

Multiple Choice Section

Question 1

Termites can be found living in dead wood in living trees or in the soil where they feed on dry plant litter, such as decaying wood. For termites to survive, they must be surrounded by air that is relatively humid. The cellulose fibres of wood that are eaten by termites are digested in their gut by protozoans that are able to produce the enzyme, cellulase.

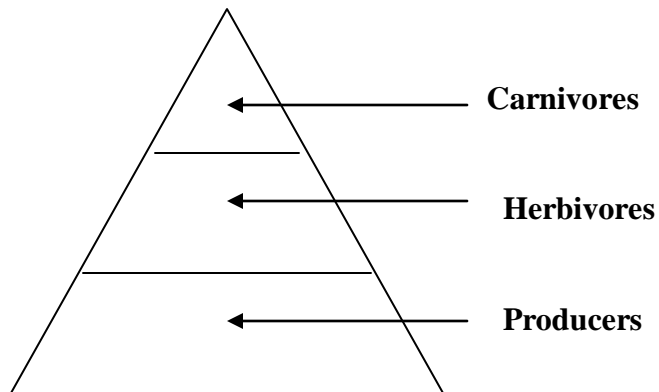
Which of the following are biotic factors affecting the survival of termites?

- A. Humidity and trees.
- B. Protozoans and trees.
- C. Humidity and protozoans.
- D. Soil and humidity.

The following information relates to Questions 2 and 3.

Question 2.

The diagram below represents an energy pyramid.



Which statement about the energy pyramid is correct?

- A. The biomass of carnivores is greater than that of herbivores.
- B. More energy is available to organisms that are higher up in the energy pyramid.
- C. All the organisms in the energy pyramid are dependent upon sunlight for survival.
- D. Herbivores and carnivores compete with each other for energy from the producers.

Question 3.

Which of the following shows a food chain that could be applied to this energy pyramid?

- A. grass → fox → rabbit.
- B. fox ← rabbit ← grass.
- C. grass → sunlight → rabbit.
- D. grass → rabbit → fox.

Question 4.

Feral cats often have significant numbers of fleas living in their fur. The relationship between these two animals is best described as

- A. mutualism.
- B. a predator-prey relationship.
- C. commensalism.
- D. a parasite-host relationship.

Question 5.

Rabbits that eat grass are eaten by raccoons that also eat fruits and berries. Bacteria decompose raccoon droppings. Which statement about these nutritional relationships is accurate?

- A. Bacteria are scavengers.
- B. Raccoons only eat producers.
- C. Rabbits are secondary consumers.
- D. Raccoons are both primary and secondary consumers.

Question 6.

Homeostasis is the condition of a relatively stable internal environment. The internal environment of a multicellular organism includes

- A. Tissue fluid
- B. Digestive fluid
- C. Cytosol
- D. Urine

Use the following information to answer Questions 7 to 9.

The thick-billed grass wren (*Amytornis textiles*) is found in arid areas of southern Australia. They favour sandy ridges and scrubland and feed on the ground and amongst bushes for seeds, berries and small beetles. They usually nest close to the ground in shrubs, such as saltbush and use dry grass and narrow strips of bark to build their nests.

Question 7.

The sandy ridges and scrubland where the thick-billed grass wren lives is best described as its

- A. habitat.
- B. environment.
- C. home range.
- D. biosphere.

Question 8.

The thick-billed grass wren can best be regarded as a

- A. producer.
- B. consumer.
- C. herbivore.
- D. carnivore.

Question 9.

Thick-billed grass wrens are an endangered species. Which of the following is an abiotic factor that could contribute to the decline in numbers of this native bird?

- A. Predation by introduced carnivores, such as cats.
- B. Destruction of saltbush by grazing cattle.
- C. An increase in the frequency and intensity of bushfires.
- D. Competition for plant matter from rabbits.

Question 10.

All flies belong to the order Diptera. Many species are pests. Some taxonomic information about several of these pests is shown in the table below.

