90948M

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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Pūtaiao, Kaupae 1, 2015

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

9.30 i te ata Rātū 10 Whiringa-ā-rangi 2015
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 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 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 2–17 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

TŪMAHI TUATAHI: NGĀ KĀWAI WHĀNAU

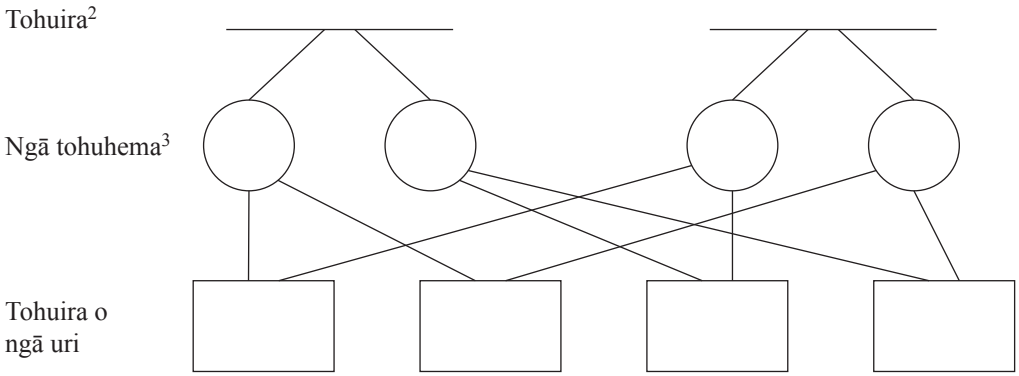
MĀ TE KAIMĀKA ANAKE

Ka puta i te kirikōtea i roto i ngā kiore ko te huru mā me te karu māwhero. Ko te pūtake o te kirikōtea ko te irarā huna[1] **a**.

(a) Whakaotihia te hoahoa e whai ake nei:

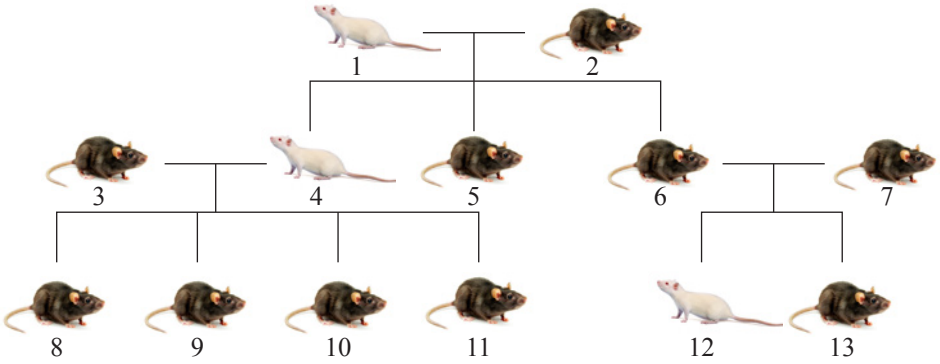
kiore kirikōtea

kiore pango iraruakē



Matapuna: www.janvier-labs.com/rodent-research-models-services/research-models/per-species/outbred-rats/product/sprague-dawley.html
www.nobuggy.com/pest-wiki/rats

(b) I puta i te kiore kirikōtea me te kiore pango iraruakē ngā reanga uri e rua, e ai ki te tūtohi kāwai i raro.



He aha ngā tohuira o ngā kiore e whai ake?

Kiore 4: _____

Kiore 6: _____

Kiore 10: _____

[1] ngoikore
[2] momoira
[3] pūtau hema

(c) **Ēhara** te Kiore 3 i te uri a te Kiore 1 me te Kiore 2 i roto i te whakapapa.

