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

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NZQA | Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Biology 2023

90927 Demonstrate understanding of biological ideas relating to micro-organisms

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of biological ideas relating to micro-organisms.	Demonstrate in-depth understanding of biological ideas relating to micro-organisms.	Demonstrate comprehensive understanding of biological ideas relating to micro-organisms.

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.

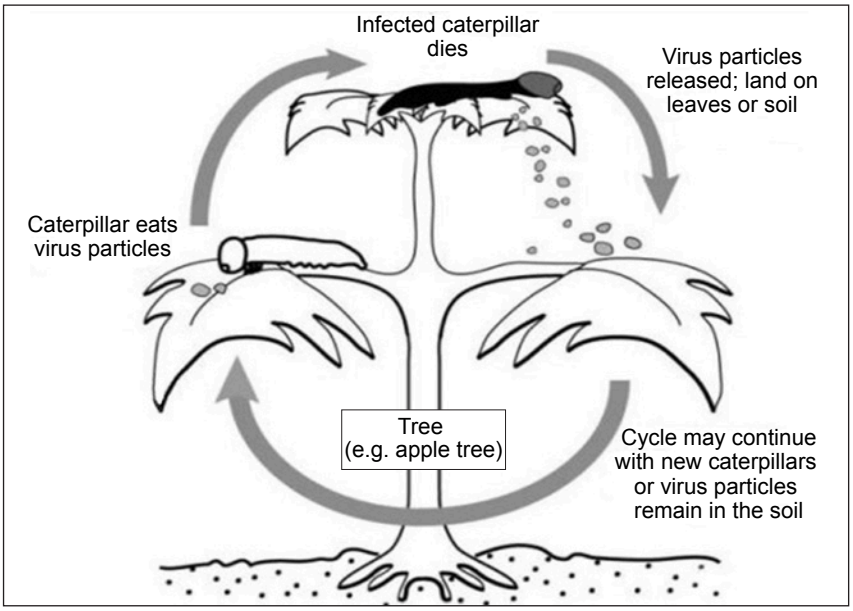
Check that this booklet has pages 2–12 in the correct order and that none of these pages is blank.

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

QUESTION ONE: A PLANT VIRUS

Although all viruses are pathogenic, they are not all harmful to humans. In fact, some viruses can be used to help us. For example, the virus shown in the diagram below is being used to protect apple crops from caterpillars which are pests.



Generalised life cycle of insect viruses affecting caterpillars

Discuss the advantages and disadvantages of using a virus in the production of crops such as apples.

In your answer, include discussion of:

- a "pathogen", including a definition
- how a virus reproduces (you may use a diagram to help you answer)
- why a virus is unable to survive without a host
- the advantages and disadvantages of using a virus to control pest insects
- why having virus particles in the soil and wider environment, used in a managed way, is not a problem.

Diagram space (optional)

QUESTION TWO: MUSHROOM PACKAGING

The New Zealand biotechnology company *BioFab* is creating 'mushroom packaging', made of mycelia and plant material. These ingredients are mixed together and put into a 3D template which sets the shape of the packaging. The plant material provides food for the fungi which grow and form the packaging, depending on the shape of the 3D template. The packaging is produced inside under controlled environmental conditions.

Filling the 3D template

Mushroom packaging

Cross-section of the packaging close up, showing the mycelia

Discuss how the **life processes** of fungi and the **environmental factors** they are provided with, allow the mushroom packaging to be made.

In your answer, include discussion of:

- the structure of a fungus, including a description (you may use a diagram to help you answer)
- TWO life processes of fungi (e.g. feeding, respiration, growth, reproduction)
- how TWO environmental factors (e.g. temperature, oxygen availability, water availability, competition) could affect the creation of the packaging
- how the packaging is created, based on the life processes of fungi and environmental factors provided.

Diagram space (optional)

QUESTION THREE: ANTIBIOTIC RESISTANCE

Some harmful bacteria are becoming resistant to antibiotics (medicines) that we use to treat them. **Antibiotic resistance** is becoming more common so to address this, healthcare providers, veterinarians, agricultural groups, and people in the general community are encouraged to use a range of different methods.

Antibiotic pills

Antibiotic cream

Discuss how antibiotic resistance in bacteria can occur and discuss actions we can take to prevent it.

In your answer, include discussion of:

- the structure of a bacterium, including a description (you may use a diagram to help you answer)
- how bacterial life processes (such as binary fission, growth, and respiration) can be affected by antibiotics
- what is meant by "antibiotic resistance"
- how antibiotic resistance in bacterial populations can develop
- how antibiotic resistance in bacteria can be reduced.

Diagram space (optional)

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

QUESTION NUMBER

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QUESTION NUMBER	

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

Page 2
Image: https://eorganic.org/node/2525

Page 4
Images: https://www.lifegate.com/biomaterials-design-future
https://vegconomist.com/investments-finance/ecovative-raises-60m-in-funding-for-its-mushroom-based-leather-packaging-food/
https://www.build-solutions.org/aiovg_videos/mycelium-grown-building-materials/

Page 6
Images: https://www.health.harvard.edu/heart-health/ask-the-doctor-medications-that-affect-warfarin
https://medicalxpress.com/news/2022-02-antibiotic-creams-skin.html