

91603



Draw a cross through the box (X) if you have NOT written in this booklet

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Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 3 Biology 2023

91603 Demonstrate understanding of the responses of plants and animals to their external environment

Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of the responses of plants and animals to their external environment.	Demonstrate in-depth understanding of the responses of plants and animals to their external environment.	Demonstrate comprehensive understanding of the responses of plants and animals to their external environment.

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 2–12 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (DO NOT WRITE). 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.

Tulips flower in spring, having been pollinated by wind or animals. Tulips have been studied for decades, and much has been learned of their responses to the abiotic environment. They have been found to show both thermonasty and photonasty, as well as geotropic responses. When cut and placed in a vase, tulips still show geotropism and phototropism.



In your answer, include discussion of:

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

The Chillingham wild cattle are the only cattle in the world that have remained pure, with no breeding from any outside population. They still roam wild in their historical surroundings, the 365-acre park at Chillingham in England, which was closed off in the 13th century to provide food and hunting. They are believed to be the descendants of the original oxen which once roamed England. Their estimated population numbers vary between 40 and 60. This is the total world population.



In your answer, include discussion of:

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

Biology 91603, 2023

QUESTION THREE: SALMON HOMING BEHAVIOUR

Masu salmon (*Oncorhynchus masou*) is a fish species native to northeast Asia. All salmon have an excellent homing ability, which results in their return to the same stream they hatched in, to produce offspring. This homing ability appears to be due to the imprinting of chemicals present in the home stream when they were young. Once in the river, the female fish release eggs, and male fish swim over the eggs, releasing sperm. This is known as spawning, after which many adults die. There is no parental care for the fertilised eggs or the young salmon once they hatch.



Just-hatched salmon



Very young salmon



Young salmon migrating downstream to sea



Adult salmon migrating upstream

Discuss how the homing behaviour of the salmon ensures their success as a species.

In your answer, include discussion of:

- a navigation method used by the salmon to move from the sea to the stream, and a taxic response to move up the stream, including a description of each
- an advantage of this homing behaviour
- how having a lot of young is a successful reproductive strategy for the salmon.

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

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

QUESTION
NUMBER

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

QUESTION
NUMBER

91603

Acknowledgements

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

Page 2

Images: <http://www.nodiggardener.co.uk/2013/05/something-for-weekend-nicely-nastic.html>

Page 5

Image: <https://chillinghamwildcattle.com/beasts/fighting/>

Page 8

Images: (just-hatched) <https://www.sciencedirect.com/science/article/pii/S0006291X20321963>
(very young) <https://twitter.com/cgtnofficial/status/1294501668625592321>
(migrating downstream) <https://kidadl.com/facts/animals/masu-salmon-facts>
(migrating upstream) <https://twitter.com/cgtnofficial/status/1294501668625592321>