

**Section One: Multiple-choice**

**30% (30 marks)**

<b>Question</b>	<b>Answer</b>
1	c
2	b
3	a
4	b
5	d
6	c
7	d
8	b
9	b
10	a
11	d
12	d
13	b
14	c
15	b
16	c
17	d
18	b
19	a
20	c
21	b
22	d
23	c
24	b
25	c
26	a
27	b
28	d
29	b
30	a

**Section Two: Short answer****50% (100 Marks)****Question 31****(20 marks)**

- (a) Identify the form and process through which carbon enters a food chain. (2 marks)

Description	Marks
Carbon dioxide	1
Photosynthesis	1
<b>TOTAL</b>	<b>2</b>

- (b) Explain how humans are altering the ratio of carbon atoms between the Earth, the ocean and the atmosphere. (4 marks)

Description	Marks
<b>Four (4) points from below for a total of four (4) marks.</b>	
Burning fossil fuels (coal, gas, oil) releases CO <sub>2</sub> into atmosphere.	1
Deforestation reduces conversion of CO <sub>2</sub> into carbohydrates and oxygen.	1
Deforestation and land clearing reduce carbon storage as biomass.	1
Land clearing exposes organic matter (containing carbon) which decays, releasing CO <sub>2</sub> into atmosphere.	1
Burning trees and vegetation in developing countries releases stored carbon into atmosphere as CO <sub>2</sub> .	1
Intensive cattle farming increases methane (CH <sub>4</sub> ) levels in the atmosphere.	1
More atmospheric CO <sub>2</sub> dissolved in oceans.	1
<b>TOTAL</b>	<b>4</b>

- (c) Suggest why this excess carbon cannot be stored or trapped within the usual carbon cycle 'sinks'. (2 marks)

Description	Marks
Ocean uptake of carbon is declining due to acidification and increased water temperatures.	1
Reduction in carbon as biomass due to deforestation.	1
<b>TOTAL</b>	<b>2</b>

- (d) Describe how excess carbon in the Earth's atmosphere has affected the biotic and abiotic factors in our terrestrial and aquatic ecosystems. Use a diagram to support your answer. (8 marks)

Description	Marks
Enhanced greenhouse effect (global warming).	1
Increased atmospheric and water temperatures.	1
Increased rate of photosynthesis in ocean and terrestrial ecosystems (most species).	1
Ocean acidification as carbon dioxide dissolves into water.	1
Change in species distribution in response to water temperature increase.	1
Diagram - must show enhanced greenhouse effect and warming, increased photosynthesis and acidification of oceans from dissolved CO <sub>2</sub> .	1 - 3
<b>TOTAL</b>	<b>8</b>

- (e) Describe **two (2)** ways in which our governments and communities can help to reduce the release of excess carbon into the atmosphere each year. (4 marks)

Description	Marks
<b>Two (2) points from below for a total of four (4) marks.</b>	
Invest more money in renewable energy technologies. This will reduce our future reliance on fossil fuels and reduce carbon dioxide emissions.	1 - 2
Produce more efficient vehicles - battery operated or less reliance on fossil fuels. Will reduce carbon dioxide emissions.	1 - 2
Greater use of public transport or alternative transport methods (bikes). Reduces number of vehicles being used and therefore carbon emissions.	1 - 2
Increase use and installation of solar cells on homes. Helps to reduce reliance on traditional coal powered electricity and therefore decrease CO <sub>2</sub> emissions.	1 - 2
Make a commitment to international treaties on reducing carbon emissions. Could stimulate global reduction in emissions.	1 - 2
Stricter regulations on industry (commercial and mining) to produce less carbon emissions and pollutants.	1 - 2
<b>TOTAL</b>	<b>4</b>

*\*Other responses are acceptable if they involve an overall reduction of emissions.*

**Question 32****(20 marks)**

- (a) The southwest region of Western Australia is classified as a 'Biodiversity Hotspot'. State the requirements for an ecosystem to be considered a Biodiversity Hotspot. (3 marks)

Description	Marks
Biogeographical region with high level of diversity.	1
High degree of endemic species.	1
Region is threatened with destruction/human impact.	1
<b>TOTAL</b>	<b>3</b>

By meeting requirements as a Biodiversity Hotspot, organisms inhabiting southwest ecosystems could be adversely affected.

