See back cover for an English translation of this cover



91159M



SUPERVISOR'S USE ONLY

Koiora, Kaupae 2, 2012

91159M Te whakaatu māramatanga ki te whakatinana ira

2.00 i te ahiahi Rāpare 22 Whiringa-ā-rangi 2012 Whiwhinga: Whā

Paetae	Paetae Kaiaka	Paetae 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 mehemea e ōrite ana te Tau Ākonga ā-Motu (NSN) kei tō pepa whakauru ki te tau kei runga ake nei.

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

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

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

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

TAPEKE

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

MĀ TE KAIMĀKA ANAKE

PĀTAI TUATAHI: TE PĀNGA O TE TAIAO

Ka taea e te taiao te whakaawe te tohuāhua o tētahi rauropi mā ngā huringa hāngai ki te tohuira, mā te āhua hoki/rānei o te whakatinana i te tohuira.

take taiao.						
I tō whakaı	utu me homai e k	oe kia kotahi te	e tauira i te iti	nga rawa o ia	kupu matua r	nei:

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

ASSESSOR'S USE ONLY

QUESTION ONE: EFFECT OF ENVIRONMENT

The environment can affect the phenotype of an organism through direct changes to the genotype, and/or by the way in which the genotype is expressed.

Discuss this statement, with reference to mutagens, gene mutations and environmental factors.
n your answer you should give at least one example of each of these key terms.

MĀ TE KAIMĀK ANAKE
ANAKE

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PĀTAI TUARUA: TE KŌTUI PŪMUA

E whakaaturia ana i raro nei tētahi wāhanga o te raupapa mRNA.

(a) Whakaotihia ngā aho pītauira mā te whakakī i ngā pāpāhua kei te ngaro, ME te tautohu ko tēhea te aho tātauira pītauira, mā te porohita i te tapanga tōtika.

DNA {	<u>T</u>	<u>A</u>	<u>C</u>	_	_	_	_	_	_	_	_	_	Aho 1
DNA	<u>A</u>	<u>T</u>	<u>G</u>	_	_	_	_	_	_			_	Aho 2
mRNA	A	U	G	G	<u>C</u>	Α	G	Α	U	U	<u>C</u>	U	

(b)	Ma te korero mo te tutoni i raro nei, whakamaramania te tikanga o te kianga 'ne tawere na tipuheke i rō waehere'.								

TŪTOHI O NGĀ CODON mRNA

		н	ĀNGA COI	DON TUAR	UA		
		U	C	A	G		
	U	PHE	SER	TYR	CYS	U	
		PHE	SER	TYR	CYS	C	
		LEU	SER	KATI	KATI	A	١
ΙΗΙ		LEU	SER	KATI	TRP	G	HUĀNGA CODON TUATORU
HUĀNGA CODON TUATAHI	C	LEU	PRO	HIS	ARG	U	Ž
TU		LEU	PRO	HIS	ARG	C	$ \mathbf{A} $
Z		LEU	PRO	GLU	ARG	A	6
)D(LEU	PRO	GLU	ARG	G	DO
\ C(A	ILE	THR	ASPN	SER	U	
\delta \frac{1}{2}		ILE	THR	ASPN	SER	C	$ U_{\mathbf{A}} $
Ā		ILE	THR	LYS	ARG	A	$ T_0 $
HI		MET	THR	LYS	ARG	G	RU
	G	VAL	ALA	ASP	GLY	U	
		VAL	ALA	ASP	GLY	C	
		VAL	ALA	GLU	GLY	A	
		VAL	ALA	GLU	GLY	G	

MĀ TE KAIMĀKA ANAKE

QUESTION TWO: PROTEIN SYNTHESIS

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Part of a sequence of mRNA is shown below.

(a) Complete the DNA strands by filling in the missing bases, AND identify which strand is the DNA template, by circling the appropriate label.

DNA {	<u>T</u>	<u>A</u>	<u>C</u>	_	_	_	_	_	_	_	_	_	Strand 1
	<u>A</u>	<u>T</u>	<u>G</u>	_	_	_	_	_	_	_	_	_	Strand 2
mRNA	A	U	<u>G</u>	<u>G</u>	<u>C</u>	Α	G	A	U	U	<u>C</u>	U	

(b)	With reference to the table below, explain what is meant by the term 'redundancy due to
	degeneracy within the code'.

