DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION
Department for Curriculum Management and eLearning
Educational Assessment Unit
Annual Examinations for Secondary Schools 2011

Track

BIOLOGY – FORM 3
TIME: 1H 30MIN

NAME: _____ CLASS: _____

Question No.	Section A								Section B				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
Max mark	5	6	6	6	10	7	7	8	15	15	15	15	15
Actual mark													**TOTAL MARK**

85% Theory Paper	15% Practical	100% Final Score

Section A

Answer ALL questions in this section.

1. Name the cell structure described in **each** of the following statements:

the part of the cell that contains chromosomes	
the part that absorbs light energy used for photosynthesis	
large permanent spaces filled with cell sap (a solution of sugar and salts)	
the organelle that produces energy for the cell	
the outermost layer of plant cells	

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

2. The upside-down jellyfish, *Cassiopea andromeda*, is a cnidarian (coelenterate) that has been sighted at Marsamxett harbour in the recent months.

a. State whether jellyfish are invertebrates or vertebrates. Give a reason for your answer

_____

_____

(2 marks)

b. Jellyfish have photosynthetic algae attached to them. These provide food to the jellyfish. These algae live in the tissue on the top side of the jellyfish.
   (i) Define the term tissue.

   _____

   _____

   (ii) Give a reason why algae live on the top side of the jellyfish.

   _____

   _____

(2, 2 marks)
Total 6 marks

3. The table below shows the classification of three wild plants of the family *Crucifac*

Family	*Crucifaceae*	*Crucifaceae*	*Crucifaceae*
Genus	*Brassica*	*Cabile*	*Brassica*
Species	*nigra*	*maritima*	*rapa*
Common name	Black mustard	Sea rocket	Wild turnip

a. Which **TWO** plants are more closely related? Give a reason for your answer.

_____

_____

_____(3 marks)

b. The three plants listed in the table are dicotyledonous. Give THREE characteristics of dicotyledonous plants.

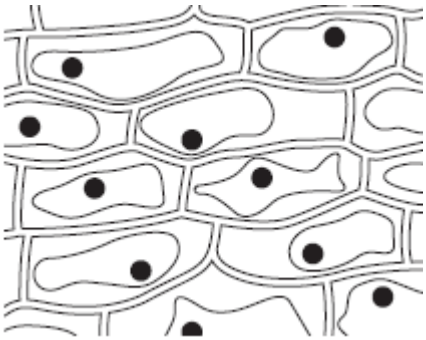
_____

_____

_____(3 marks)

Total 6 marks

4. The following diagram shows plant cells that were left in a strong salt solution for six hours.



a. i) Describe what has happened to these cells.

_____

_____

ii) Name the process that brought about the effect shown in the diagram above.

_____

(2, 1 mark)

b. Predict what happens to the plant cells if they were placed in distilled water instead in the strong salt solution.

_____(1 mark)

c. Mineral salts are absorbed by root hair cells by **diffusion** or **active transport**. State TWO differences between these two processes.

_____

_____

_____(2 marks)

Total 6 marks

5. The fruit of the 'rough cocklebur' that grows at Chadwick Lakes, has hooks that stick to grazing animals. It is also woody enabling it to float. Its seeds are toxic to herbivores.

a. Name the **TWO** methods of fruit dispersal used by the rough cocklebur.

_____

_____(2 marks)

b. Explain why it is important that fruits are dispersed away from the mother plant.

_____

_____(2 marks)

c. The seeds of the 'rough cocklebur' are toxic to herbivores and this increases the chances of seeds to germinate. Explain.

_____

_____(1 mark)

d. This plant has its sex organs on separate flowers which can be found on the same stem. Explain why the male flower is always found above the female flower.

_____

_____(2 marks)

e. The wild radish plant also grows at Chadwick Lakes. It produces white flowers with veins that attract insects. It has six stamens and a central carpel.

i) Name **ONE** function of the stamen and **ONE** function of the carpel.

Stamen: _____

Carpel: _____

ii) Explain why it is beneficial for wild radish plants to attract insects.