Family	Genus	Species	Common Name
<i>Calliphoridae</i>	<i>Lucilia</i>	<i>cuprina</i>	Australian Sheep Blowfly
<i>Calliphoridae</i>	<i>Chrysomya</i>	<i>rufifacies</i>	Green Maggot Blowfly
<i>Calliphoridae</i>	<i>Calliphora</i>	<i>stygia</i>	Eastern Brown Blowfly
<i>Calliphoridae</i>	<i>Calliphora</i>	<i>albifrontalis</i>	Western Brown Blowfly
<i>Tephritidae</i>	<i>Bactrocera</i>	<i>tryoni</i>	Queensland Fruit Fly
<i>Muscidae</i>	<i>Stomoxys</i>	<i>calcitrans</i>	Stable Fly

From the information given, it can be concluded that

- A. the Australian sheep blowfly is more closely related to the stable fly than it is to the green maggot blowfly.
- B. Eastern and Western brown blowflies would freely interbreed.
- C. Queensland fruit flies are in the same class as stable flies and green maggot blowflies.
- D. not all fly species belonging to the genus, *Bactrocera*, would be in the family, *Tephritidae*.

Question 11.

In the animal kingdom, it would be expected that there would be

- A. more phyla than orders.
- B. more families than genera.
- C. fewer orders than classes.
- D. fewer phyla than families.

Question 12.

As a general rule, about 10 per cent of the energy at one trophic level is passed onto the next level. If the producers in an ecosystem have a biomass equal to 1,000 tonnes, it would be expected that second order consumers would have a biomass of

- A. 100 tonnes.
- B. 10 tonnes
- C. 1 tonne
- D. 0.1 tonne.

Use the following key to the frogs of Tasmania to answer Questions 13 to 17.

- 1a. Vomerine teeth present **2**
- 1b. Vomerine teeth absent **8**
- 2a. Frogs possessing round pads on their fingers
and toes that act as suction caps **3**
- 2b. Frogs lacking round pads on their fingers and toes **5**
- 3a. Adult frogs up to 45 mm in length. Usually
brown in colour *Litoria ewingi*
- 3b. Adult frogs greater than 55 mm in length. Body
colour predominantly green **4**
- 4a. Frogs lacking webbing between toes *Litoria reniformis*
- 4b. Frogs possessing webbing between toes *Litoria burrowsae*
- 5a. Vomerine teeth small *Geocrinia laevis*
- 5b. Vomerine teeth large **6**
- 6a. Back of frog with irregular shaped olive spots *Limnodynastes tasmaniensis*
- 6b. Back of frog lacking olive spots **7**
- 7a. Large squat shaped frogs. Back dark and light
brown with warts *Limnodynastes dumerili*
- 7b. Body not squat shaped. Back having brown
and golden stripes *Limnodynastes peroni*
- 8a. Back grey with dark brown warts *Pseudophryne semimarmorata*
- 8b. Back not as above **9**
- 9a. Rear legs patterned with chocolate stripes *Bryobatrachus nimbus*
- 9b. Rear legs lacking chocolate stripes **10**
- 10a. Belly of frog blotched with pink *Crinia tasmaniensis*
- 10b. Belly of frog not blotched with pink *Crinia signifera*

Question 13.

How many genera of Tasmanian frogs possess vomerine teeth?

- A. Two
- B. Three
- C. Four
- D. Five

Question 14.

In a Tasmanian lake, a frog was found that had vomerine teeth and well developed finger and toe pads. It could be concluded that this frog belongs to the genus

- A. Limnodynastes.
- B. Litoria.
- C. Pseudophryne.
- D. Geocrinia.

Question 15.

The number of couplets that have been used in the construction of this key is

- A. Six.
- B. Ten.
- C. Eleven.
- D. Twenty.

Question 16.

A frog was found that lacked webbing between its toes. Which of the following statements is the most accurate regarding the identity of this frog?

- A. The frog is *Litoria reniformis*.
- B. The frog is *Litoria burrowsae*.
- C. The frog is *Bryobatrachus nimbus*.
- D. It is not possible to accurately identify the species of frog.

Question 17.

