



BIOLOGY – FORM 3
TIME: 1H 30MIN

NAME: _____

CLASS: _____

| Question No. | Section A | | | | | | | | Section B | | | | | TOTAL MARK |
|--------------------|-----------|---|---|---|---|---|---|---|-----------|----|----|----|----|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | |
| Max mark | 4 | 5 | 7 | 8 | 5 | 9 | 8 | 9 | 15 | 15 | 15 | 15 | 15 | |
| Actual mark | | | | | | | | | | | | | | |

| 85% Theory Paper | 15% Practical | 100% Final Score |
|------------------|---------------|------------------|
| | | |

Section A

Answer all questions in this Section.

1. The following sentences describe the biological control method of the Prickly Pear Cactus. The sentences are not in the right order. Re-arrange the sentences in the right order and write the letters in the correct sequence in the boxes below.

| | |
|----------|---|
| A | In six years the caterpillars had completely destroyed all the cacti. |
| B | The fast growing plants made the land useless for agricultural purposes. |
| C | During the 1920's the Prickly Pear Cactus was introduced into Australia from America. |
| D | So in 1927, scientists decided to try and attack the cactus by using predators. |
| E | The caterpillars of these moths fed on the prickly pear cactus. |
| F | Scientists released thousands of moths called <i>Cactoblastis cactorum</i> . |
| G | Getting rid of the cactus by spraying or cutting would have been too expensive. |
| H | The first few plants spread very quickly and nothing else could grow. |

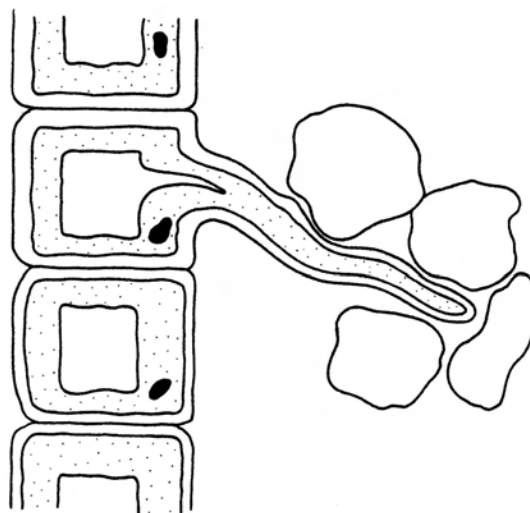
| | | | | | | | |
|--|--|--|--|--|--|--|--|
| | | | | | | | |
|--|--|--|--|--|--|--|--|

(4 marks)

Total: 4 marks

2. The following diagram shows part of a root in soil.
a. Label the diagram with the words in the box.

cell wall, vacuole, cytoplasm, nucleus, soil particle, root hair



(3 marks)

b. Name the process by which water is absorbed by the roots from the soil.

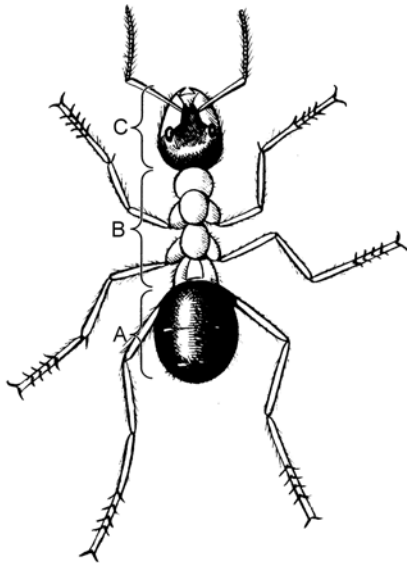
_____ (1 mark)

c. Mineral salts in the form of ions are drawn into the roots along with the water. They are taken up partly by passive diffusion. However they can be absorbed by the roots even when they are present in the soil in a lower concentration than inside the root cells. Name the process by which mineral salts can be taken up into the root cells when they are present in a low concentration in the soil.

