

Trial Examination 2007

VCE Biology Unit 2

Written Examination

Question and Answer Booklet

Reading time 15 minutes
Writing time 1 hour 30 minutes

Student's Name: _____

Teacher's Name: _____

Structure of Booklet

Section	Number of questions	Number of questions to be answered	Number of marks
A	25	25	25
B	8	8	50
			Total 75

Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers. Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape. No calculator is allowed in this examination.

Materials supplied

Question and answer booklet of 17 pages.

Answer sheet for multiple-choice questions.

Instructions

Write your **name** and **teacher's name** on this booklet and in the space provided on the answer sheet for multiple-choice questions. All written responses should be in English.

At the end of the examination

Place the answer sheet for multiple-choice questions inside the front cover of this booklet and hand them in.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

SECTION A: MULTIPLE-CHOICE QUESTIONS**Instructions for Section A**

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

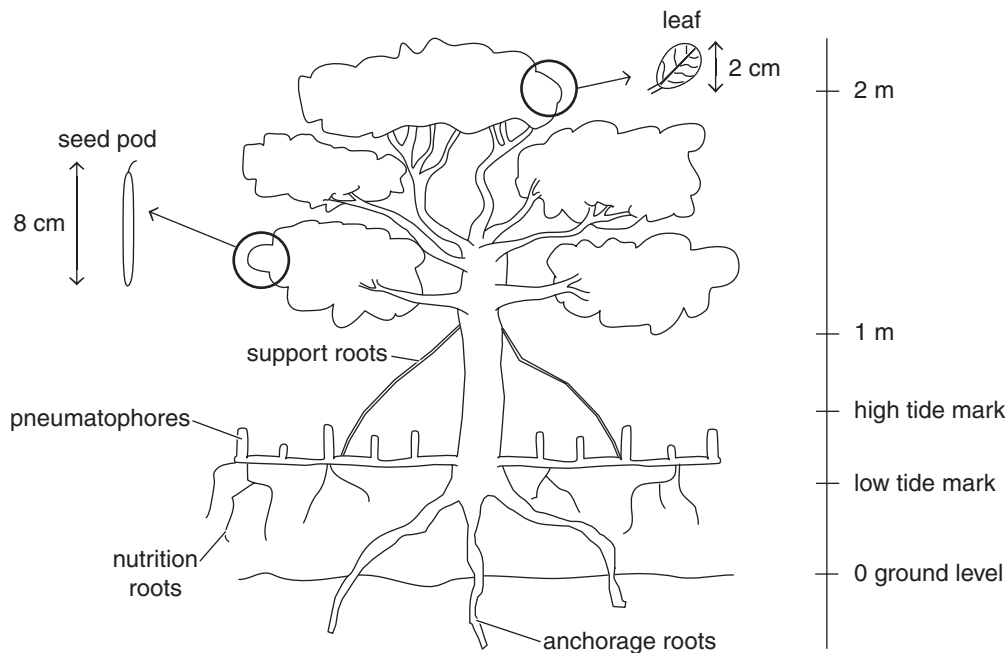
Choose the response that is **correct** for the question.

A correct answer scores 1, an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Use the following diagram of a mangrove to answer Questions 1–3.

**Question 1**

Pneumatophores assist in survival by gaining oxygen

- A. at all times.
- B. at high tide only.
- C. at low tide only.
- D. at night.

Question 2

Mangrove leaves are able to excrete salt.

This is

- A. a physiological adaptation.
- B. a behavioural adaptation.
- C. an environmental response.
- D. a structural adaptation.

Question 3

For the mangrove, an environmental condition that would be greater at high tide compared to low tide would be the availability of

- A. oxygen.
- B. carbon dioxide.
- C. water.
- D. light.

Question 4

In an experiment, seeds from three different plant species were placed in Petri dishes (ten seeds per dish) with paper towelling and adequate water. The dishes were then stored at a range of temperatures and light levels, and were left for ten days. The results are shown below.

