

See back cover for an English translation of this cover

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90948M



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Pūtaiao, Kaupae 1, 2012

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

9.30 i te ata Rāhina 19 Whiringa-ā-rangi 2012
Whiwhinga: Whā

Paetae	Paetae Kaiaka	Paetae 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 Ākongā ā-Motu (NSN) kei tō pepa whakauru ki te tau kei runga ake nei.

Me whakautu e koe ngā pātai KATOĀ kei roto i te pukapuka nei.

Ki te hiahia koe ki ētahi atu wāhi hei tuhituhi whakautu, whakamahia te (ngā) whārangi kei muri i te pukapuka nei, ka āta tohu ai i ngā tau pātai.

Tirohia mehemea kei roto nei ngā whārangi 2–19 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

HOATU TE PUKAPUKA NEI KI TE KAIWHAKAHAERE HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.

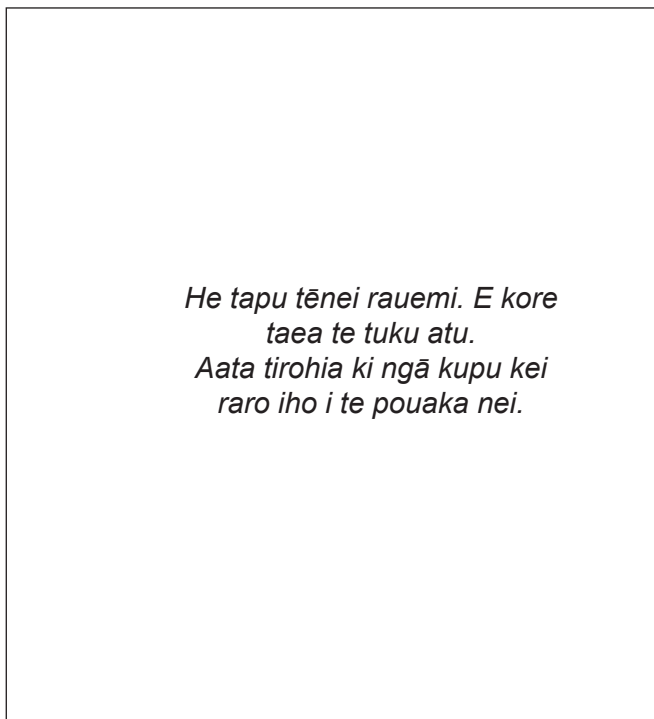
TAPEKE

MĀ TE KAIMĀKA ANAKE

Kia 60 meneti hei whakautu i ngā pātai o tēnei pukapuka.

PĀTAI TUATAHI: HANGANGA IRANGA

Ka whakaatu te kauwhata i raro nei i te hononga i waenga i ngā pūira, ngā ira me te pītau-ira (DNA).



<http://www.newbornscreening.info/Pro/genetics.html>

(a) Whakamāramahia ngā hononga i waenga i te pītau-ira, ngā pūira me ngā ira.

Ka taea e koe te tāpiri tuhipoka, tapanga hoki ki te hoahoa o runga hei tautoko i tō whakautu.

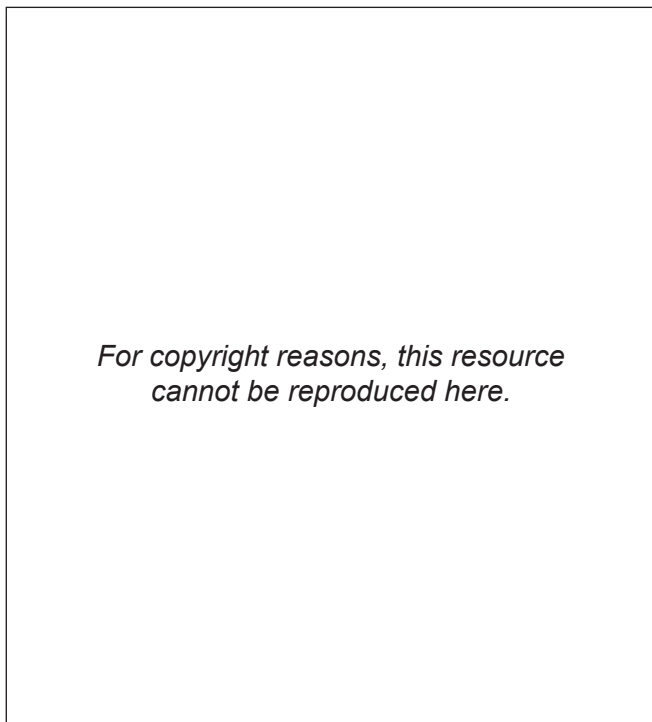
(b) Whakamāramahia he pēhea ka puta ai ngā āhuatanga rerekē i ngā hononga i tō whakautu mō te (a), ā, he pēhea te whai wāhi atu ki te **rerekētanga ā-ira**.



