



Annual Examinations for Secondary Schools 2015

**BIOLOGY – FORM 3
 TIME: 2 HOURS**

NAME: _____ CLASS: _____

Question No.	Section A							Section B					TOTAL MARK
	1	2	3	4	5	6	7	1	2	3	4	5	
Max mark	8	7	7	11	9	6	7	15	15	15	15	15	
Actual mark													

85% Theory Paper	15% Practical	100% Final Score

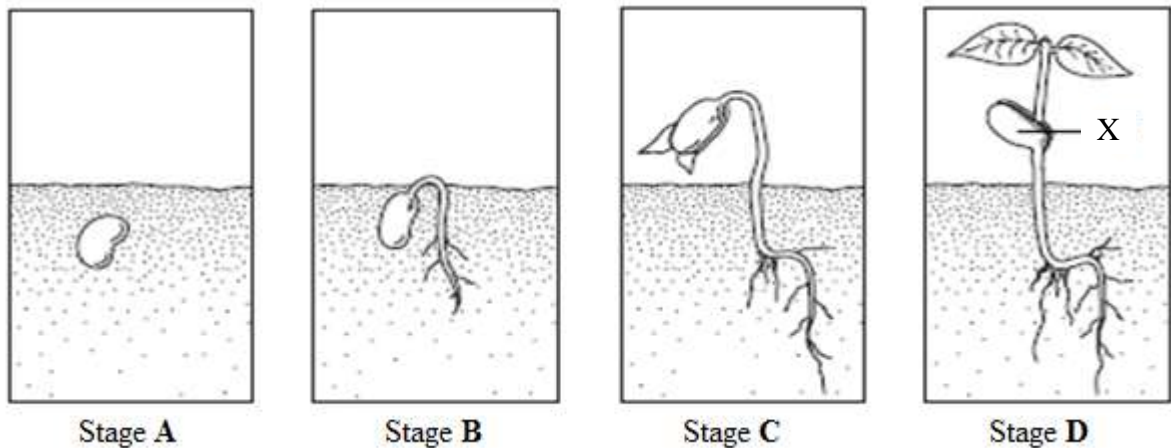
Section A. Answer ALL questions in this section.

1. Sunflower plants are grown for oil, seeds and flowers. Birds peck seeds out of the flower, knocking some seeds to the ground.

a) Besides animal dispersal, name ONE other method of seed dispersal.

_____ (1 mark)

b) The diagram shows the stages of growth of the sunflower plant.



i. Name the type of germination exhibited by the sunflower seed.

_____ (1 mark)

ii. The hypocotyl grows hook shaped out of the soil. Explain why this is important.

_____ (1 mark)

iii. Name the structures labelled X.

_____ (1 mark)

iv. Describe the role of X in the growth of the seedling.

_____ (2 marks)

v. The seed was soaked in water overnight before sowing. Explain why this is important.

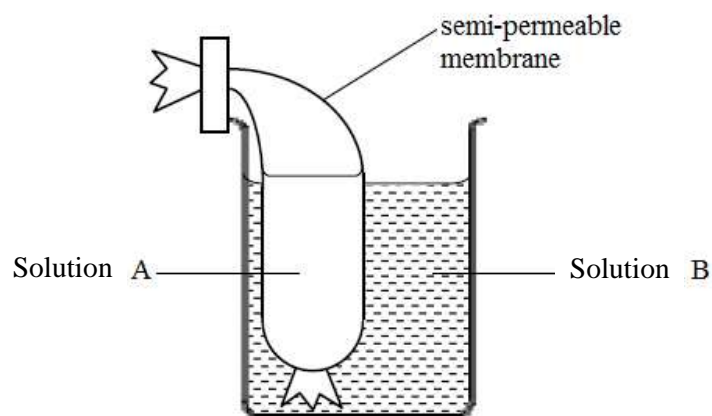
_____ (1 mark)

c) Squirrels hide seeds in their burrows often at considerable distance from the parent plant. Explain why this is an advantage for the plant.

_____ (1 mark)

Total: 8 marks

2. During an experiment, students investigated the movement of particles across a semi-permeable membrane. Two sugar solutions labelled **A** and **B** were used during the experiment.