- (b) Explain the possible impacts on the Woylie populations in the southwest region of Western Australia. (3 marks)

Description	Marks
Human impact/destruction is major factor in the Woylie decline.	1
Woylies habitat is affected by land clearing/fragmentation.	1
Introduced species pose a threat - feral cats and foxes.	1
<b>TOTAL</b>	<b>3</b>

- (c) Explain the reasoning behind the removal of other native animals from Perup sanctuary. (2 marks)

Description	Marks
Reduce competition for food and resources.	1
Prevent overpopulation of other species in small, protected area.	1
<b>TOTAL</b>	<b>2</b>

- (d) Outline the appropriate, field-based procedure that researchers would follow to capture the Woylies for translocation. (6 marks)

Description	Marks
Cage traps (Sheffield) are placed along transects in chosen region.	1
Traps are laid at night when animals active (nocturnal). Trapping lasts at least three nights.	1
Traps are baited every night with food to attract woylies.	1
Traps checked early every morning for animals.	1
Animals given health check and measurements taken.	1
Selected animals are tagged for identification.	1
<b>TOTAL</b>	<b>6</b>

- (e) Suggest **two (2)** factors that must be considered when selecting individuals for a breeding population. (2 marks)

Description	Marks
<i>Two (2) points from below for a total of two (2) marks.</i>	
Should be of breeding age (not too old to successfully reproduce).	1
Health of the animal.	1
Enough male and female individuals to produce adequate numbers of offspring and/or find a mate.	1
<b>TOTAL</b>	<b>2</b>

- (f) Explain the importance of introducing new individuals into the breeding population over time. (2 marks)

Description	Marks
<i>Two (2) points from below for a total of two (2) marks.</i>	
Maintain genetic diversity of the breeding population.	1
This will increase the resilience of the population when released.	1
Replace individuals that have been released.	1
<b>TOTAL</b>	<b>2</b>

- (g) Identify **two (2)** problems associated with releasing captive-bred animals into their 'natural' habitat. (2 marks)

Description	Marks
Have been bred in 'ideal' environment. Need to release animals into similar habitat.	1
Captive-bred animals are not 'predator aware'. The release habitat needs to be free of foxes and cats. (Or animals could be trained for awareness.)	1
<b>TOTAL</b>	<b>2</b>

**Question 33****(20 marks)**

- (a) Outline **two (2)** reasons why scientists classify organisms. (2 marks)

Description	Marks
<i>Two (2) points from below for a total of two (2) marks.</i>	
Scientific communication is more accurate.	1
Organising information - huge number of species.	1
Analyse organisms and relationships with other species.	1
<b>TOTAL</b>	<b>2</b>

- (b) Identify the **two (2)** most closely related birds from the list above. (2 marks)

Description	Marks
<i>Pyrilia vulturina</i>	1
<i>Pyrilia haematotis</i>	1
<b>TOTAL</b>	<b>2</b>

- (c) Explain why these two birds were chosen. (1 mark)

Description	Marks
Belong to the same genus.	1
<b>TOTAL</b>	<b>1</b>

- (d) Define the term 'dichotomous key' and explain how it is used by scientists. (3 marks)

Description	Marks
A key that offers two opposite statements (choices) of a trait or characteristic of an organism.	1
Each statement/choice leads to another set of two statements. This process continues until a final classification is determined.	1
Used to determine an organism's taxonomic group or particular species.	1
<b>TOTAL</b>	<b>3</b>

- (e) Identify the **five (5)** fish using the information below. (5 marks)