You are advised to spend 60 minutes answering the questions in this booklet.

QUESTION ONE: GENETIC STRUCTURE

The diagram below shows the relationship between chromosomes, genes, and DNA (deoxyribonucleic acid).



<http://www.newbornscreening.info/Pro/genetics.html>

(a) Explain the relationships between DNA, chromosomes and genes.

You may add notes and labels to the diagram above to support your answer.

- (b) Explain how the relationships in your answer to (a) lead to different characteristics and how this contributes to **genetic variation**.

PĀTAI TUARUA: NGĀ TAUIRA O TE TUKUNGA IHO

Ko te mate ā-toto ka hua mai i ngā pūtau toto whero he rerekē, he piko (sickle) te āhua ka tuku iho mā tētahi ira kotahi, e rua pea ōna āhuaira, he pūnoa, he piko rānei.

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

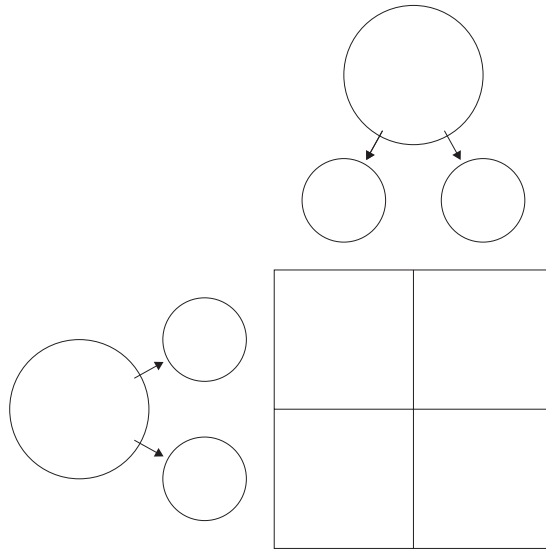
pūtau toto whero pūnoa pūtau toto āhua piko
www.lifebridgeblogs.org/2011/09/16/national-sickle-cell-awareness-month/

Whakamahia a ‘**H**’ hei tohu i te irarā ‘pūnoa’ ngoi, me te ‘**h**’ hei tohu i te irarā ‘piko’ ngoikore.

(a) Whakamāramahia he pēhea te whai pēpi pūtau toto āhua piko a ngā mātua whai pūtau toto pūnoa.

I tō whakautu, me:

- tuhi te tohuira o te tamaiti whai pūtau toto āhua piko
- tuhi ngā tohuira o ngā mātua pūnoa **e rua**
- tā mai tētahi tūtohi tukutuku (Punnett) hei whakaatu he pēhea te whai pēpi pūtau toto āhua piko a ngā mātua pūnoa.

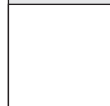


(b) Tokowhā ngā tamariki a ngā mātua i te wāhanga (a), he pūtau toto āhua piko katoa o rātou. E wahahia ana tā rāua tamaiti tuarima.

(i) Whakamāramahia ka pēhea te puta i ngā mātua pūnoa ngā tamariki TOKOWHĀ he pūtau toto āhua piko o rātou.

Me kōrero koe mō tō tūtohi tukutuku o (a) i tō whakautu.

(ii) Whakamāramahia te tūponotanga kei te tamaiti tuarima ngā pūtau toto āhua piko.



