SUPERVISOR'S USE ONLY

Tirohia te uhi o muri e kitea ai te whakapākehātanga o tēnei uhi

2

91156M

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Tuhia he (☒) ki te pouaka mēnā kāore koe i tuhi kōrero ki tēnei puka

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Te Mātai Koiora, Kaupae 2, 2025

91156M Te whakaatu māramatanga ki ngā tukanga ora i te taumata pūtau

Ngā whiwhinga: E whā

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki ngā tukanga ora i te taumata pūtau.	Te whakaatu māramatanga ki ngā tukanga ora i te taumata pūtau, kia hōhonu.	Te whakaatu māramatanga ki ngā tukanga ora i te taumata pūtau, kia tōtōpū.

Tirohia kia kitea ai 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.

Ki te hiahia wāhi atu anō koe mō ō tuhinga, whakamahia ngā whārangi wātea kei muri o tēnei pukapuka.

Tirohia kia kitea ai e tika ana te raupapatanga o ngā whārangi 2–15 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

Kaua e tuhi i ngā paenga (). Ka poroa aua wāhanga ka mākahia ana te pukapuka.

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

TE TŪMAHI TUATAHI: Te ahotakakame i ngā taiao rerekē

He tino tukanga te ahotakakame ki ngā tipu o te whenua me ngā tipu o te wai. Ka rerekē te pāpātanga o te ahotakakame puta noa i te rā. He waehanga whakahirahira te hauhā (CO_2) ki ngā tipu i ngā taiao katoa, ā, he rite tonu tōna putanga hei āhuatanga here i te tipu i ngā taiao wai pērā i ngā awa me ngā kōawa.

Te waewaekoukou *(Lycopodium volubile G.Forst.),* he tipu whenua nō Aotearoa e kitea whānuitia ana.

He rērēwai *(Myriophyllum propinquum),* he tipu wai nō Aotearoa e kitea whānuitia ana.

Matapakina te tukanga me te hirahira o te ahotakakame ki ngā tipu, me te āhua o tā ngā āhuatanga o te taiao pā ki tēnei tauhohe i ngā taiao o te whenua me te wai.

I tō tuhinga, me whai wāhi te matapakinga o:

- te tukanga o te ahotakakame, tae atu ki ngā taipitopito o ngā pae matua me te wāhi ki te kanokāriki
- te take ka panoni te pāpātanga o te ahotakakame mai i te aranga ki te tōnga o te rā, me te āhua o tā ngā āhuatanga pērā i te kaha o te aho me te paemahana pā ki tēnei rerekētanga
- te take ka heke te pāpātanga o te ahotakakame nā te iti o te hauhā (CO_2) e wātea ana i ngā taiao wai, tēnā i ngā tipu whenua ka kitea i ngā wāhi e āhua ōrite ana.

QUESTION ONE: Photosynthesis in different environments

Photosynthesis is a vital process for both terrestrial (land-based) plants and aquatic (water-based) plants. The rate of photosynthesis varies throughout the day. Carbon dioxide (CO_2) is a critical component for photosynthesis for plants in all environments, and is often found to be a limiting factor in aquatic environments such as rivers and streams.

Climbing clubmoss (*Lycopodium volubile G.Forst.*), a common New Zealand terrestrial plant.

Common water milfoil (*Myriophyllum propinquum*), a common New Zealand aquatic plant.