Students measured the sugar concentration in each solution every 2 minutes and recorded their results in a table.

Time from the start of the experiment/minutes	Sugar concentration in arbitrary units	
	Solution A	Solution B
2	45	15
4	37	22
6	33	27
8	30	30

- a) Define 'semi-permeable membrane'.

_____ (1 mark)

- b) Name the more dilute sugar solution at the beginning of this experiment.

_____ (1 mark)

- c) Draw arrows to show the direction of water molecules between Solutions **A** and **B**. (1 mark)

- d) Name and describe the process shown by the arrows drawn in (c).

_____ (1, 1 marks)

- e) Explain what happened after 8 minutes.

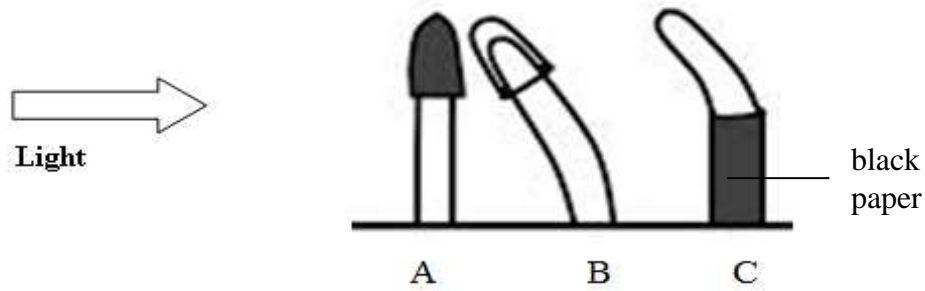
_____ (1 mark)

- f) After 8 minutes, a student decided to add more sugar to Solution **A**. Predict the result obtained.

_____ (1 mark)

Total: 7 marks

3. The experiment shows the effect of a stimulus on the growth of shoots. The shoots were exposed to light coming from one direction.

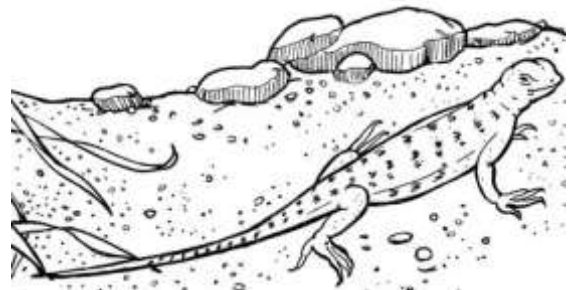


- a) Name the response to the stimulus exhibited by shoots B and C.
 _____ (1 mark)
- b) Name the substance which brings about this response in the shoots.
 _____ (1 mark)
- c) Give ONE benefit of this growth pattern in shoots.
 _____ (1 mark)
- d) In both shoots A and C, part of the shoot was covered with black paper. However, only shoot C bent towards light. Use your biological knowledge to explain this.

 _____ (3 marks)
- e) Predict the result obtained if the experiment was carried out using light coming from all directions.
 _____ (1 mark)

Total: 7 marks

4. Reptiles are ectothermic animals. They lie on hot rocks during the day and bask in the sun until their body becomes warm enough to metabolize well.



- a) Define the term 'ectotherm'.

 _____ (1 mark)
- b) List TWO behavioural adaptations that help reptiles avoid excess increase in body temperature.

 _____ (2 marks)

c) List TWO characteristics common to reptiles.

(2 marks)

d) Complete the table below to explain the role of sweat glands and blood capillaries in temperature control in humans.

	Hot, dry day	Cold, wet day
Sweat gland		
Blood capillaries		

(4 marks)

e) In cold weather, birds fluff up their feathers. Give a biological explanation for this.