QUESTION TWO: PATTERNS OF INHERITANCE

A blood disorder caused by red blood cells with an unusual curved (sickle) shape is inherited through a single gene with two possible alleles, normal and sickle.

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normal red blood cell sickle-shaped blood cell

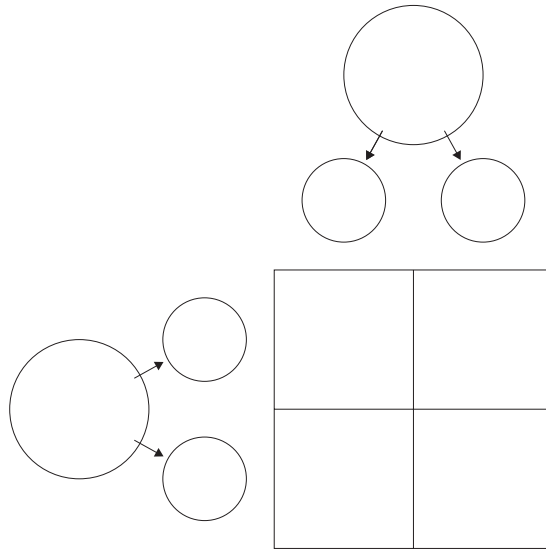
www.lifebridgeblogs.org/2011/09/16/national-sickle-cell-awareness-month/

Use ‘**H**’ to represent the dominant ‘normal’ allele, and ‘**h**’ to represent the recessive ‘sickle’ allele.

(a) Explain how two parents with normal blood cells can have a child with sickle-shaped blood cells.

In your answer, you should:

- state the genotype of a child with the sickle-shaped blood cells
- state the genotypes of **both** normal parents
- draw a Punnett square to show how two normal parents can produce a child with sickle-shaped blood cells.



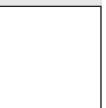
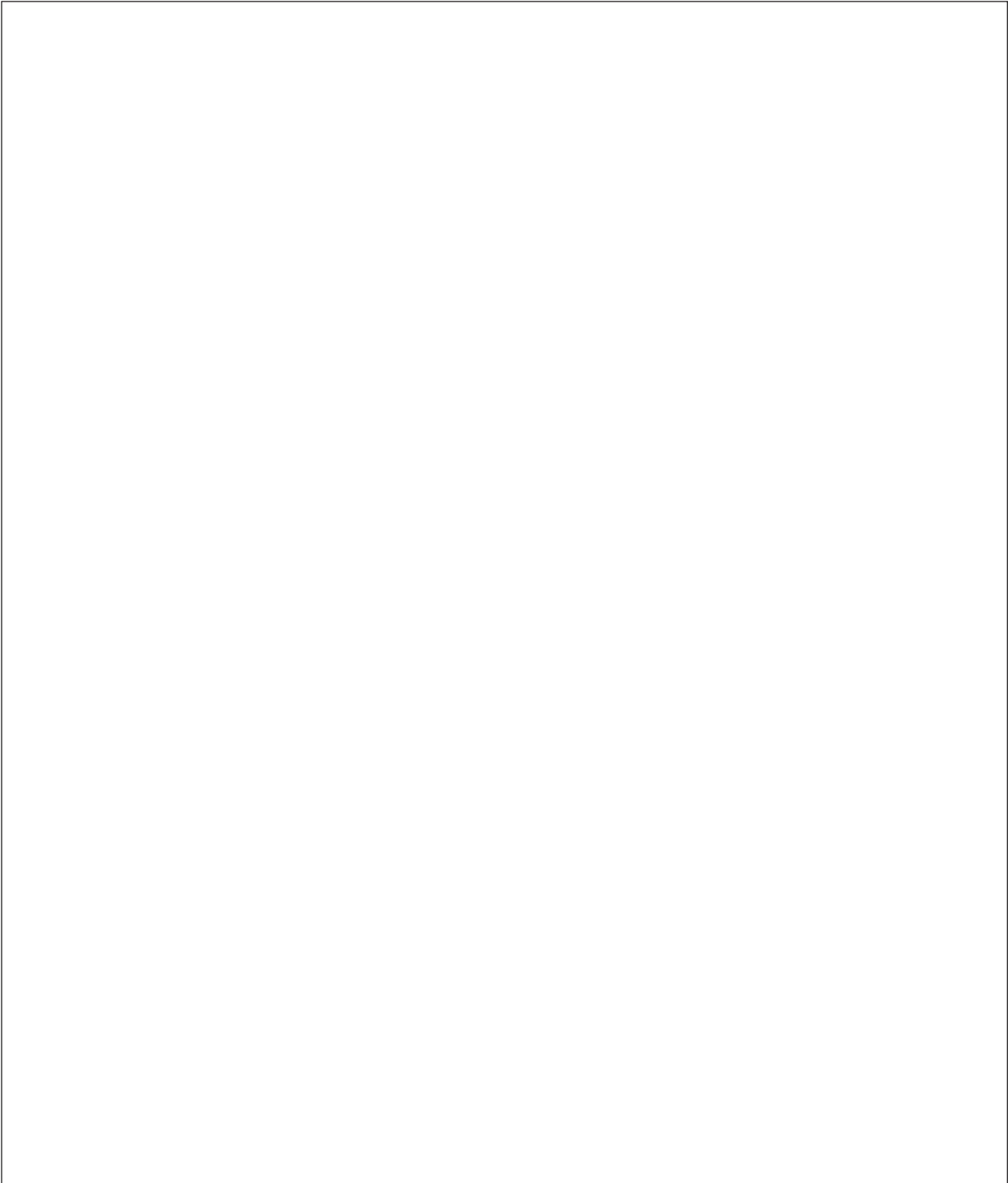
(b) The parents in part (a) have four children all with sickle-shaped blood cells. They are expecting a fifth child.

