**DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION**  
Curriculum Management and eLearning Department  
Educational Assessment Unit  

**Annual Examinations for Secondary Schools 2014**

---

**BIOLOGY – FORM 3**  
TIME: 2 HOURS

**NAME: _______________________________**  
**CLASS: ______________________________**

---

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Section A</th>
<th>Section B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Max mark</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Actual mark</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL MARK**

---

<table>
<thead>
<tr>
<th>85% Theory Paper</th>
<th>15% Practical</th>
<th>100% Final Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Biology – Form 3 Secondary – Track 3 – 2014  
Page 1 of 12
Section A

Answer ALL questions in this section.

1. Flamingos are a type of wading bird in the genus *Phoenicopterus*. Flamingos filter-feed on brine-shrimp and blue-green algae. Their beaks are especially adapted to separate mud from the food they eat. The pink colour of flamingos comes from proteins in their diet of animal and plant plankton. These proteins are broken down into pigments by liver enzymes.

a. From the passage above write the name of:
   i. a crustacean ________________________________
   ii. an organ. ________________________________ (1 mark)

b. Flamingos live in groups called colonies whose populations can number in thousands. Explain ONE advantage of large colonies.
   ______________________________________________________________________ (1 mark)

c. The following table gives the scientific classification for the flamingo. Fill in the blanks in the table below with the correct taxonomic group name. (2 marks)

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chordata</td>
</tr>
<tr>
<td></td>
<td>Birds</td>
</tr>
<tr>
<td></td>
<td><em>Phoenicopteriformes</em></td>
</tr>
<tr>
<td></td>
<td><em>Phoenicopteridae</em></td>
</tr>
<tr>
<td>Genus</td>
<td><em>Phoenicopterus</em></td>
</tr>
</tbody>
</table>

d. Python snakes attack flamingos. The python snakes are often referred to as ambush predators or sit-and-wait predators. They remain motionless and wait for their prey to come within striking distance. Give ONE reason why this mode of predation is advantageous to predators such as the python snake.
   ______________________________________________________________________ (1 mark)

Total: 6 marks
2. The following poster was placed at the entrance of the school garden.

a. Name the annelid referred to in the poster adjacent and describe ONE visible structural feature typical of annelids.

   Name: ________________________________

   Structural feature: ________________________________ (2 marks)

b. In many soils, annelids such as the one in the poster play a major role in the conversion of large pieces of organic matter into humus, thus improving soil fertility. Describe ONE way how annelids change organic matter into humus.

   ___________________________________________ (1 mark)

c. Name the type of soil with poor water drainage.

   ___________________________________________ (1 mark)

d. Explain the disadvantage of waterlogged soils.

   ___________________________________________ (2 marks)

e. The Maidenhair fern is found in the shady area of the school garden. The lower side of the leaves of this fern plant contains a number of brown patches called sori. What is found inside these sori?

   ___________________________________________ (1 mark)

f. The school gardener ploughs the soil before sowing seeds. Describe ONE advantage of this practice.

   ___________________________________________ (1 mark)

g. Saprophytic fungi live in soil.

   i. Explain the saprophytic mode of nutrition in fungi.

   ___________________________________________ (2 marks)

   ii. Describe ONE benefit of saprophytic fungi in soil.

   ___________________________________________ (2, 1 mark)

Total: 11 marks
3. The following diagram shows a phototropism experiment and the result obtained.

![Diagram of phototropism experiment]

a. Write the conclusion derived from this experiment.

_____________________________________________________________________

(1 mark)

b. In another phototropism experiment two shoot tips were cut off. One tip was replaced on agar block while the other on a metal disc and put in front of a lamp as shown in the diagram below. Compare the result of the growth of the two shoot tips in this experiment.

![Diagram of another phototropism experiment]

_____________________________________________________________________

_____________________________________________________________________

(2 marks)
c. The *Euglena* is a unicellular protist that contains chloroplasts. The whole *Euglena* organism moves in response to the stimulus of light – indeed the *Euglena* moves towards the light stimulus. Explain the advantage of *Euglena* moving towards the light stimulus. 

_____________________________________________________________________

(1 mark)

d. The *Euglena* reproduces by binary fission. Name the type of reproduction involved in binary fission. 

_____________________________________________________________________

(1 mark)

e. In *Euglena* water enters by osmosis. 

i. Define the term osmosis. 

_____________________________________________________________________

ii. Name the organelle present in protists such as the *Euglena* that pumps excess water out of the cell. 

