# Sample assessment task

# Integrated Science – General Year 12

## Task 3 – Unit 3

**Assessment type:** Test

**Conditions**

Time for the task: 50 minutes

**Task weighting**

4% of the school mark for this pair of units

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**Earth systems/cycles in nature and structure and function of biological systems (54 marks)**

**Part A: Multiple-choice (10 marks)**

This section has **10** questions. Answer all questions on the separate multiple-choice answer sheet.

* + - 1. The long-tailed mouse eats fungi, insects, spiders and fruits and is, therefore

1. an autotroph.
2. a detritivore.
3. a herbivore.
4. an omnivore.
   * + 1. Which of the following is an example of predation?
5. A flea sucks the blood of a dog.
6. A spider traps and eats a fly.
7. A sea anemone hitchhikes on the shell of a crab.
8. A lion kills a leopard in a fight.

3. An aquarium containing plants and invertebrates is completely sealed so that no organisms, gases or other matter can enter or leave. It is placed so that it receives six to eight hours of sunlight daily. After three months, living plants and invertebrates are still present in the aquarium. Which of these statements about the aquarium is correct?

1. No energy has entered or left the aquarium.
2. The total amount of carbon in the aquarium is reduced.
3. The invertebrates in the aquarium cannot be competing.
4. Some of the energy in the plants has moved to the invertebrates.
5. Use the pyramid of biomass below to answer the question that follows.

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| Trophic level 4 |  |  |  |  |  |  |  |  |  |  |  |
| Trophic level 3 |  |  |  |  |  | | |  |  |  |  |
| Trophic level 2 |  |  |  | | | | | | |  |  |
| Trophic level 1 |  | | | | | | | | | | |

Approximately what proportion of the energy fixed in the bodies of primary producers in the food pyramid will be available to the first order consumers?

1. 1
2. 0.1
3. 0.01
4. 0.001
5. Examples of decomposers include
6. bacteria.
7. fungi.
8. bacteria and fungi.
9. producers.
10. Which of the following is the best example of symbiosis?

(a) Fungi and algae live together. The algae provide food for the fungi and the fungi provide habitat for the algae.

(b) A tapeworm lives within the gut of a dog. The dog’s health declines as a result of the tapeworm and the tapeworm derives nutrients from the dog.

(c) Ants live and work together to benefit the colony.

(d) Mistletoe provides fruit and nesting sites for the mistletoe bird.

1. After a trip to a lake, four students each drew a food chain showing the feeding relationships between four of the organisms. Which of the students drew the chain correctly?
2. marsh harrier blue-billed duck snails algae
3. algae snails blue-billed duck marsh harrier
4. sun algae snails marsh harrier blue-billed duck
5. algae snails blue-billed duck marsh harrier
6. Which of the following would contribute to the turbidity of water?
7. fine materials such as clay
8. stains that have come out of plants
9. microscopic algae that grow in the water
10. all of the above
11. Which of the following are abiotic factors?
12. trees
13. reeds
14. water
15. pH
16. ducks
17. air
18. fish
19. (i), (ii), (iii)
20. (iii), (iv) and (v)
21. (iii), (iv) and (vi)
22. (iv), (v), (vi) and (vii)

10. Some ants live in *Acacia* trees. The trees provide shelter and food for the ants. The ants attack animals that attempt to eat the *Acacia* trees. The relationship between the ants and *Acacia* trees is an example of

(a) mutualism.

(b) competition.

(c) parasitism.

(d) collaboration.

**End of Part A**

**Part B: Short answer (44 marks)**

# This section has **six** questions. Answer all questions in the spaces provided.

# The diagram below shows how carbon cycles through an ecosystem.

# 

A

Respiration

B

Higher order consumers

C

D

E

Waste material and dead plants and animals

F

The following terms are missing from the diagram: herbivores (primary consumers), photosynthesis, the burning of fossil fuels, decomposers, plants (autotrophs), carbon dioxide in the atmosphere.

Match the terms with the correct label. (6 marks)

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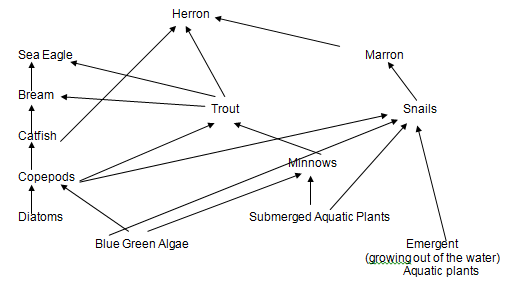
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12. This question relates to the following diagram showing a simplified food web occurring in a freshwater lake community in Southern Australia.