(i) Explain how normal parents could have produced FOUR children with sickle-shaped blood cells.

You should refer to your Punnett square in (a).

(ii) Explain what the chances are of the fifth child having sickle-shaped blood cells.

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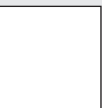
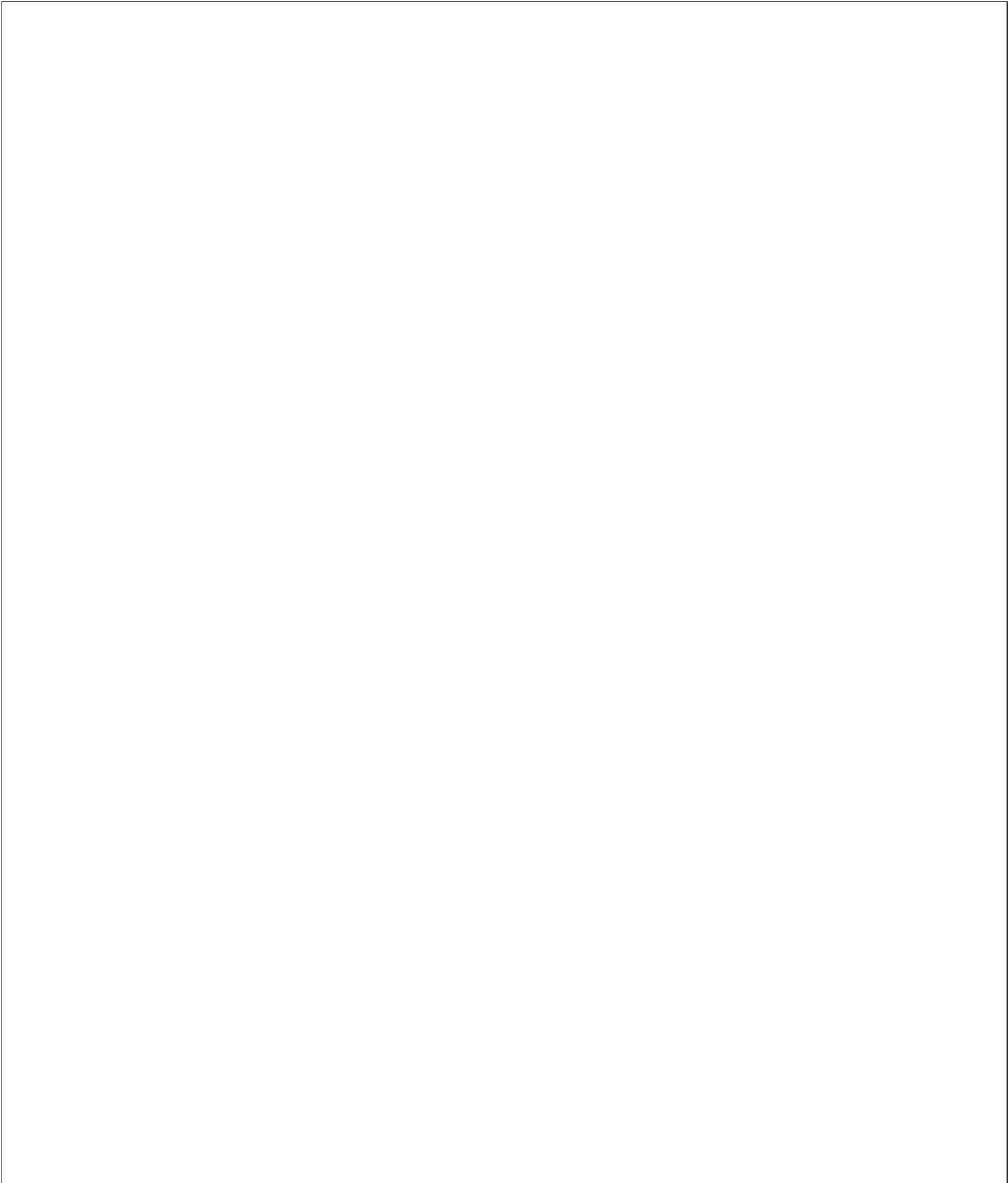
QUESTION THREE: SEXUAL REPRODUCTION AND SURVIVAL

