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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 1 Biology, 2008

90163 Describe the transfer of genetic information

Credits: Three
9.30 am Monday 17 November 2008

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 2–10 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 ideas relating to transfer of genetic information.	Explain biological ideas relating to transfer of genetic information.	Discuss biological ideas relating to transfer of genetic information.
Overall Level of Performance		

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

Assessor's use only

QUESTION ONE

Lactose is a sugar found in milk.
Some people can digest lactose, while other people cannot digest lactose. People who cannot digest lactose are described as lactose intolerant.
The recessive allele of a gene causes lactose intolerance.
The recessive allele for lactose intolerance is represented by the symbol **e**.
The dominant allele for digestion of lactose is represented by the symbol **E**.

(a) **Describe** the genotype(s) of a person with lactose intolerance.

(b) **Explain** the phenotype of a person who is heterozygous for this gene.

(c) A man who is heterozygous for lactose digestion has children with a woman who has lactose intolerance.

(i) Complete the Punnett square below to show the proportion of their children expected to have lactose intolerance.

(ii) The proportion of children expected to have lactose intolerance is _____

The couple had six children, but only one of the six was lactose intolerant.

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(iii) **Explain** how it is possible that only one child has lactose intolerance.

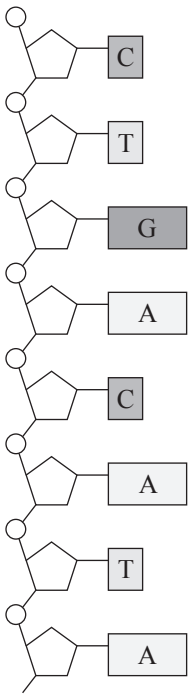
QUESTION TWO

Assessor's use only

A part of DNA that codes for a protein is called a gene. A small part of one side of a gene is shown below.

(a) Label one of each of the following on the diagram of the part of the DNA molecule below:

Sugar, Phosphate, Base.



(b) **Explain** how a gene acts as a code for a protein.

(c) **Discuss** how DNA replication ensures that a gene remains the same in each of the new body cells produced in cell division.

Assessor's use only

In your discussion you should LINK the following:

- a **description** of DNA replication
- an **explanation** of how the process of DNA replication ensures the gene remains the same in each new body cell.

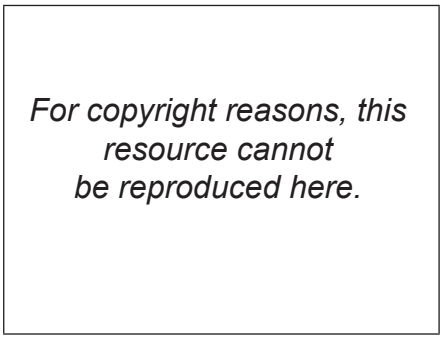
You may use labelled diagrams to support your answer.

QUESTION THREE

Assessor's use only

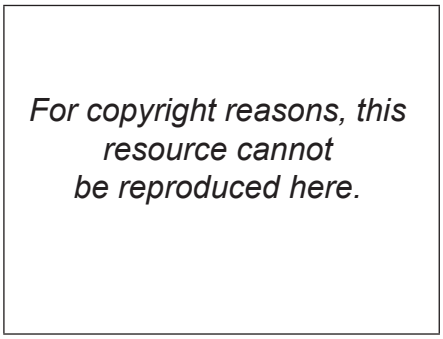
In guinea pigs the allele for long hair (h) is recessive. The allele for short hair (H) is dominant.

Long-haired guinea pig



http://home.comcast.net/~hopkinsj6/PIGS/PGraphics/zander.jpg-longhaired

Short-haired guinea pig



http://www.dkimages.com/discover/previews/743/125666.JPG-shorthaired

(a) **Describe** how a recessive allele can be expressed in an individual.

When two **short-haired** guinea pigs were mated together, they only produced offspring with short hair.

Assessor's use only

(b) **Explain** why the parent genotypes may be homozygous or heterozygous.
Use Punnett squares to support your answer.

Question Three continues on the following page.

(c) **Discuss** how you could use a breeding trial to find out the genotype of a short-haired guinea pig.

Assessor's use only

In your discussion you should LINK the following:

- a **description** of the possible genotype(s) of the short-haired guinea pig and the possible genotypes(s) of a breeding partner(s)
- a **description** of how the breeding trial would be carried out
- an **explanation** of how the outcomes in the offspring of the trial would determine the genotype of the short-haired parent guinea pig.

Use Punnett squares to support your answer.

(d) A guinea pig breeder wants to breed **only** short-haired guinea pigs.

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Explain a genetic advantage in using cloning, rather than selective breeding, to breed only short-haired guinea pigs.

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

Assessor's use only

Question number