_____________________________________________________________________

iii. The *Euglena* does not have a cell wall. Explain what happens to the *Euglena* cell if excess water is not pumped out of the cell. 

_____________________________________________________________________

(2, 1, 1 mark)

**Total: 9 marks**

4. The following diagram shows a halved broad bean seed. 

![Diagram of a halved broad bean seed]

A
B
C
D
a. Label the parts A and D.
   A: _________________________   D: _________________________   (2 marks)

b. Write the letter of the part showing the region of the young shoot that will produce the first leaves.
   ____________________________   (1 mark)

c. Seeds vary in size. The difference in size reflects differences in the amount of food reserves stored in the seed. The larger the seed the more food reserves it contains. Explain the advantage of more food reserves present in the seed.
   ______________________________________________________________________________
   ______________________________________________________________________________   (2 marks)

d. Write the type of seed dispersal in each (X and Y) of the following fruits. Give a reason for your answer.

   **X**

   Type of seed dispersal: __________________
   Reason: ________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________

   **Y**

   Type of seed dispersal: __________________
   Reason: ________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________

   (2, 2 marks)

   **Total: 9 marks**
5. The following diagram shows a small herbivorous mammal called hyrax. About 25 species of lice live on the hyrax.

   ![Hyrax Image]

   a. Define the term herbivore.  
   
   b. The body of lice is flattened dorsoventrally (flattened from top to bottom). Explain the benefit of this.  
   
   c. The bacterium *Bacillus anthracis* is another parasite of hyrax. In the box below draw the outer shape of the bacterium *Bacillus anthracis*.  
   
   d. Describe ONE similarity between bacteria and plant cells.  
   
   e. A biology student remarked that both bacteria and viruses can be observed using a light microscope. Explain whether this observation is correct.  
   
   f. Hyraxes have symbiotic bacteria present in their stomachs. Explain the biological importance of the presence of symbiotic bacteria in the stomach of hyraxes.  

   Total: 8 marks
6. The following graphs (X and Y) each show the water loss from a plant over a period of time.

![Graphs X and Y showing water loss over time](image)

a. Write the letter of the graph that represents water loss
   i. with increasing humidity ___________
   ii. with increasing temperature ___________
   iii. with increasing light ___________
   iv. with decreasing wind speed. ___________ (1, 1, 1, 1 mark)

b. The following table shows the density of stomata on the leaf surfaces of three different species of plants (A, B and C).

<table>
<thead>
<tr>
<th>Plant</th>
<th>Stomatal density (number of stomata/mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In upper leaf surface</td>
</tr>
<tr>
<td>A</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>460</td>
</tr>
<tr>
<td>C</td>
<td>0</td>
</tr>
</tbody>
</table>

i. Write the letter of the plant representing the aquatic water lily __________
ii. Write the letter of the underwater plant *Anacharis* in which the leaves float on the water surface. ___________ (1, 1 mark)

**Total: 6 marks**
7. Name and describe the vital function represented in each of the following pictures (A, B and C).

A

_________________________________________________
_________________________________________________
_________________________________________________

B

_________________________________________
_________________________________________
_________________
________________________

C

_________________
______________________________
_________________
______________________________
_________________
______________________________

(2, 2, 2 marks)
Total: 6 marks
Section B

Answer the first question and choose any TWO other questions. Answer the questions of Section B on a foolscap.

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

*Mosquito fish in Australia*

Mosquito fish are a noxious fish species introduced in Australia in 1925. Initially they were introduced as a biological control agent for mosquitoes that cause malaria. Mosquito fish have a dorsally flattened head, rounded tail and a single dorsal fin. Unlike many fish, they give birth to live young. Mosquito fish are extremely aggressive predators that compete with native fish, eat their eggs and predate their young. Mosquito fish also pose a threat to populations of native frogs. They have also negatively impacted populations of beetles and molluscs.

a. From the passage above name ONE arthropod and ONE amphibian.  
   \(2\) marks

b. Fins facilitate the movement of fish through water. Explain how the body of fish is adapted to facilitate movement of fish in water.  
   \(2\) mark

c. Mosquito fish mature rapidly (in less than two months). Explain ONE advantage of this adaptation.  
   \(1\) mark

d. Name the type of:
   i. chordates that usually give live birth  
   \(1, 1\) mark

   ii. fertilisation that takes place in mosquito fish.

e. Mosquitoes undergo complete metamorphosis. Name all the stages involved in complete metamorphosis.  
   \(2\) marks

f. The females of many species of mosquitoes are blood eating pests. The mouthparts of the female mosquito contain stylets that pierce skin.
   i. Blood is a tissue. List TWO other types of animal tissue.

   ii. Explain TWO ways how the skin protects the human body.  
   \(2, 2\) marks

g. The Australian authorities are considering the use of pesticides to control the population of mosquito fish. Explain ONE disadvantage of this decision.  
   \(2\) marks

Total: 15 marks
2. Invertebrate life in Antarctica includes microscopic mites, nematodes, krill and springtails.
   a. Describe ONE structural feature of nematodes. (1 mark)
   
   b. The following diagram shows the krill.