_____ (1 mark)

Total: 5 marks

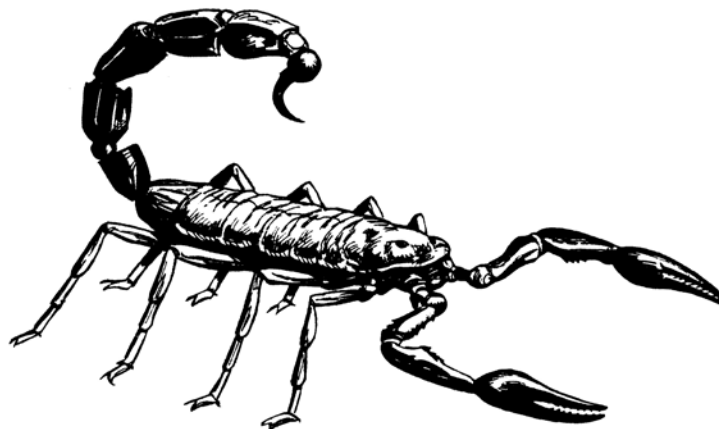
3a. Label the parts A, B and C of the ant shown in the diagram below.



| |
|----|
| A: |
| B: |
| C: |

(1, 1, 1 mark)

b. The diagram below shows a scorpion.



(i) Describe the appendages of both the scorpion and the ant.

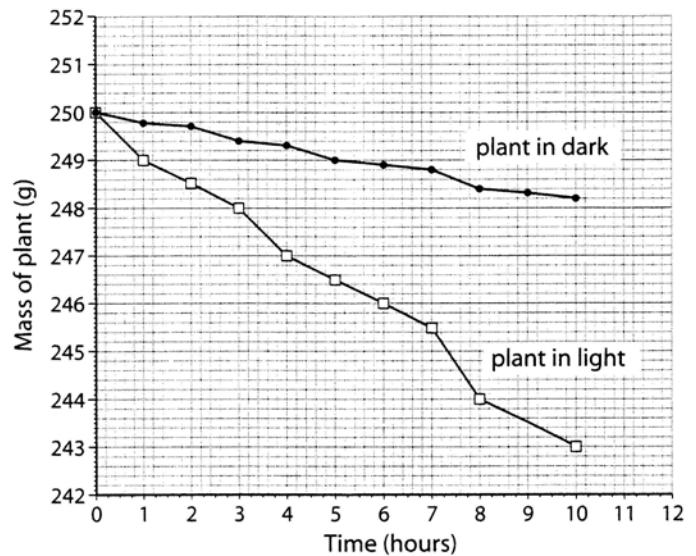
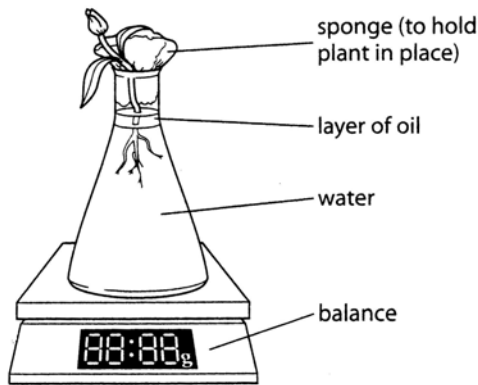
(ii) Name the class to which the scorpion belongs.

(iii) List TWO structural differences (visible in the two diagrams) between the ant and the scorpion.

(1, 1, 2 marks)

Total: 7 marks

4. Two similar plants were set up like the one shown in the diagram below, to measure the amount of water lost by each plant. One plant was placed in the light while the other was placed in the dark. The masses of each plant were measured every hour for 12 hours. A graph of the results is shown below.



a. Why is there a layer of oil on the water?

(1 mark)

b. List TWO conditions that need to be kept the same for this experimental investigation.

(2 marks)

c. Compare the results obtained from this experiment.

(2 marks)

d. The plant that was in the lit place was placed in front of a heater. Predict the changes in water loss that you would expect.

(1 mark)

e. Work out the percentage loss of water for the plant placed in light conditions after 6 hours.

(2 marks)

Total: 8 marks

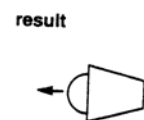
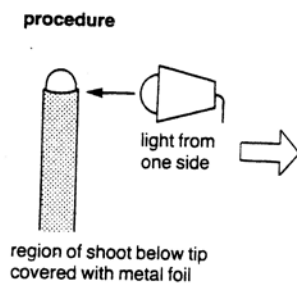
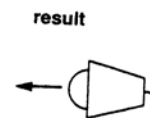
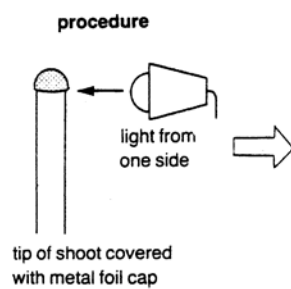
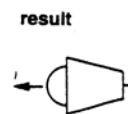
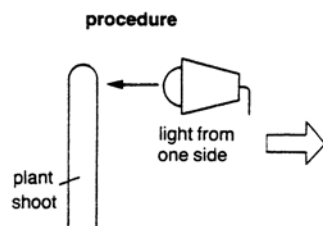
5. Plants respond to stimuli by growing in a particular direction.

a. (i) Name the growth response of a plant towards light.