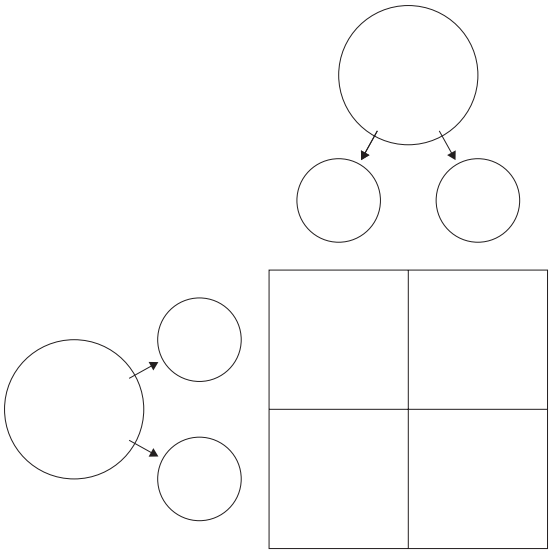
MĀ TE KAIMĀKA ANAKE

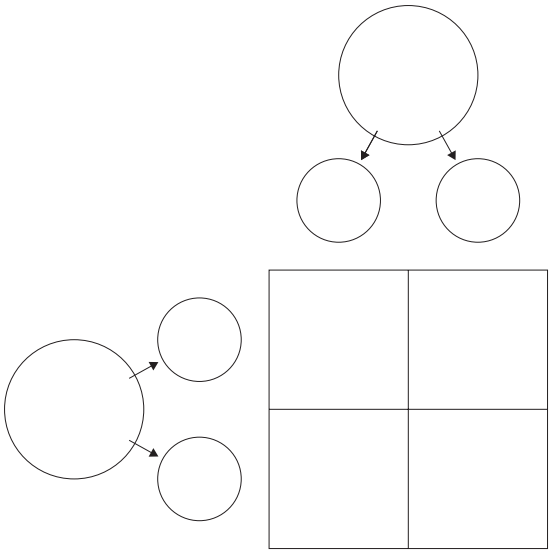
Homai ngā tohuira e tāea ana mō te Kiore 3 me te whakamārama ko tēhea ake te tohuira mō te Kiore 3.

Ki roto i tō tuhinga, me:

- tuhi ko ngā tohuira e tāea ana mō te Kiore 3
- whakamārama mai i te take ka tāea ngā tohuira e rua ēngari ko te tikanga he tōtika ake tētahi
- whakamārama mai he aha ngā mea ka tāea e koe kia mōhio tūturu ko tēhea te tohuira o te Kiore 3.

He whaitake ngā tūtohi tukutuku.





QUESTION ONE: FAMILY PEDIGREES

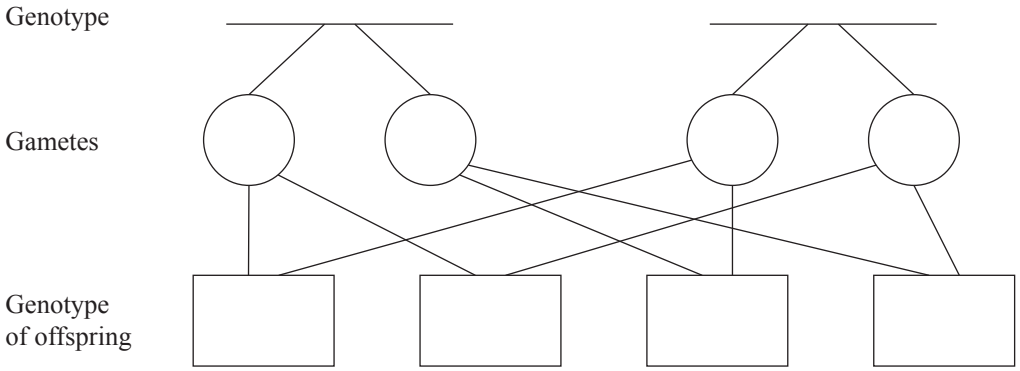
ASSESSOR'S USE ONLY

Albinism in rats results in white fur and pink eyes. Albinism is caused by a recessive allele **a**.

