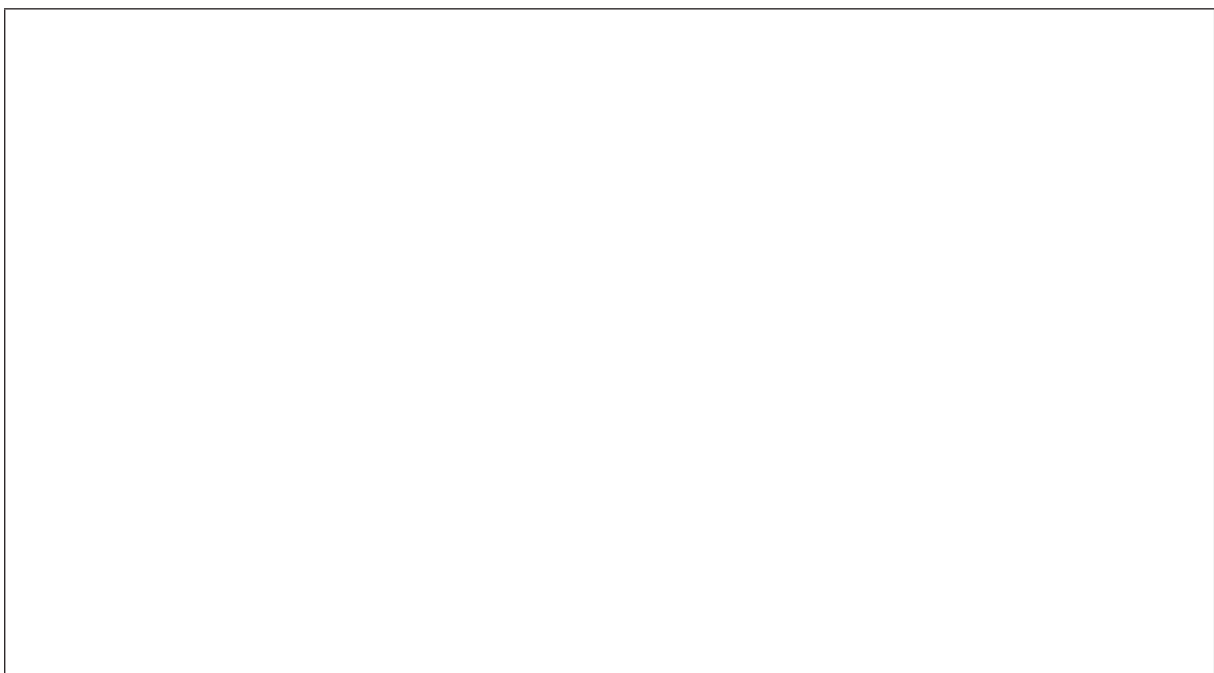
There is more space for your answer to this question on the following page.

- (b) The allele for brown eyes (B) is dominant over the allele for blue eyes (b) in humans.

Discuss how it would be possible for a child to have blue eyes, even though both their parents have brown eyes.

In your answer you should:

- use labelled Punnett squares
- link the genotypes and phenotypes of the child, parents, AND grandparents.



QUESTION THREE: SEXUAL REPRODUCTION

For both plants and animals, there are advantages and disadvantages to sexual reproduction.

- (a) Identify TWO **disadvantages** of sexual reproduction in **animals** and explain why they are disadvantages.

(1.) _____

(2.) _____

- (b) Explain how sexual reproduction contributes to variation in a population of **animals**.
In your answer you should refer to gametes, meiosis and fertilisation.

- (b) Explain how the survival of certain individuals in the wild within the Tasmanian devil population can change the ratio of aggressive to less aggressive types of Tasmanian devil within the species over time AND relate this to the species avoiding extinction.

**Extra paper if required.
Write the question number(s) if applicable.**

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