**SKILLS AND APPLICATIONS TASK**

**SUMMATIVE ASSESSMENT TASK**

**TOPIC 4: Biodiversity and Ecosystem Dynamics**

**Purpose and Background Information of the Assessment Task: To have the opportunity to show your in-depth knowledge and understanding of the concepts taught in the Topic 4: Biodiversity and Ecosystem Dynamics.**

**TASK DESCRIPTION:**

**The test will be conducted under supervision.**

**Time: 50 minutes + 5 mins reading time**

**The test will contain the following questions:**

**Part A: Multiple Choice Questions**

**Part B: Short Answer Questions including Science as an Inquiry**

**Part C: Paragraph answers related to Science as a Human Endeavour**

**The amount of space is an indicator on how much you should write.**

**Use of appropriate Biological Terminology will be assessed.**

**You may use a calculator.**

**Performance Standard:**

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|  | Investigation, Analysis and Evaluation | Knowledge and Application |
| A | Critically deconstructs a problem and designs a logical and coherent biological investigation with detailed justification.  Obtains, records, and represents data, using appropriate conventions and formats accurately and highly effectively.  Systematically analyses and interprets data and evidence to formulate logical conclusions with detailed justification.  Critically and logically evaluates procedures and their effect on data. | Demonstrates deep and broad knowledge and understanding of a range of biological concepts.  Applies biological concepts highly effectively in new and familiar contexts.  Critically explores and understands in depth the interaction between science and society.  Communicates knowledge and understanding of biology coherently, with highly effective use of appropriate terms, conventions, and representations. |
| B | Logically deconstructs a problem and designs a well-considered and clear biological investigation with reasonable justification.  Obtains, records, and represents data, using appropriate conventions and formats mostly accurately and effectively.  Logically analyses and interprets data and evidence to formulate suitable conclusions with reasonable justification.  Logically evaluates procedures and their effect on data. | Demonstrates some depth and breadth of knowledge and understanding of a range of biological concepts.  Applies biological concepts mostly effectively in new and familiar contexts.  Logically explores and understands in some depth the interaction between science and society.  Communicates knowledge and understanding of biology mostly coherently, with effective use of appropriate terms, conventions, and representations. |
| C | Deconstructs a problem and designs a considered and generally clear biological investigation with some justification.  Obtains, records, and represents data, using generally appropriate conventions and formats, with some errors but generally accurately and effectively.  Undertakes some analysis and interpretation of data and evidence to formulate generally appropriate conclusions with some justification.  Evaluates procedures and some of their effect on data. | Demonstrates knowledge and understanding of a general range of biological concepts.  Applies biological concepts generally effectively in new or familiar contexts.  Explores and understands aspects of the interaction between science and society.  Communicates knowledge and understanding of biology generally effectively, using some appropriate terms, conventions, and representations. |
| D | Prepares a basic deconstruction of a problem and an outline of a biological investigation.  Obtains, records, and represents data, using conventions and formats inconsistently, with occasional accuracy and effectiveness.  Describes data and undertakes some basic interpretation to formulate a basic conclusion.  Attempts to evaluate procedures or suggest an effect on data. | Demonstrates some basic knowledge and partial understanding of biological concepts.  Applies some biological concepts in familiar contexts.  Partially explores and recognises aspects of the interaction between science and society.  Communicates basic biological information, using some appropriate terms, conventions, and/or representations. |
| E | Attempts a simple deconstruction of a problem and a procedure for a biological investigation.  Attempts to record and represent some data, with limited accuracy or effectiveness.  Attempts to describe results and/or interpret data to formulate a basic conclusion.  Acknowledges that procedures affect data. | Demonstrates limited recognition and awareness of biological concepts.  Attempts to apply biological concepts in familiar contexts.  Attempts to explore and identify an aspect of the interaction between science and society.  Attempts to communicate information about biology. |

**Part A: Multiple Choice Questions. Put the correct letter corresponding to each question in the answer box provided at the end of the section.**

1. *Homo erectus*, *Homo sapiens* and *Australopithecus africanus* belong to the

J. same species and same genus

K. same genus but different species

L. same genus and same family

M. same family but different species

1. An ecologist describes an area of bushland as a ‘river-red gum community’.

The term ‘river red gum community’ refers to all the

J. organisms living on a single river red gum tree.

K. river red gum trees in the area of bushland.

L. organisms in the area of bushland.

M. living and non-living components in the area of bushland.

1. Which one of the following mechanisms will not help to maintain the reproductive isolation of different species in a community?

J. Different mating behaviours and courting rituals.

K. Anatomical differences in the genitals of the different species.

L. Similar habitat preferences within a community.

M. Gametes unable to fuse successfully to produce a zygote.

1. An ecologist designed an investigation to investigate the effects of land use on plant size and diversity. She recorded tree height, species diversity, and the distribution of species on current farmland, on abandoned farmland, and on land that had never been farmed.