Litoria burrowsae would have the following set of characteristics.

- A. Vomerine teeth, toe pads and webbing between the toes.
- B. Vomerine teeth, no toe pads and webbing between the toes.
- C. No vomerine teeth, no toe pads and a green body.
- D. No vomerine teeth, toe pads and webbing between the toes.

Question 18.

Which of the following would contain the greatest diversity of organisms?

- A. A rainforest in Queensland.
- B. The biosphere.
- C. The desert biomes of the southern hemisphere.
- D. A large urban ecosystem.

Question 19.

When plants are under stress, stomata close and growth is reduced. The main hormone responsible for this response to stress is

- A. auxin.
- B. abscisic acid.
- C. gibberellin.
- D. cytokinin.

Question 20.

The shoots of plants bend towards the light because

- A. the movement of auxin down the stem is greater on the side facing the light.
- B. the movement of auxin down the stem is greater on the side away from the light.
- C. the movement of cytokinins down the stem is greater on the side facing the light.
- D. the movement of cytokinins down the stem is greater on the side away from the light.

Question 21.

The following diagram shows the typical way that an animal responds to change.

Stimulus → Receptor → Transmission → Effector → Response

If the core temperature of the body dropped and the response was shivering, then it is reasonable to assume that

- A. the pituitary gland acted as the receptor.
- B. the stimulus was detected by heat sensors in the skin.
- C. the hypothalamus was the receptor and skeletal muscles were the effector.
- D. this form of control is mainly due to the action of hormones.

Question 22.

An elephant maintains its body temperature within a narrow range.

In conditions of extreme heat, factors that contribute to increased heat loss from an elephant include

- A. folding the ears against the body
- B. decreased blood flow to the ears
- C. huddling with others
- D. flapping the ears

Question 23.

During winter, the temperature inside a bee hive is usually much warmer than outside.

Which of the following would produce heat within the hive during winter?

- A. the contraction of the wing muscles of bees during flight.
- B. the possession of hairs on the body of a bee to insulate it from the cold.
- C. the huddling of adult bees into a circular mass.
- D. the evaporation of water from the hive.

Question 24.

Illness in animals is often accompanied by fever, which is a rise in body temperature.

Fever is caused by the resetting of the temperature control centre.

This control centre is located in the

- A. skin
- B. hypothalamus
- C. pituitary gland
- D. thyroid gland

Question 25.

You are sitting in front of an open window. The air temperature is 18 degrees. A breeze blows through the window and you feel cold. The increase in heat loss from your body is largely caused by an increase in

- A. radiation
- B. evaporation
- C. conduction
- D. convection

Refer to the following information to answer question 26.

Dung beetles feed exclusively on the dung (droppings) of animals in both their larval and adult stages. Adults bury balls of dung and lay a single egg inside each ball. By burying dung, these beetles reduce the supply of food to bush flies that also use the dung as a food source for their young.

Australia has a large number of native dung beetles. However, these feed mainly on the dung from kangaroos and other marsupials. Since the introduction of cattle for agriculture, the amount of dung, particularly in farmland, has increased substantially. To help overcome this, a large number of foreign dung beetles have been introduced that feed mainly on cow dung.

Question 26.

The relationship between dung beetles and bush flies is one of

- A. mutualism.
- B. competition.
- C. parasitism.
- D. commensalism.

Question 27.

The striated thornbill (*Acanthiza lineata*) is a small bird that feeds on insects in the higher branches of forest trees. A closely related species, the brown thornbill (*Acanthiza pusilla*), also feeds on insects, but is usually found in the lower branches of forest trees. Both species are found in southeastern Australia and it is quite common to see both species feeding in the same tree. Striated thornbills tend to nest in the upper canopy of the forest while brown thornbills always nest close to the ground.

From the information given, it can be concluded that

- A. the two species of thornbills live in the same habitat and occupy the same ecological niche.
- B. the two species of thornbills live in different habitats but occupy the same ecological niche.
- C. the two species of thornbills live in the same habitat but occupy different ecological niches.
- D. the two species of thornbills live in different habitats and occupy different ecological niches.

