



91156

Mana Tohu Mātauranga o Aotearoa New Zealand Qualifications Authority

Level 2 Biology 2023

91156 Demonstrate understanding of life processes at the cellular level

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of life processes at the cellular level.	Demonstrate in-depth understanding of life processes at the cellular level.	Demonstrate comprehensive understanding of life processes at the cellular level.

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 2–16 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (Content of the area will be cut off when the booklet is marked.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

QUESTION ONE: PHOTOSYNTHESIS AND ENZYMES

Photosynthesis is an enzyme-controlled reaction where the reactants of the process are the substrates for the photosynthesis enzymes. Therefore, photosynthesis can be affected by environmental factors such as temperature and substrate concentration.

- (a) Write the **complete** word equation for photosynthesis.
- (b) Discuss how both temperature and substrate concentration can affect the process of photosynthesis.

In your answer, refer to the **light-dependent** and **light-independent phases** of photosynthesis, and include a discussion of:

- an enzyme, including a description
- the starting reactants of the photosynthesis reactions, naming them, and how they affect photosynthesis
- how and why both very high and very low temperatures affect enzyme function and photosynthesis.

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

3

		DO NOT W NOT WRITE OT WRITE
	4	TEIN THIS
		A BONOT W TOM OG
		OT WEITE I
		lis area Do not w
		O NOT WE
		VRITE IN TH
		THIS AREA
		VRITEINTI
		REA DON
		OT WRITE IN T
		E IN THIS AT
		IN THIS AP
		E IN THIS A
		DO NO
		VRITE IN TI TE IN THIS
		REA DO N
		TE IN THIS
		TEINITHIS THISAREA
		A DOND
		DOPOIN
		WRITE IN
		HISAREA WRITE IN
		IN, THÍS ARE T. WRITE IN
		TE IN THIS HIS AREA
		SABEA D
ר כיייייייייייייייייייייייייייייייייי		DO'NOT WI NOT WRITE
ר יייין ריייין רייייין ריייייין רייייייייי		VRITE IN TE IN THIS I
ר יייין ריייין רייייין ריייייין רייייייייי		WRITE IN
ר יייין ריייין רייייין ריייייין רייייייייי		WRITE IN . TE IN THIS
ר יייין ריייין רייייין ריייייין רייייייייי		HIG AREA S AREA DO
ר יייין ריייין רייייין ריייייין רייייייייי		NOT WRIFE DO NOT W
איז		NOT WRITE
איז		TE IN THIS HIS AREA
איז		IN THIS ARE TWRITE
איז		TE IN THIS
איז		IS AREA D
איז		NOT WRITE
นับขึ้น สาร สาร สาร สาร 2012 ค.ศ. 2012 -		RITE IN THIS
م جوب الاست الاست المراجع المراح المراحع المراحع المراحع المراحع المراحع المراحع المراحع الم المراحع الم المراحع المم المم المم المم المم المم المم الم		AREA DO
م جوب الاست الاست المراجع المراح المراحع المراحع المراحع المراحع المراحع المراحع المراحع الم المراحع الم المراحع المم المم المم المم المم المم المم الم		HIS AREA RITE IN THIS
90744 1917 We 1918		N THIS ARE AREA DO
אסיידער Biology 91156, 2023 דעימיב איז אוקר איז		WRITE N
Biology 91156, 2023		NOT WRITE
Twark	Biology 91156, 2023	TE IN THIS
		T WRITEIN

This page has been deliberately left blank. The assessment continues on the following page.

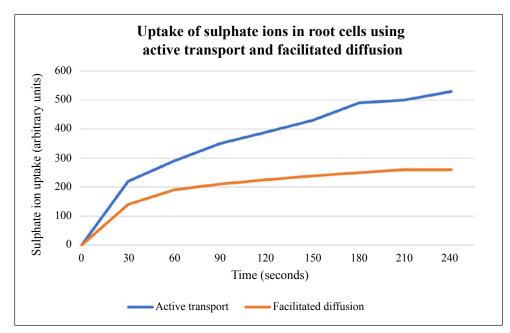
QUESTION TWO: TRANSPORT OF MATERIALS

Plants absorb materials from the soil through the cells in their roots. Some ions, such as the sulphate ion, can enter the root cells by both facilitated diffusion and active transport.



Structure of cell membrane

In an investigation of the uptake of sulphate ions by root cells, the following results were obtained:



Discuss how specific structures in the cell membrane allow it to carry out the transport of the sulphate ion into the plant root.

In your answer, refer to the graph above and include a discussion of:

- active transport, including a description, and why it would be used
- facilitated diffusion, including a description, and why it would be used
- the similarities and differences between active transport and facilitated diffusion
- the reasons for the differences in sulphate ion absorption, as shown in the graph.