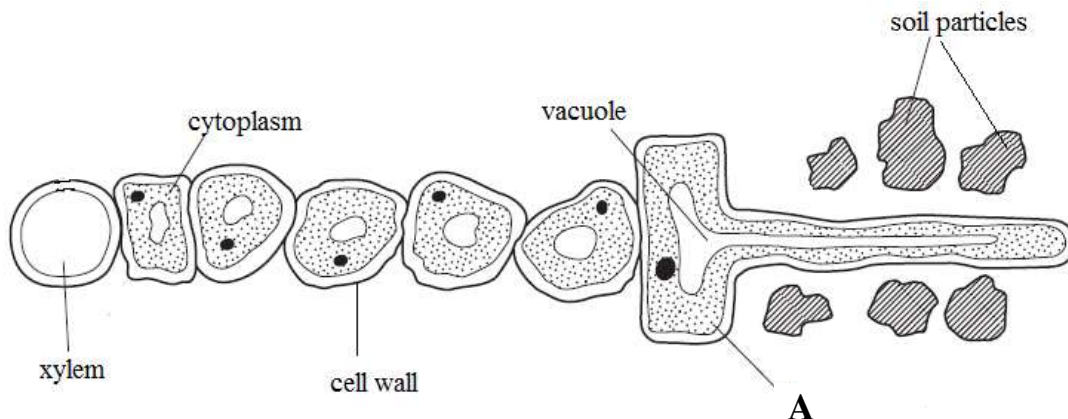
(2 marks)



(<http://sonnyspics.wordpress.com/>)

Total: 11 marks

5. The diagram below shows a cross-section through a plant root.



a) Name the part of the plant cell which stores cell sap.

(1 mark)

b) Name the specialised plant cell labelled A.

(1 mark)

c) Cell A absorbs mineral ions from the soil. Name the process involved.
 _____ (1 mark)

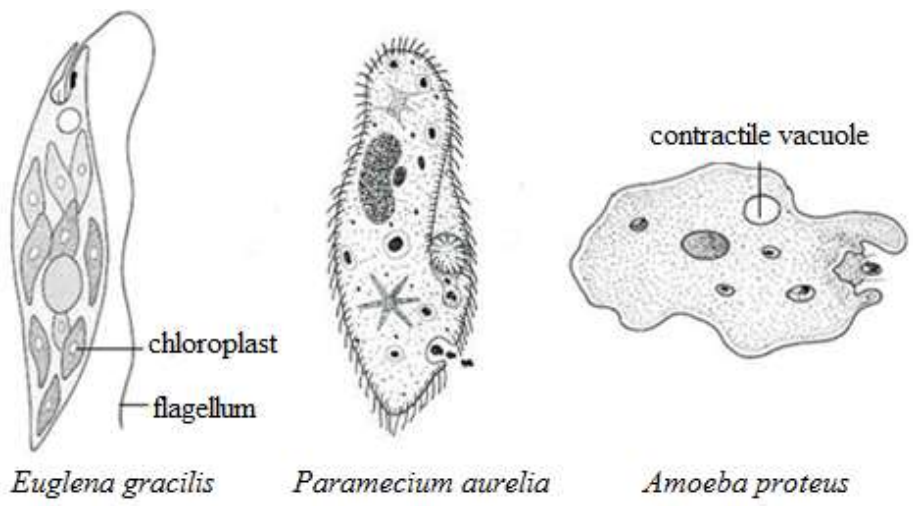
d) Cell A is rich in mitochondria. Explain how this helps it perform its function.

 _____ (2 marks)

e) Name TWO specialised animal cells and state their function.
 Cell: _____ Function: _____
 Cell: _____ Function: _____ (4 marks)

Total: 9 marks

6. A student studied three organisms found in a freshwater pond.



a) Some students described these organisms as prokaryotes. Name ONE evidence from the diagrams above, which shows that the students were incorrect.
 _____ (1 mark)

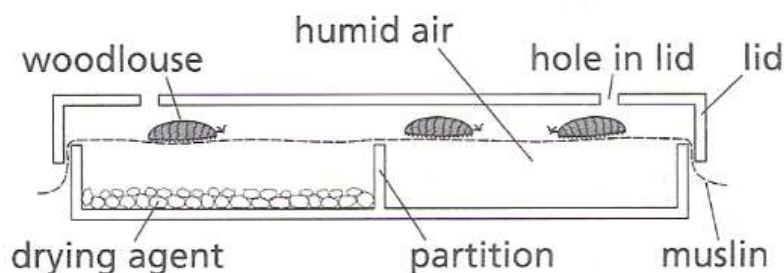
b) Name the kingdom the organisms in the diagram above belong to. Give ONE characteristic feature of this kingdom.

