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91159M



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NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

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

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Tohua tēnei pouaka mēnā  
KĀORE koe i tuhi kōrero  
ki tēnei pukapuka

## Mātai Koiora, Kaupae 2, 2022

### 91159M Te whakaatu māramatanga ki te whakatinanatanga o te ira

Ngā whiwhinga: E whā

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki te whakatinanatanga o te ira.	Te whakaatu māramatanga ki te whakatinanatanga o te ira, kia hōhonu.	Te whakaatu māramatanga ki te whakatinanatanga o te ira, kia tōtōpū.

Tirohia kia kitea ai e rite ana te Tau Ākonga ā-Motu (NSN) kei runga i tō puka whakauru ki te tau kei runga i tēnei whārangi.

**Me whakamātau koe i ngā tūmahi KATOĀ kei roto i tēnei pukapuka.**

Ki te hiahia wāhi atu anō koe mō ō tuhinga, whakamahia ngā whārangi wātea kei muri o tēnei pukapuka.

Tirohia kia kitea ai e tika ana te raupapatanga o ngā whārangi 2–15 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

Kaua e tuhi ki tētahi wāhi e kitea ai te kauruku whakahāngai (✂/✂). Ka poroa pea taua wāhi ka mākahia ana te pukapuka.

**HOATU TĒNEI PUKAPUKA KI TE KAIWHAKAHAERE Ā TE MUTUNGA O TE WHAKAMĀTAUTAU.**

## TE TŪMAHI TUATAHI: TE KŌTUITANGA PŪMUA

He wāhanga whakahirahira te whakaraupapatanga nō te kōtuitanga pūmua.



Te mātāpuna: <https://www.thinglink.com/scene/750792545688092673>

Matapakina te hiranga o te whakaraupapatanga (*translation*), me ngā take i kore ai e tōtika te whakaraupapatanga o te whenu pītau ira hei taura *polypeptide*.

I tō tuhinga, me:

- whakaahua te kōtuitanga pūmua
- whakamārama te whakaraupapatanga
- matapaki te hononga i waenga i ngā pūihokarihi (*codons*), i ngā pūihokarihi-ātete (*anticodons*), te tRNA, te mRNA, me ngā waikawa amino
- parahau, mā te whakatakoto i ngā pūtake e RUA, ngā take i kore ai e whakaraupapa tōtikahia te pītau ira (DNA) hei taura *polypeptide*.

He wāhi anō mō tō tuhinga  
mō tēnei tūmahi kei te  
whārangi e whai ake nei.

