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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Koiora, Kaupae 2, 2016

91159M Te whakaatu māramatanga ki te whakatinana ira

9.30 i te ata Rāmere 18 Whiringa-ā-rangi 2016
Whiwhinga: Whā

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki te whakatinana ira.	Te whakaatu māramatanga hōhonu ki te whakatinana ira.	Te whakaatu māramatanga matawhānui ki te whakatinana ira.

Tirohia mēnā 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 KATOA kei roto i tēnei pukapuka.

Mēnā ka hiahia whārangi atu anō koe mō ō tuhinga, whakamahia te (ngā) whārangi wātea kei muri o tēnei pukapuka, ka āta tohu ai i te tau tūmahi.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–21 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

ME HOATU RAWA KOE I TĒNEI PUKAPUKA KI TE KAIWHAKAHAERE Ā TE MUTUNGA O TE WHAKAMĀTAUTAU.

TAPEKE

MĀ TE KAIMĀKA ANAKE

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Kia kaua rawa he wāhi o tēnei tuhinga e whakahuatia ki te kore te whakaaetanga tuatahi a te Mana Tohu Mātauranga o Aotearoa.

MĀ TE KAIMĀKA ANAKE

TŪMAHI TUATAHI : NGĀ WAIKAWA KARIHI

(a) Ka whai wāhi te pītau ira (DNA) me te waikawa tuipūmua (RNA) ki te kōtui pūmua.

Whakaahuatia te hanganga o te pītau ira me te waikawa tuipūmua.

Ka whakaaetia te whakamahi hoahoa hei tautoko i tō tuhinga.

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QUESTION ONE: NUCLEIC ACIDS

(a) Deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) are both involved in protein synthesis.

Describe the structure of DNA and RNA.

You may use diagrams in your answer.

MĀ TE KAIMĀKA ANAKE

(b) Kei roto te pītau ira, mRNA, me te tRNA i te hanga pūmua.

Matapakitia te hiranga o ēnei i roto i te hanga pūmua, me te take he aha i hangaia tonuhia ai e te pūtau ngā rāpoi ngota mRNA, ēngari kaua ngā rāpoi ngota pītau ira, i te wā o te kōtui pūmua.

Me whakauru ki roto i tō tuhinga:

- he whakamāramatanga o te mahi a te rāpoi ngota pītau ira, mRNA, me te tRNA
- he whakamārama mō te puakanga mai o te mRNA
- he matapakinga o te hiranga o te pītau ira, mRNA, me te tRNA mō te hanga pūmua whāiti.

He wāhi anō mō tō tuhinga mō tēnei tūmahi kei te whārangi 6.

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(b) DNA, mRNA, and tRNA are all involved in the formation of proteins.

Discuss the significance of these molecules in forming proteins, and why the cell continually makes mRNA molecules, but not DNA molecules, during protein synthesis.

In your answer include:

- an explanation of the function of DNA, mRNA, and tRNA molecules
- an explanation of how mRNA is produced
- a discussion of the significance of DNA, mRNA, and tRNA in forming specific proteins.

There is more space for your answer to this question on page 7.

MĀ TE KAIMĀKA ANAKE

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MĀ TE KAIMĀKA ANAKE

TŪMAHI TUARUA: NGĀ ĀHUATANGA TAIAO ME TE WHAKATINANATANGA IRA

E rua ngā tohuāhua uwha o te pī mīere (*Apis mellifera*).

Momo uwha	Kai Torongū	Tohuāhua Pakeke	Tohuira
Pī huauri[1]	tiere roera	• rahi wharekano nui ake • papatipu tinana nui • ora mō te 2 tau	ōrite
Pī kaimahi	tiere roera mō te 3 rā, i muri mai ko te hae me te mīere anake	• wharekano matapā • papatipu tinana paku ake • ora mō te 3 – 6 wiki	

www.britannica.com/media/full/171791/141787

(a) Whakamāramahia mai ngā kupu 'whakatinanatanga ira'.

(b) Whakamāramahia mai he aha i tino pai ai te whakataurite i ngā pī mīere kaimahi uwha me ngā pī mīere huauri uwha mō ngā whakamātautau e pā ana ki ngā take taiao me te whakatinana ira.

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QUESTION TWO: ENVIRONMENTAL FACTORS AND GENE EXPRESSION

The honey bee (*Apis mellifera*) has two female phenotypes.

Female type	Larvae Diet	Adult phenotype	Genotype
Queen bee	royal jelly	• increased ovary size • large body mass • live for 2 years	the same
Worker bee	royal jelly for 3 days, then only pollen and honey	• infertile ovaries • smaller body mass • live for 3 – 6 weeks	

www.britannica.com/media/full/171791/141787

(a) Describe the term gene expression.