TABLE	OF	mRNA	COD	ONS

		SEC	COND COD	ON ELEME	ENT		
		U	C	A	G		
	U	PHE	SER	TYR	CYS	U	
		PHE	SER	TYR	CYS	C	
		LEU	SER	STOP	STOP	A	
Ţ		LEU	SER	STOP	TRP	G	
AE)	C	LEU	PRO	HIS	ARG	U	THIRD
EN		LEU	PRO	HIS	ARG	C	
EI		LEU	PRO	GLU	ARG	A	191
ON		LEU	PRO	GLU	ARG	G	
FIRST CODON ELEMENT	A	ILE	THR	ASPN	SER	U	CODON ELEMENT
T (ILE	THR	ASPN	SER	C	E
RS		ILE	THR	LYS	ARG	A	
F		MET	THR	LYS	ARG	G	
	G	VAL	ALA	ASP	GLY	U	
		VAL	ALA	ASP	GLY	C	
		VAL	ALA	GLU	GLY	A	
		VAL	ALA	GLU	GLY	G	

(c)

Matapakitia te hanganga o tētahi pūmua mahi ka tīmata ki tētahi aho mRNA kua oti.	MĀ TE KAIMĀKA
I tō matapakinga, me kōrero koe mō ia mea e whai ake:	ANAKE
• te tauhuringa	
ngā tuipūmuate tRNA	
ngā codon ME ngā anticodon	
ngā codon tīmata, kati HOKI	
 ngā mekameka pētinirau (polypeptide). 	
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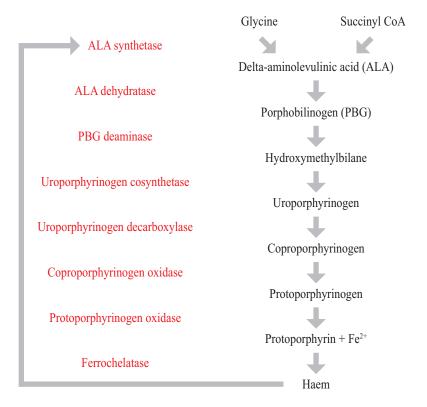
Discuss the formation of a functional protein, beginning with a completed mRNA strand.		
In your discussion, you should refer to each of the following:translationribosomes		
• tRNA		
• codons AND anticodons		
• start AND stop codons		
• polypeptide chains.		

PĀTAI TUATORU: NGĀ ARA WHAKARAU PŪNGAO

MĀ TE KAIMĀKA ANAKE

He rōpū mate onge te mate porphyria e heke iho ana i roto i ngā whānau, i kore ai e tika te hanga o tētahi wāhanga hira o te kawehā, e kīia ana ko te haem.

Ko te tikanga, mahia ai e te tinana te haem mā tētahi tukanga upane-maha. Ka hangaia ngā porphyrin i ētahi o ngā upane o tēnei tukanga. Kei ngā tūroro e pāngia ana e te mate porphyria he hohoretanga o ētahi pūmua whākōkī e hiahiatia ana mō tēnei tukanga. Ka pupū ake ngā rahinga inati o ngā porphyrin, ngā matū whai pānga rānei i roto i te tinana.



I te hoahoa i runga, he whero ngā pūmua whākōkī.

Matapakitia he aha i rerekē ai pea ngā pūtakenga mate o ngā tūroro e pāngia ana e te mate porphyria, ka whakamārama anō ka pēhea e taea ai e ngā mātua e rua whai mate porphyria te whakawhānau tamariki kāore e whai mate porphyria.

I tō whakautu, me whai whakaaro ki:

- **te whakaahuatanga** o te tikanga o te kupu 'ara whakarau pūngao'.
- he **whakamāramatanga** he aha i tūhene ai pea ētahi pūmua whākōkī.

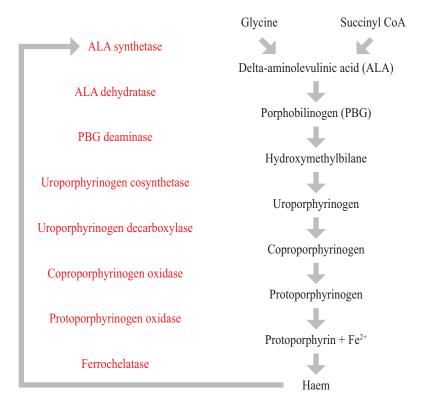
he **arotakenga** o te hoahoa hei **parahau** he aha i taea ai pea ngā pūtakenga rerekē o taua

QUESTION THREE: METABOLIC PATHWAYS

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Porphyrias are a group of rare disorders passed down through families, in which an important part of haemoglobin, called haem, is not made properly.

Normally, the body makes haem in a multi-step process. Porphyrins are made during several steps of this process. Patients with porphyria have a deficiency of certain enzymes needed for this process. This causes abnormal amounts of porphyrins or related chemicals to build up in the body.



In the above diagram, the enzymes are shown in red.

Discuss why patients with Porphyria may have different causes of the disorder, and how two parents with Porphyria could give birth to children who do not have it. In your answer you should consider:

- **description** of what is meant by the term 'metabolic pathway'.
- an **explanation** of why some enzymes might be deficient.

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MĀ T KAIMĀ ANAK

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USE ONLY

	He puka anō mēnā ka hiahiatia.		
TAU ĀTAI	Tuhia te (ngā) tau pātai mēnā e hāngai ana.		

		Extra paper if required.	
NIESTION	ı	Write the question number(s) if applicable.	
QUESTION NUMBER		(с) и орринения	

English translation of the wording on the front cover

Level 2 Biology, 2012

91159 Demonstrate understanding of gene expression

2.00 pm Thursday 22 November 2012 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 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 2–15 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.