The independent variable in this investigation was

J. tree height.

K. distribution of species.

L. type of land use.

M. area of land sampled.

5. Which one of the following statements mentions only one species?

J. Two different breeds of dog that are able to produce viable offspring.

K. A red kangaroo and a grey kangaroo that live in the same area.

L. A koala eats a leaf from a eucalyptus tree.

M. A tiger and a lion are able to breed and produce an infertile liger.

1. Refer to the following diagram of a food web in which the arrows represent the flow of energy.



Which one of the following alternatives identifies the producer(s) in this food web?

J. VI and VII.

K. V only.

L. III and IV.

M. I and II.

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| **Question** | **1** | **2** | **3** | **4** | **5** | **6** |
| Answer |  |  |  |  |  |  |

**Part B: Short Answer Questions.**

**Please answer all questions in the space provided.**

1. Refer to the following diagram, which shows the carbon cycle in a stable woodland community.

Carbon dioxide in the air

Organic compounds in plants and animals

decomposers

1. With reference to the diagram, state the role of decomposers in the carbon cycle.

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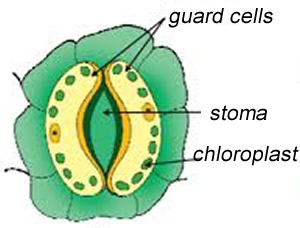
Fires are common in these stable woodland communities.

1. Explain, how succession could lead to the establishment of a different community after the fire.

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1. Refer to the following diagram, which shows a pair of guard cells. Guard cells are specialised photosynthetic cells found on the leaf surfaces of many green plants.



The volume of the guard cell varies with different environmental conditions.

Refer to the following table, which shows the results of an investigation to determine the change in volume of one guard cell over a 24-hour period, beginning at midnight.

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| Time (h) | 0 (midnight) | 4 | 8 | 12  (noon) | 16 | 20 | 24 (midnight) |
| Volume of guard cell (µm2) | 3000 | 4000 | 4750 | 5000 | 4750 | 4000 | 3000 |

1. *Complete* the graph below using the data in the table above to show the change in volume of the guard cell over the 24-hour period.

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1. Describe the change in volume of the guard cell over the 24-hour period.

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1. Using only the information provided state on factor in the design of this investigation that would affect the reliability of the results.

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1. State the dependent variable in this investigation.

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1. It was later found that a systematic error had affected the results of the investigation. Explain how this systematic error would have been identified.

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1. Describe one possible limitation for any conclusion drawn from the results of this investigation.

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1. Read the following information and answer the question below.

Red Kangaroos eat mainly grasses and are found in small groups. They are crepuscular, which means they are active mainly at dawn and dusk. This enables them to conserve energy and water during the hottest part of the day. They are often found resting under the shade of trees.

A fully-grown male is nearly 2 metres high with a thick, reddish brown woolly body fur. Its chest, belly and tip of its tail are paler in colour. Females are usually much smaller and bluish in colour.

Kangaroos can maintain body temperature at 37.5 OC for several hours in an air temperature of 44 OC, if water is available. On very warm days they can be seen licking their forelimbs and panting. When water is in short supply they produce very concentrated urine.

Hopping saves energy. At low speeds hopping on two legs uses the same amount of energy as running on all fours. The real benefit occurs at high speeds, it is far more efficient. The Achilles tendon in each hind leg act like a spring, recycling energy with every bound.

A kangaroo saves energy every time it breathes. As it hops along, its diaphragm moves up and down. This empties and fills the lungs automatically. A four-legged animal uses more energy the faster it goes. This isn’t the case with a kangaroo. If it wants to go faster, it simply lengthens its stride, without changing its hopping frequency.

Female Red Kangaroos can have three babies developing at different stages at once: a young joey out of the pouch, a small baby in the pouch and a tiny embryo. When there is an infant in her pouch, she'll keep the embryo in a state of suspension which stops it growing when it's about a quarter of a millimetre long. This unique reproductive system helps Kangaroos to cope with the life in the bush and maintain their numbers through drought.

a) Create a table in the space provided below to classify the information above into the different types of adaptations for survival found in organisms.

1. Using examples, explain the difference between zonation, and stratification.

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**Part C: Paragraph answers**

1. Humans have significant impacts on ecosystems and can affect both the abiotic and biotic components of these systems.
2. Distinguish between abiotic and biotic components of an ecosystem.

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1. Describe how abiotic components of ecosystems can be used to develop strategies to minimise the effects of these changes caused by humans.

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1. Explain how human activities can cause changes in ecosystems.

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