(b) Explain why comparing worker and queen honey bee females is ideal for experiments on environmental factors and gene expression.

MĀ TE KAIMĀKA ANAKE

(c) Kua whakaūhia e ngā whakamātautau ēhara te tiere roera i te matū whakakē ira.

Matapakitia te pānga o te taiao ki te whakatinanatanga o te tohuāhua i ngā uwha pī mīere.

Me whakauru ki roto i tō tuhinga:

- he whakaahuatanga o te take taiao e whai pānga ana ki te tohuāhua o te pī mīere
- mā te whakamahi i tētahi tauira, he whakamāramatanga o te rerekētanga i waenga i te take taiao me te matū whakakē ira
- he matapakinga he pēhea te huri o te tohuāhua o te pī miere me te kore huri i te tohuira
- he matapakinga he aha i tino whakatinanahia ai te tohuāhua o te pī huauri, engari kīhai te tohuāhua o te pī kaimahi.

He wāhi anō mō tō tuhinga mō tēnei tūmahi kei te whārangi 12.

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(c) Experiments have confirmed that royal jelly is not a mutagen.

Discuss the effect the environment has on the expression of the phenotype in honey bee females.

In your answer include:

- a description of the environmental factor that affects honey bee phenotype
- using an example, an explanation of the difference between environmental factor and mutagen
- a discussion of how honey bee phenotype can change without changing the genotype
- a discussion of why the queen bee's phenotype is fully expressed, but the worker bee's phenotype is not.

There is more space for your answer to this question on page 13.

MĀ TE KAIMĀKA ANAKE

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MĀ TE KAIMĀKA ANAKE

TŪMAHI TUATORU: NGĀ IRAKĒTANGA

(a) Whakaahuatia he aha te irakētanga.

Ka haere tonu te Tūmahi Tuatoru i te whārangi 16.

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QUESTION THREE: MUTATIONS

(a) Describe what a mutation is.

Question Three continues on page 17.

MĀ TE KAIMĀKA ANAKE

(b) Neke atu i te 1000 ngā irakētanga e pā mai ai te mate hūware tāpiapia. Ko tētahi irakētanga noa ko tētahi irakētanga whakakore e kore ai e puta tētahi waikawa amino kotahi ki te pūmua whakamutunga. Ko tētahi atu irakētanga he irakētanga whakakapi e puta ai tētahi waikawa amino rerekē i roto i te pūmua whakamutunga.

Pūira 7

Matapakitia he pēhea te whai pānga o ēnei irakētanga e rua ki te pūmua whakamutunga o te ira o te mate hūware tāpiapia me te tohuāhua ka puta.

Me whakauru ki roto i tō tuhinga:

- he whakamāramatanga he aha e kore atu ai tētahi waikawa amino kotahi mai i te pūmua whakamutunga nā te irakētanga whakakore, ā, he pēhea te whai pānga o tēnei ki te pōkai pūmua
- he whakamāramatanga he aha i puta mai ai i te irāketanga whakakapi tētahi waikawa amino rerekē ki roto i te pūmua whakamutunga, ā, he pēhea te whai pānga o tēnei ki te pōkai pūmua
- he matapakinga he aha i puta mai ai i te irakētanga whakakore te mate hūware tāpiapia taumaha, ēngari he māmā ake te mate hūware tāpiapia ka puta i te irakētanga whakakapi.

He wāhi anō mō tō tuhinga mō tēnei tūmahi kei te whārangi 18.

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(b) There are over 1000 mutations that can cause cystic fibrosis. A common mutation is a deletion mutation that results in the absence of one amino acid in the final protein. Another mutation is a substitution mutation that results in a different amino acid in the final protein.

Chromosome 7

Discuss how these two mutations affect the cystic fibrosis gene's final protein and resulting phenotype.

In your answer include:

- an explanation of why the deletion mutation causes one amino acid to be absent in the final protein, and how this affects protein folding
- an explanation of why the substitution mutation causes a different amino acid to be present in the final protein, and how this affects protein folding
- a discussion of why the deletion mutation causes severe cystic fibrosis disease, whereas the substitution mutation causes milder cystic fibrosis disease.

There is more space for your answer to this question on page 19.

MĀ TE KAIMĀKA ANAKE

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He whārangi anō ki te hiahiatia.
Tuhia te (ngā) tau tūmahi mēnā e tika ana.

TAU TŪMAHI

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, 2016

91159 Demonstrate understanding of gene expression

9.30 a.m. Friday 18 November 2016
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.

91159M

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 2–21 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.