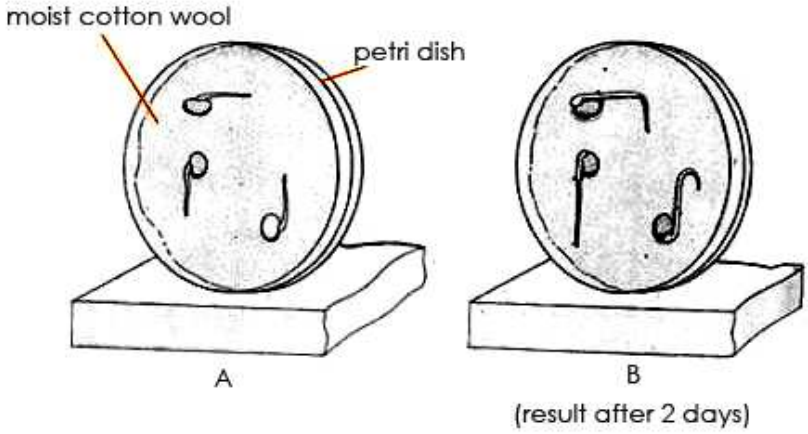
_____

_____

(2, 1 mark)

Total 10 marks

6. Some broad bean seeds were soaked overnight and set up as in diagram **A** below. After 2 days the radicles grew as shown in diagram **B** below.



.

a. i) Describe what happened to the radicles in diagram 'B'.

_____

ii) Give ONE benefit of the growth pattern of the radicles.

_____

iii) Explain why seeds were soaked overnight before the experiment.

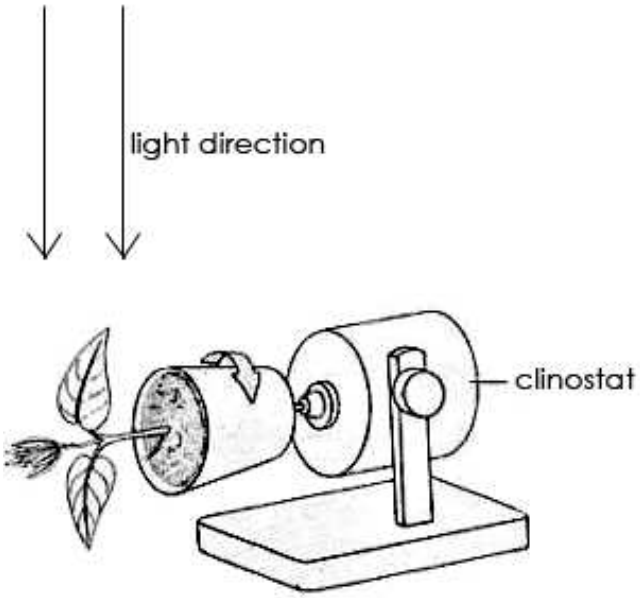
_____

(1, 1, 1 mark)

b. Plants display a positive phototropic response. Explain.

_____(1 mark)

c. A plant was placed on a clinostat as shown in the diagram below and was left to rot
days.



Write the letter of the diagram that represents the plant after two days rotating as shown above. Give a reason for your answer.

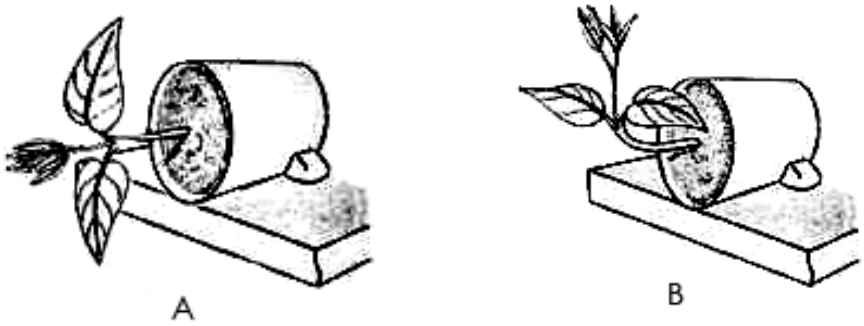


Diagram: _____

Reason: _____

_____

(1, 2 marks)

Total 7 marks

7a. From the list in the box below choose and write the term that fits **each** description. (Each term can be used once, more than once or not at all)

parasitism	mutualism	predator-prey relationship

Description	Term
a fungus damaging an oak tree by absorbing nutrients from its phloem	
an alga and a fungus living together as a lichen on a rock.	
a chameleon eating a locust	
an orb web spider feeding on a fly it has just captured	
hairs of a dodder plant extracting sap from wild thyme	

(1, 1, 1, 1, 1 mark)

b. A biology student took different soil samples from Buskett. These samples were tested and results showed that soil taken from an area full of the leguminous plant clover had a high content of nitrates. Explain.