(a) Complete the following diagram:

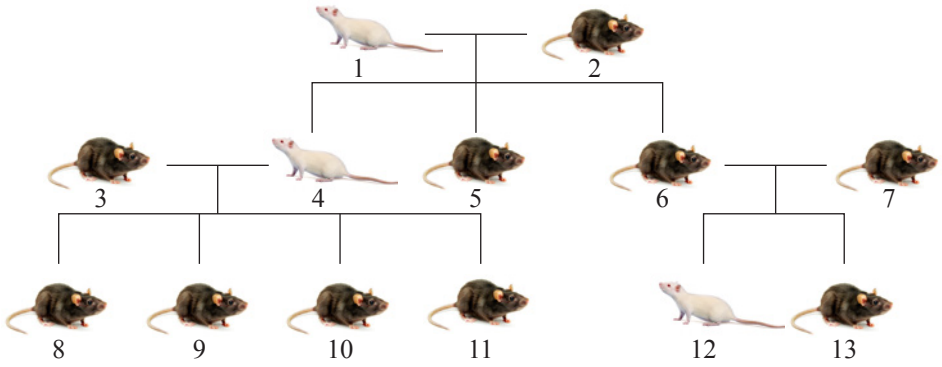
albino rat

heterozygous black rat



Sources: www.janvier-labs.com/rodent-research-models-services/research-models/per-species/outbred-rats/product/sprague-dawley.html
www.nobuggy.com/pest-wiki/rats

(b) The albino rat and the heterozygous black rat produced the following two generations of offspring, as shown in the pedigree chart below.



What are the genotypes of the following rats?

Rat 4: _____

Rat 6: _____

Rat 10: _____

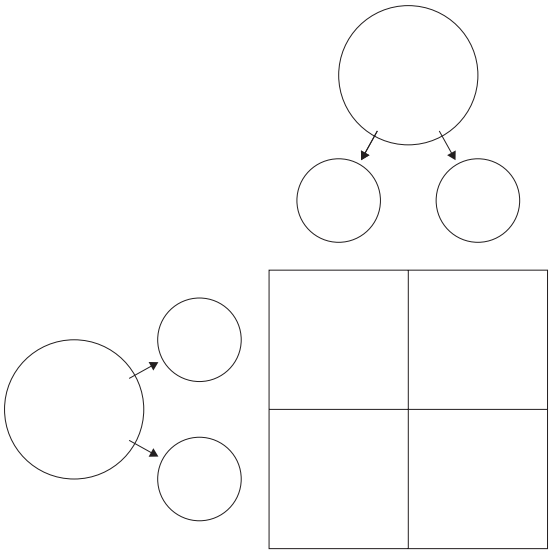
(c) Rat 3 was **not** an offspring of Rat 1 and Rat 2 in the family tree.

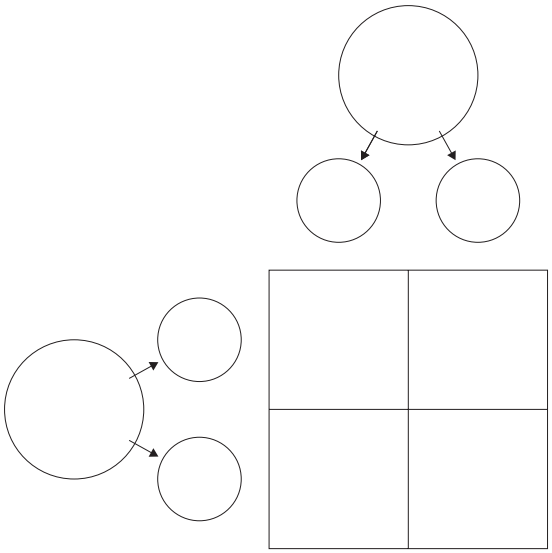
ASSESSOR'S USE ONLY

Give the possible genotypes for Rat 3 and explain which is the most likely genotype for Rat 3.
In your answer you should:

- state the possible genotypes for Rat 3
- explain why both genotypes are possible but one is more likely
- explain what you could do to be more certain about the genotype of Rat 3.

Punnett squares will be useful.

