

JUNIOR LYCEUM ANNUAL EXAMINATIONS 2006
EDUCATIONAL ASSESSMENT UNIT – EDUCATION DIVISION

BIOLOGY- FORM III
 TIME: 1H 30 MIN

NAME: _____

CLASS: _____

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

85% Theory Paper	15% Practical	100% Final Score

Section A

This Section Carries 55 marks. Answer ALL Questions in this section.

1a. Name ONE location within the plant cell where **each** of the following substances is found.

- (i) cell sap _____
- (ii) cellulose _____
- (iii) chlorophyll _____
- (iv) genetic material such as DNA _____ (4 marks)

b. Which substance from the ones listed in part 'a' is also present in an animal cell?

_____ (1 mark)

c. The red blood cell is a specialised cell. Name TWO other specialised cells in the human body.

_____ (2 marks)

Total 7 marks

2. Paramecium lives in stagnant water and it has two contractile vacuoles for the collection and release of excess water from its body. The following table records the average time taken by a contractile vacuole to fill up and empty when the organism is placed in three different liquids X, Y and Z.

Bathing Liquid	Time (s)
X	189
Y	28
Z	62

a. Name the process by which water enters the Paramecium.

_____ (1 mark)

b. Write the letter that represents **each** of the following;

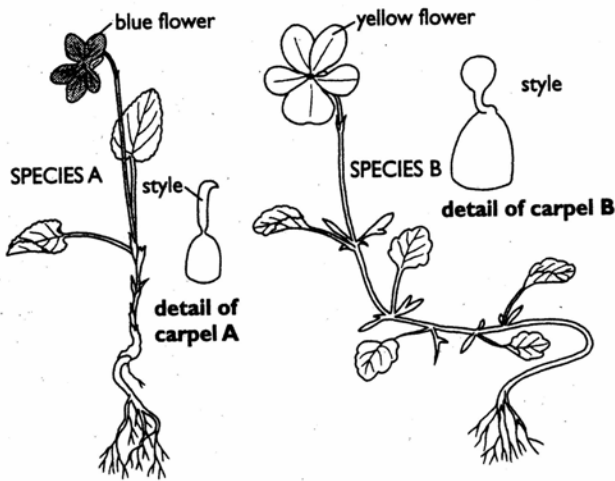
- (i) water _____
- (ii) 0.1% salt solution _____
- (iii) 0.3% salt solution _____ (3 marks)

c. Explain what happens if excess water enters a red blood cell.

_____ (2 marks)

Total 6 marks

3a. Use the following key to identify the two species of *Viola*.



- 1 style expanded into ball-like stigma2
style not expanded into ball-like stigma3
- 2 long creeping horizontal stem present. *Viola lutea*
no long creeping horizontal stem present *Viola tricolor*
- 3 style extended into hook-like stigma4
style not extended into hook-like stigma
..... *Viola palustris*
- 4 leaf stalks (petioles) hairy5
leaf stalks (petioles) not hairy6
- 5 flowers sweetly scented *Viola odorata*
flowers not sweetly scented *Viola hirta*
- 6 petals blue *Viola canina*
petals white *Viola stagnina*

Species A: _____

Species B: _____ (2 marks)

b. Write the species name of plant A.

_____ (1 mark)

c. The carpel is the female part of the flower containing the female gamete. Name:

(i) the male part of the flower and the male gamete.

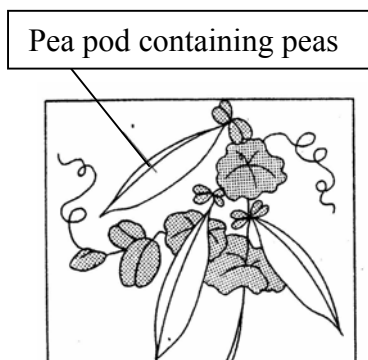
(ii) _____
the part of the carpel that contains the female gamete.

(iii) _____
the structure that protects the flower when it is still a bud.

(2, 1, 1 marks)

Total 7 marks

4. A group of biology students carried out an investigation about plant competition where five groups of pea plants were grown in areas of fertile soil, each measuring 0.25m². The students calculated the average number of pea pods per plant in each of the five plant groups. The following Table shows the students' results.