Description	Marks
P - Species 5	1
Q - Species 1	1
R - Species 4	1
S - Species 3	1
T - Species 2	1
<b>TOTAL</b>	<b>5</b>

- (f) Identify **four (4)** major morphological characteristics that are used to classify animals into their appropriate phylum. (4 marks)

Description	Marks
<b>Four (4) characteristics from below for a total of four (4) marks.</b>	
Body symmetry	1
Segmentation	1
Presence of organs	1
Type of skeleton/body covering - invertebrate/vertebrate	1
Presence of spinal cord (notochord)	1
Internal body cavity (coelom)	1
<b>TOTAL</b>	<b>4</b>

- (g) Outline how ecosystems are classified or named. (2 marks)

Description	Marks
Named after dominant plant species or distribution. (E.g. Jarrah forest, Open sclerophyll forest)	1
Named after abiotic features like climate. (E.g. Rainforest)	1
<b>TOTAL</b>	<b>2</b>

- (h) Suggest why it is essential for scientists to classify ecosystems. (1 marks)

Description	Marks
Determine and compare biodiversity of different ecosystems. OR Understand the dynamics of biotic and abiotic factors that influence ecosystem function.	1
<b>TOTAL</b>	<b>1</b>



**Question 34****(20 marks)**

- (a) Propose an appropriate hypothesis for this investigation. (2 marks)

Description	Marks
Appropriate scientific statement containing dependent and independent variable.	1 - 2
<i>Example - The application of aphid pesticide to broccoli seedlings will increase their growth.</i>	
<b>TOTAL</b>	<b>2</b>

- (b) Identify the following variables in the investigation. (2 marks)

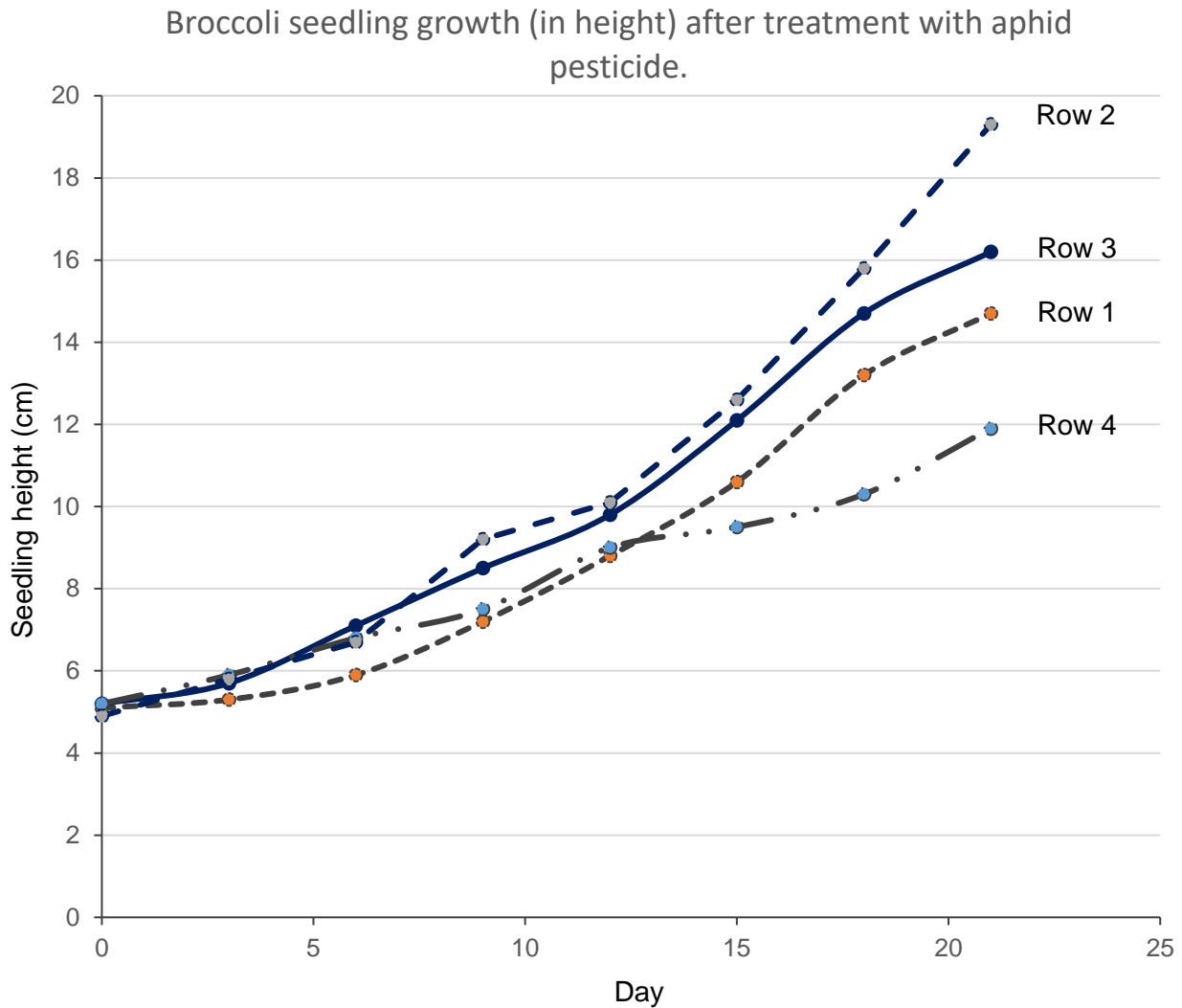
Description	Marks
(i) Independent - Aphid pesticide (application of).	1
(ii) Dependent - Growth of seedlings (cm).	1
<b>TOTAL</b>	<b>2</b>

