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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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Level 1 Science, 2014

90948 Demonstrate understanding of biological ideas relating to genetic variation

9.30 am Monday 10 November 2014
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 2–13 in the correct order and that none of these pages is blank.

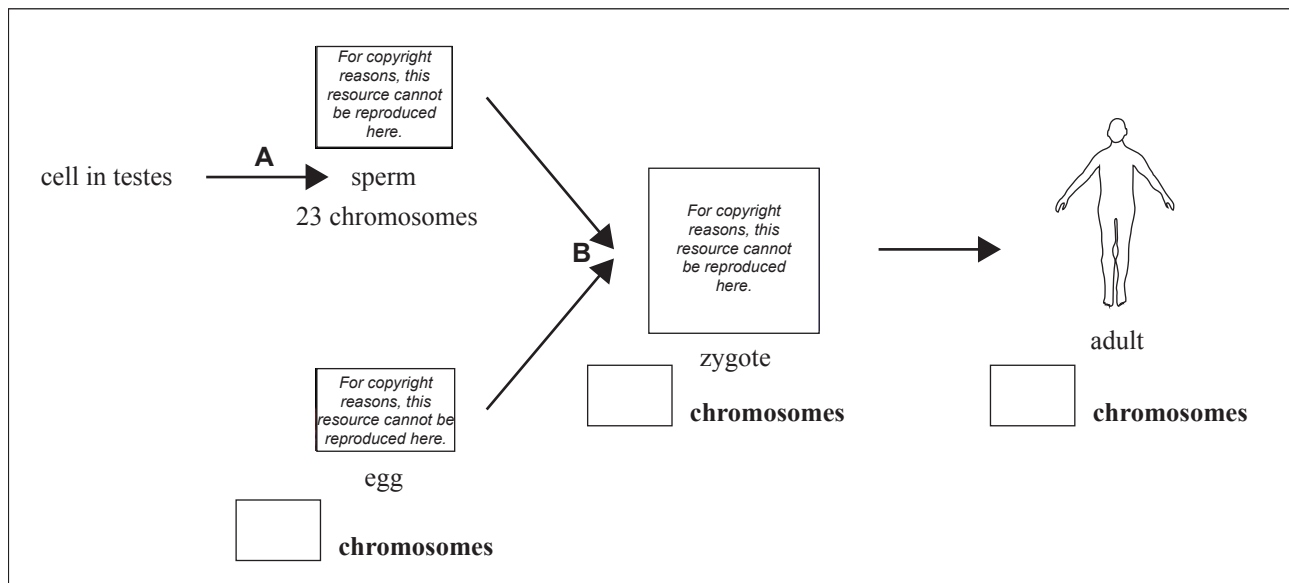
YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

TOTAL

ASSESSOR'S USE ONLY

QUESTION TWO: VARIATION IN HUMANS

The diagram below shows the relationship between gametes (sex cells), zygotes, and chromosome number in humans.



sources: www.thedrinksbusiness.com/wordpress/wp-content/uploads/2014/03/more-sperm.jpg

<http://scm-l3.technorati.com/11/10/27/55025/zygote.jpg?t=20111027092220>

<http://static.guim.co.uk/sys-images/Guardian/About/General/2011/10/17/1318873301247/A-human-ovum-in-the-fallo-007.jpg>

(a) Name the processes represented by **A** and **B**:

Process A: _____

Process B: _____

(b) Complete the diagram above by writing the numbers of chromosomes in the boxes.

(c) Compare the chromosome number of the egg, sperm, zygote and adult, AND explain any differences and similarities in the numbers.

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

QUESTION THREE: ANIMAL BREEDING

An animal breeder wanted to produce sheep with white wool, but some white sheep produce lambs that have black wool.

Animal breeders often use one male sheep to mate with all their female sheep.

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<http://dansperry.com/wp/wp-content/uploads/2013/02/sheep.jpg>

<http://verrasnotebook.typepad.com/.a/6a00e54fd05e9e8834010534be51f4970b-p>

- (a) Give all possible genotypes for each phenotype.

Use **A** to represent the dominant allele for common white wool, and **a** to represent the recessive allele for black wool.

White wool: _____

Black wool: _____

- (b) Discuss how a farmer could develop a group of sheep that are pure breeding for white wool.

In your answer you should:

- state the genotypes of the male and female sheep the farmer should use to breed from
- explain how the animal breeder can determine the genotypes of the male and female to produce sheep that all have white wool.

You should include at least two Punnett squares with your explanation

- explain how the animal breeder could make sure that the offspring would always be pure breeding.

QUESTION FOUR: FAMILY TREE

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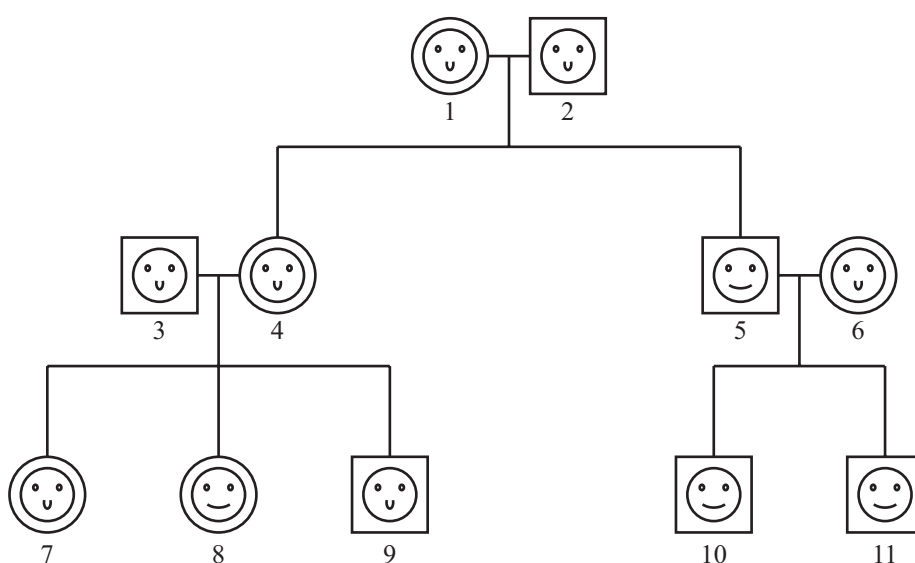
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Non tongue roller.