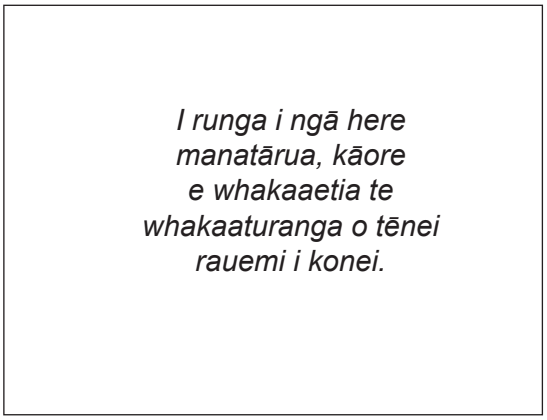




TŪMAHI TUARUA: TE PĪTAUIRA, NGĀ IRARĀ, NGĀ IRA ME NGĀ PŪIRA

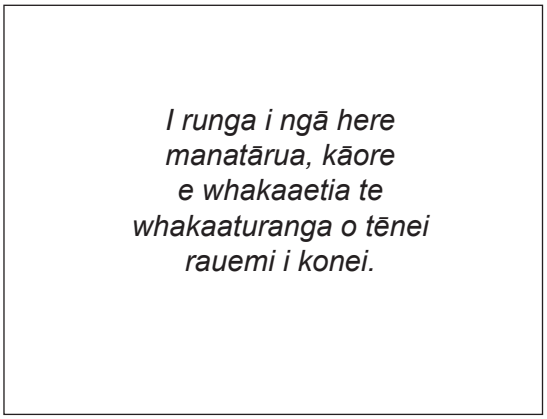
MĀ TE KAIMĀKA ANAKE

Ka tāea e te ngata e mōhiotia ana ko te *Cepaea nemoralis* te whai anga māori, anga tāhei rānei.



Anga māori

http://en.wikipedia.org/wiki/List_of_non-marine_molluscs_of_Ireland

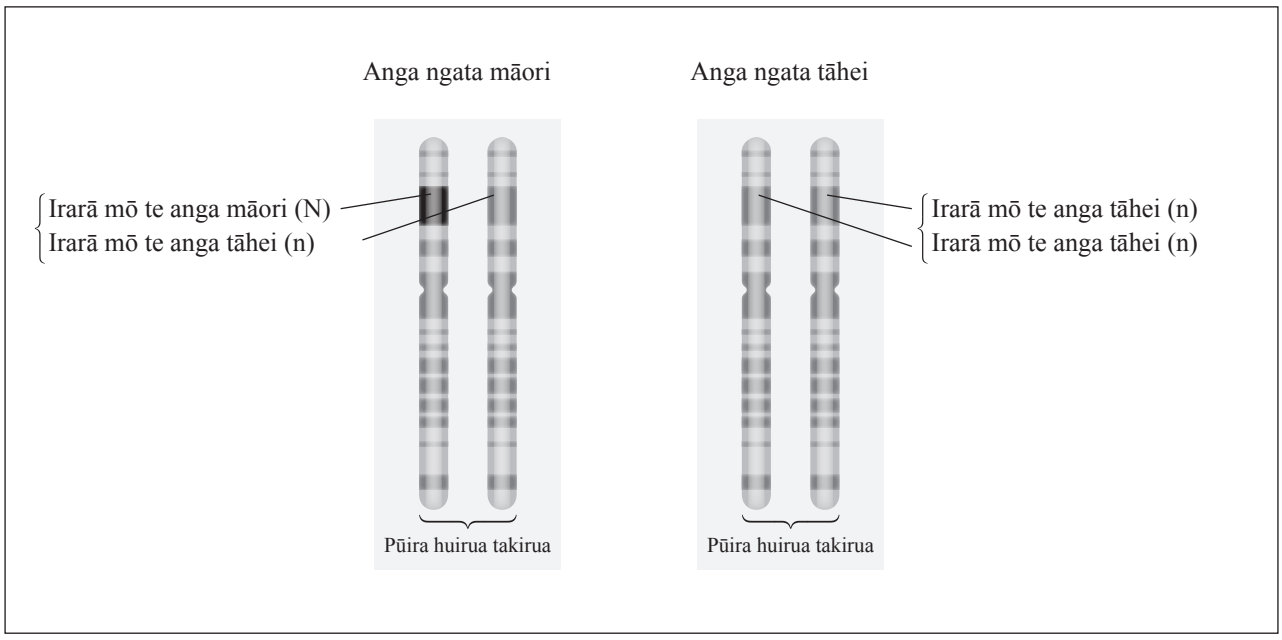


Anga tāhei

http://de.wikipedia.org/wiki/Hain-B%C3%A4nderschnecke

E whakaatu ana ngā hoahoa i raro i ngā pūira huirua kei roto ko te ira mō te tauira anga mō ia ngata i roto i ngā whakaahua i runga ake.

