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translation of this cover

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91157M



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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

MĀ TE KAIMĀKA ANAKE

Koiora, Kaupae 2, 2013

91157M Te whakaatu māramatanga ki te rerekētanga ā-ira me te huringa

9.30 i te ata Rāmere 22 Whiringa-ā-rangi 2013
Whiwhinga: Whā

Paetae	Paetae Kaiaka	Paetae Kairangi
Te whakaatu māramatanga ki te rerekētanga ā-ira me te huringa.	Te whakaatu māramatanga hōhonu ki te rerekētanga ā-ira me te huringa.	Te whakaatu māramatanga matawhānui ki te rerekētanga ā-ira me te huringa.

Tirohia mehemea e ōrite ana te Tau Ākonga ā-Motu (NSN) kei tō pepa whakauru ki te tau kei runga ake nei.

Me whakautu e koe te KATOA o ngā pātai kei roto i te pukapuka nei.

Ki te hiahia koe ki ētahi atu wāhi hei tuhituhi whakautu, whakamahia te (ngā) whārangi kei muri i te pukapuka nei, ka āta tohu ai i ngā tau pātai.

Tirohia mehemea kei roto nei ngā whārangi 2–17 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

HOATU TE PUKAPUKA NEI KI TE KAIWHAKAHAERE HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.

TAPEKE

MĀ TE KAIMĀKA ANAKE

Kia 60 meneti hei whakautu i ngā pātai o tēnei pukapuka.

PĀTAI TUATAHI: KĀWAIHEKE PARITO PŪRUA

*He tapu tēnei rauemi. E
kore taea te tuku atu. Aata
tirohia ki ngā kupu kei raro
iho i te pouaka nei.*

<http://brian-howlett.blogspot.co.nz/2010/05/sweet-pea-purple.html>

I roto i te tipu pī reka, *Lathyrus odoratus*, he ngoi ake te irarā mō te tae putiputi waipoporo (P) i te irarā mō te tae putiputi whero (p). Ka whakarite tētahi ira tuarua i te hanga o te hae. He ngoi ake te hae roa (L) i te hae porohita (l)

- (a) Ka whakawhitia tētahi tipu PPLL waiporoporo, hae roa, ki tētahi tipu ppll whero, hae porohita.

Homai te tohuira o te whakatipuranga F_1 : _____

E rua ngā tipu whakatipuranga F_1 i whakawhitia kia puta ko ngā tipu whakatipuranga F_2 .

- (b) Whakamahia te tapawhā Punnett hei whakaatu i ngā tohuhema me ngā tohuira e tūmanakohia ana mō ngā uri katoa F_2 e taea ana mai i ēnei tipu F_1 e rua.

Ngā tohuhema F_1

Ngā tohuhema F_1

- (c) Homai te ōwehenga tohuāhua e tūmanakohia ana mō te whakawhiti kua oti i a koe.

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

QUESTION ONE: DIHYBRID INHERITANCE

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<http://brian-howlett.blogspot.co.nz/2010/05/sweet-pea-purple.html>

In the sweet pea plant, *Lathyrus odoratus*, the allele for purple (P) flower colour is dominant over the allele for red (p) flower colour. A second gene determines the shape of the pollen. Long (L) pollen is dominant over round (l) pollen.

- (a) A purple, long-pollen plant, PPLL is crossed with a red, round-pollen, ppll plant.

Give the genotype of the F₁ generation: _____

Two F₁ generation plants were crossed to produce the F₂ generation plants.

- (b) Use the Punnett square to show the gametes and the expected genotypes of all the possible F₂ offspring from these two F₁ plants.

		F ₁ gametes			
F ₁ gametes					

- (c) Give the expected phenotype ratio for the cross you have completed.

- | | Ōwehenga
tohuāhua i kitea |
|------------------------------|--------------------------------------|
| Waiporoporo, roa (PpL1) | 12 |
| Waiporoporo, porohita (Pp11) | 1 |
| Whero, roa (ppL1) | 1 |
| Whero, porohita (pp11) | 2 |

- whakaahuatia tēnei mea te **hononga**
- whakamāramahia te take e kore ai ngā ira hono e wehewehe motuhaketia
- whakamāramahia he pēhea te whakawhitinga e whakanao tauhonohonotanga ai
- matapakitia he aha i puta ai i te whakawhitinga te iti o ngā tohuāhua hae porohita waiporoporo me ngā tohuāhua hae roa whereo.

- | | Observed
phenotype ratio |
|----------------------|-------------------------------------|
| Purple, long (PpLl) | 12 |
| Purple, round (Ppll) | 1 |
| Red, long (ppLl) | 1 |
| Red, round (ppll) | 2 |

Discuss why the **expected phenotype** ratio you calculated is different from the **observed ratio** the biologists actually observed.

