LUI

Venue code

School name

Given name/s

Family name

Attach your
barcode ID label here

Sample assessment 2020

Biology

Paper 1

Time allowed

- Perusal time — 10 minutes
- Working time — 90 minutes

General instructions

- Answer all questions in this question and response book.
- QCAA-approved calculator permitted.
- Planning paper will not be marked.

Section 1 (25 marks)

- 25 multiple choice questions

Section 2 (25 marks)

- 5 short response questions

Section 1

Instructions

- Choose the best answer for Questions 1–25.
- This section has 25 questions and is worth 25 marks.
- Use a 2B pencil to fill in the A, B, C or D answer bubble completely.
- If you change your mind or make a mistake, use an eraser to remove your response and fill in the new answer bubble completely.

	A	B	C	D
Example:	●	○	○	○

	A	B	C	D
1.	○	○	○	○
2.	○	○	○	○
3.	○	○	○	○
4.	○	○	○	○
5.	○	○	○	○
6.	○	○	○	○
7.	○	○	○	○
8.	○	○	○	○
9.	○	○	○	○
10.	○	○	○	○
11.	○	○	○	○
12.	○	○	○	○
13.	○	○	○	○
14.	○	○	○	○
15.	○	○	○	○
16.	○	○	○	○
17.	○	○	○	○
18.	○	○	○	○
19.	○	○	○	○
20.	○	○	○	○
21.	○	○	○	○
22.	○	○	○	○
23.	○	○	○	○
24.	○	○	○	○
25.	○	○	○	○

Section 2

Instructions

- Write using black or blue pen.
- Respond in paragraphs consisting of full sentences.
- If you need more space for a response, use the additional pages at the back of this book.
  - On the additional pages, write the question number you are responding to.
  - Cancel any incorrect response by ruling a single diagonal line through your work.
  - Write the page number of your alternative/additional response, i.e. See page …
  - If you do not do this, your original response will be marked.
- This section has 5 questions and is worth 25 marks.

QUESTION 26 (4 marks)

Explain microevolutionary change through mutation.

QUESTION 27 (4 marks)

An experiment compared different strains of bacteria. A wild type (WT) of bacteria and two mutant strains, mutant 1 (M1) and mutant (M2), that had different disrupted genes were investigated. Maximal growth rate was used as a determinant of success rate.

The results of the experiment are shown below.
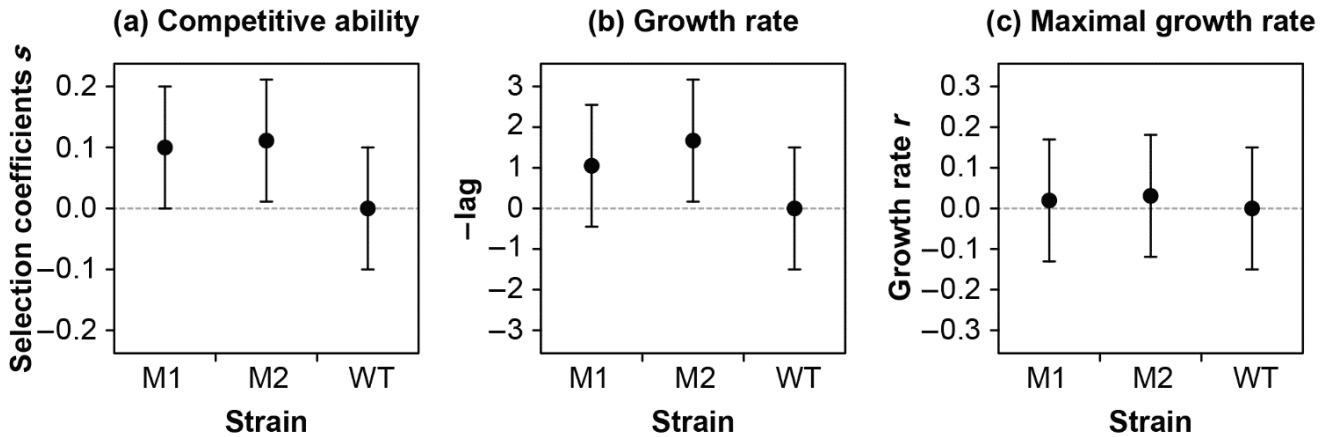
a) Draw conclusions about the competitive ability and growth rate of the wild type of bacteria used in this experiment.

