See back cover for an English translation of this cover

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90948M

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SUPERVISOR'S USE ONLY

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Tohua tēnei pouaka mēnā KĀORE koe i tuhituhi i roto i tēnei pukapuka

Pūtaiao, Kaupae 1, 2021

90948M Te whakaatu māramatanga ki ngā ariā koiora e pā ana ki te rerekētanga ā-ira

Ngā whiwhinga: Whā

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki ngā ariā koiora e pā ana ki te rerekētanga ā-ira.	Te whakaatu māramatanga hōhonu ki ngā ariā koiora e pā ana ki te rerekētanga ā-ira.	Te whakaatu māramatanga matawhānui ki ngā ariā koiora e pā ana ki te rerekētanga ā-ira.

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

Me whakamātau koe i ngā tūmahi KATOA kei roto i tēnei pukapuka.

Ki te hiahia koe ki ētahi atu wāhi hei tuhituhi whakautu, whakamahia te wāhi wātea kei muri i te pukapuka nei.

Tirohia mehemea kei roto nei ngā whārangi 2–15 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

Kaua e tuhi ki ki roto i tētahi wāhi kauruku whakahāngai (✂). Ka tapahia pea tēnei wāhi ina mākahia te pukapuka.

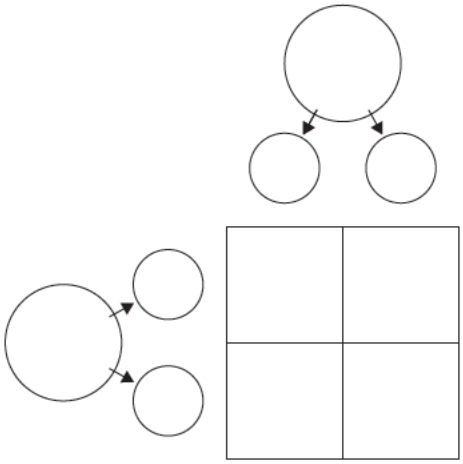
ME HOATU RAWA KOE I TĒNEI PUKAPUKA KI TE KAIWHAKAHAERE Ā TE MUTUNGA O TE WHAKAMĀTAUTAU.

TŪMAHI TUATAHI

Mātāpuna: https://line.17qq.com/articles/ghgfogbz.html

E toru ngā tamariki a John rāua ko Noelene, e rua ngā kōtiro, kotahi te tāne.

(a) Whakaotihia tētahi tapawhā Punnett e whakaatu ana i te tukunga iho o te ira tangata.



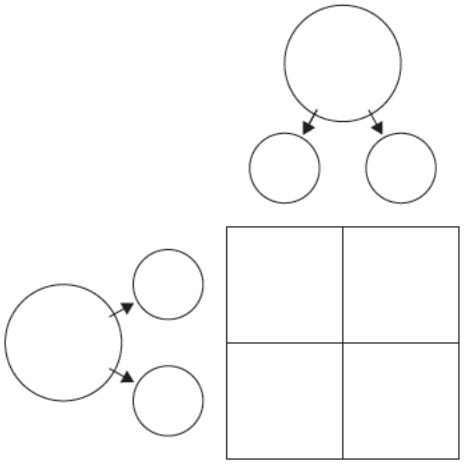
(b) Whakamāramahia mai he pēhea te whakarite i te ira tangata o te tangata.

QUESTION ONE

Source: https://line.17qq.com/articles/ghgfogbz html

John and Noelene have three children, two girls and one boy.

(a) Complete a Punnett square showing sex inheritance.



(b) Explain how sex of children is determined in humans.

(c) Whakamāramahia mai te tūponotanga he kōtiro te tamaiti whai ake a John rāua ko Noelene.

(d) He kaimahi hanga papa kōhatu kīhini a John. He mate takawai ia, he mate pūkahukahu tēnei ka ahu mai i te whakahā puehu kōhatu.

Ka heke iho te mate takawai ki te pēpi hou a John rāua ko Noelene?

Whakamāramahia mai he aha ai, he aha i kore ai rānei.

(c) Explain the likelihood of John and Noelene's next child being a girl.

(d) John is a stone bench kitchen worker. He has silicosis, a lung disease caused by breathing in stone dust.

Will John and Noelene's new baby inherit silicosis?

Explain why or why not.

TŪMAHI TUARUA

Kei raro iho ko tētahi whakaahua o te huaketo ārai-kore (HIV) e whakapoke ana i tētahi pūtau tangata.

Mātāpuna: https://en.wikipedia.org/wiki/HIV#/media/File:HIV-budding-Color.jpg

Ka taea e tētahi irakē i roto i tētahi ira tangata te whakamaru te tangata mai i tētahi whakapokenga huaketo ārai-kore.

(a) Whakamāramahia te hononga i waenganui i te pītau ira, ngā ira, ngā irarā me te tohuāhua mā te kōrero mō tēnei irakē.

I tō tuhinga me tautuhi e koe te pītau ira, ngā ira, ngā irarā, te tohuāhua me te irakē.

QUESTION TWO

Below is a photo of an HIV virus infecting a human cell.

Source: https://en.wikipedia.org/wiki/HIV#/media/File:HIV-budding-Color.jpg

A mutation in a human gene can cause people to be protected from HIV infection.

(a) Explain the relationship between DNA, genes, alleles, and phenotype using this mutation.
In your answer you should define DNA, genes, alleles, phenotype, and mutation.

(b) Me matapaki mēnā he whaihua tēnei irakētanga ā-ira, e ārai nei i te huaketo ārai-kore, ki te taupori tangata.

I tō tuhinga me whakamārama ka pēhea pea te tuku iho ki te reanga o muri mai.

(b) Discuss whether this gene mutation, which protects against the HIV virus, is helpful to the human population.

In your answer, you should explain how it might be passed on to the next generation.

TŪMAHI TUATORU

He whakaputa uri tōrua ngā wuruhi o Himareia.

Mātāpuna: https://twitter.com/geosrilanka/status/1172696055256928256

(a) Whakamāramahia mai he pēhea te pā mai o te rerekētanga ā-ira[1] nā te whakaputanga uri tōrua.
I tō tuhinga me kōrero koe mō ngā tukanga o te whāiti pūira (maiohi) me te whakatōnga.

[1] taurangitanga ā-ira

QUESTION THREE

Himalayan wolves reproduce sexually.

Source: https://twitter.com/geosrilanka/status/1172696055256928256

(a) Explain how sexual reproduction causes genetic variation.

In your answer you should include the processes of gamete formation (meiosis) and fertilisation.

(b) Ka taea e ngā wuruhi o Himareia te noho i ngā wāhi teitei ake i te 4000 m. He pahekotanga hou ō ngā ira kei roto e nui ake ai te hāora ka uru ki ngā wuruhi mai i te hau.

Whakamāramahia te hononga i waenga i te rerekētanga ā-ira me te oranga tonutanga o te taupori wuruhi o Himareia i runga ake i te 4000 m.

(b) Himalayan wolves can live in places higher than 4000 m. They have new combinations of genes that mean they can take more oxygen from the air.

Explain the link between genetic variation and the survival of the Himalayan wolf population above 4000 m.

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

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 1 Science 2021

90948M Demonstrate understanding of biological ideas relating to genetic variation

Credits: Four

90948M

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 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 (▨). 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.