Plant species	Environmental conditions	Number of seeds germinated after ten days (out of ten seeds)
I	5°C, dark	5
	5°C, light	1
	20°C, dark	10
	20°C, light	3
	80°C, dark*	0
	80°C, light*	0
II	5°C, dark	0
	5°C, light	0
	20°C, dark	0
	20°C, light	0
	80°C, dark*	8
	80°C, light*	9
III	5°C, dark	8
	5°C, light	7
	20°C, dark	0
	20°C, light	0
	80°C, dark*	0
	80°C, light*	0

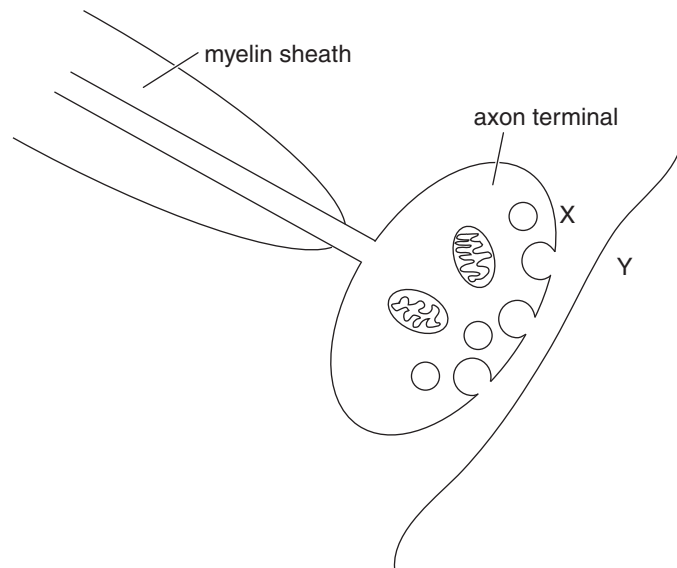
* These seeds were heated at 80°C for 10 minutes and then incubated at 20°C.

From the results and your knowledge, it is reasonable to conclude that

- A. light is necessary for seeds to germinate.
- B. seeds from species I and II would have a hard seed coat.
- C. all seeds would eventually germinate.
- D. seeds of species II would be suited to an Australian environment where bushfires often occur.

Use the following diagram to answer Questions 5–7.

The following diagram is of a neuromuscular junction.



Question 5

There is a transfer of information from X to Y.

The conveyance of the message is via

- A. conduction of an electrical action potential.
- B. diffusion of a chemical.
- C. secretion of a chemical.
- D. diffusion of a hormone.

Question 6

The junction illustrated above is

- A. a dendrite.
- B. an interneuron.
- C. a node of Ranvier.
- D. a synapse.

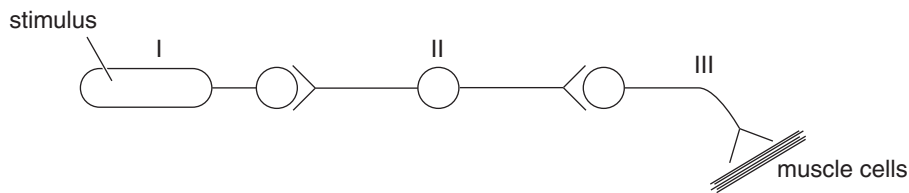
Question 7

Myelin is found around the axons of

- A. all neurons.
- B. interneurons only.
- C. neurons in the peripheral nervous system.
- D. neurons in the central nervous system.

Question 8

Consider the following pathway.



The transmission of information from I to III is achieved by

- A. electrical and chemical messages.
- B. electrical messages only.
- C. chemical messages only.
- D. changes in the concentration of sodium ions.

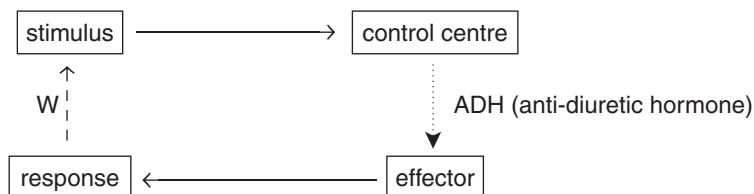
Question 9

Unlike messages travelling via nerves, mammalian hormones

- A. are fast acting.
- B. circulate throughout the whole organism.
- C. work for short periods.
- D. have specific pathways to the effector.

Use the following information to answer Questions 10 and 11.

Consider the water balance pathway shown below.

**Question 10**

In the above pathway, the stimulus is the eating of a salty meal.

In this system, an effector would be

- A. the kidneys.
- B. the liver.
- C. the bladder.
- D. the small intestine.

Question 11

'W' represents

- A. homeostasis.
- B. negative feedback.
- C. positive feedback.
- D. nerve transmission.