[2 marks]

b) Appraise the outcome of the data and determine the success rate of the mutations
for this species.   *[2 marks]*

_____

_____

_____

_____

_____

QUESTION 28 (5 marks)

The figure below shows a model of ecological niche occupation by species A–E.
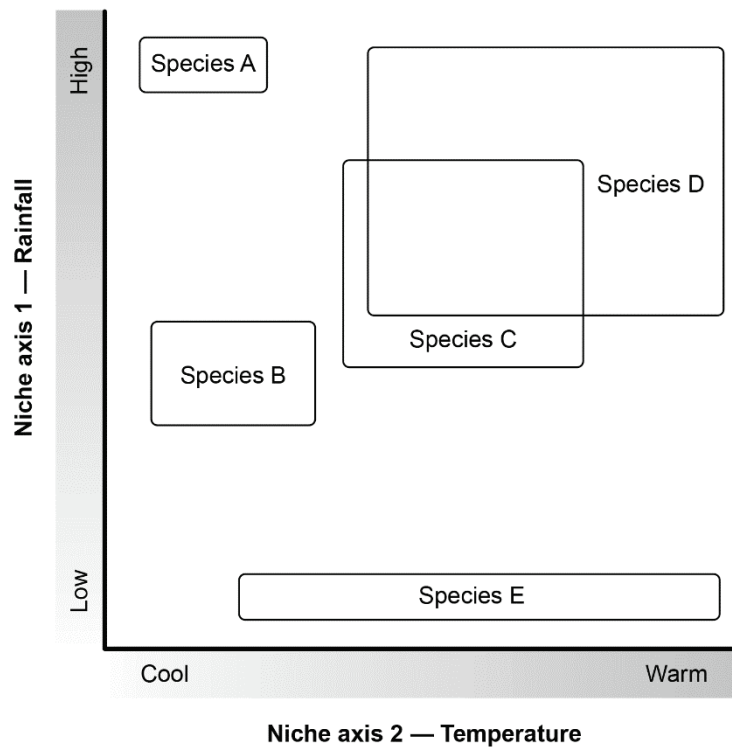
a) Identify which two species are occupying the same ecological niche.   *[1 mark]*

_____

b) Species A and B have a common ancestor. Which diversification pattern would have occurred between species A and species B for them to occupy these niches?   *[1 mark]*

_____

The table below shows the frequencies of genotypes and phenotypes for a particular trait in a generation of species E.

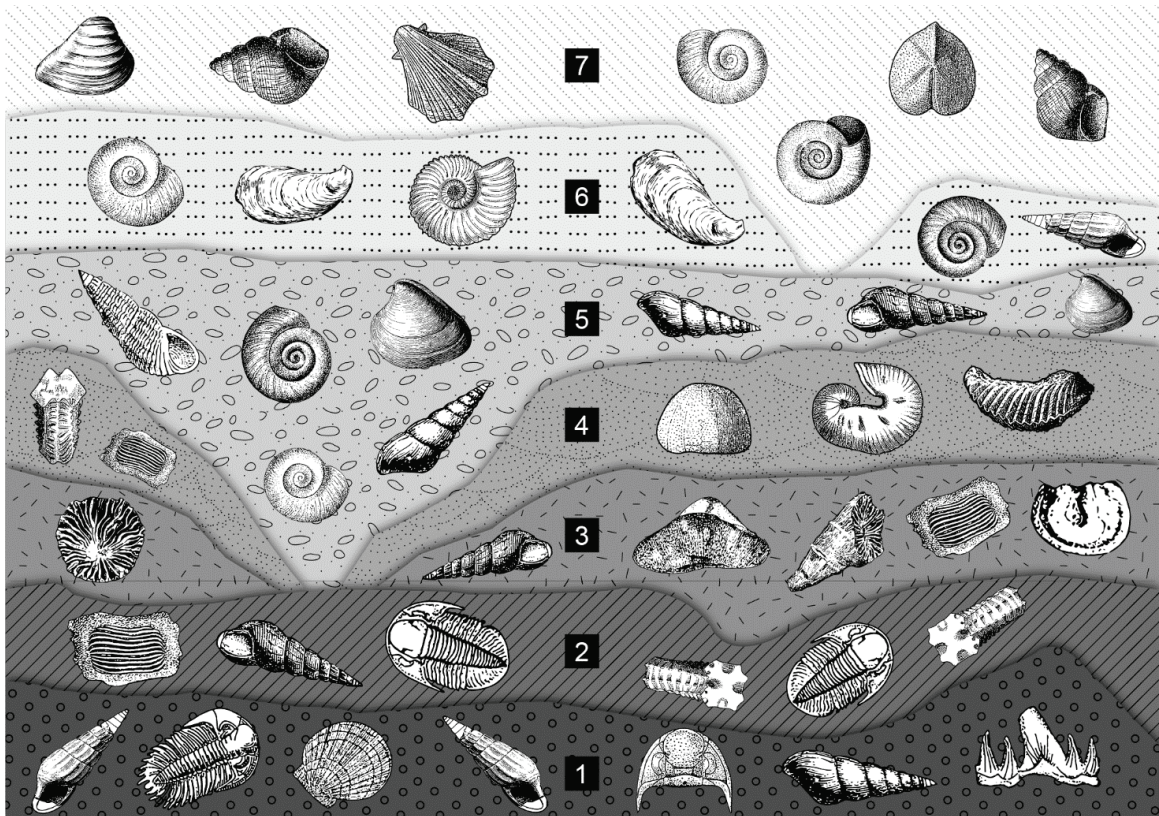| Genotype (% frequency)	Phenotype (% frequency)
TT (0)	Phenotype 1 (100)
Tt (100)	
tt (0)	Phenotype 2 (0)