Plant Group	Number of Plants per 0.25m ²	Average number of Pea Pods per plant
1	20	8.3
2	40	6.8
3	60	3.9
4	80	2.7
5	100	2.1

- a. Describe how the average number of pea pods per plant changes as the number of pea plants per 0.25m^2 increases.

_____ (1 mark)

- b. Write the term used to describe competition between members of the **same** species.

_____ (1 mark)

- c. Name TWO factors that neighbouring pea plants may be competing for.

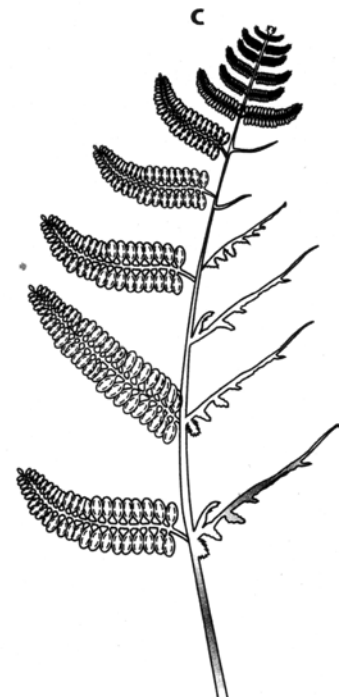
_____ (2 marks)

- d. Pea plants are leguminous plants. Name the type of bacteria present in their root nodules.

_____ (1 mark)

Total 5 marks

5. The following diagrams represent three species of plants.



- a. Which TWO plants belong to the same phylum?

_____ (2 marks)

b. Name the phylum to which the plants mentioned in 'a' belong.

_____ (1 mark)

c. List ONE difference (visible in the diagram) between the two plants you name in 'a'.

_____ (2 marks)

d. Write the letter of the plant that is likely to be found growing in very damp places.

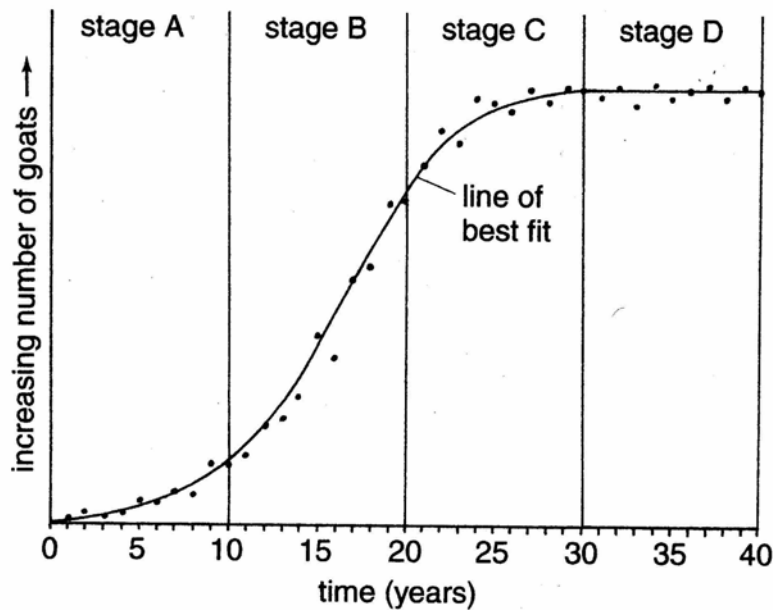
_____ (1 mark)

e. Give ONE feature visible in the diagram, of the plant you name in 'd'.

_____ (1 mark)

Total 7 marks

6. The following graph shows the growth of a population of goats, introduced to an uninhabited grassy island.



a. At which stage was the population's growth rate:

(i) increasing rapidly? _____

(ii) increasing gradually? _____

(iii) decreasing gradually? _____

(iv) at zero? _____

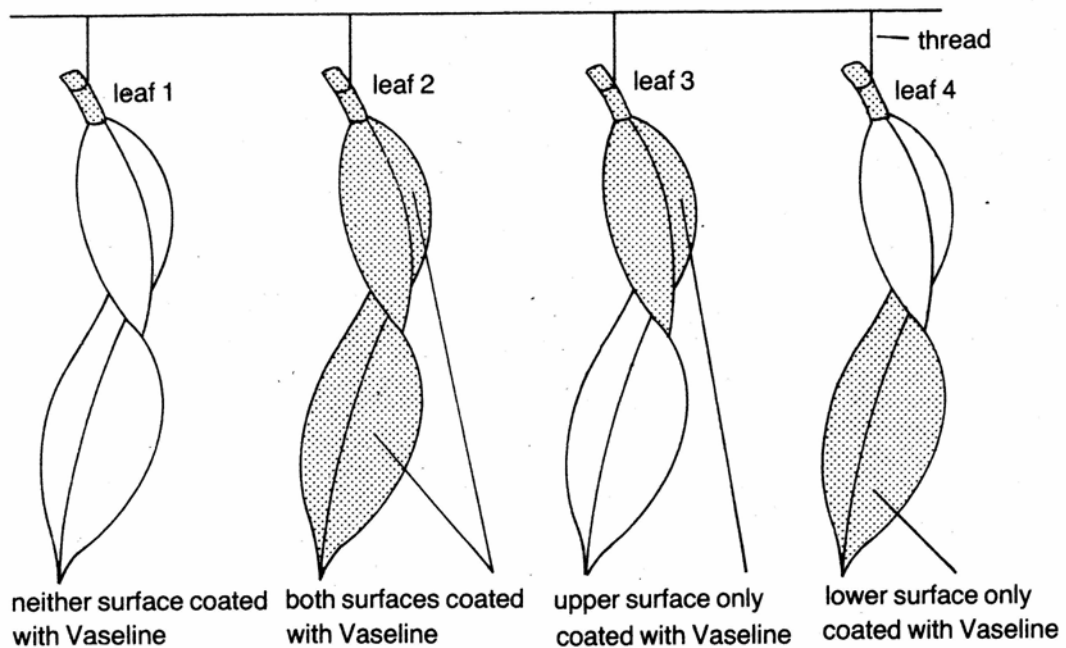
(4 marks)

b. Which stage shows the maximum number of goats that the habitat (grassy land) can hold?

_____ (1 mark)

Total 5 marks

7. A biology student used four leaves that have been detached from a potted plant, to find out the location of stomata in the leaves. The following diagram shows the experimental set up in which vaseline was used to coat the different surfaces of the leaves. The four leaves were left for two days and then the student checked out the weight loss in each leaf.



- a. Name the cells that open or close the stomata.

(1 mark)

- b. What happens to the stomata when the cells named in 'a' become:

(i) turgid?

(ii) flaccid?

(1, 1 marks)

- c. Which leaf would you expect to lose most water? Give a reason for your answer.

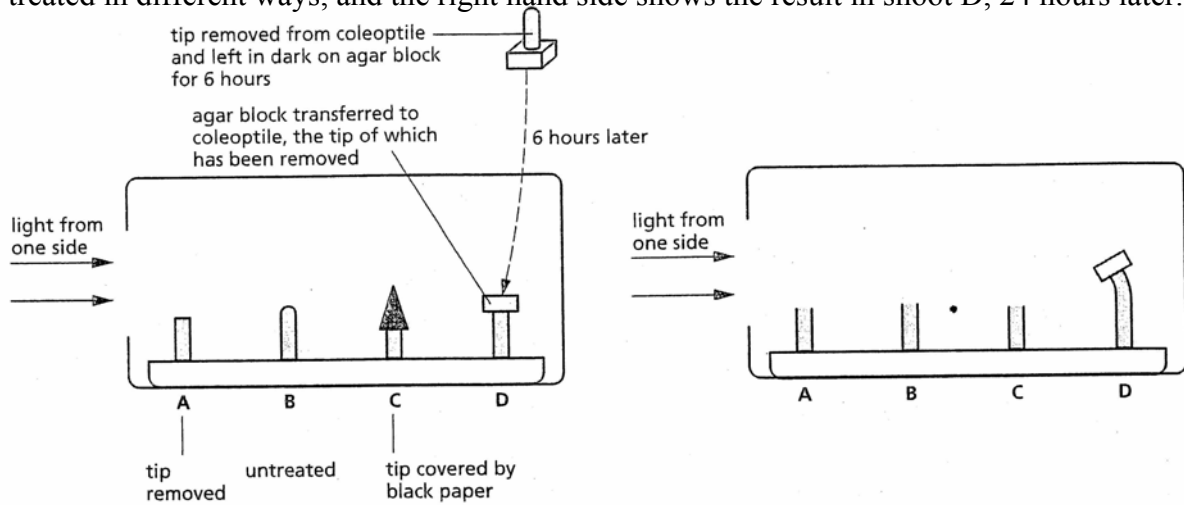
(2 marks)

- d. The biology student found that leaf 3 loses more weight than leaf 4. What can you conclude about the location of stomata in the leaf used in the experiment?