(ii) Name ONE other stimulus (besides light) that plants respond to.

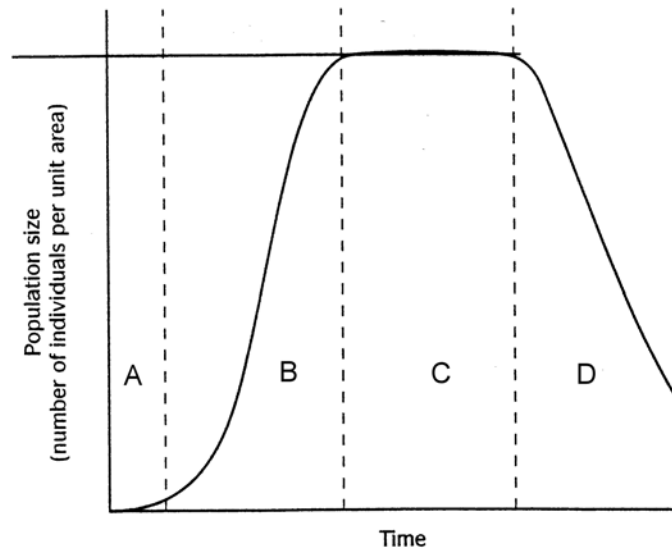
(1,1 mark)

b. A biology student carried out three investigations to study the effect of light on plant shoots. Draw the result for **each** of the following experimental investigation shown below.



(1, 1, 1 mark)
Total: 5 marks

6. The following diagram shows the population growth curve for yeast over a period of time.



a. From the diagram above, write the letter that shows that:

(i) population size remains the same _____

(ii) population size decreases. _____

(1, 1 mark)

b. Explain why there is little change in the population size in part A.

_____ (1 mark)

c. Yeast reproduce asexually by budding. List TWO other types of asexual reproduction.

_____ (2 marks)

d. Explain why:

(i) asexual reproduction occurs much faster than sexual reproduction.

(ii) asexual reproduction is advantageous to organisms such as desert lizards living in habitats with a low population density.

(1, 1 mark)

e. Compare the genetic make up of the offspring by asexual and sexual reproduction.

_____ (2 marks)

Total: 9 marks

7. In good soil there are plenty of air spaces between the soil particles and crumbs. These spaces are filled with air.

a. List ONE reason why the oxygen in soil air is important.

_____ (1 mark)

b. What happens to the water in a soil that contains:

(i) very large soil particles

(ii) very small soil particles that are tightly packed?

_____ (1, 1 mark)

c. Sandy soil is loose and light.

(i) List ONE advantage of this.

(ii) Sandy soil dries up quickly in hot weather. List ONE way of preventing sandy soil from drying up.

_____ (1, 1 mark)

d. Name:

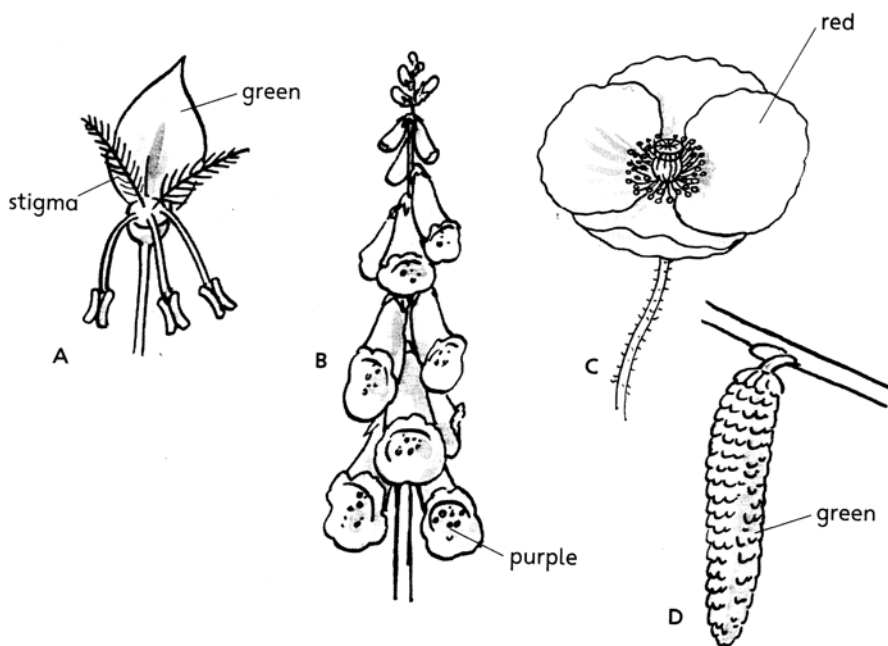
(i) the substance that gives a black colour in the topsoil layer