Ko te whakapae he tāpua[4] te irarā mō te anga māori (N) ki te irarā mō te anga tāhei (n).



(a) I roto i te hoahoa i runga ake, ko tēhea te ngata iraruakē mō te tauira anga?

Whakamāramahia mai he aha koe i tohu ai i tēnei ngata.

[4] ngoi

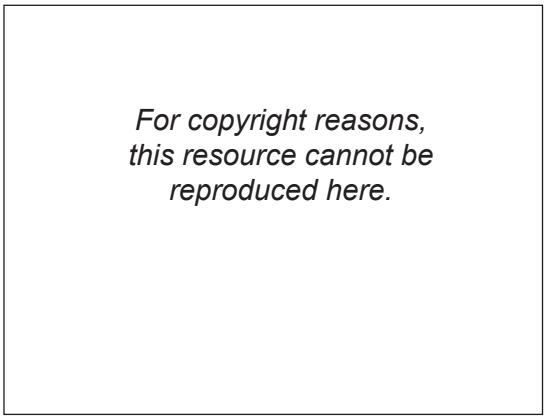
QUESTION TWO: DNA, ALLELES, GENES, AND CHROMOSOMES

ASSESSOR'S USE ONLY

A snail known as *Cepaea nemoralis* can have either a plain shell or a banded shell.

Plain shell

http://en.wikipedia.org/wiki/List_of_non-marine_molluscs_of_Ireland

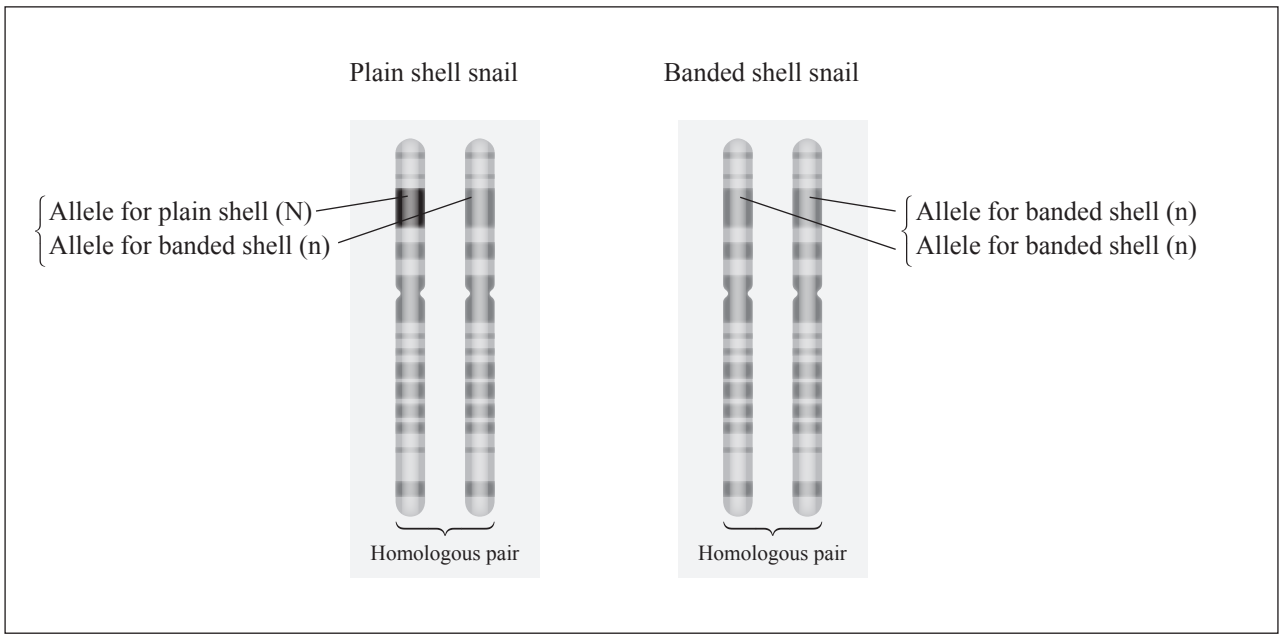


Banded shell

http://de.wikipedia.org/wiki/Hain-B%C3%A4nderschnecke

The diagrams below show the homologous chromosomes that contain the gene for shell pattern for each of the snails in the photographs above.