- (c) Suggest **two (2)** variables that needed to be controlled during this investigation. (2 marks)

Description	Marks
<i>Any <b>two (2)</b> variables from below for a total of <b>two (2)</b> marks.</i>	
Amount of water. Timing of watering. Amount of fertiliser. Amount of pesticide applied. Same plants measured each time. Amount of soil collected for sampling.	1 - 2
<b>TOTAL</b>	<b>2</b>

- (d) Construct an appropriate graph, in the space provided, using mean plant height data from Table 1. (5 marks)

Description	Marks
Line graph with correctly plotted data.	1
Correct axes and scale.	1
Correct labels with units on axes.	1
Title (with variables linked appropriately).	1
Key or coloured/patterned lines identifying 4 different treatments.	1
<b>TOTAL</b>	<b>5</b>



(e) Comment on any patterns or relationships in the graphed data that you may have found unexpected. (3 marks)

Description	Marks
Growth of seedlings was better in Row 1 (water) than Row 4 (water and pesticide).	1
Addition of fertiliser and pesticide (Row 3) had less of an effect on growth than fertiliser only (Row 2).	1
Row (2) showed the best growth results of all the treatments but had no pesticide added.	1
<b>TOTAL</b>	<b>3</b>

- (f) Explain how the loss of nitrifying bacteria has affected the cycling of nitrogen in the soil and plant growth. Use the data in Table 2 to help formulate your response. (4 marks)

Description	Marks
Nitrifying bacteria convert ammonium ions into nitrites, and nitrites into nitrates.	1
Plants take up nitrogen from the soil as nitrates.	1
If nitrates are not being created, no nitrogen is available to plants.	1
Plant growth and cellular processes will be hindered as a result.	1
<b>TOTAL</b>	<b>4</b>

- (g) Indicate whether the data collected in this investigation met Doug's original aim; "Will adding pesticide to prevent aphid attack increase the growth of broccoli seedlings?" (2 marks)