(1 mark)

Total 6 marks

8. A biology teacher used oat coleoptiles (shoots) to show the effect of unidirectional source of light as shown in the figure below. The left hand side shows the experimental setup in which the coleoptiles (shoots) have been treated in different ways, and the right hand side shows the result in shoot D, 24 hours later.



- a. (i) Name the response shown by shoot D.

_____ (1 mark)

- (ii) Explain what has caused the response you name in a(i).

_____ (2 marks)

- b. Complete the figure on the right to show the likely results for shoots A, B and C. (3 marks)

Total 6 marks

- 9a. If you compared a rat and a hippopotamus, which would have the smallest surface area to volume ratio?

_____ (1 mark)

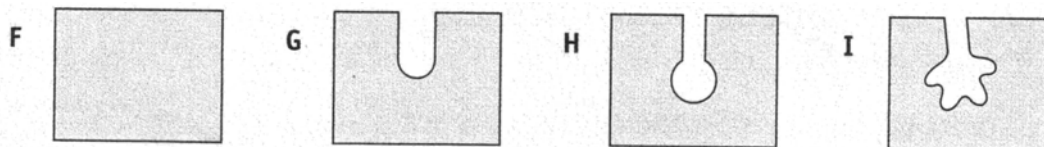
- b. (i) If a slug, an earthworm and a tapeworm all had the same volume which would have the largest surface area to volume ratio?

_____ (1 mark)

- (ii) Which of the organisms named in b(i) is a mollusc?

_____ (1 mark)

- c. The following four diagrams (F, G, H, I) represent four organisms all with the same volume.



Write the letter of the organism which has the largest surface area for diffusion.

(1 mark)

- d. Define the term diffusion.

(2 marks)

Total 6 marks

Section B

Answer question ONE and any TWO others.

Each question carries 15 marks.

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

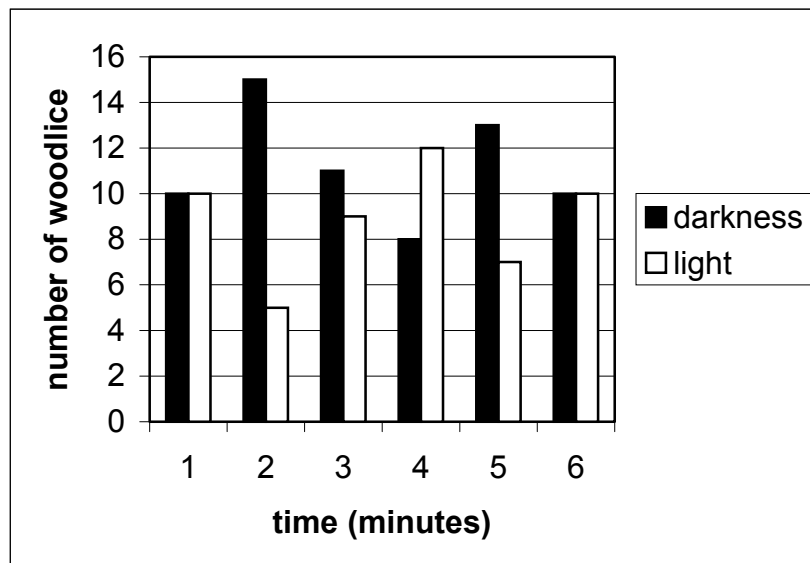
The adult whitefly and its larvae is a common pest of greenhouse crop plants. The moth-like insect covers the underside of leaves, feeding on the sugary liquid transported in one of the tissues of the plants. Whiteflies excrete a sticky juice that slows crop growth and makes fruit dirty and unattractive.

Encarsia formosa is a small parasitic wasp that lays its eggs inside the whitefly larvae; when the wasp larvae hatch they feed on the tissues of the whitefly larvae and kill them. Adult wasps emerge from the dead whitefly. The wasps can be released into greenhouses to act as a biological control for the whitefly.