Assume the allele for plain shell (N) is dominant over the allele for banded shell (n).



(a) In the diagram above, which snail is heterozygous for shell pattern?

Explain why you chose this snail.

MĀ TE KAIMĀKA ANAKE

(b) E ai ki ngā tauira kua whakaaturia i mua ake mō te tauira anga, whakamāramahia te rerekētanga i waenga i tētahi irarā me tētahi ira.

(c) I puta ai ēnei ngata e rua i te whakaputa uri tōrua mai i te toa me te uwha ōrite.

Matapakitia i pēhea tā rāua whiwhi irarā rerekē mō te tauira anga.

Ki roto i tō tuhinga, me:

- whakamārama mai i ahu mai ngā pūira huirua i hea
- homai ngā tohuira e tāea ana mō ngā kātua e rua me te whakamārama i pēhea tō whakatau i ēnei tohuira e tāea ana.

He wāhi anō me ētahi tūtohi tukutuku mō tō tuhinga mō tēnei tūmahi kei te whārangi 10.

ASSESSOR'S USE ONLY

(b) Referring to the examples shown previously for shell pattern, explain the difference between an allele and a gene.

(c) These two snails were produced by sexual reproduction from the same male and female.

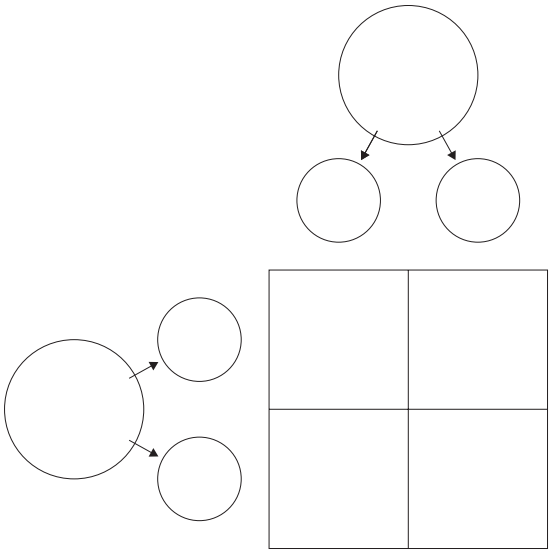
Discuss how they have inherited different alleles for shell pattern.

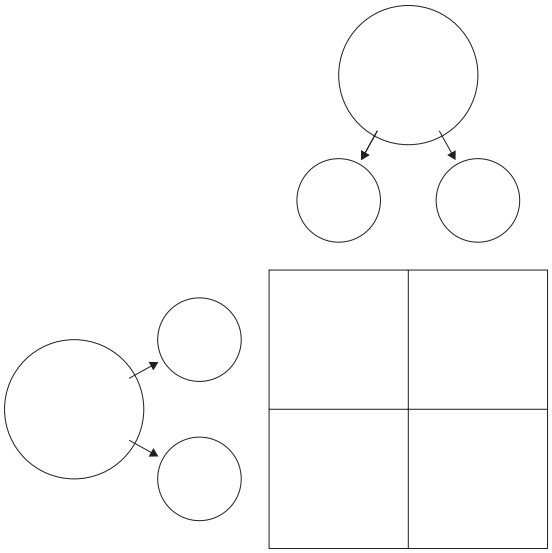
In your answer you should:

- explain where the homologous chromosomes have come from
- give the possible genotypes of both parents and explain how you determined these possible genotypes.

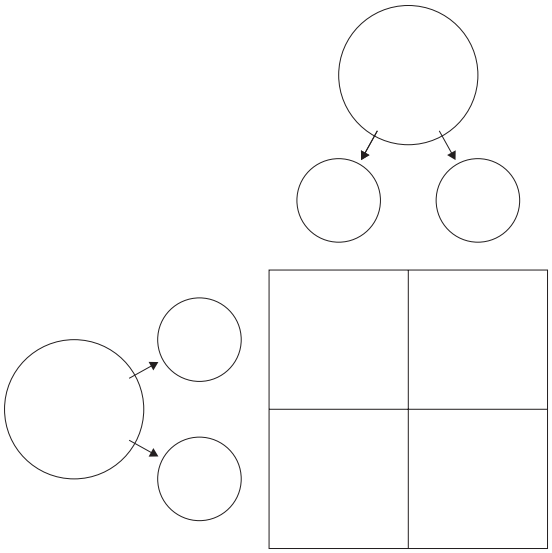
There are more space and Punnett squares for your answer to this question on page 11.