Question 12

The plant hormone ethylene is involved in

- A. stomatal closure.
- B. cell elongation.
- C. fruit ripening.
- D. seed dormancy.

Question 13

When a seed is planted, the roots of the plant grow downwards and the shoot system grows upwards and out of the soil.

The roots' response would be best described as

- A. negative phototropism.
- B. positive phototropism.
- C. negative geotropism.
- D. positive geotropism.

Question 14

A family moves from a quiet location to one near a railway line. For the first week, members of the family had trouble sleeping and awoke with the passing of the trains. After a few weeks, all members of the family slept well and even during the day seemed not to notice the passing of the trains.

The term to describe what has occurred is

- A. habituation.
- B. imprinting.
- C. associative learning.
- D. trial and error.

Question 15

If parents are likely to produce offspring with a genetic condition, genetic screening can be used to determine if their foetus is at risk of developing the condition. A sample of the fluid in which the foetus is developing is required for this procedure.

The fluid sample is obtained by

- A. amniocentesis.
- B. ultrasound.
- C. chorionic villus sampling.
- D. IVF.

Question 16

The tsunami on Boxing Day in 2004 resulted in enormous loss of life and the inundation and destruction of low-lying coastal areas in the Indonesian archipelago. Eighteen months later, components of the natural ecosystem had started to appear along parts of the coast.

This is described as

- A. primary succession.
- B. secondary succession.
- C. recession.
- D. ecological niche.

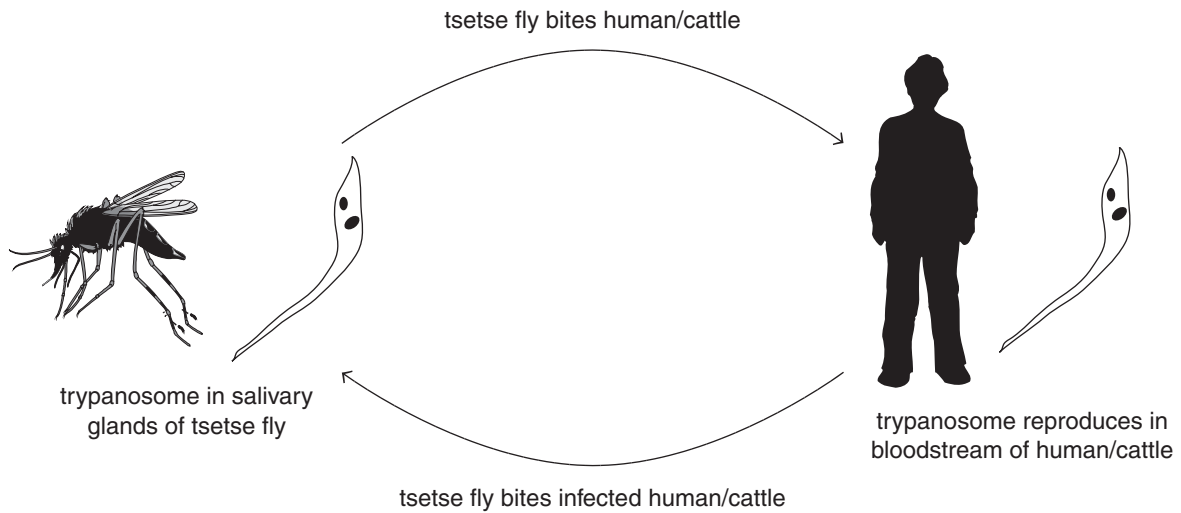
Question 17

Elements such as nitrogen (N) and phosphorus (P) are cycled through bio-geochemical systems. Compared to 100 years ago, the total amount of these elements on Earth would now be

- A. higher.
- B. lower.
- C. the same.
- D. impossible to determine.

Use the following information to answer Questions 18 and 19.

African sleeping sickness is caused by a single-celled organism: the trypanosome. Humans and cattle are affected by this disease which can result in short periods of fever, unresponsiveness and ‘sleepiness’. 50 000 people die of this condition per year. The tsetse fly is a vector for trypanosomes. Below is a life cycle for this disease.