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

7

Biology 91156, 2023	ייס קסן אנד דעשי דעשי דעשי ער שיר ער שיר ער שיר
	1407 † we 721
	دیم ۱۳۳۷ ۵۰
	ער אין דער אין דער געראין געראין געראין
	יין אין איז אין עד גער איז גער איז גער עד גער עד גער גער גער גער גער גער גער גער גער גער גער גער גער גער גער גער גער גער גער
	יייי נידדי: אביגא
	אינים אינים קיעיד קיעיד קיעיד אילים סער סער קידים קידים קידים קידים קידים
	TE IN HISP IS AR
	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
	Të nj
	NOT NOT
	не А не А А ^{рт}
	9 TEU "W81 Ře Int
	אישע דביע אוקא זידו זידו גער גער גער גער גער גער גער גער גער גער
	່ະ " ຊົ່ງ 43 ທີ່ດ້າ
	דב און אופא עקצו עלדו עלדו דב אופ דב אופ
	NOT WR TE IN
	וייים אד גער גער גער גער גער גער גער גער גער גער
	Hills Also D. A.
	τε (ξ 6 Α ^ξ Τε) ₁ Ττι 9
	REÁ
	ס אַכ ס איז עוזידי
	שעד ד איז ואגאיז
	IS AR EA D IN TI
	איז
	нти Азя, И Од
	I FHU NOP
	۲۰٬۰ ۱۸ ۲۲ REA
	סס סד זיי 15 לע 10 ייי 10 ייי 10 ייי 10 ייי 10 ייי 10 ייי 10 ייי
	កដ្ _ម
	A DON DON OT W
8	DO N
	DQ NOT

This page has been deliberately left blank. The assessment continues on the following page.

QUESTION THREE: MITOSIS AND DNA REPLICATION

DNA replication and mitosis are important processes for animals.



Life cycle of a butterfly

Replication of a DNA strand

Discuss the relationship between DNA replication and mitosis, and why both are needed for the survival of both a cell and the entire organism.

In your answer, include a discussion of:

- when DNA replication occurs, including a description, and how the process is carried out
- mitosis, including a description, and its purpose
- why mitosis is needed, by referring to stages of a butterfly's life cycle, as shown above.

THISAREA DO		
SAREA DO NOT		
AREA DO NOT		
TWO A		
SAREA DO NOT AREA DO NOT UD NOT WRITE WRITE N THIS SIN THIS AREA DO NOT V		
FIN THIS AREA		
AREA DO NOT V		
AREA DO NOT V DO NOT WRITE		
TWRITE IN THISA THISAREA DO THISAREA DO THISAREA DO NOT SAREA DO NOT		
THISAREA DO		
THIS AREA DO N		
SAREA DONOT		
NGT WRITE		
NGT WRITE IN TH		
OT WRITE INT.		
OT WRITE IN THIS SAREA DONOT EA DONOTWRIT		
A DO NOT WRIT		
NOT WRITE IN TR		
PTE IN THIS AREP THIS AREA DON AREA DONOT		
THIS AREA DO N		
AREA DONOT		
ONOT WRITE		
ONOT WRITE IN		
E INITUIS AREA		
O NOT WRITE		
REA # DO NOT#WID:		
TEIN		
E IN THIS AREA SAREA DO NOT I		
EA DO NOT WR/		
DO NOT WRITE N		
DO NOT WRITE IN		
" = "N THIS ARE"		
DO NOT WRITE IN WRITE IN THIS AF		
WRITE IN THIS AF		
DO NOT WRITE IN		
IOT WRITE IN THE		
E IN THIS AREA		
PA DO NOT-WRI		
IS AREA DO NOT		
DEA DO NOT		
REA HOLDER MA		
DO NOT WRITE I		
TWRITE IN THIS		
REA DOINGT WA		
NOT WRITE IN T		
DO NOT WRITE		
TWRITE IN THIS		
WRITE		
IS AREA. DO NOT		
IS AREA DO NOT		
IS AREA DONOT		
REA. DO NOT WR		
DO NOT WRITE IN WRITE IN THIS		
REA DO NOT WR		
NOT WRITEIN TH		
REA DO NOT WR		
DO'NOT WRITE IN T ^{. WRITE IN} THIS		
T-WRITE IN THIS		
WRITE IN THIS AF		
IS AREA DO'NOT		
THIS AREA DO		
IGAREA DONOT REA DONOTWA		
-5.10746.1 1		
NUT WRITE N TWRITE N THIS REA DONGT WE		
REA DONGT WE		
NOT WRITE IN TI		
REA DO NOT WA		
T WRITEIN THIS		
WRIT:		
WRITE IN THIS AF		
IS AREA DO NOT		
DONOTWA		
"DO NOT W.S. "		
NOT WRITE IN TH		
NOT WRITE IN TH RITE IN THIS ARE		
C DO		
DO NOT WRITE		
NOT WRITE IN TH		
TE IN THIS AREA		
REA DO NOT WA		
NTHISP		
DEA DO NO		
REA DONOTWI		
DO NOT WRITE		

There is more space for your answer to this question on the following pages.

