90948

909480

1

SUPERVISOR'S USE ONLY

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

Level 1 Science, 2019

90948 Demonstrate understanding of biological ideas relating to genetic variation

9.30 a.m. Thursday 14 November 2019
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 room for any answer, use the extra space 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.

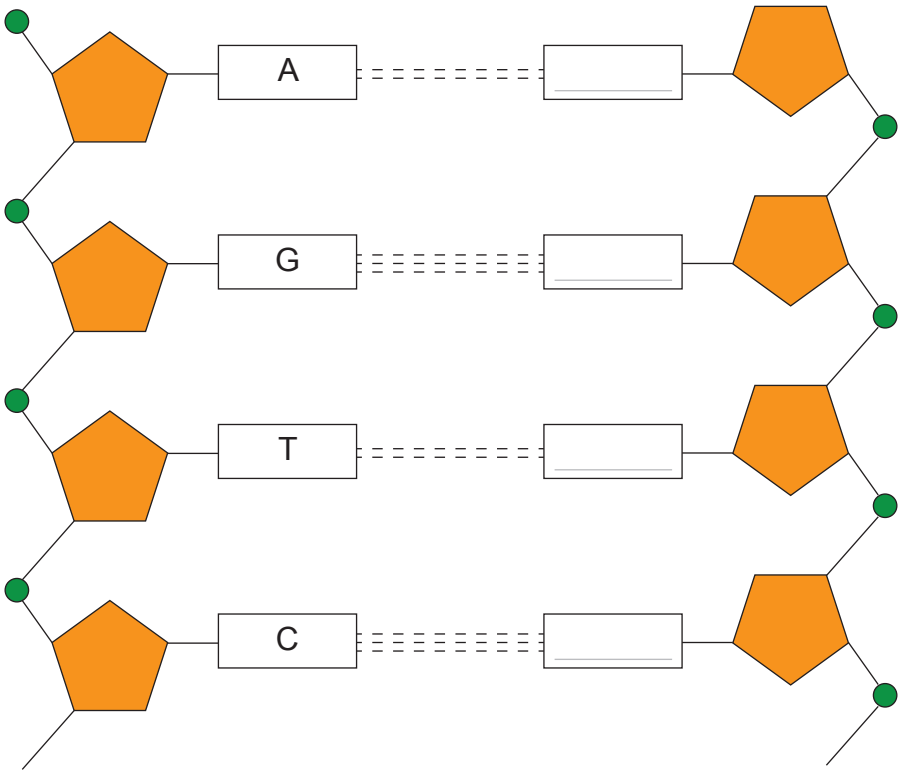
TOTAL

ASSESSOR'S USE ONLY

QUESTION ONE: DNA STRUCTURE

ASSESSOR'S USE ONLY

(a) Label the blank bases A, G, T or C in the diagram of DNA shown below.



Adapted from: http://cronodon.com/BioTech/Cell_Nucleus.html

Some adults can digest milk, but the majority 65% cannot. The ability to digest milk as an adult is caused by a DNA mutation.

(b) What is a mutation?

(c) Explain how a mutation can give adults the ability to digest milk.

You should include the terms **DNA**, **gene**, **allele**, **phenotype**, and **mutation**.

ASSESSOR'S USE ONLY

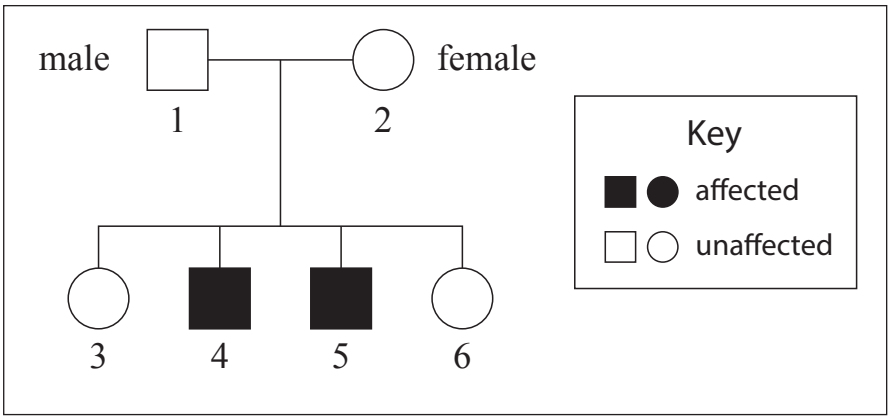
(d) Explain how a mutation can be passed on to the next generation.

QUESTION TWO: CYSTIC FIBROSIS

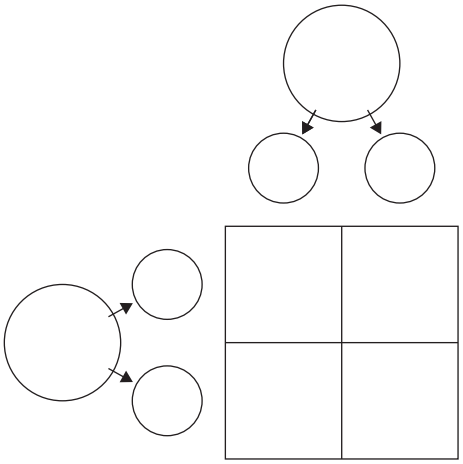
ASSESSOR'S USE ONLY

Cystic fibrosis is a genetically inherited condition. It can be traced through a family, as shown in the pedigree chart. The cystic fibrosis allele (t) is recessive to the unaffected allele (T).

Sample pedigree – cystic fibrosis



(a) Complete the Punnett square for the cross between individual 1 with individual 2.



(b) Work out the genotypes of the following three individuals.

Individual 1: _____ Individual 2: _____ Individual 5: _____

(c) Explain any difference in the expected phenotypes of the offspring ratio to the actual phenotypes of the offspring ratio between the cross with individual 1 and individual 2.

In your answer you should refer to the expected and actual phenotype ratios for the cross.

Expected phenotype ratio: _____ Actual phenotype ratio: _____

ASSESSOR'S USE ONLY

QUESTION THREE: SEXUAL REPRODUCTION AND SURVIVAL

ASSESSOR'S USE ONLY

www.radionz.co.nz/national/programmes/insight/audio/2018623809/insight-kauri-dieback-can-these-noble-trees-be-protected

The kauri dieback disease damages the tissues that carry nutrients within the kauri tree. This means some trees survive and others starve to death.

(a) Describe genetic variation in kauri trees.

(b) Explain how the sexual reproduction of kauri trees causes genetic variation AND how this could lead to increased survival of the species when faced with kauri dieback disease.

In your answer you should consider:

- the processes of gamete formation (meiosis) and fertilisation
- how sexual reproduction leads to variation in the population
- the link between genetic variation and the survival of kauri trees as a species.

ASSESSOR'S USE ONLY

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

QUESTION NUMBER

ASSESSOR'S USE ONLY

90948