   ![Krill Diagram]

   i. From the adjacent diagram list ONE visible structural feature characteristic of arthropods.
   ii. Name the class of arthropods that krill belongs to. (1, 1 mark)

   c. Most penguins in Antarctica feed on krill. Penguins are aquatic flightless birds that dive in deep water to catch fish.
      i. Explain why penguins that live in cold areas like the Antarctica are rather large.
      ii. Describe TWO ways how feathers help to keep penguins warm.
      iii. In hot weather penguins hold their flippers away from their bodies. Explain. (2, 2, 2 marks)

   d. Most birds have hollow bones however penguins have solid bones. Explain the biological importance of:
      i. hollow bones in most birds
      ii. solid bones in penguins. (1, 2 marks)

   e. The Antarctic hair grass is one plant species typically found in Antarctica. The Antarctic hair grass is self pollinating.
      i. Define the term self pollination.
      ii. Explain ONE advantage of self pollination for the Antarctic hair grass. (2, 1 mark)

   Total: 15 marks

3. Explain why each of the following statements is incorrect:
   a. All vertebrates are endothermic. (3 marks)
   b. Adult insects do not keep growing because of their exoskeleton. (3 marks)
   c. Dicotyledonous and monocotyledonous plants have tap root systems and broad net-veined leaves. (3 marks)
   d. In protists such as the Amoeba, there is division of labour. (2 marks)
   e. All animal cells have a nucleus. (2 marks)
   f. Molluscs such as the tortoise and the garden snail are slow moving animals. (2 marks)

   Total: 15 marks
4. Thrips are tiny insects that pierce and suck fluid from different plants including tomatoes, soybeans and strawberries. They also transmit diseases such as the tomato spotted wilt virus.

a. Name the plant vessel from where thrips suck fluids. (1 mark)

b. The adult thrips present on strawberry plants are mostly found in flowers where they are attracted to pollen and nectar. Female thrips lay their eggs in sepals.
   i. Distinguish between pollen and nectar.
   ii. Name the type of plants where sepals will be present.
   iii. A student wrote that sepals are brightly coloured. Discuss whether this statement is correct. (2, 1, 2 marks)

c. The soybean plant is a leguminous plant.
   i. Name the type of bacteria present in leguminous plants and state their exact location.
   ii. A farmer had a monoculture of soybean plants. Describe ONE disadvantage of monocultures.
   iii. When the farmer sows the soybeans seeds, the cotyledons are brought above the ground as the seedling grows. Name the type of germination typical of soybean seeds. (2, 1, 1 mark)

d. Explain why viral populations do not grow through cell division. (1 mark)

e. Explain how viruses use a host cell to reproduce. (4 marks)

Total: 15 marks

5. Succulent plants are typically found in dry, arid habitats.

a. Succulent plants have a swollen appearance. Explain. (1 mark)

b. Name the main site of photosynthesis in many succulent plants. (1 mark)

c. The spiny outer surface creates a humid environment around the plant. Explain the advantage of this. (2 marks)

d. The Silver Hair is an endangered moss.
   i. Explain how mosses are anchored to their substrate.
   ii. List TWO reasons why mosses must have a damp environment in which to grow. (1, 2 marks)

e. The Sandarac Gum Tree (Gharghar) is the Maltese national tree. It is a coniferous evergreen tree, that is wind pollinated.
   i. Name the site where pollen in the Sandarac Gum Tree is located.
   ii. Name the site in the Sandarac Gum Tree that contains seeds.
   iii. Conifers have naked seeds. Explain. (1, 1, 1 mark)

f. Cynomorium coccineum is a parasitic plant that gives the Fungus Rock (il-Ġeba tal-Ġeneral) its name. The plant has no chlorophyll.
   i. Explain the importance of chlorophyll in plants.
   ii. The plant was often mistaken for a fungus. Name the process that is NOT carried out by both Cynomorium coccineum and fungi.
   iii. Draw a diagram to show the process of sporulation (reproduction by spores) in fungi. (1, 1, 3 marks)

Total: 15 marks