Biology 91156, 2023	7 E IN 7 THE N 7 T WRT T WRT T WRT T WRT
	จัง.401 พ.ศ. พ. 1 พ.ศ. 1 17 - โพ 1
	0, ABA 00, YBA WIRW 1917W
	นักระเทศ เป็น 25 เกม เป็น 25 เกม พ. 1911
	N. DITITI A.REA.
	NOT Wit ชัสมัธร ชัศธิภมโ
	384 čiri A394 20 544 1001
	N 7116 V 9715 TW9715 TE N 13
	า ฟลับระ TE ฟ ามี พุธ/งระ พุธ/งระ พุธ/งระ พุธ/งระ พุธ/งระ TE พุรุก พุธ/งระ พ (พ) พ (พ) พ
	עשעדים דב וע דאר איז אפיבי זיי דעופא זיי דעופא עשעדים זיי דעופא עשעדים זיי דעופא געשעדים
	τε ην τη His Apre S A ^{TRA}
	ण्यत्रान्द्रं ज नहावद्र श्रम्भहार
	Ware TE IN sh HS ABE
	NOTWA DO'NAT NOTWA WATE
	7Ε Ν 1 30,600 436,6 10 Ν 10 Ν 10 Ν
	ТЕ ју тн. тні 5 Арё́- Мугде Т. Т. Т. Т. Т. Т. Т. Т. Т. Т. Т. Т. Т.
	NCT WR WRITE TE IN TH
	רע האיז סט איז אסט ג ער סט ער סט ער ע
	אד אל אלשיו אד איז
	דו ער דער דער דער דער דער דער דער דער דער
	ענגעייב איז ענגעייב איז דבוא קא
	E (v 1) H 6 A & C 2 A & C
	a DO. In Trub WRITS'IN
	0 1 9747 Marite E Mu Thil Is AREA
	СТ Work TE WAT HIS ARE A 90 NO DO NOT DO NOT DO NOT DO NOT DO NOT DO NOT HIS ARE DO NOT NOT WAT NOT WAT N
	THIS A NOT WR //Riten/
	ภ. ฮาาเรีง 4 8irt ห 10 . ศ. ร.ว.
	ಷಣ್ಣ ಕರ್ಷ ರಂಗುಂದ ಗ್ರಾಂಗ ರಂಗ ರಂಗುಂದ
	po NO7 O⊺ ਆਸੂ7 7ਵਿੰ N 11
12	TEUTUT HISPARE A DON
	DONG NOT W OT WR

	13	
QUESTION NUMBER	Extra space if required. Write the question number(s) if applicable.	

		OC NO NOF W OT WRI TE.,MT
	14	ରିବିଜ୍ଞାମ ୦୦ ୟ ୦୦ ୦୦
	Extra space if required.	이 T WKY 17 등 IN T 비동 북옥토
UESTION NUMBER	Write the question number(s) if applicable.	DOING VRITE /
		N THIS
		דוון 19 אסדיען אדידיין אידידיין אידידיין
		DO NO
		01 V/A MRITE E M TH c SAC
		E MI TH IS ÂRÊ EA DO IN THU WRITE
		E IN TH
		e an e ao origina Varie TE.Man
		רבואד דוופא דבא ס דבואד
		TEJN 1 TRJN A REF
		REA D A JOO WRDE
		00 NO NOT W WRITZ
		TE IN T HISAR Want
		NCTHIS TWART TE IN 1
		יין איז
		роїля Notw Write
		7E ไม่ ส HIS AS
		דע איז איז איז איז איז איז איז איז איז איז איז איז איז איז איז איז איז איז
		HIS ÅR ^I S Å ^{RE®} NOT W
		DO'NG NOT W T WRI FI
		7 # 16] T 1415-457 WR17
		ע זידוק דיעפודן דפ _{ו אי} ד
		างผาม าระเบา เมื่อสีสั พ.พระก พ.พระก เพ.พระก เต.ศ. เธ.ศ. เธ.ศ. เธ.ศ. เธ.ศ. เธ.ศ. เธ.ศ. เร
		NOT V VR512 2/TE/N/
		N THIS AREA
		รับระม เปล ครูป มาระ (ค. พ. ามเร.
		REA REA WRITE
		มอ เราะ รับพืช รั
	Biology 91156, 2023	75 JN 3 1968-84 17 Wrdy 10 Wate

	15	
QUESTION NUMBER	Extra space if required. Write the question number(s) if applicable.	

IN THIS AREA

	edgements rom the following sources has been adapted for use in this assessment:
Page 6	https://www.pathwayz.org/Tree/Plain/ORGANELLES
Image:	https://practicalbiology.org/exchange-of-materials/active-uptake/tracking-active-uptake-of-minerals-by-plant-
Data:	roots
Page 10	https://www.floridamuseum.ufl.edu/educators/resource/butterfly-life-cycle/
Images:	https://www.zarkanderson.com/2010/10/self-dna-repair.html