c) Predict the next generation's genotype and phenotype frequency. Which type of inheritance pattern is represented for Phenotype 1?   *[3 marks]*

_____

_____

_____

_____

QUESTION 29 (6 marks)

The diagram below shows fossilised marine organisms found in a site across seven stratum layers.

a) Analyse the data above to identify three relationships that provide evidence of changes in past ecosystems. Identify at least one biotic change and at least one abiotic change.

[3 marks]

_____

_____

_____

_____

_____

_____

_____

_____

b) From the given information, determine the species richness (*D*) for strata 2.
Use the following formula:

$$D = \frac{s}{\sqrt{N}}$$

Where s= the number of different species represented in the sample and N = the total number of individual organisms in the sample   *[2 marks]*
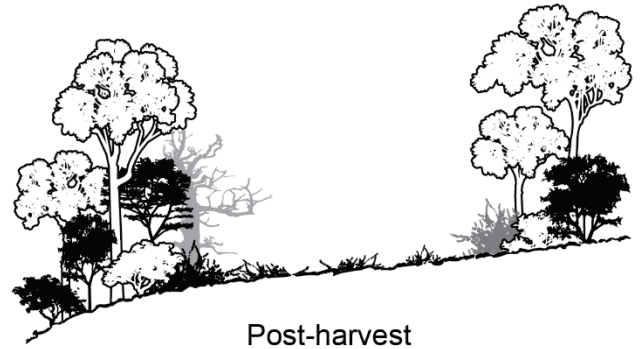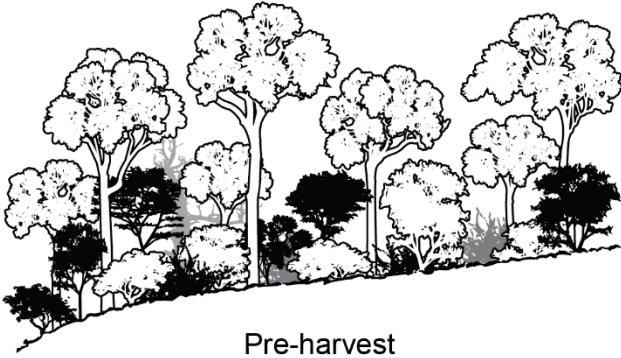
_____

_____

_____

_____

_____

_____

_____

c) Identify one limitation of using fossil evidence to determine species richness.   *[1 mark]*

_____

_____

_____

QUESTION 30 (6 marks)

The figures below show a forest before harvesting (pre-harvest) and after harvesting (post-harvest).

Pre-harvest   Post-harvest

Identify an ecological surveying technique and sampling method that could be used to effectively analyse the change in species diversity between the two ecosystems. Identify a strength and a limitation of each of your choices.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

END OF PAPER

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

References

Question 27

Graphs derived from Vale, PF, Lafforgue, G, Gatchitch, F, Gardan, R, Moineau, S & Gandon, S 2015, 'Costs of CRISPR-Cas-mediated resistance in *Streptococcus thermophilus*', *Proceedings of the Royal Society B*, vol. 282, 'Figure 2' at p. 4, https://doi.org/10.1098/rspb.2015.1270.

Question 29

Diagram derived from:

- CK-12 Foundation 2009, *Earth Science* (flexbook), CK-12 Foundation, http://cafreetextbooks.ck12.org/science/CK12_Earth_Science_rev.pdf

  and

- White, CA 1883, *A Review of the Non-marine Fossil Mollusca of North America*, United States Government Printing Office, Washington, https://doi.org/10.5962/bhl.title.58954.

Question 30

Figures derived from Forestry Tasmania 2009, 'Group selection', *Native Forest Silviculture Technical Bulletin No. 8: Lowland wet eucalypt forests*, November, p. 8, www.sttas.com.au/sites/default/files/media/documents/tb8wet-eucalypts.pdf.

— Public use —

— Public use —