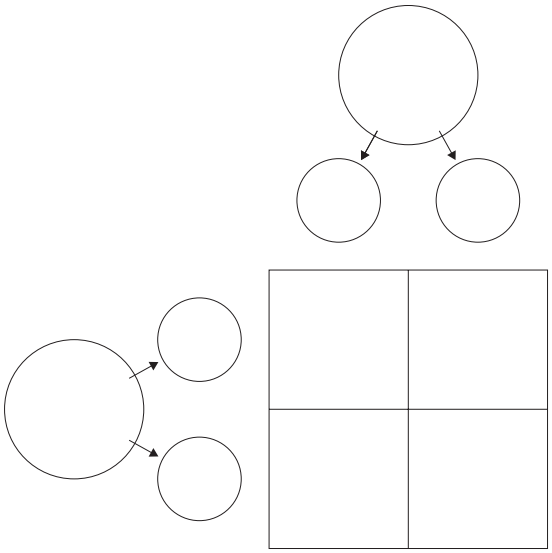
MĀ TE KAIMĀKA ANAKE





ASSESSOR'S USE ONLY





TŪMAHI TUATORU: TE REREKĒTANGA I WAENGA TIPU

MĀ TE KAIMĀKA ANAKE

E whakaatu ana te whakaahua i raro i ngā tipu maha nō te momo kotahi katoa.

http://blogs.ext.vt.edu/soybean-update/files/2013/08/Brown-Stem-Rot-IMAG0159.jpg

(a) Ko te tae kōwhai-parauri o ētahi o ngā tipu i takea mai i tētahi tahumaero. Kua puta whānuitia te tahumaero i te papa, ēngari ko ētahi tipu anake ka pāngia. E pēnei ana nā te rerekētanga i waenga tipu.

Whakamāramahia mai te tikanga o te rerekētanga i kore ai e pāngia katoahia ngā tipu e te tahumaero.

(b) He mea whakatipu ngā tipu i roto i te whakaahua mai i ngā kākano. Ko te kākano he hua nō te whakaputa uri tōrua.

(i) Whakaingoatia tētahi tukanga ka pā mai i te wā o te whakaputa uri tōrua, ā, whakamāramahia mai he pēhea te puta o te rerekētanga.

QUESTION THREE: VARIATION IN PLANTS

ASSESSOR'S USE ONLY

The photograph below shows a large number of plants that are all the same species.

http://blogs.ext.vt.edu/soybean-update/files/2013/08/Brown-Stem-Rot-IMAG0159.jpg

(a) The yellow-brown colour in some of the plants has been caused by a disease. The disease is present throughout the field, but affects only some plants. This is because of variation in the plants.

Explain why variation means not all the plants get the disease.

(b) The plants in the photograph were grown from seeds. Seeds are the result of sexual reproduction.

(i) Name one process that occurs during sexual reproduction, and explain how it results in variation.

(ii) Matapakitia ngā painga o te whakaputa uri tōrua mō tētahi momo ina huri ai te taiao.

Ki roto i tō tuhinga, me:

- homai he tauira o tētahi taiao hurihuri
- whakamārama mai te pānga o ngā taiao hurihuri ki tētahi taupori
- whakaaroaro te hiranga o te rerekētanga i roto i tētahi taupori i tētahi taiao hurihuri.

MĀ TE KAIMĀKA ANAKE

(ii) Discuss the advantages of sexual reproduction for a species when the environment changes.

ASSESSOR'S USE ONLY

In your answer you should:

- give examples of a changing environment
- explain the impact of changing environments on a population
- consider the importance of variation in a population in a changing environment.

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

ASSESSOR'S USE ONLY

English translation of the wording on the front cover

Level 1 Science, 2015

90948M Demonstrate understanding of biological ideas relating to genetic variation

9.30 a.m. Tuesday 10 November 2015
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 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.