Explain how sexual reproduction causes genetic variation AND how this leads to increased survival of the species.

In your answer you should consider:

- the processes of gamete formation (meiosis) and fertilisation
- how sexual reproduction leads to variation in the population
- the link between genetic variation and survival of a species.

You may use labelled diagrams with notes to support your answer.



PĀTAI TUAWHA: TE REREKĒTANGA Ā-IRA

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

Rākau hāmā

www.sciencephoto.com/media/371575/enlarge

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

Rākau uriuri

<http://amusedartichoke.wordpress.com/2011/04/15/egos-and-evolution/>

E rua ngā tohuāhua o tētahi momo pepe, he tea, he uriuri hoki. Ka kainga ngā pepe tea, uriuri hoki e ngā manu.

Whakamāramahia he pēhea te āwhina a ngā tohuāhua e rua o te momo pepe kia ora haere tonu te taupori mēnā **ka rerekē haere te taiao**, ā, ka uriuri ake ngā rākau katoa e nōhia e ngā pepe.

I tō whakautu, me:

- tautuhi te kupu 'tohuāhua'
- whakamārama he pēhea te āwhina a te tae kia ora haere tonu ngā pepe takitahi
- whakamārama he aha e pā ai te uriuri haere ake o ngā rākau, ki te ōwehenga o ngā tohuāhua ki te taupori pepe i roto i te wā.

QUESTION FOUR: GENETIC VARIATION



Light-coloured tree

www.sciencephoto.com/media/371575/enlarge

Dark-coloured tree

<http://amusedartichoke.wordpress.com/2011/04/15/egos-and-evolution/>

A species of moth has two phenotypes, light and dark. Both light and dark moths are eaten by birds.

Explain how the two phenotypes of the species of moth help the population to survive if the **environment changes** and all the trees on which the moths live become darker.

In your answer you should:

- define phenotype
- explain how colour helps individual moths to survive
- explain why the environmental change to darker trees, affects the ratio of the phenotypes in the moth population over time.

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English translation of the wording on the front cover

Level 1 Science, 2012

90948 Demonstrate understanding of biological ideas relating to genetic variation

9.30 am Monday 19 November 2012
Credits: Four

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 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 2–19 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.

90948M