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# Write **one** food chain from this food web. (1 mark)

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1. For the food chain in (a), explain the following: (7 marks)
2. the original source of energy

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1. the way that energy became trapped and usable in the food web

# \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. the way that energy passed through the food chain

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1. **three** different ways that energy may be lost in the food chain.

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# Using the food web, describe **three** impacts of an increase in nutrients flowing in the waterway. (3 marks)

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# Indicate whether each of the following statements about the relationships between organisms in the freshwater lake community is true or false by circling the correct answer. Give one reason for each of your answers. (8 marks)

1. Heron and bream are competitors.

True/False

Reason:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Minnows are predators to trout.

True/False

Reason:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. A decrease in the number of minnows in the freshwater lake community is likely to result in an increase in the number of trout in the lake.

True/False

Reason:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. A decrease in the number of heron in the freshwater lake community is likely to result in an increase in the number of marron in the reserve.

True/False

Reason:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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13. Distinguish between the following terms:

1. competition and predation (2 marks)

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1. parasitism and commensalism (2 marks)

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14. Seagrass meadows support diverse communities of organisms. The organisms in the seagrass meadows acquire nutrients in a variety of ways. State whether each of the following organisms is an autotroph, a herbivore, a carnivore, an omnivore or a detritivore. (4 marks)

1. marine worms that feed on dead pieces of seagrass plants \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. photosynthetic algae that live attached to the seagrass plants \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. fish that feed only on other fish \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. dugongs (sea cows) that eat only seagrass plants \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

15. Some students in a class were investigating the relationship between water temperature and dissolved oxygen. They got some frozen ice blocks of distilled water and placed them in a container with a large opening at the top. They left the ice blocks until they melted and reached a temperature of 60C. Using an oxygen probe, they measured the level of dissolved oxygen in the water as the temperature of the water rose. The data is shown below.

(A gap in the data indicates the students failed to measure dissolved oxygen at this temperature.)

**Solubility of Oxygen in Pure Water Saturated with Oxygen**

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| --- | --- | --- | --- |
| **Temperature**  **(C)** | **Dissolved Oxygen**  **(mg/L)** | **Temperature**  **(C)** | **Dissolved Oxygen**  **(mg/L)** |
| 6 | 12.0 | 14 | 10.0 |
| 7 | 11.8 | 15 |  |
| 8 | 11.5 | 16 | 9.6 |
| 9 |  | 17 | 9.4 |
| 10 | 10.9 | 18 |  |
| 11 | 10.7 | 19 | 9.0 |
| 12 | 10.4 | 20 |  |
| 13 |  |  |  |

1. Draw a line graph using all of the data above on the grid below. (5 marks)

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1. Use your graph to find the:
2. amount of dissolved oxygen present in water of 15°C in mg/L \_\_\_\_\_\_\_\_\_
3. amount of dissolved oxygen present in water of 25°C in mg/L\_\_\_\_\_\_\_\_\_
4. temperature at which water would contain 10.20 mg/L of oxygen in °C \_\_\_\_\_\_\_.

(3 marks)

1. Explain how an increase in temperature would affect the survival of organisms in a freshwater lake. (3 marks)

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**End of test**

# Marking key for sample assessment task 3 – Unit 3

**Part A: Multiple-choice**

|  |  |  |
| --- | --- | --- |
| **Description** | | **Marks** |
| Question | Answer |  |
| 1 | d | 1 |
| 2 | b | 1 |
| 3 | d | 1 |
| 4 | b | 1 |
| 5 | c | 1 |
| 6 | a | 1 |
| 7 | d | 1 |
| 8 | d | 1 |
| 9 | c | 1 |
| 10 | a | 1 |
|  | **Total** | **/10** |

**Part B: Short answer**

# 11. The following terms are missing from the diagram: herbivores (primary consumers), photosynthesis, the burning of fossil fuels, decomposers, plants (autotrophs), carbon dioxide in the atmosphere. Match the terms with the correct label.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| A: carbon dioxide in the atmosphere | 1–6 |
| B: photosynthesis |
| C: the burning of fossil fuels |
| D: herbivores (primary consumers) |
| E: plants (autotrophs) |
| F: decomposers |
| **Total** | **/6** |

12. This question relates to the following diagram showing a simplified food web occurring in a freshwater lake community in Southern Australia.