Question 28.

Carolus Linnaeus was a botanist who

- A. developed the theory of evolution by natural selection.
- B. established the modern binomial system for naming plants and animals.
- C. travelled to Australia with Captain Cook and brought back plant specimens to England.
- D. discovered that plants give out oxygen as a waste product.

Question 29.

Rotting logs often have fungi growing on them. In this situation, the fungi are acting as

- A. producers and consumers.
- B. decomposers and producers.
- C. consumers and decomposers.
- D. omnivores and consumers.

Question 30.

Which of the following interactions is beneficial to only one of the two organisms involved?

- A. Intra-specific cooperation.
- B. Inter-specific cooperation.
- C. Parasite-host relationship.
- D. Mutualism.

Question 31.

The amount of energy between the trophic levels of a food chain

- A. decreases along the length of the food chain.
- B. increases along the length of the food chain.
- C. stays the same along the length of the food chain.
- D. increases along the length of some food chains and decreases along the length of other food chains.

Question 32.

Homothermy is the

- A. regulation of blood solute concentration
- B. maintenance of a constant body temperature
- C. increase in metabolic rate with increasing external temperatures
- D. maintenance of body temperature the same as that of the external environment

Refer to the following picture of the human nervous system to answer Questions 33 and 34.

Question 33.

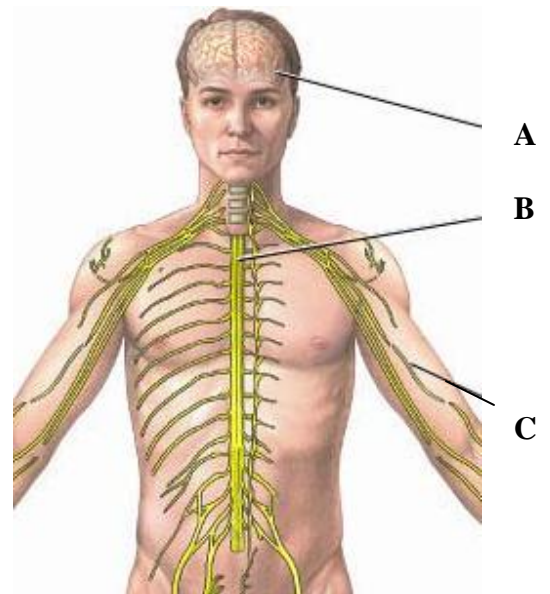
The part(s) of the Central Nervous System are

- A. Part A only.
- B. Part B only.
- C. Parts A and B.
- D. Parts A, B and C.

Question 34.

The part(s) of the Peripheral Nervous System are

- A. Part A only.
- B. Part B only.
- C. Part C only.
- D. Parts B and C.



Question 35.

When comparing the nervous and endocrine systems, it is true to say that

- A. the nervous system is highly specific while the endocrine system is non-specific.
- B. both systems bring about responses in target cells.
- C. the endocrine system acts more rapidly than the nervous system.
- D. only the endocrine system relies on the use of chemicals to send messages around the body.

Question 36.

The olfactory part of a brain is responsible for an animal's ability to smell. The brain of a black flying fox has a relatively large olfactory lobe, indicating that these flying foxes rely heavily on smell to find their food. Signals between neurons in the olfactory lobe would occur by means of

- A. enzymes.
- B. hormones.
- C. neurohormones.
- D. neurotransmitters.

Question 37.

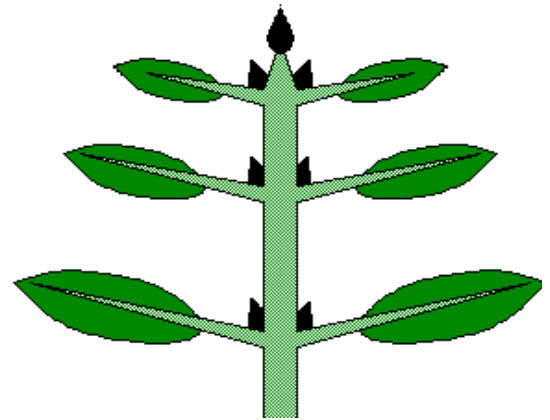
The area where an animal lives, obtains its requirements and defends against other animals is called its

- A. home range.
- B. habitat.
- C. niche.
- D. territory.