_____

_____

_____(2 marks)

Total: 7 marks

8a. From the list in the box below choose and write the name of the correct type of soil to match **each** description.
(Each term can be used once, more than once or not at all).

loam	clay soil	sandy soil

Description	Type of soil
minerals are easily washed out	
soil generally contains more nutrients	
can become waterlogged easily	
soil more prone to erosion	

(1, 1, 1, 1 mark)

b. Some farmers add humus to soil. Give TWO benefits of adding humus to soil.

_____

_____(2 marks)

c. Earthworms help to fertilise the soil by pulling leaves into it. Explain.

_____

_____(2 ma

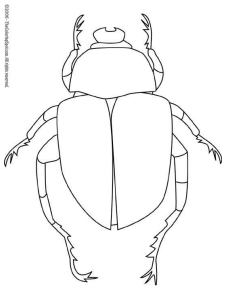
Total 8 mark

Section B

Answer question ONE and choose any other TWO. This section carries 45 marks. Write the answers for section B on a foolscap.

1. Read the following paragraph and answer the questions below.

The Scarab Beetle Species



Some days ago I found several beetles along the water's edge at Mellieha Bay. The insects belonged to a common species of the scarab family. Like many members of this family it does not have a common English name. In Maltese most beetles are known as 'ħanfus'. The unique scientific name of this beetle is *Phyllognathus excavatus*.

The male of this species has a structure on its head that resembles the horns of a rhinoceros. Around September it is the most common beetle in the Mediterranean. The scarab beetle family consists of over 30,000 species. Many of these have bright metallic colours ranging in size from 1.5mm to 160mm. The larvae have no exoskeleton. They are soft-bodied pale yellow or white grubs. Most live underground or under leaves away from sunlight. The majority are scavengers and many species live on dung, dead animals or decaying vegetation. Some beetles lay eggs in dung.

(Text adapted from The Scarab Beetle Species by Paul Portelli, The Times, 30th September 2010)

a. Why are scientific names unique? (1 mark)

b. Write the phylum and the genus of the scarab beetle species mentioned in the passage.(2 marks)

c. Apart from the segmented body, name TWO other characteristics shared with all animals of the same phylum. (2 marks)

d. Name the other TWO main body segments of the beetle besides the head. (2 marks)

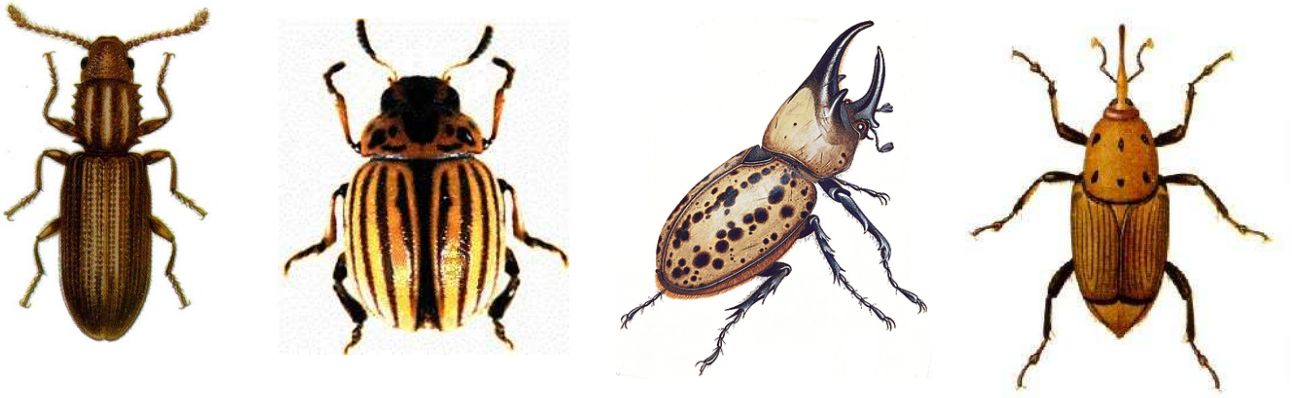
e. (i) Name the process that changes the larva into an adult beetle.
(ii) Name the stage between the larva and the adult. (1, 1 mark)

