

## Unit 3 – Task 2: Earth systems/cycles in nature and structure and function of biological systems – Marking Key

### 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
	<b>Total</b>	<b>/10</b>

### 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	
<b>Total</b>	<b>/6</b>

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

(b) For the food chain in (a), explain the following:

(i) the original source of energy

Description	Marks
the sun	1
<b>Total</b>	<b>/1</b>

(ii) 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)	1
→ sugar + oxygen	1
<b>Total</b>	<b>/2</b>

(iii) 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
<b>Total</b>	<b>/1</b>

(iv) **three** different ways that energy may be lost in the food chain

Description	Marks
Any three ways that energy is lost	1–3
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"> <li>lost as heat to the atmosphere</li> <li>movement</li> <li>cell metabolism</li> <li>when body products are lost (skin cells, feathers)</li> <li>parts of the body are inedible</li> </ul>	
<b>Total</b>	<b>/3</b>

(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
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"> <li>(initially) more growth of producers/consumers</li> <li>lack of light penetration</li> <li>reduced producers/consumers</li> <li>more decomposers</li> <li>declining levels of dissolved oxygen</li> </ul>	
<b>Total</b>	<b>/3</b>

- (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.
- (i) Heron and bream are competitors.
  - (ii) Minnows are predators to trout.
  - (iii) 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.
  - (iv) 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
(i) True The heron and bream both eat trout/compete for food	1 1
(ii) False Trout eat minnows so are the predator to the minnow, not the other way around	1 1
(iii) 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
(iv) 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
<b>Total</b>	<b>/8</b>

13. Distinguish between the following terms.

- (a) 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
<b>Total</b>	<b>/2</b>

- (b) parasitism and commensalism

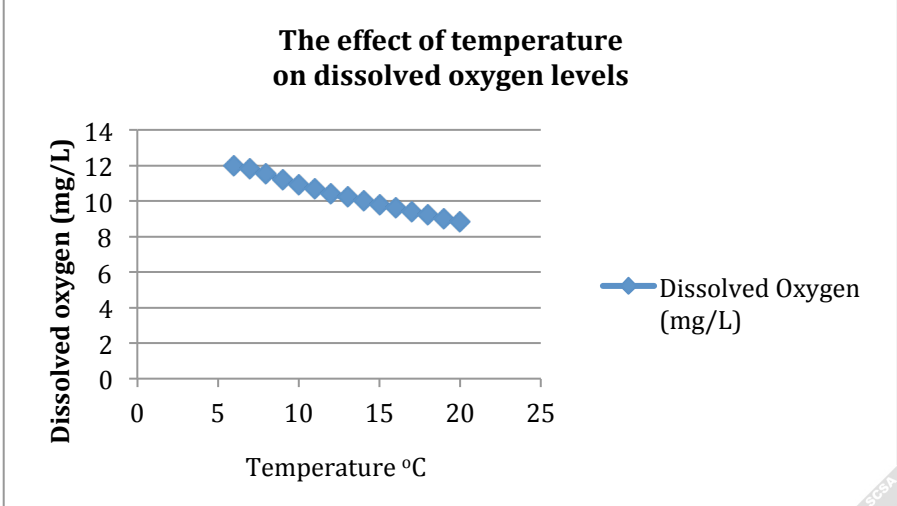
Description	Marks
Parasitism occurs when one organism harms another organism while obtaining nutrients by living on or in the body of that organism.	1
Commensalism occurs when two species share a relationship in which one organism benefits but does not harm the other organism/the other organism is not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

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)

- (a) marine worms that feed on dead pieces of seagrass plants
- (b) photosynthetic algae that live attached to the seagrass plants
- (c) fish that feed only on other fish
- (d) dugongs (sea cows) that eat only seagrass plants

Description	Marks
(a) detritivore	1
(b) autotroph	1
(c) carnivore	1
(d) herbivore	1
<b>Total</b>	<b>/4</b>

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

Description	Marks
<p style="text-align: center;"><b>The effect of temperature on dissolved oxygen levels</b></p> 	
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 (°C) and dissolved oxygen (mg/L)	1
Variables on correct axes – horizontal axis temperature (°C) and dissolved oxygen (mg/L) on the vertical axis	1
Correct plotting of data from the table	1
Appropriate scale used	1
<b>Total</b>	<b>/5</b>

- (b) Use your graph to find the:
- (i) amount of dissolved oxygen present in water of 15°C in mg/L
  - (ii) amount of dissolved oxygen present in water of 25°C in mg/L
  - (iii) 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
<b>Total</b>	<b>/3</b>

- (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
<b>Total</b>	<b>/3</b>

16. Explain the role of Autotrophs within the Carbon Cycle.

Description	Marks
Autotrophs photosynthesise, convert CO <sub>2</sub> .	1
How carbon enters a food chain/foodweb	1
<b>Total</b>	<b>/2</b>