 _____ (1, 1 marks)

c) Give ONE function of **each** of these structures:
 i. Flagellum: _____
 ii. Contractile vacuole: _____
 iii. Chloroplast: _____
 (1, 1, 1 marks)

Total: 6 marks

7. A student observed woodlice gathering under the bark of logs. She used the choice chamber shown below to test which habitat is preferred by woodlice.



The student collected 10 woodlice and gently dropped them through the holes in the lid of the choice chamber. She recorded her results in the table below.

Time/min	1	2	3	4	5	6	7	8	9	10
Number of woodlice in humid side	5	6	3	5	7	7	8	9	9	9
Number of woodlice in dry side	5	4	7	5	3	3	2	1	1	1

- a) Describe the habitat preferred by woodlice.

_____ (1 mark)

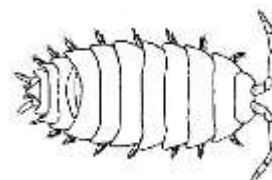
- b) The student put the choice chamber on a flat surface where it received equal amounts of light from all directions. Explain the importance of this.

_____ (1 mark)

- c) The woodlouse shown in the picture belongs to the phylum Arthropoda.

- i. List TWO characteristics common to arthropods.

 _____ (2 marks)



- ii. The scientific name of the woodlouse is *Armadillidium vulgare*. Write the species name of the woodlouse.

_____ (1 mark)

- iii. Name ONE advantage of giving organisms a scientific name.

_____ (1 mark)

- iv. Name the class to which the woodlouse belongs.

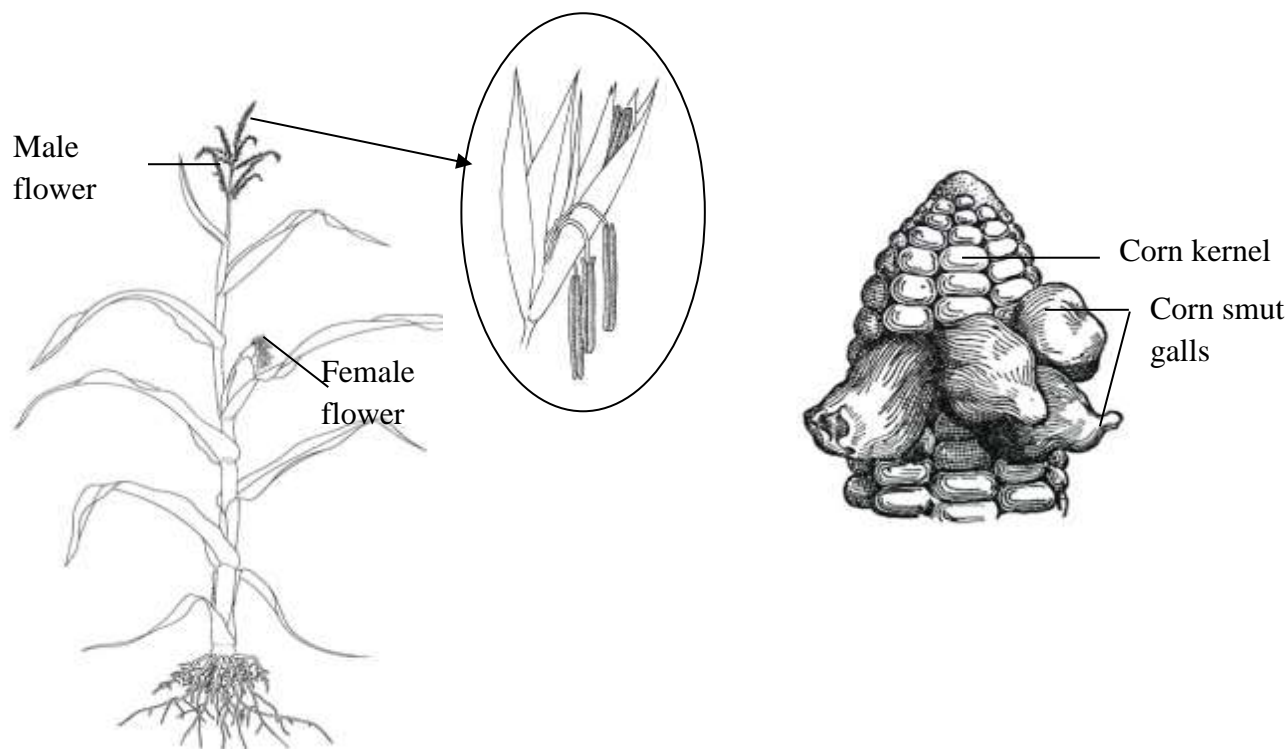
_____ (1 mark)