Question 38.

The diagram below shows a growing shoot with an apical (top) bud and several lateral (side) buds. If the apical bud was removed, you would expect that the

- A. plant would die.
- B. lateral buds would become active.
- C. plant's growth would show apical dominance.
- D. the amount of ethylene released from the top of the plant would increase.



Question 39.

The part of a nerve cell that conducts a nerve impulse is the

- A. nucleus.
- B. cell membrane.
- C. myelin sheath.
- D. cytoplasm.

Question 40.

Some species of baboon live in social groups of up to 100 individuals. An individual baboon living in a social group would have

- A. reduced competition for mates.
- B. better protection from predators, such as leopards.
- C. less chance of catching a contagious disease.
- D. reduced competition for food.

Short Answer Section

Question 1.

There are many caves in Australia. Even though the cave receives no light, many organisms inhabit these areas and are adapted to this environment. An important species in many caves is the bent-wing bat. The bats don't live permanently in the caves but roost there during the day and the breeding season. When they leave the cave at night, they feed on flying insects outside the cave ecosystem.

When roosting in the cave, bats produce large quantities of droppings called guano that accumulates on the floor of the cave. Bacteria and fungi break down the guano. Guano is also eaten by cave beetles, millipedes and springtails. Guano flies feed on the bacteria growing on the guano. Cave spiders eat the guano flies, as well as the cave beetles, millipedes and springtails. Guano mites are also found feeding on the fungi that grow on the guano pile.

a. Draw a food web for the cave community described above.

b. What part of a "normal" food web is missing from the cave food web? (3 marks)

_____ (1 mark)

c. What is the source of energy for the cave food web?

_____ (1 mark)

d. If the cave entrance was blocked due to a landslide, explain what would happen to the cave community.

(2 marks)

Total = 7 marks

Question 2.

Tadpoles and mosquito larvae often live in the same habitat, such as freshwater ponds. This habitat is shared since they are both herbivores, feeding on freshwater algae and diatoms.

a. What term describes the interaction between different species that live in the same habitat and need the same resource?

(1 mark)

To investigate this interaction, biologists set up a series of tanks where they varied the amount of food made available to the mosquito larvae and the tadpoles. They also set up tanks that contained only tadpoles. After a period of three days, they measured the change in weight of the tadpoles. **Figure 2** shows the results of this experiment.