**Question 18**

The relationship between the tsetse fly and humans is

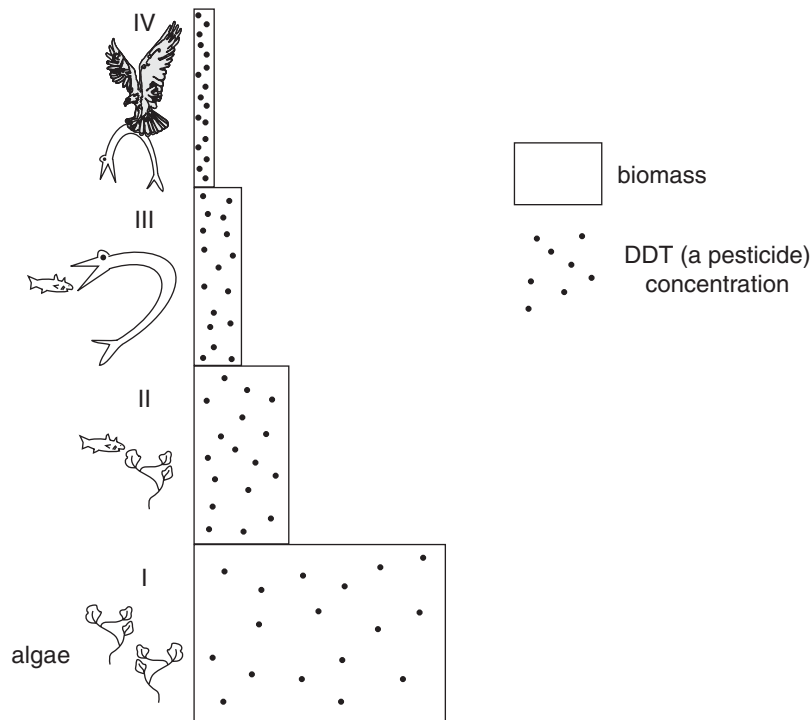
- A. predator–prey.
- B. competitors.
- C. parasite–host.
- D. disease–host.

Question 19

The relationship between the tsetse fly and the trypanosomes is

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

Use the following diagram to answer Questions 20–22.



Question 20

The above diagram illustrates the biological phenomenon of

- A. biomass.
- B. a food web.
- C. biological control.
- D. bioaccumulation.

Question 21

The type of pyramid illustrated is of

- A. biodegradable substances.
- B. energy.
- C. numbers.
- D. biomass.

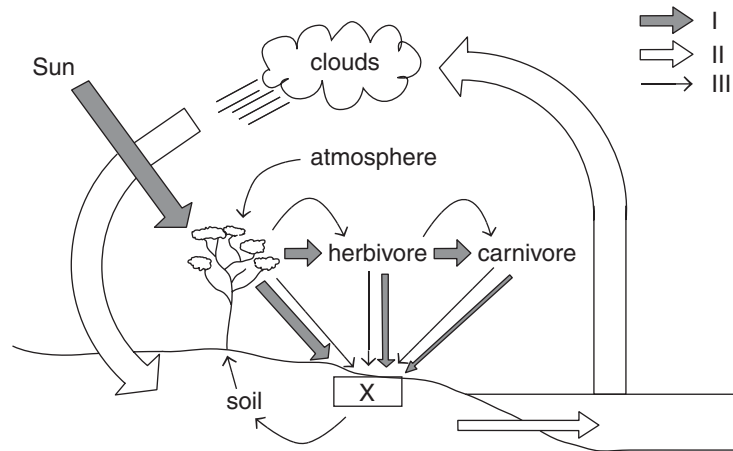
Question 22

Using only the information provided in the diagram, organism III would best be described in terms of feeding as

- A. an omnivore.
- B. a third-order consumer.
- C. a first-order carnivore.
- D. an autotroph.

Use the diagram below to answer Questions 23 and 24.

The diagram below shows transfers of water, nutrients/carbon and energy.



Question 23

The labels for I, II and III respectively would be

- | | I | II | III |
|----|--------|-----------|--------|
| A. | energy | nutrients | water |
| B. | carbon | water | energy |
| C. | energy | water | carbon |
| D. | carbon | energy | water |

Question 24

The biotic component of the ecosystem, labelled X, would most likely be

- parasites.
- predators.
- decomposers.
- inorganic nutrients.

Question 25

Compared with lower trophic levels, the highest trophic level in a food chain would have

- the greatest amount of total energy and the lowest amount per gram of organism.
- the smallest amount of total energy and the highest amount per gram of organism.
- the greatest amount of total energy and the highest amount per gram of organism.
- the smallest amount of total energy and the lowest amount per gram of organism.