(ii) the type of soil that tends to stick to garden tools. Give a reason for your answer.

_____ (1, 2 marks)

Total: 8 marks

8. The following diagram shows four flowers (A, B, C and D).



- a. Complete the following Table by ticking (✓) in the correct boxes.

| characteristic | FLOWER | | | |
|-----------------------------------|--------|---|---|---|
| | A | B | C | D |
| produces lots of pollen | | | | |
| produces nectar | | | | |
| Pollen grains with spiky surfaces | | | | |

(3 marks)

- b. Write TWO features (visible in the diagram) that help plant A with its type of pollination.

_____ (2 marks)

- c. Define the term self-pollination and list ONE reason why it might be advantageous.

_____ (2 marks)

- d. Self pollination takes place regularly in orchids. Some orchids like *Neottia* lack chlorophyll. Such orchids obtain their energy and nutrients by parasitizing soil fungi.

- (i) What is the function of chlorophyll?

- (ii) Define the term parasitism.

(1, 1 mark)

Total: 9 marks

Section B

Answer question 1 and choose TWO others. This section carries 45 marks. Write the answers for section B on a foolscap.

1. Read the following passage and then answer the questions that follow.

In New Zealand the largest commercial crop is *Pinus radiata*, commonly known as Monterey Pine from California, which grows better in New Zealand than in California. However the pine forests are also occupied by deer from North America and Europe and by possums from Australia. All these organisms are not indigenous of New Zealand. The pines are seen as beneficial but the deer and possums are regarded as serious pests.

Rabbits introduced in New Zealand as a food source by sailors in the 1800's have become a severe nuisance to farmers. The *myxomatosis* virus was imported and released but it had little lasting effect upon the rabbit population.

Rats brought to New Zealand by Europeans have had a devastating effect upon native birdlife, particularly because many New Zealand birds are flightless. Sparrows which were brought to control insects upon the introduced grain crops, have also displaced native birds.

- a. Most pines have males and female cones on the same tree.
 (i) Name the substance found in the male cones.
 (ii) Name the phylum to which pines belong. (1, 1 mark)
- b. Explain why the deer and possums are regarded as serious pests but the pines are considered as beneficial. (2 marks)
- c. The white tail spider was also introduced in New Zealand. Two common species of white tailed spider are *Lampona cylindrata* and *Lampona murina*. Explain why both species have a common first name. (1 mark)
- d. From the passage list TWO examples of biological pest control. (2 marks)
- e. Suggest TWO reasons why invasive species are successful in a new environment. (2 marks)
- f. Common gorse, originally a hedge plant in Scotland was also introduced in New Zealand and it survived well. Common gorse is widely used for land reclamation purposes because of its nitrogen-fixing capacity.
 (i) Explain the term *nitrogen-fixation*.
 (ii) List ONE reason why agricultural weed such as the common gorse is a nuisance to gardeners. (2, 1 marks)
- g. Draw a labelled diagram to show how a virus reproduces. (3 marks)
- Total: 15 marks**

2. Give a biological explanation for **each** of the following statements:

- a. Sperms are specialised cells.
 b. The young form of the locust is a miniature of the adult locust.
 c. The chameleon can be yellow, green or brown depending on its background.
 d. Arctic mammals such as seals and polar bears are relatively large.
 e. Monocotyledons are easily identified from their leaves.
 f. Living things produce energy.