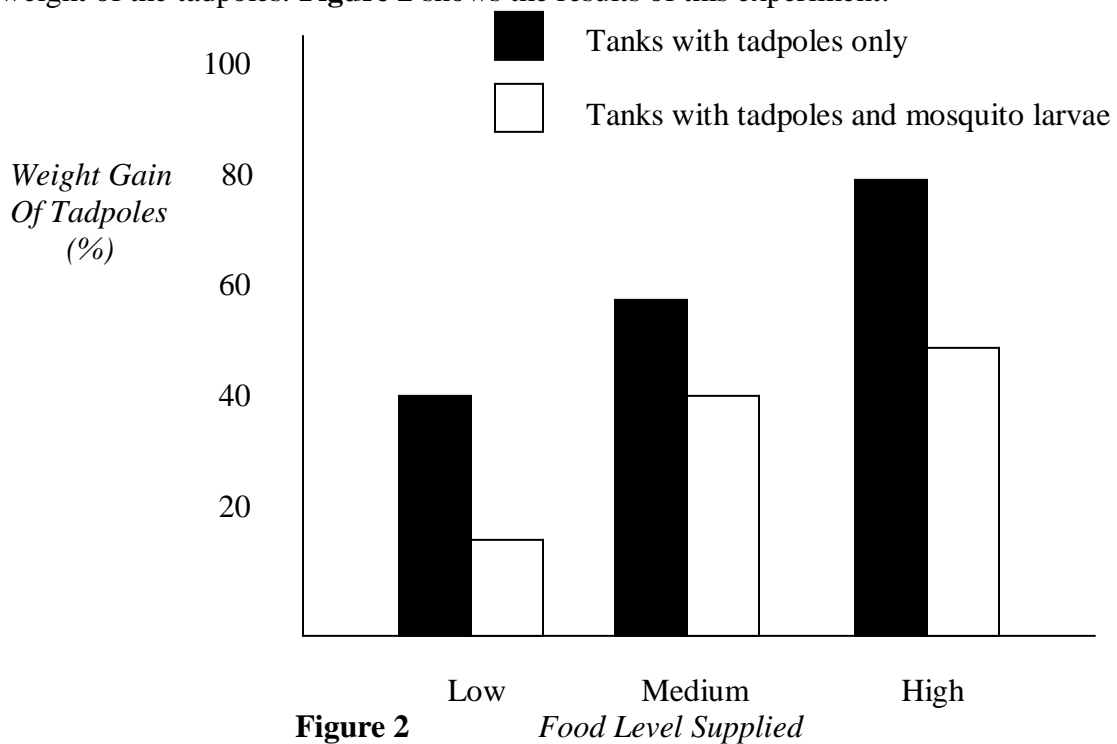


Figure 2

b. Briefly describe two conclusions from this experiment that can be drawn from the results shown in **Figure 2**.

Conclusion 1. _____

Conclusion 2. _____

(2 marks)

Why did the biologists set up some tanks that only contained tadpoles?

_____ (1 mark)

d. The experiment carried out by the biologists was replicated. Explain how the biologists would have replicated the experiment?

_____ (1 mark)

e. Mosquitoes are important vectors in spreading diseases, such as malaria and encephalitis. In recent years, there has been a global decline in frog populations. What impact may this decline have on the health of human populations. Justify your answer.

_____ (2 marks)

Total = 7 marks

Question 3.

The short-beaked echidna, *Tachyglossus aculeatus*, has no sweat glands and does not pant. However, it can survive in very hot weather in Australia. When temperatures become high, an echidna often changes its behaviour by becoming nocturnal.



a. How do sweat glands in a mammal help it regulate its body temperature?

(2 marks)

In winter, the temperature of the echidna's habitat can drop dramatically. The echidna's normal body temperature is 31 – 32 °Celsius but during winter its body temperature may drop to 9 °Celsius.

b. Explain how the fall in body temperature helps the echidna survive over winter.

(1 mark)

Total = 3 marks

Question 4. The broad-billed prion, *Pachyptila vittata*, is a seabird found south of mainland Australia. It spends most of its life resting on the sea and feeds at night on crustaceans, using its broad “frogmouth” bill as a scoop. Inside its bill, is a series of lamellae that resemble a comb. These are used to strain the water for crustaceans.

Spending large amounts of time at sea, the broad-billed prion is forced to drink seawater. However, it can remove excess salt from its blood using glands above its eyes. These secrete highly concentrated saltwater into its nasal cavity which then drains to the exterior. The birds only come ashore during the breeding season where they build a nesting chamber at the end of a burrow.

a. From the description above, identify a functional, structural and behavioural adaptation of the broad-billed prion. For each of these adaptations, describe how it aids survival.

Functional Adaptation _____

Survival Value _____

Structural Adaptation _____

Survival Value _____

Behavioural Adaptation _____

Survival Value _____

(3 x 2 = 6 marks)

b. Describe one way that human influence could threaten the survival of the broad-billed prion in these areas.

_____ (1 mark)

Total = 7 marks

Question 5.

Photosynthesis and respiration are two key processes carried out by green plants.

a. Give a balanced chemical equation for photosynthesis.

_____ (2 marks)

b. Give a balanced chemical equation for respiration.

_____ (2 marks)

c. Give the name of an organism that carries out respiration but not photosynthesis.

_____ (1 mark)

Total = 5 Marks

End Of Task