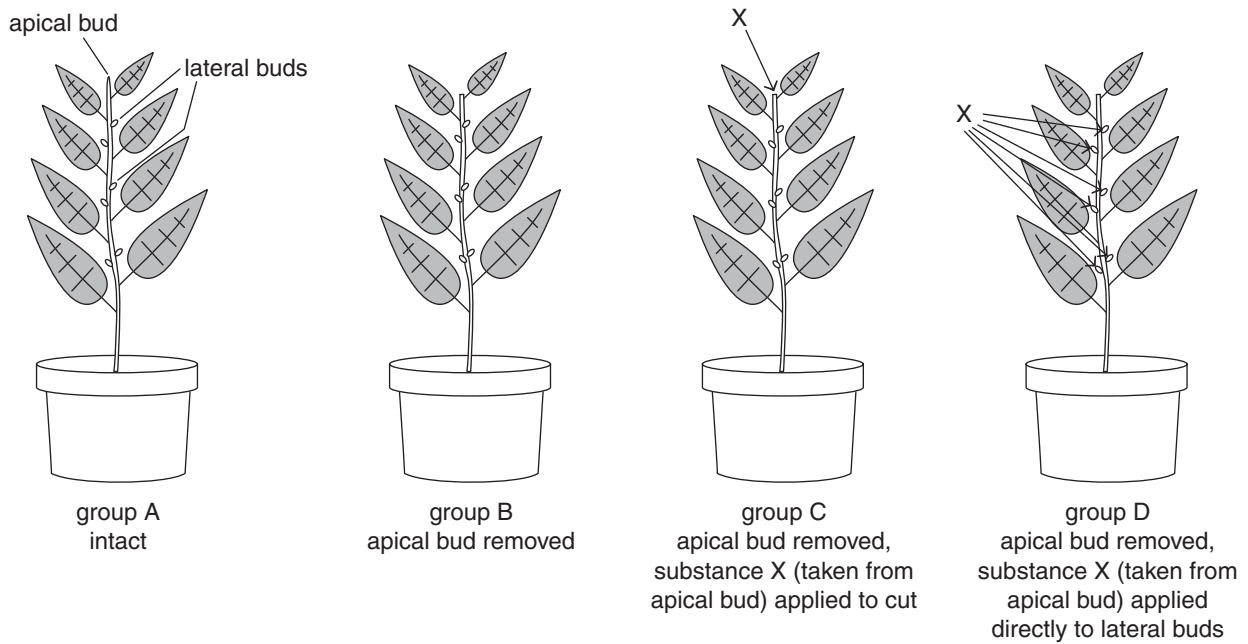
SECTION B: SHORT-ANSWER QUESTIONS

Instructions for Section B

Answer this section in pen.
 Answer **all** questions in the spaces provided.

Question 1

In an experiment, four groups of healthy plants of the same type and age were grown under identical conditions except for the treatments shown in the diagrams below.



The results after one week of growth are shown in the following table.

Group	Result
A	continued upward growth
B	lateral bud growth
C	no upward growth or lateral bud growth
D	no upward growth or lateral bud growth

- a. Substance X is a plant hormone.
 Where in the plant is it produced?

1 mark

- b. Substance X is also involved in phototropic and geotropic responses.
 Name substance X.

1 mark

- c. Using the information provided, what effect does substance X have on lateral buds? Explain.

2 marks

- d. From the results observed for groups C and D, what else can be inferred about substance X?

1 mark

Total 5 marks

Question 2

In New Zealand, there are hot springs in the temperature range 50–80°C. The water bubbles to the surface bringing with it sulfur in the form of dissolved sulfite ions. Bacteria live in these hot springs and use the sulfite ions to produce sulfate ions. The sulfate ions are then used in the production of organic compounds.

- a. Name a biotic component of the hot springs.

1 mark

- b. Give an example of a different environment where bacteria could be found, and state two environmental factors that would differ from those found in the hot springs.

3 marks

Total 4 marks

Question 3

Experiments have recently been conducted on the common raven (*Corvus corax*), which is a member of the crow family. Ravens are highly social, have well-developed means of communication and are highly intelligent.

- a. Name a mode of communication ravens could use. What information could be conveyed via this mode of communication?