- a. (i) Is the wasp *Encarsia formosa* an ectoparasite or an endoparasite? Give a reason for your answer.
 (ii) To what stage in their metamorphosis will the wasp larvae change into before emerging as adult wasps? (2, 1 marks)
- b. (i) Name the type of tissue that transports the sugary liquid that whiteflies feed on.
 (ii) If the tissue you name in b(i) is damaged or removed, how will the roots be affected? (1, 1 marks)
- c. Draw a clearly labelled diagram of the palisade cell present in leaves. (4 marks)
- d. The palisade mesophyll and the spongy mesophyll are two layers present in leaves. Explain why the cells in the palisade mesophyll are densely packed while those in the spongy mesophyll are rather loosely packed. (2 marks)
- e. Give ONE reason why the biological control method making use of the wasp might be more effective than the use of chemical pesticides, for controlling the whitefly. (1 mark)
- f. (i) Explain the term excretion.
 (ii) List TWO other vital functions referred to in the passage. (1, 2 marks)

Total 15 marks

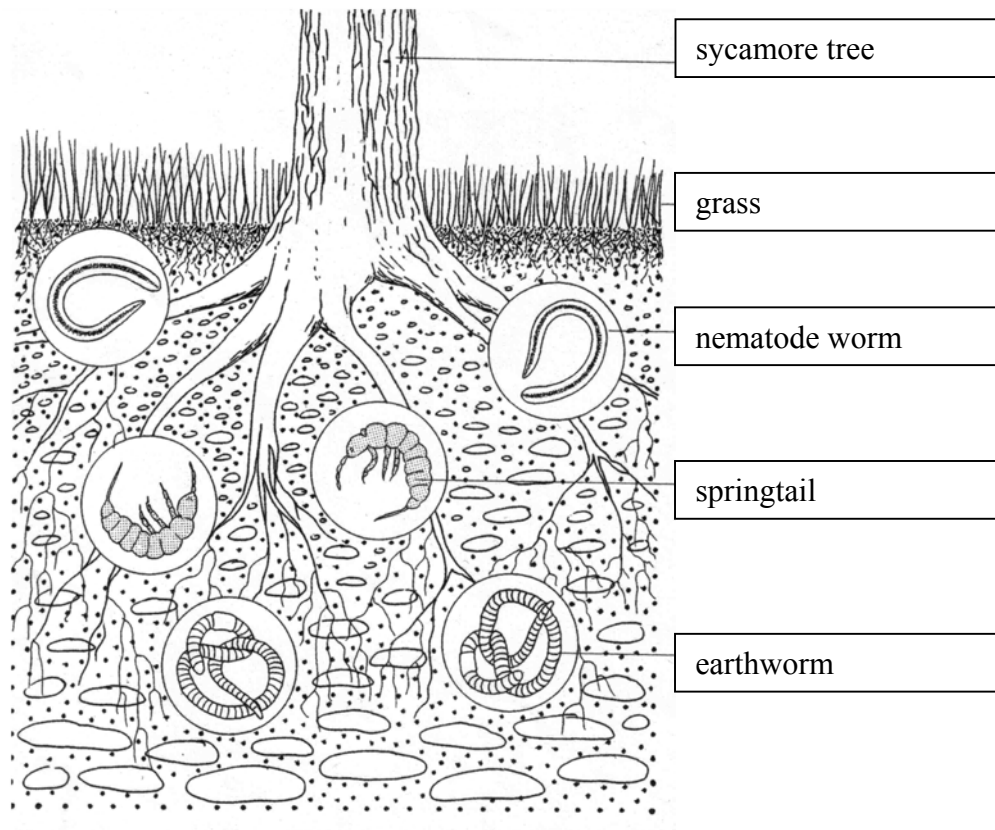
2. Crustaceans, or group of animals with crusty skins, include crabs, lobsters, shrimps and woodlice. The only members of the group that spend all their time on land are the woodlice.
- (i) To which phylum do crustaceans belong? (1 mark)
 (ii) List THREE other classes of the phylum you mention in a(i). (3 marks)
 - Most woodlice have well developed stink glands along the sides of the body, that secrete a foul smelling scent. Explain the benefit of these stink glands. (2 marks)
 - Some woodlice curl up into a ball.
 Give ONE possible benefit of this behaviour. (1 mark)
 - The woodlouse has an exoskeleton that is not waterproof. What is the limitation of this? (1 mark)
 - Woodlice feed on dead wood and leaves, breaking them down and adding to the fertility of the soil.
 Decaying remains of dead plants form an important component of a fertile soil. Name this component and list TWO ways how this component is beneficial to soil. (3 marks)
 - Twenty woodlice were released into a choice chamber with one side illuminated and one side in darkness. The distribution of the woodlice was recorded each minute for six minutes. The results are shown in the following bar chart.