f. Suggest ONE reason why
(i) larvae prefer to stay away from sunlight
(ii) some beetles lay eggs in dung. (1, 1 mark)

g. There are around 400,000 different species of beetles. Use the identification key to distinguish between the following four beetles:

1. Body is striped …… go to 2
   Body is spotted ……**Hercules beetle**
2. Long, pointed appendage attached to head …… **Red palm weevil**
   No pointed appendage attached to head …… go to 3
3. Roundish abdomen …… **Colorado potato beetle**
   Elongated abdomen …… **Sawtooth beetle**

A **B** **C** **D**



(4 marks)
Total 15 marks

2. A biology student owns an aquarium. The student gives extra fish food since some females are bearing offspring. After two days the aquarium became infested with *Hydra* - a simple fresh-water animal that reproduces asexually by budding. Soon enough the newly-hatched fish started falling prey to the *Hydra's* stinging tentacles around its mouth.

(i) Name the phylum to which the *Hydra* belong.
(ii) Explain why asexual reproduction is advantageous to the *Hydra*.
(iii) List TWO factors that helped the *Hydra* population to grow so fast.
(iv) Fish lay hundreds of eggs. Give ONE advantage and ONE disadvantage of this.
(1, 1, 2, 2 marks)

b. In this aquarium *Hydra* can be regarded as a pest. The student introduces a species of fish called *Gouramis*, that feed on *Hydra*.
Name this method of controlling the growth of the pest population. Give ONE advantage of it.
(2 marks)

c. Distinguish between the terms predator and prey. (2 marks)

d. One other method of getting rid of the *Hydra* population is to remove the fish from the tank temporarily and treat the water with an appropriate concentration of salt. How does salt kill the fresh-water *Hydra*? (2 marks)

e. Most aquarium plants reproduce by vegetative propagation.
(i) List ONE disadvantage of vegetative propagation.
(ii) Explain why reproduction of the aquarium plants by vegetative propagation could be a disadvantage in the event of a viral infection. (1, 2 marks)
Total 15 marks

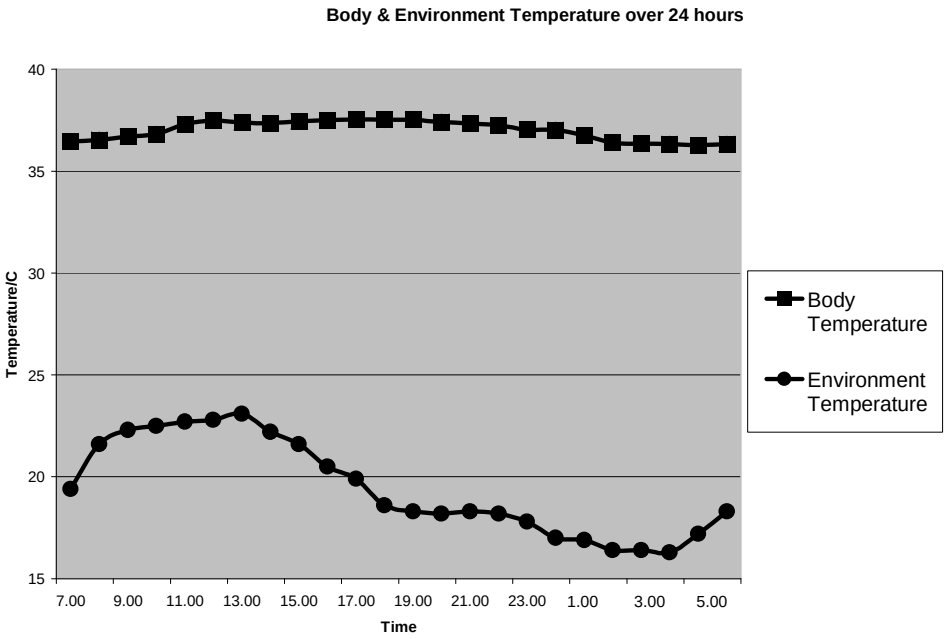
3a. A student used a UV (ultra-violet) monitor to measure how the strength of ultra-violet rays changes across a period of 12 hours. These are the results obtained.