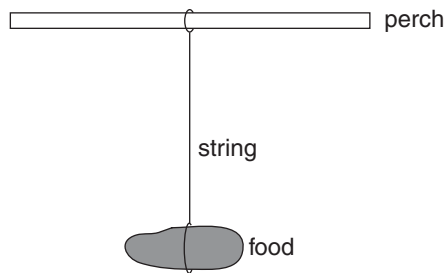
2 marks

- b. Ravens tend to feed in groups. The discovery of carrion (the carcass of a kill) draws the flock, and frenzied eating ensues.

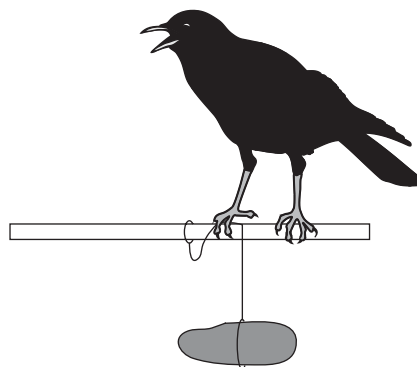
With respect to this information, what type of consumer is a raven? Explain.

2 marks

In an experiment, food was suspended from a perch as shown below.



To gain the food, birds must pull the string to raise the food, then hold the raised string with their foot. The process may need to be repeated six times for the food to become within reach.



One-year-old birds adopted various unsuccessful methods to retrieve the food and on average took six minutes to work out the successful method. Mature birds with no previous experience would examine the situation for several minutes and then perform the successful method in as little as 30 seconds.

- c. With respect to gaining the food, what type of learning is displayed by
i. the yearling ravens? Explain.

- ii. the mature ravens? Explain.

2 + 2 = 4 marks

- d. Describe an unsuccessful method a yearling may have used to reach the food.

2 marks

Total 10 marks

Question 4

Consider the following data.

Animal	Number of ova produced in a lifetime	Number of sperm produced relative to ova	Yolk provided to ovum
bird, e.g. fowl, emu	few	millions	large amount
mammal, e.g. ape, human	very few	millions	very little
sea star			very little

- a. With respect to reproduction, what function does the yolk have?

1 mark

- b. Explain why apes and humans have very little yolk associated with the ova.

2 marks

- c. i. Add the missing information to the table above for the sea star, which lives in a marine environment (an intertidal zone).

2 marks

- ii. Explain your choice for the number of ova produced in the lifetime of a sea star.

2 marks

Total 7 marks

Question 5

Termites are insects that digest wood with the aid of protozoans which live in the termite gut.

- a. Name the type of symbiotic relationship which exists between termites and the protozoans.

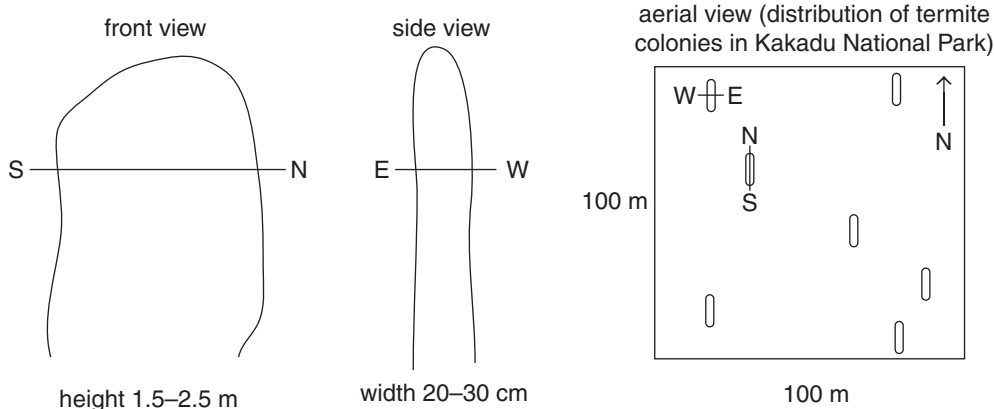
1 mark

- b. Termites live in large colonies which are controlled by a queen. The queen uses chemical messages to control all members of the colony.

What is the biological term to describe chemicals used for communication?

1 mark

Consider the following diagrams which show the approximate dimensions, orientation and distribution of termite colonies.



- c. As shown in the diagram, the orientation of all the colonies is the same.

Give a possible explanation for this arrangement.

2 marks

- d. i. What is the density of termite colonies in the area shown in the aerial view diagram?

- ii. If the distribution of termites was similar over a 10 km^2 area, explain how the total number of colonies could be estimated.