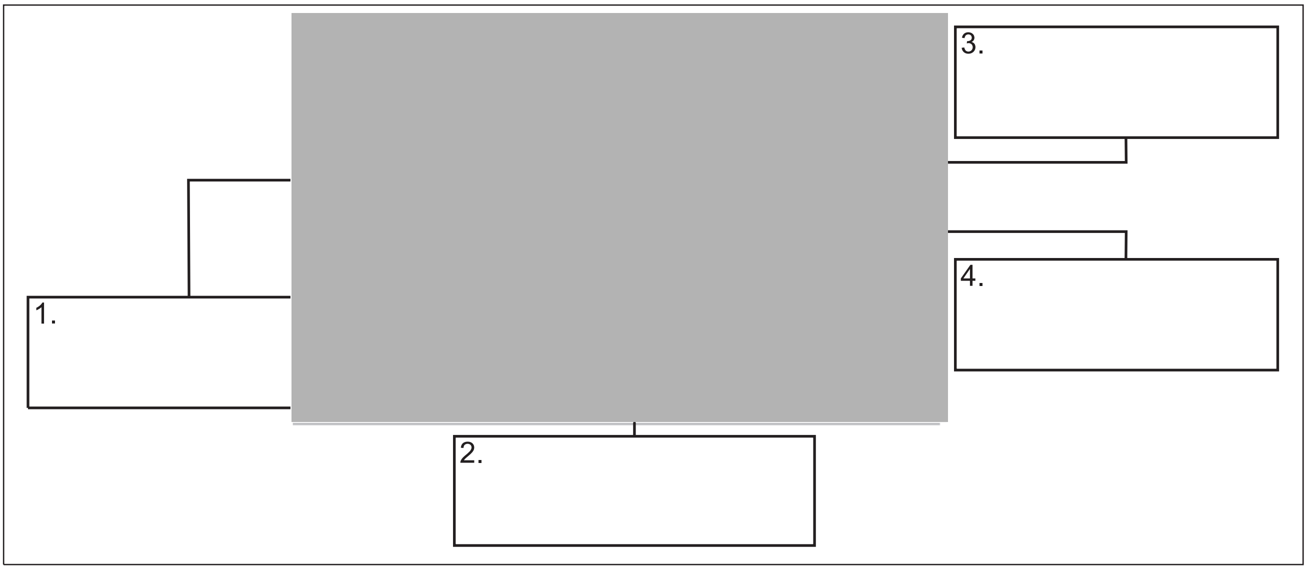
Discuss the process and importance of photosynthesis to plants, and how environmental factors can influence this reaction in both terrestrial and aquatic environments.

In your answer, include discussion of:

- the process of photosynthesis, including details of the main stages and the role of chlorophyll
- why the rate of photosynthesis changes from sunrise to sunset, and how factors such as light intensity and temperature influence this variation
- why the limited availability of CO_2 in aquatic environments leads to lower rates of photosynthesis, compared to terrestrial plants found in similar locations.

TE TŪMAHI TUARUA: Te tukupūngao a te pūtau

(a) Mā te pata pūngao e āhei ai ngā pūtau ki te whakatutuki i ngā hiahia ā-pūngao. Tapaina ngā hanga e whai ake nei ki te hoahoa pata pūngao i raro nei: te kiriuhi o waho, te kiriuhi o roto, te anga ā-roto *(matrix)*, me te kirita *(crista)*.



(b) Ko te tieta te kararehe whenua tere katoa, e taea nei te tere te eke ki te 112 km/h, i ngā kōkiringa poto, e whai pārurenga ai.

He tieta e oma ana i tōna tere katoa.

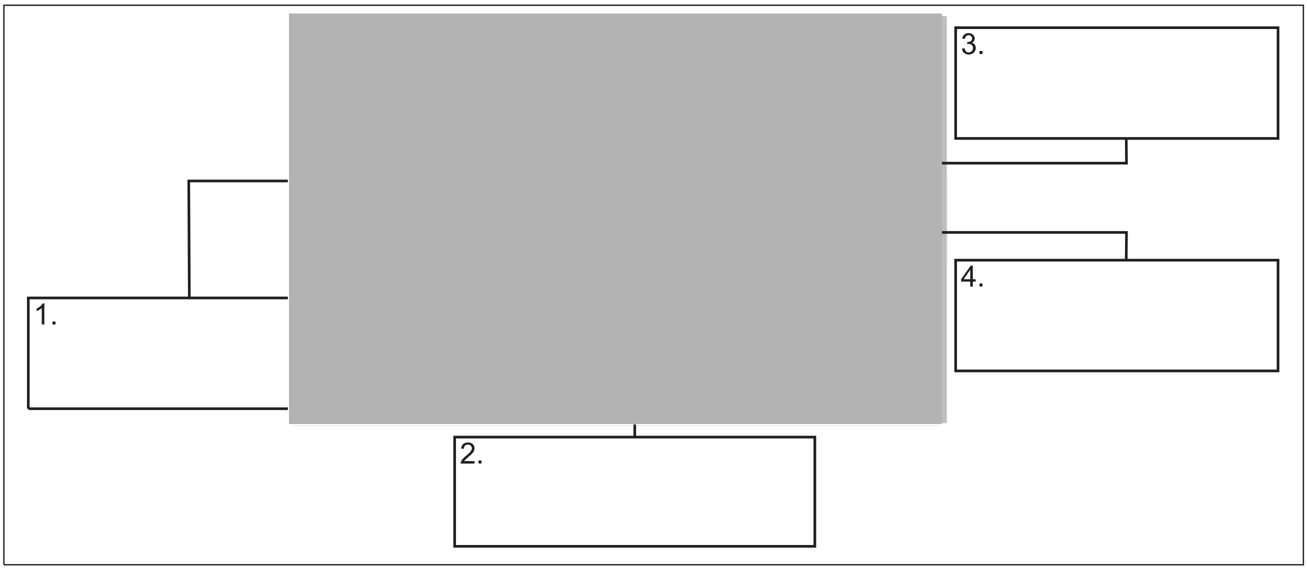
Matapakina te wāhi me te wā e rere ai te tukupūngao hāora-kore me te tukupūngao ā-hāora i te tieta.