Total: 7 marks

Section B

Answer any THREE questions. Answer the questions of Section B on a foolscap.

1. Corn smut is a disease caused by the parasitic fungus *Ustilago maydis*. It forms galls (tumor-like structures) which when mature, break and release spores. Each spore enters the corn plant through cuts. It grows down into the kernels and forms galls. Growers can walk through the fields, physically remove visible smut galls and burn them.



- a) *Ustilago maydis* is a parasitic fungus. Name ONE other fungus that is harmful to humans. (1 mark)
- b) Name the part of the fungus structure that invades the corn kernels. (1 mark)
- c) Describe the type of reproduction in corn smut. (2 marks)
- d) Farmers physically remove corn smuts and burn them. Describe the importance of this. (2 mark)
- e) The corn plant is a monocotyledon. From the diagram above, list TWO evidences that confirm this. (2, 2 marks)
- f) The corn flower is wind pollinated. List ONE adaptation of the female flower to wind pollination. (2 marks)
- g) One tassel of corn produces 20-25 million pollen grains.
- i. Explain the importance of producing large amounts of pollen.
- ii. Corn pollen grains are light and smooth. Explain the importance of these properties. (1, 2 marks)

Total: 15 marks

2. The outbreak of the Ebola virus is the most severe since its discovery in 1976. The virus is transmitted among humans through blood and other body fluids.

a) Viruses are border-line between living and non-living. Explain. (2 marks)

b) Draw a labeled diagram to show the general structure of a typical virus. (4 marks)

c) Viruses are always harmful, but some bacteria are beneficial.

i. Besides the Ebola virus, name ONE other example of a virus.

ii. List TWO examples of useful bacteria and describe their importance. (1, 4 marks)

d) Insect viruses are an effective control over a variety of insect pests. Baculoviruses infect caterpillars and are specific to certain hosts.

i. Explain how these baculoviruses affect the insect population.

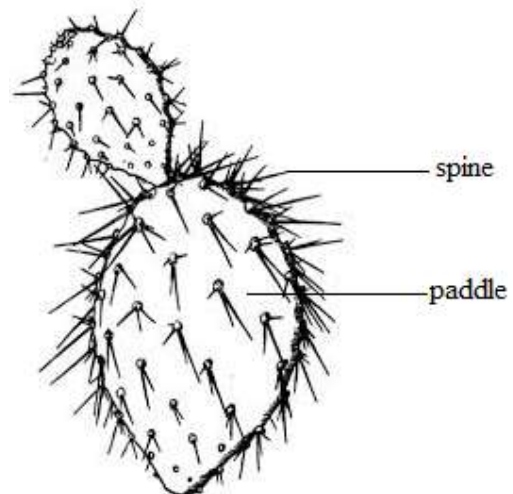
ii. Name this type of pest control. (2, 2 marks)

Total: 15 marks

3. A biology student studied the biodiversity in a field by observing the variation in the populations and communities of animals and plants over a year.

a) Define the term 'population'. (1 mark)

b) The farmer used prickly pears as a boundary for the field, because its large spines stop intruders and stray animals from entering the field.



i. List ONE advantage for the prickly pear to have spines.

ii. Each paddle that detaches from the parent plant can grow into a new prickly pear. State ONE advantage of this mode of reproduction. (1, 2 marks)

c) Prickly pears are flowering plants. Name the part of the flower that:

i. attracts insects.

ii. produces male gametes.