(a) Write **one** food chain from this food web

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Answer must start with a producer and the arrow must show the direction of movement of energy from organism to organism | 1 |
| **Answer could include, but is not limited to;** |  |
| blue-green algae copepods trout heron | |
| **Total** | **/1** |

1. For the food chain in (a), explain the following:
2. the original source of energy

|  |  |
| --- | --- |
| **Description** | **Marks** |
| the sun | 1 |
| **Total** | **/1** |

1. the way that energy became trapped and usable in the food web

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Photosynthesis | 1 |
| Light energy is trapped by the sun and incorporated into the plant tissue | 1 |
| OR |  |
| Carbon dioxide + water (in the presence of sunlight and chlorophyll)  sugar + oxygen | 1  1 |
| **Total** | **/2** |

1. the way that energy passed through the food chain

|  |  |
| --- | --- |
| **Description** | **Marks** |
| By being eaten by another organism (the copepod’s energy is passed to the trout when it is eaten) | 1 |
| **Total** | **/1** |

1. **three** different ways that energy may be lost in the food chain

# 

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Any three ways that energy is lost | 1–3 |
| **Answer could include, but is not limited to:** |  |
| * lost as heat to the atmosphere * movement * cell metabolism * when body products are lost (skin cells, feathers) * parts of the body are inedible | |
| **Total** | **/3** |

# (c) Using the food web, describe **three** impacts of an increase in nutrients flowing in the waterway.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Any three impacts of an increase in nutrients | 1–3 |
| **Answer could include, but is not limited to:** | |
| * (initially) more growth of producers/consumers * lack of light penetration * reduced producers/consumers * more decomposers * declining levels of dissolved oxygen | |
| **Total** | **/3** |

# (d) Indicate whether each of the following statements about the relationships between organisms in the freshwater lake community is true or false by circling the correct answer. Give one reason for each of your answers.

1. Heron and bream are competitors.
2. Minnows are predators to trout.
3. A decrease in the number of minnows in the freshwater lake community is likely to result in an increase in the number of trout in the lake.
4. A decrease in the number of heron in the freshwater lake community is likely to result in an increase in the number of marron in the reserve.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| 1. True   The heron and bream both eat trout/compete for food | 1  1 |
| 1. False   Trout eat minnows so are the predator to the minnow, not the other way around | 1  1 |
| 1. False   Trout eat minnows and, therefore, if the number of minnows decreased, there would be less food for the trout (which is likely to lead to a decrease in trout numbers, rather than an increase) | 1  1 |
| 1. True   Heron eat/are a predator of marron and, therefore, a reduction in the numbers of this predator would mean fewer marron would be killed (and therefore the number of marron would increase) | 1  1 |
| **Total** | **/8** |

13. Distinguish between the following terms.

1. competition and predation

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Competition occurs when two organisms require the same resource. | 1 |
| Predation occurs when one organism captures and feeds on another. | 1 |
| **Total** | **/2** |

1. parasitism and commensalism

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Parasitism occurs when one organism harms another organism while obtaining nutrients by living on or in the body of that organism. | 1 |
| Commensalism occurs when two species share a relationship in which one organism benefits but does not harm the other organism/the other organism is not affected. | 1 |
| **Total** | **/2** |

14. Seagrass meadows support diverse communities of organisms. The organisms in the seagrass meadows acquire nutrients in a variety of ways. State whether each of the following organisms is an autotroph, a herbivore, a carnivore, an omnivore or a detritivore. (4 marks)

1. marine worms that feed on dead pieces of seagrass plants
2. photosynthetic algae that live attached to the seagrass plants
3. fish that feed only on other fish
4. dugongs (sea cows) that eat only seagrass plants

|  |  |
| --- | --- |
| **Description** | **Marks** |
| 1. detritivore | 1 |
| 1. autotroph | 1 |
| 1. carnivore | 1 |
| 1. herbivore | 1 |
| **Total** | **/4** |

15. (a) Draw a line graph using all of the data on the grid below.

|  |  |
| --- | --- |
| **Description** | **Marks** |
|  |  |
| Title – appropriate title that shows the relationship between the two variables  A line graph showing the changes in oxygen solubility as temperature increases | 1 |
| Axes labelled correctly with correct units – temperature (oC) and dissolved oxygen (mg/L) | 1 |
| Variables on correct axes – horizontal axis temperature (oC) and dissolved oxygen (mg/L) on the vertical axis | 1 |
| Correct plotting of data from the table | 1 |
| Appropriate scale used | 1 |
| **Total** | **/5** |

(b) Use your graph to find the:

1. amount of dissolved oxygen present in water of 15°C in mg/L
2. amount of dissolved oxygen present in water of 25°C in mg/L
3. temperature at which water would contain 10.20 mg/L of oxygen in °C.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| 9.8 | 1 |
| 7.6–7.8 | 1 |
| 13 | 1 |
| **Total** | **/3** |

(c) Explain how an increase in temperature would affect the survival of organisms in a freshwater lake.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| An increase in temperature causes a decrease in the amount of oxygen available for the organisms. | 1 |
| This would decrease the survival rate of organisms. | 1 |
| Oxygen required for respiration is no longer available. | 1 |
| **Total** | **/3** |