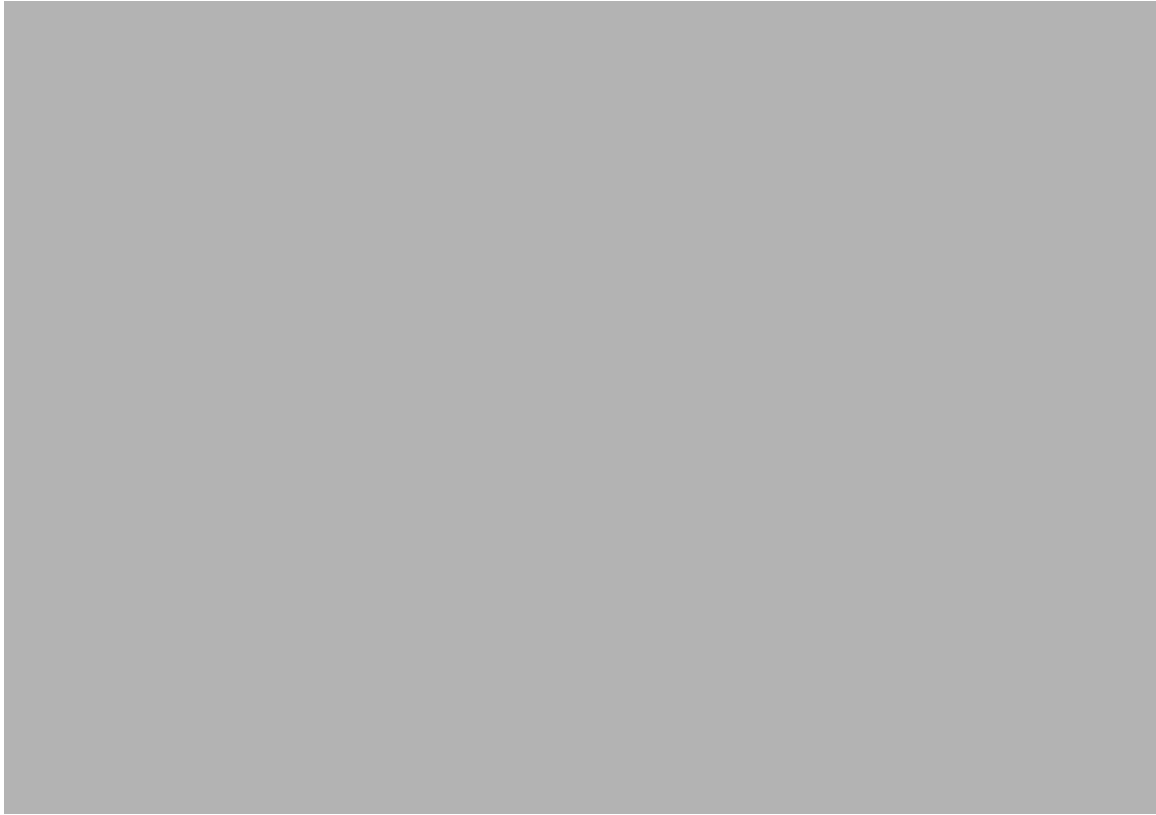






## TE TŪMAHI TUARUA: TE TŪTOHINGA IRA

Ka puta mai te mate kirikōtea i tētahi irakētanga o te tūtoHINGA ira mō te pūmua whākōkī *tyrosine*, he mate e heke iho ai te whakaputanga o te kano taekiri (*melanin*). He tohuāhua kirikōtea tō ēnei kararehe, nā te mea ka whāngai te taekiri i te kano ki ō rātou kiri, ki ō rātou huruhuru, me ō rātou karu.



Te mātāpuna: <https://www.quora.com/Can-animals-have-albinism>

(a) Whakaahuatia te irakētanga.

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(b) Ka taea e ngā irakētanga pūwāhi rerekē te whakaputa te mate kirikōtea.

Matapakina te pānga o ngā irakētanga pūwāhi ki ngā pūmua whakamutunga.

I tō tuHINGA, me:

- whakaahua tētahi irakētanga whakauru, tētahi irakētanga whakakore, me tētahi irakētanga whakakapi
- whakaingoa te momo irakētanga pūwāhi ka kore pea e panoni i te pūmua, ā, me whakamārama ngā take
- whakaingoa te momo irakētanga pūwāhi e puta ai te panonitanga nui katoa ki te pūmua, ā, me whakamārama ngā take
- matapaki te āhua o te pānga o ēnei irakētanga ki te roa me te whakatinanatanga o te raupapa pāpāhua pītau ira
- matapaki te tipuheke i te tūtoHINGA ira.

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*He wāhi anō mō tō tuHINGA  
mō tēnei tūmahi kei te  
whārangi e whai ake nei.*

## QUESTION TWO: THE GENETIC CODE

A mutation in the gene coding for the enzyme tyrosine causes albinism, a condition that results in a decrease in the production of the pigment melanin. These individuals have albino phenotypes, because melanin gives pigment to their skin, hair, and eyes.



Source: <https://www.quora.com/Can-animals-have-albinism>

(a) Describe what a mutation is.

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(b) Different point mutations can cause albinism.

Discuss the effect of point mutations on final proteins.

In your answer:

- describe an insertion, deletion, and substitution mutation
- name the type of point mutation that is unlikely to change the protein, and explain why
- name the type of point mutation that would change the protein the most, and explain why
- discuss how these mutations affect the length and expression of the DNA base sequence
- discuss the degeneracy in the genetic code.