Tongue roller.

<http://staff.gpschools.org/speirss/meapcontent/responses/inherit.htm>

In the family tree below, people who are tongue rollers are shown as ☺, while those who cannot roll their tongue are shown as ☹.



Use the letters **T** and **t** to represent the alleles for tongue rolling (**T**) and non rolling (**t**).

- (a) (i) Use the family tree above to work out the genotype of individual 5.

- (ii) Explain how you worked this out.

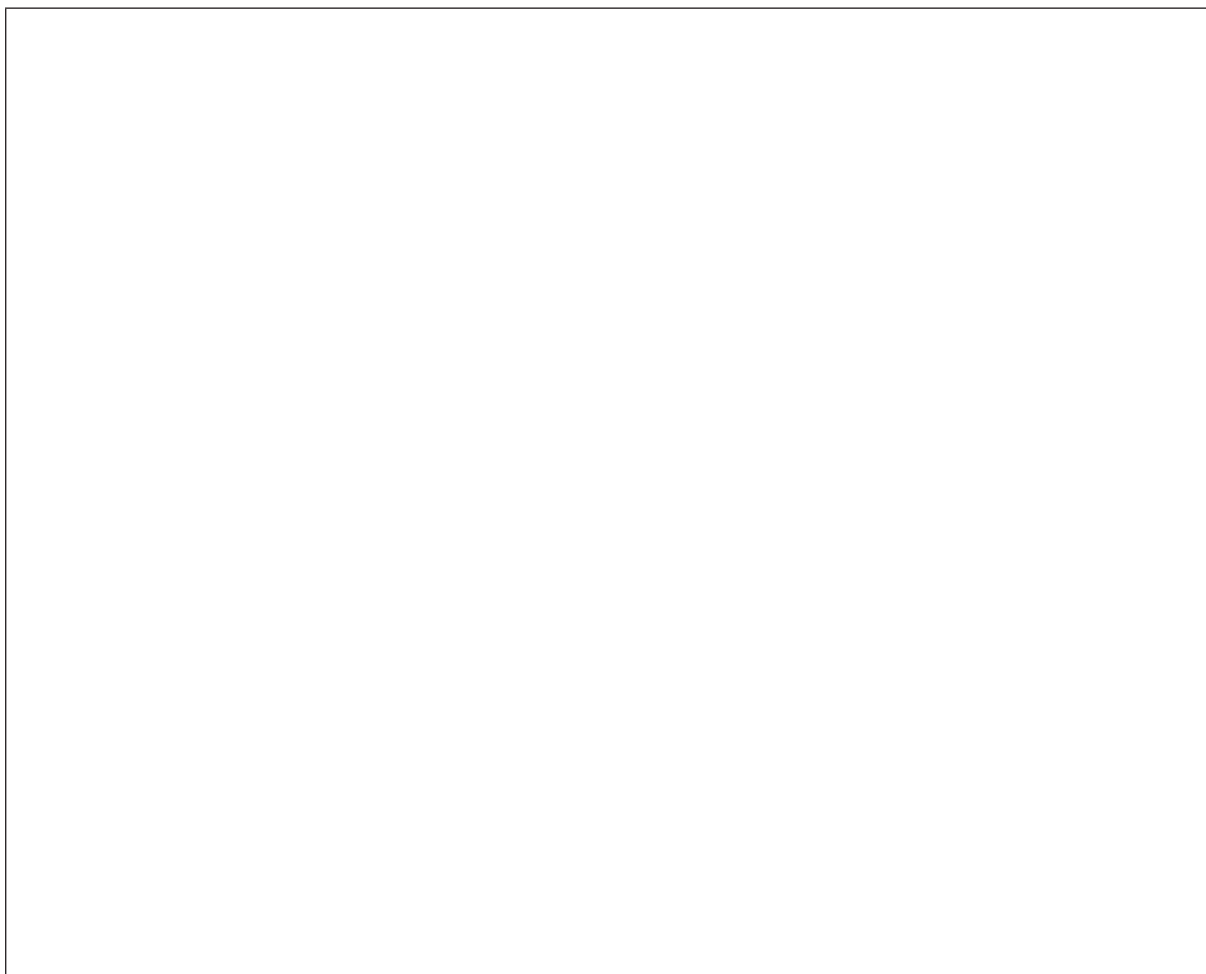
(b) Use the family tree to explain why individual 6 must be **Tt**.

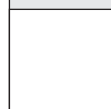
**Question Four continues
on the following page.**

(c) Explain why the genotypes for individuals 3 and 4 both must be **Tt**.

In your answer you should:

- draw Punnett squares in the box below
- explain why the genotypes of individuals 3 and 4 **cannot** be **TT** or **tt**.





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