- describe **linkage**
- explain why linked genes do not assort independently
- explain how crossing over produces recombinants
- discuss how crossing over resulted in the low occurrence of purple, round-pollen and red, long-pollen phenotypes.

Ko te tohuāhua o ngā huruhuru o tētahi ngeru nā ngā ira rerekē, irarā rerekē hoki.

<http://www.warrenphotographic.co.uk/29139-tabby-and-black-kittens>

(a) Whakamahia te papatau i runga ki te whakamārama he aha i puta ai i te ngoi-ngātahi, ngoi hukihihi, tino ngoi hoki ngā tohuāhua rerekē i roto i te ngeru.

- tētahi **whakaahuatanga** o te ngoi-ngātahi, ngoi hukihuki, me te tino ngoi hoki
- tētahi **whakamāramatanga** he pēhea e whakaputa ai ngā tohuira mō ia ira i ngā tohuāhua rerekē.

The phenotype of a cat's coat is determined by different genes and alleles.

<http://www.warrenphotographic.co.uk/29139-tabby-and-black-kittens>

Co-dominance		Incomplete dominance		Complete dominance	
BB	black coat	SS	extensive spotting in coat	LL	short hair coat
Bb	black and tan coat (tabby)	Ss	medium spotting in coat	Ll	short hair coat
bb	tan coat	ss	no spotting in coat	ll	long hair coat

- In your answer include:

- a **description** of co-dominance, incomplete dominance, and complete dominance
- an **explanation** of how genotypes for each gene produce the different phenotypes.

- **describe** independent assortment and mutation
- **explain** why mutations are the major source of new alleles in a population AND why independent assortment does not introduce new alleles into a population
- **compare and contrast** how independent assortment and mutation produce variation within an organism.

PĀTAI TUATORU: NGĀ PUNA IRA

He mea toiwhenua nō Amerika ki te Raki te rango hua rākau, *Drosophila pseudoobscura*. I urutomokia a Aotearoa e taua momo i roto i ēnei tau 50 kua hipa.

Kua kitea i roto i ngā tātaritanga ira inatata e whakataurite ana i ngā taupori o Amerika ki te Raki me Aotearoa he kaha te pānga whakaū o *D. pseudoobscura* e pūreirei haere ana i Aotearoa, otirā e 6 ngā mea takitahi i roto i te taupori taketake.

He whakatauritenga o te maha o ngā irarā kei te *Drosophila pseudoobscura* i te Raki o Amerika me Aotearoa

*He tapu tēnei rauemi. E
kore taea te tuku atu. Aata
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iho i te pouaka nei.*

Reiland, J et al, *Journal of Heredity*, 2002, 93: 415–420

E whakaatu ana te taupori o Aotearoa he iti ake ngā irarā i ia pūwāhi ira i mātaihia.

Matapakitia he aha i whakaaturia ai e te taupori *D. pseudoobscura* kei Aotearoa te rerekēnga kētanga tino iti ina whakatauritea ki tērā o te taupori o Amerika ki te Raki.

Me uru ki tō whakautu:

- tētahi whakaaturanga o te **pānga whakaū**
- tētahi whakautu he pēhea te pānga o te **terenga iranga** ki te taupori o Aotearoa
- tētahi matapaki mō te take he iti ake ngā irarā o te taupori o Aotearoa i ia pūwāhi ina whakatauritea ki te taupori o Amerika ki te Raki.

QUESTION THREE: GENE POOLS

The fruit fly *Drosophila pseudoobscura* is endemic to North America. Within the last 50 years, the species has invaded New Zealand.

Recent genetic analysis comparing the North American and New Zealand populations has shown a strong founder effect of *D. pseudoobscura* colonising New Zealand, with 6 individuals in the founding population.

A comparison of the number of alleles in *Drosophila pseudoobscura* in North America and New Zealand

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Reiland, J et al, *Journal of Heredity*, 2002, 93: 415–420

The New Zealand population shows fewer alleles at each gene locus studied.

Discuss why the New Zealand population of *D. pseudoobscura* shows such low genetic diversity compared to the North American population.

In your answer include:

- a description of the **founder effect**
- an explanation of how **genetic drift** has affected New Zealand's population
- a discussion of why the New Zealand population has fewer alleles at each locus compared to the North American population.

**He puka anō mēnā ka hiahiatia.
Tuhia te (ngā) tau pātai mēnā e hāngai ana.**

TAU
PĀTAI

MĀ TE
KAIMĀKA
ANAKE

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

QUESTION
NUMBER

ASSESSOR'S
USE ONLY

English translation of the wording on the front cover

Level 2 Biology, 2013

91157 Demonstrate understanding of genetic variation and change

9.30 am Friday 22 November 2013
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of genetic variation and change.	Demonstrate in-depth understanding of genetic variation and change.	Demonstrate comprehensive understanding of genetic variation and change.

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 2–17 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.

91157M