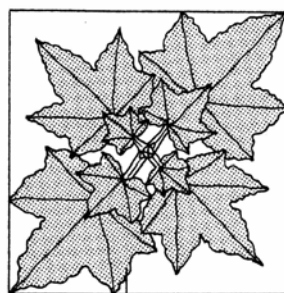
- What is the percentage of woodlice present in darkness at minute 5?
- Write down the number of woodlice present in darkness at the fourth minute.
- Express as a ratio the number of woodlice present in the dark to those present in light at the second minute. (1, 1, 2 marks)

Total 15 marks

3. The following diagram shows a soil ecosystem.



- a. List TWO ways in which the burrows where earthworms live improve the soil. (2 marks)
- b. i) Give ONE structural difference between the nematode and the earthworm.
 ii) Name the phylum to which the earthworm belongs. (2, 1 marks)
- c. In hard-packed soils such as clay soil, the spaces between the particles are small. What is the effect of this? (2 marks)
- d. Explain the advantage of the leaf mosaic arrangement of leaves of the sycamore tree shown in the following diagram. (3 marks)



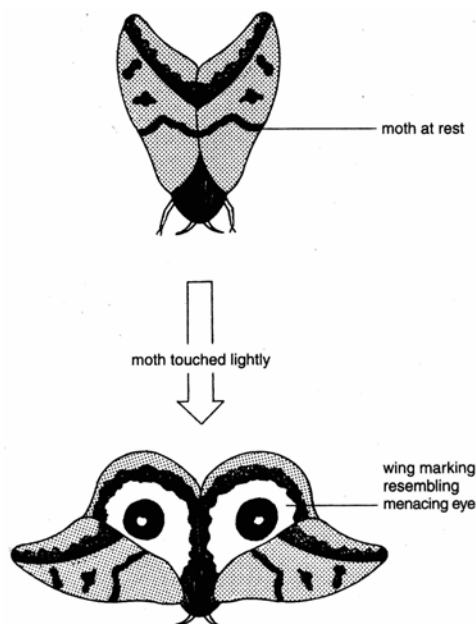
sycamore
(as seen from above)

- e. Suggest TWO ways in which damage to the root system can eventually lead to the tree's death. (2 marks)
- f. Name the cell through which water is absorbed from the soil and explain why it is a specialised cell. (3 marks)

Total 15 marks

- 4a. Birds such as pigeons have their body covered with feathers. What is the body covering of each of the following organisms:
- lizard
 - mouse
 - fish.
- (3 marks)
- b. Write ONE structural characteristics that is common to all four organisms (pigeon, lizard, mouse and frog) mentioned in 'a'. (1 mark)
- c. The pigeon and the mouse are both endotherms while the lizard and the frog are ectotherms. Distinguish between the terms endotherms and ectotherms. (2 marks)
- d. The feathers of a pigeon are covered in oil. Suggest ONE advantage of this. (2 marks)
- e. Explain how feathers insulate birds. (2 marks)
- f. Birds have wings to fly. What brings about movement in **each** of the following organisms:
- a bacterium
 - a named Protist
- (1, 2 marks)
- g. List TWO structural characteristics that make sharks efficient swimmers. (2 marks)
- Total 15 marks**

- 5a. Distinguish between the terms predator and prey and give an example of **each**. (4 marks)
- b. Explain the benefit of **each** of the following hunting strategies used by predators:
- predators hunt in groups
 - predators catch large prey
 - predators catch the young, old, sick or injured prey
 - predators have a variety of prey species that they hunt.
- (4 marks)
- c. Camouflage is important for predators as well as for prey species. Explain. (2 marks)
- d. Explain the importance of the behaviour of the moth shown in the following diagram. (2 marks)



- e. Moths visit flowers. List THREE ways in which flowers attract moths and other insects. (3 marks)
- Total 15 marks**