Time	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm	7pm
UV index	2	4	6	9	12	11	10	8	6	5	2	1

(i) How do the student's results confirm that it is not recommended to sunbathe between 11am and 3pm?
(ii) Explain how the skin acts as a protective layer against UV rays.

(2, 2 marks)

b. During another investigation the body temperature of a human being and that of the surrounding environment were measured every hour over a period of 24 hours. The data was plotted on the chart below.



(i) Explain why the body temperature changed very little in spite of the changes in the temperature of the surrounding environment.
(ii) List TWO body processes by which humans lose heat.
(iii) Explain why we need to eat more on winter days in order to keep a constant body temperature.
(iv) Explain the importance of the adipose tissue under the skin.

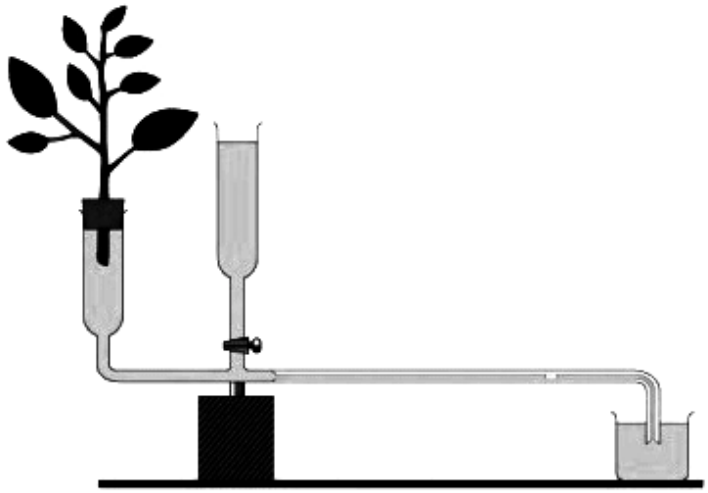
(2, 2, 1, 1 mark)

c. The Maltese wall lizard is a reptile often seen basking in the sun. Explain. (2 marks)

d. Malta's hot and dry summer season is harsh on many plants living on the island. List THREE adaptations that help plants survive this hot and dry season. (3 marks)

Total 15 marks

4. A student was conducting an investigation about transpiration. The student set up t... as in the diagram below making sure to cut and insert the plant under water. The ex... was performed twice, first under strong light conditions and then in low light condition... results showed that the transpiration rate decreased in low light conditions.



a. (i) Name of the apparatus used for this investigation.
(ii) Explain the importance of cutting and inserting the shoot under water.
(iii) Give two reasons why the rate of transpiration decreases under low light conditions.
(iv) List TWO environmental factors besides light intensity that affect the rate of transpiration.
(v) The student compared the transpiration rate of several leaves. Which leaf feature should be measured to obtain a fair comparison? (1, 2, 2, 2, 2 marks)

b. In dry desert conditions, seeds of palm trees can remain dormant for well over a year until it rains before they germinate by hypogeal germination.

(i) Why is water important for germination to take place?
(ii) Explain why palm tree seeds have a relatively hard seed coat.
(iii) Distinguish between hypogeal and epigeal germination.
(iv) Explain why it is difficult to germinate a palm tree seed in a cold northern European country. (1, 1, 2, 2 marks)

Total 15 marks

5. Give a biological explanation for **each** of the following statements:
(i) Viruses need a living cell to reproduce. (3 marks)
(ii) Mosses are simple plants living in humid conditions. (4 marks)
(iii) Whales and dolphins are marine mammals. (2 marks)
(iv) The Arctic vegetation consists of small plants that grow only during summer months. (4 marks)
(v) Amphibians live on land but lay eggs in water. (2 marks)

Total 15 marks