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





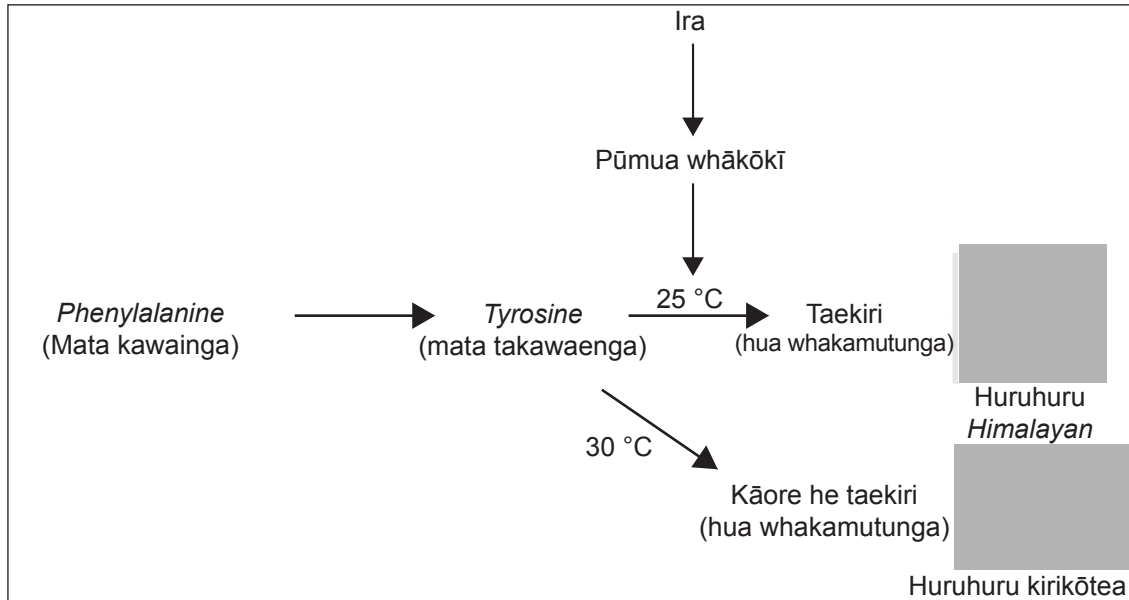


## TE TŪMAHI TUATORU: TE WHAKATINANATANGA O TE IRA ME TE TAI AO

Ka whakaatu ngā rāpeti *Himalayan* i tētahi momo irakē o te kirikōtea ka pāngia e te pāmahana.

I ngā pāmahana mātao iho (i raro iho i te 25 °C), ka whakaputaina e te ira te taekiri (pango) i ngā huruhuru. Ka houtete te pūmua whākōkī i ngā pāmahana wera ake (neke atu i te 30 °C), ā, kāore e whakaputaina he taekiri (mā) i ngā huruhuru. Ko te pāmahana toharite o tō te rāpeti *Himalayan* tinana, ko te 37 °C.

### Te ara whakarau pūngao kua whakamāmāhia



He mea whakahāngai te kōrero i: <https://arba.net/recognized-breeds/> and <https://animalcorner.org/rabbit-breeds/himalayan-rabbit-breed/>

Matapakina te āhua o tā ngā ira, o tā ngā pūmua whākōkī, me tā te taiao whakahaere i te putanga o te taekiri i ngā rāpeti *Himalayan*.

I tō tuhinga, me:

- whakaahua te ara whakarau pūngao
- whakamārama tētahi ara whakarau pūngao mā te whakamahi i ngā kupu nei, arā, te 'kawainga', te 'mata' (*substrate*), te 'takawaenga', te 'pūmua whākōkī', te 'ira', me te 'hua whakamutunga'
- matapaki ngā take i uri ai te whakaputanga taekiri o ngā rāpeti *Himalayan* i ngā matamata o ō rātou tinana pērā i te ihu, i ngā taringa, i ngā waewae, me te whiore, engari kāore i pērā i te riu o ō rātou tinana
- matapaki ngā āhuatanga taiao me mātua kite e puta ai i ngā rāpeti *Himalayan* te taekiri (pango katoa) ME te taekiri-kore (mā katoa) i ngā tae huruhuru mō te roanga o te oranga.

He wāhi anō mō tō tuhinga  
mō tēnei tūmahi kei ngā  
whārangi e whai ake nei.

At lower temperatures (below 25 °C), the gene produces melanin (black) in fur. The enzyme is inactive at higher temperatures (above 30 °C) and produces no melanin (white) in fur. The average body temperature of a Himalayan rabbit is 37 °C.



In your answer:

- describe what a metabolic pathway is
- explain a metabolic pathway using the terms precursor, substrate, intermediate, enzyme, gene, and final product
- discuss why Himalayan rabbits have dark melanin expression in their body extremities such as nose, ears, feet, and tail, and not in their core body
- discuss the environmental conditions necessary for Himalayan rabbits to express melanin (all black) AND no melanin (all white) fur colour for their entire life span.

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





**He whārangi anō ki te hiahiatia.  
Tuhia te tau tūmahi mēnā e hāngai ana.**

TE TAU  
TŪMAHI

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

QUESTION  
NUMBER

*English translation of the wording on the front cover*

## Level 2 Biology 2022

### 91159M Demonstrate understanding of gene expression

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of gene expression.	Demonstrate in-depth understanding of gene expression.	Demonstrate comprehensive understanding of gene expression.

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.

Check that this booklet has pages 2–15 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (XXXX). This area may be cut off when the booklet is marked.

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

91159M