Description	Marks
Not a definitive 'yes' or 'possibly'.	1
Other factors/variables became influential to the data collected.	1
<b>TOTAL</b>	<b>2</b>

**Question 35****(20 marks)**

- (a) Complete the table below by explaining the dynamics of each abiotic factor in the intertidal zone. (4 marks)

**One (1) mark is allocated per explanation of each abiotic factor, for a total of four (4) marks. Examples of explanations include;**

Abiotic Factor	Explanation of factor
<b>Temperature</b>	Water temperature increases from lower to upper intertidal zone. Rock pools in middle zone vary in temperature based on atmospheric conditions.
<b>Water / moisture</b>	Upper intertidal zone only covered in water at high tide, middle zone is regularly covered in water and lower zone is always covered (except at very low tides).
<b>Salinity</b>	Salinity is variable depending on tide, rainfall and evaporation. Mid and high zone have a higher, but more variable, salt concentration.
<b>Wave action</b>	High energy forces can pound the intertidal zone. Lower zones are more affected than the upper zone.

- (b) The intertidal zone is an incredibly harsh environment, yet it is highly diverse. Suggest **two (2)** benefits (to an organism) of living in this ecosystem. (2 marks)

Description	Marks
<b>Two (2) points from below for a total of two (2) marks.</b>	
Less competition for food and shelter.	1
Light penetration in shallow water allows plants and algae to grow.	1
Adaptations for surviving this harsh environment help to protect against predation.	1
<b>TOTAL</b>	<b>2</b>

- (c) Explain this pattern of distribution of the hermit crab. (2 marks)

Description	Marks
<b>Two (2) points from below for a total of two (2) marks.</b>	
Mobile so can move into water when tide is low.	1
Can retreat into shell for protection from desiccation and predators.	1
Has a tough exoskeleton to prevent damage or desiccation.	1
<b>TOTAL</b>	<b>2</b>

- (d) The abundance of primary producers is greatest in the lower-intertidal zone. Explain this phenomenon. (3 marks)

Description	Marks
Usually always covered in water, except at very low tide, so they don't dry out.	1
Light can still penetrate for photosynthesis.	1
Salinity and temperature are more constant.	1
<b>TOTAL</b>	<b>3</b>

- (e) Humans pose the greatest threat to life in the intertidal zone. Discuss **three (3)** human activities and/or environmental problems with the potential to threaten the diversity, habitat and interactions between organisms of intertidal zones. (6 marks)

Description	Marks
<i><b>Three (3)</b> points from below - <b>one (1)</b> mark for activity and <b>(1) mark</b> for explanation - for a total of <b>six (6)</b> marks.</i>	
Removal of species and/or shells from reef. (Usually invertebrates) Can alter food webs by removing a food source or predator. OR Taking shells removes a form of shelter for some species.	1 - 2
Overfishing of species - e.g. abalone. Can endanger populations to point of local extinction and/or remove food source for a consumer.	1 - 2
Pollution from stormwater runoff. Potentially harm susceptible species, reducing diversity.	1 - 2
Climate change/global warming is causing sea levels to rise, thereby changing the distribution of zones. This will affect species diversity and distribution.	1 - 2
Aquaculture. Some fish or invertebrate aquaculture farms are located next to intertidal zones. This can interfere with the natural flow of water with tides or alter the abundance of species in the food web.	1 - 2
People walking on the reef/rocks at low tide. This can cause damage to the rocks and plants/algae growing on them. Animals can be harmed or removed.	1 - 2
<b>TOTAL</b>	<b>6</b>

- (f) Suggest why marine park management should involve significant input from the local Indigenous community. (3 marks)

Description	Marks
May hold title over the land and/or water within the confines of the marine park.	1
They possess knowledge of the ecology and traditional culture of the natural environment.	1
Increasing input from indigenous people will enable the transfer of traditional knowledge (to the next generation) to a wider audience.	1

	<b>TOTAL</b>	<b>3</b>
--	--------------	----------