(2, 3, 2, 3, 2, 3 marks)

Total: 15 marks

3. Discuss the importance of:

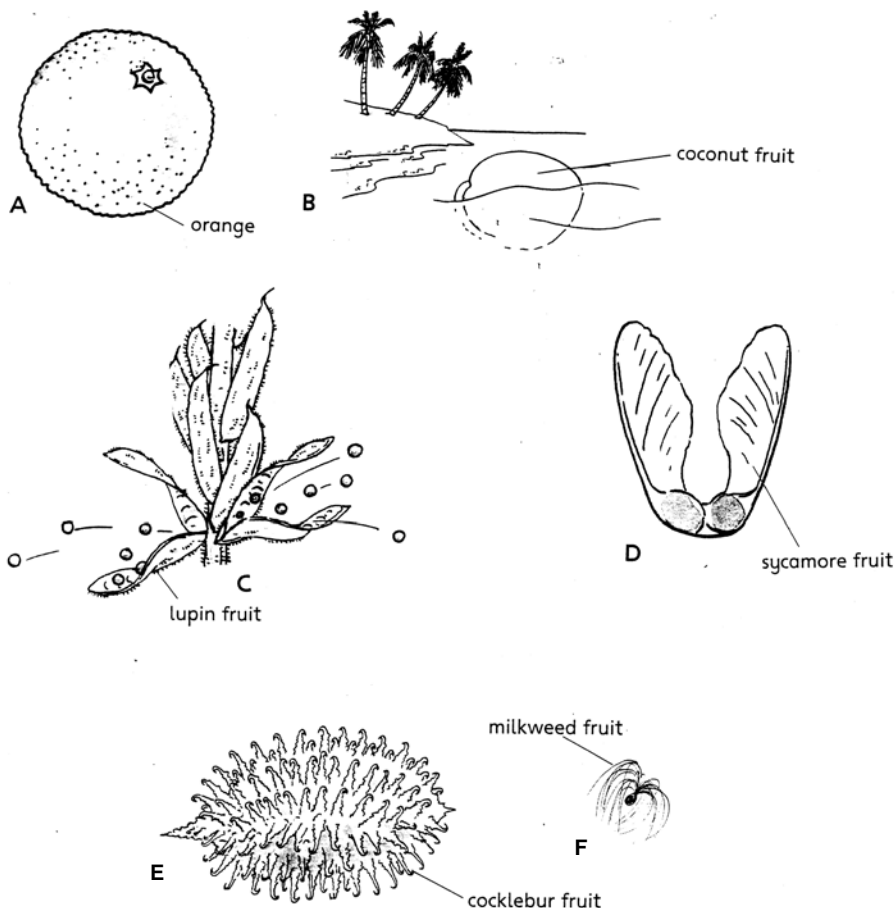
- a. skin as a protective layer
 b. stinging cells in the tentacles of jellyfish
 c. osmoregulation in a protist such as the Amoeba
 d. bacteria in the root nodules of leguminous plants
 e. excretion in living things.

(4, 2, 3, 3, 3 marks)

Total: 15 marks

4. A person enters a sauna and remains there for about half an hour. In a sauna the temperature reaches 80°C or above.
- List TWO physical changes that the person undergoes during the time spent in the sauna. (2 marks)
 - After the sauna, the person takes a very cold shower and starts shivering. Explain why shivering takes place. (2 marks)
 - Describe the role of:
 - fat in the adipose tissue
 - sebum produced by sebaceous glands. (1, 2 marks)
 - Emperor penguins living in the cold Antarctic region huddle together in groups that may contain several thousand penguins. What is the advantage of this? (2 marks)
 - In cold weather penguins tuck their flippers close to their bodies but in hot weather penguins hold the flippers away from the body. Explain. (4 marks)
 - When on land, muscles allow the feathers of the penguin to be held erect (straight). What is the advantage of this? (2 marks)
- Total: 15 marks**

- 5a. For **each** of the following fruits (A to F) shown in the diagram below, explain how seeds are dispersed. (You may present your answer in the form of a Table.) (6 marks)



- b. If a plant's seeds are well dispersed the chance of survival of the species is increased. Explain. (3 marks)
- c. Describe the process following pollination that leads to fertilisation. (3 marks)
- d. The carpel is the female part of the flower. Name and draw a diagram of the male part of the flower. (3 marks)

Total: 15 marks