1 + 2 = 3 marks

- e. Living in a colony has advantages and disadvantages for individual termites.

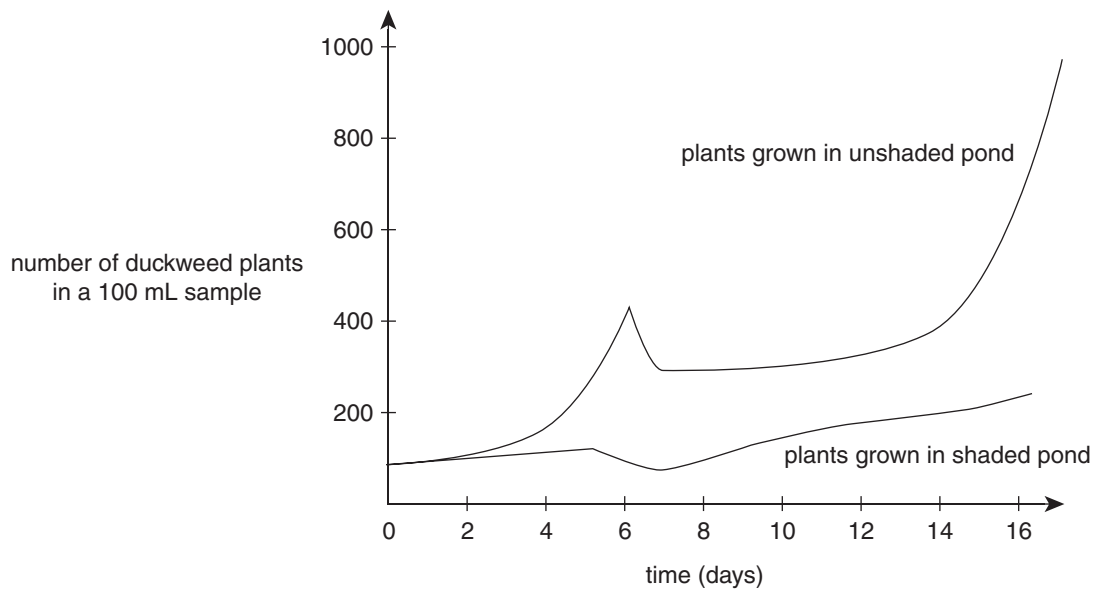
Give one example of such an advantage and one example of such a disadvantage.

2 marks

Total 9 marks

Question 6

An experiment was set up to determine the rate of growth of duckweed, a free floating plant, growing on the surface of a pond. Part of the pond was shaded, the other part was not. Consider the following graph.



- a. What type of growth is exhibited by the plants grown on the unshaded pond?

1 mark

- b. i. On what day(s) is the death rate of duckweed greater than the 'birth' rate for the unshaded plants?

- ii. Outline a possible explanation for this.

1 + 1 = 2 marks

- c. Which factor is limiting the growth of the duckweed in this experiment?

1 mark

Total 4 marks

Question 7

In 1900, the population of the California condor (*Gymnogyps californianus*) was estimated to be around 5000 birds. In 1987, the sole remaining wild California condor was caught and taken into captivity. At the time, only 27 of these birds survived in captivity. Following a successful breeding program, there are now 127 California condors flying free in California, Arizona and Mexico.



These birds have a wing span of 3 metres.

California condors feed on carcasses, many of which have been shot by hunters. The ingestion of lead shot from the carcasses has led to 13 condors dying from lead poisoning and many others requiring treatment. A proposal has been made to stop hunters using lead shot in the condors' range.

- a. In a food chain, explain where a condor would be placed.

1 mark

- b. Name two human activities that could have led to the dramatic decline in the condor population between 1900 and 1987.

2 marks

- c. Outline two key components of a successful captive breeding program.

2 marks

Total 5 marks

Question 8

Scientists believe that a greater understanding of the carbon cycle can have a positive impact on global warming.

- a. Which carbon-based gas contributes most to the greenhouse effect and to global warming?

_____ 1 mark

- b. Explain how a knowledge of photosynthesis could be used to reduce the levels of this carbon-based gas in the environment.

_____ 2 marks

- c. Name one biological process that contributes to an increase in this carbon-based gas.

_____ 1 mark

- d. Describe a human activity that has contributed significantly to the greenhouse effect.

_____ 2 marks
Total 6 marks

END OF QUESTION AND ANSWER BOOKLET