(2, 2 marks)

- d) The student observed the Aleppo pine in the field. This evergreen tree belongs to the gymnosperm group.



- i. Name the reproductive structures present in gymnosperms.
- ii. Aleppo pine leaves are needle-like. Explain the advantage of this adaptation.

(2, 2 marks)

- e) The student observed organisms A and B in the field.

Organism A



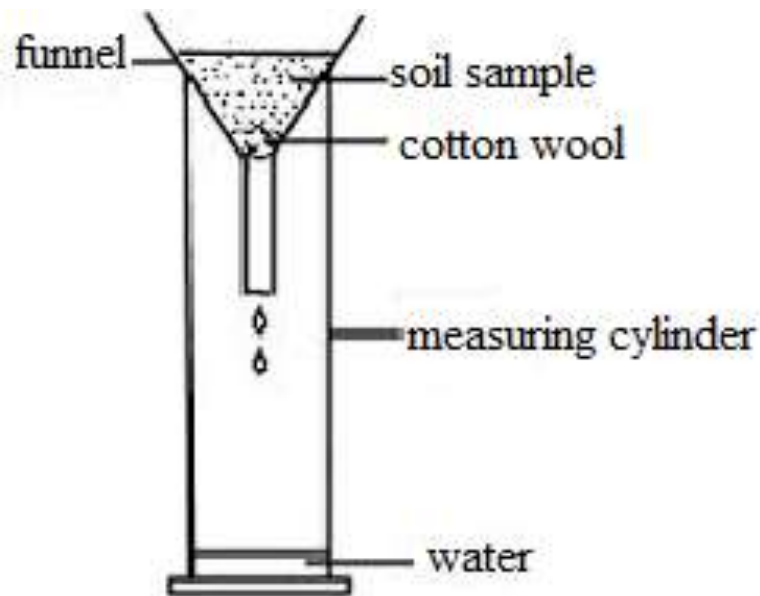
Organism B

- i. List TWO visible features of organism A characteristic of its group.
- ii. Organism B belongs to the phylum Mollusca. List ONE feature common to molluscs.

(2, 1 marks)

Total: 15 marks

4. Terra Rossa is a reddish coloured clay soil common on the Maltese islands.
- a) Terra Rossa soil has a low humus content but nutrients are retained well due to the fact that the clay content in the soil varies between 20-50%.
- Explain how humus is formed in the soil.
 - Describe the effect of humus on the soil water permeability. (2, 2 marks)
- b) Scientists wanted to study which of two soil samples is more permeable to water. They set up the following apparatus and measured the time taken to collect 5cm³ of water in the measuring cylinder. The results were recorded in the table below.



Soil sample	Time to collect 5cm ³ of water/seconds
A	30
B	120

- Name the soil sample most likely to be sandy soil. Give ONE reason for your answer.
 - Loam soil is considered the best type of soil for the farmer. Explain. (2, 2 marks)
- c) Soil is a habitat for different organisms.
- Earthworms are beneficial to the soil. Name the phylum to which earthworms belong.
 - List TWO ways how earthworms can be beneficial to the soil.
 - Give an example of ONE harmful soil organism.



(2, 4, 1 marks)

Total: 15 marks

5.

a) Give a biological explanation for **each** of these statements.

- i. When placed in distilled water, animal cells swell up and burst.
- ii. Most water loss in plants happens from the underside of the leaf.
- iii. Polar bears have a thick layer of white fur.
- iv. Mosses are small land plants that survive in humid habitats.

(3, 3, 3, 3 marks)

b) Give ONE biological term to describe **each** of the statements below:

- i. The movement of gas particles from a high concentration to a low concentration.
- ii. The outer layer of the skin, made up of dead cells.
- iii. The relationship between two organisms, where both benefit from the relationship.

(1, 1, 1 marks)

Total: 15 marks