

See back cover for an English  
translation of this cover

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91157M



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NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

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## Koiora, Kaupae 2, 2012

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

2.00 i te ahiahi Rāpare 22 Whiringa-ā-rangi 2012  
Whiwhinga: Whā

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

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 i ētahi atu wāhi hei tuhituhi whakautu, whakamahia te (ngā) whārangi kei muri i te pukapuka nei ka āta tuhi i te tau pātai.

Tirohia mehemea kei roto nei ngā whārangi 2–15 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

## PĀTAI TUATAHI: NGA ĀHUAIRA HŌU

Matapakitia tēnei kīanga, me te whakaaroaro ki ēnei take e whai ake ana i tō whakautu:

- he aha te tikanga o ēnei kupu: te irakētanga me te puna ira
- ngā rerekētanga i waenga i ngā irakētanga ā-tinana (somatic), ā-tohuhema (gametic) hoki
- ngā āhuatanga ka whakatau mēnā ka uru he āhuaira ki te puna ira.

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## PĀTAI TUARUA: NGA ĀHUAIRA TAUREA

Ko tētahi tauira o ngā āhuaira taurea ko tērā ka whakataui i te tauira huruhuru o ngā rakiraki mallard. Ka hua i te āhuaira M te tauira Mallard mohao. Ka hua i te āhuaira tuarua, i te  $M^R$ , tētahi tauira rerekē e kīia ana he Restricted, ka hua hoki i tētahi āhuaira tuatoru, i te  $m^d$ , tētahi tauira e kīia ana he Dusky.

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

Restricted

[www.backyardchickens.com/t/410593/understanding-basic-colour-genetics-mallards-derivative](http://www.backyardchickens.com/t/410593/understanding-basic-colour-genetics-mallards-derivative)

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

Mallard

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

Dusky

I roto i tēnei rangatū, he ngoi ake te Restricted i te Mallard me te Dusky, ā, he ngoi ake te Mallard i te Dusky.

$M^R$  (Restricted) > M (Mallard) >  $m^d$  (Dusky)

E ono ngā tohuira ka taea e ēnei āhuaira e toru kia hua mai ai ngā tohuāhua e toru.

Matapaki he aha i kotahi anake ai te pahekotanga o ngā tohuira mātua ka whakaputa uri e whakaatu ana i ngā tohuāhua e toru katoa i ngā uri  $F_1$ .

I tō whakautu me whakaoti e koe te tūtohi tukutuku (Punnett) hei whakaatu i te whakawhiti, me te āta tautohu i ngā ōwehenga tohuira, tohuāhua hoki e whakaaturia ana hei ōrau, hei ōwehenga rānei. I tō whakautu me kōrero mō te tūtohi tukutuku kua oti i a koe.

		Ngā tohuhema $F_1$	
Ngā tohuhema $F_1$			

Tohuira: \_\_\_\_\_

Tohuāhua: \_\_\_\_\_



## QUESTION TWO: MULTIPLE ALLELES

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An example of multiple alleles is one that determines the feather pattern of mallard ducks. One allele  $M$ , produces the wild-type mallard pattern. A second allele  $M^R$ , produces a different pattern called restricted, and a third allele,  $m^d$ , produces a pattern termed dusky.

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Restricted

Mallard

Dusky

[www.backyardchickens.com/t/410593/understanding-basic-colour-genetics-mallards-derivative](http://www.backyardchickens.com/t/410593/understanding-basic-colour-genetics-mallards-derivative)

In this series, restricted is dominant over mallard and dusky, and mallard is dominant over dusky:

$M^R$  (Restricted) >  $M$  (Mallard) >  $m^d$  (Dusky)

There are six genotypes possible with these three alleles to produce the three phenotypes.

Discuss why there is only one combination of parental genotypes which can produce offspring that show all three phenotypes in the  $F_1$  offspring.

In your answer you should complete the Punnett square to show the cross, and clearly identify the genotype and phenotype proportions expressed as a percentage or ratio. Refer to your completed Punnett square in your discussion.

	F1 gametes	
F1 gametes		

Genotype: \_\_\_\_\_

Phenotype: \_\_\_\_\_





Ka pā mai ngā huringa ki te puna ira o ngā taupori i te haere o te wā. Ko ngā tauira i Aotearoa ko ngā wī me te toutouwai pango o Wharekauri.

Me kōrero koe mō ngā tauira kua tukuna, mō ētahi atu tauira rānei o Aotearoa hei whakamārama i tō whakautu.

Changes occur in the gene pool of populations over time. Examples in New Zealand include tussock grasses and the Chatham Island black robin.

You should refer to the examples given, or any other New Zealand examples to help to clarify your answer.





**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

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*English translation of the wording on the front cover*

## Level 2 Biology, 2012

### 91157 Demonstrate understanding of genetic variation and change

2.00 pm Thursday 22 November 2012  
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 2–15 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.**

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