I tō tuhinga, me whai wāhi te matapakinga o:

- te tukupūngao hāora-kore me te tukupūngao ā-hāora i ngā pūtau o te tieta, me tautohu hoki te wāhi ka kitea ia momo tukupūngao i tētahi pūtau kararehe
- te take ka poto noa iho te roa o tā te tieta tukupūngao hāora-kore
- ngā huanga me ngā mate o tā te tieta tukupūngao hāora-kore, tukupūngao ā-hāora hoki.

QUESTION TWO: Cell respiration

(a) Mitochondria allow cells to meet their energy needs. Label the following structures in the mitochondrion diagram below: outer membrane, inner membrane, matrix, and crista.



(b) The cheetah (*Acinonyx jubatus*) is the fastest land animal, capable of reaching speeds of up to 112 km/h, in short bursts, to catch prey.

A cheetah running at full speed.

Discuss where and when anaerobic and aerobic respiration occur in the cheetah.

In your answer, include discussion of:

- anaerobic respiration and aerobic respiration in the cheetah's cells, and identify where each type of respiration occurs in an animal cell
- why the cheetah can carry out anaerobic respiration for only short periods of time
- the advantages and disadvantages of the cheetah carrying out both anaerobic and aerobic respiration.

TE TŪMAHI TUATORU: Te mahi a te pūmua whākōkī me te paemahana

Ka whai pānga ngā maneitanga ā-paemahana ki te mahi a ngā pūmua whākōkī, mā reira e pāngia ai te pāpātanga o ngā mahi katoa a ngā pūtau i tētahi rauropi.

Matapakina te hirahira o ngā pūmua whākōkī i ngā tukanga pūtau, me te pānga o te paemahana ki te mahi a te pūmua whākōkī.

I tō tuhinga, me whai wāhi te matapakinga o:

- te hanganga o ngā pūmua whākōkī
- te wāhi ki ngā pūmua whākōkī i ngā tukanga koiora
- te tikanga e mahi ai ngā pūmua whākōkī
- te take e rerekē ai te pānga o ngā paemahana wera, o ngā paemahana makariri hoki ki te mahi a te pūmua whākōkī.

E pai ana tō whakauru i ētahi hoahoa ki te wāhi i raro nei hei taunaki i tō tuhinga (he kōwhiringa).

QUESTION THREE: Enzyme function and temperature

Temperature fluctuations can impact the activity of enzymes, thereby influencing the rate of all cellular activities in an organism.

Discuss the importance of enzymes in cellular processes, and how temperature affects enzyme activity.

In your answer, include discussion of:

- the structure of enzymes
- the role of enzymes in biological processes
- the mechanism by which enzymes function
- why high and low temperatures have different effects on enzyme activity.

You may include diagrams in the space below to support your answer (optional).

He whārangi tāpiri tēnei hei whakaoti i ō whakautu mēnā e hiahiatia ana.
Āta tuhia te tau o te pātai.

TAU PĀTAI

Ngā Mihi
He mea whakahāngai ngā kōrero i ngā mātāpuna e whai ake nei hei whakamahinga i tēnei aromatawai:

Te whārangi 2
https://collections.tepapa.govt.nz/object/1406044
https://niwa.co.nz/freshwater-aquatic-plants/outreach/species-guide/submerged-macrophytes

Te whārangi 6
https://ib.bioninja.com.au/mitochondrion/
https://stock.adobe.com/983734679

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

TAU PĀTAI

Acknowledgements
Material from the following sources has been adapted for use in this assessment:

Page 2
https://collections.tepapa.govt.nz/object/1406044
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English translation of the wording on the front cover

Level 2 Biology 2025

91156M Demonstrate understanding of life processes at the cellular level

Credits: Four

91156M

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 2–15 in the correct order and that none of these pages is blank.

Do not write in the margins (). This area will be cut off when the booklet is marked.

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