DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION
Department for Curriculum Management and eLearning
Educational Assessment Unit
Annual Examinations for Secondary Schools 2013

Track

BIOLOGY – FORM 3
TIME: 2 HOURS

NAME: _____ CLASS: _____

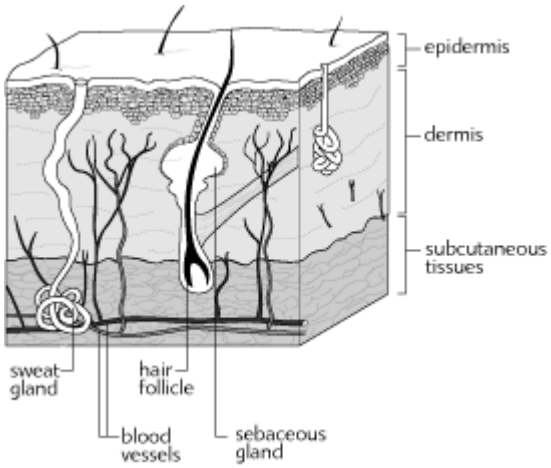
Question No.	**Section A**							**Section B**					
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	
Max mark	10	10	10	5	7	6	7	15	15	15	15	15	
Actual mark													**TOTAL MARK**

85% Theory Paper	**15% Practical**	**100% Final Score**

Section A

Answer ALL questions in this section.

1. The diagram below shows a cross-section of the skin.



a. From the diagram above name:

(i) the layer of skin rich in blood vessels _____

(ii) the gland that secretes sebum. _____

(1, 1 mark)

b. Dark coloured persons have a high content of the pigment melanin. Name the layer of the skin that contains melanin.

_____ (1 mark)

c. On the diagram label the erector muscle. (1 mark)

d. A teacher wrote the following statement:

Sweating helps to cool the body.

(i) Explain how sweating helps to cool the body.

_____

_____

_____

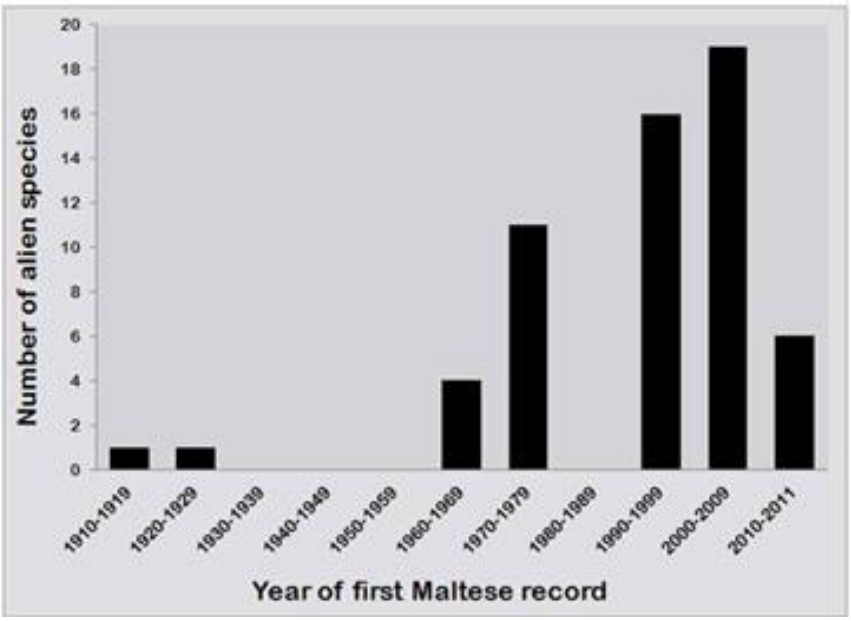
(ii) Name and describe ONE other process which allows the body to cool down.

_____

_____

(3, 3 marks)
Total: 10 marks

2. The bar chart below shows the number of animal or plant alien species obser[illegible] waters. These organisms enter the Mediterranean Sea from the Atlantic Ocean th[illegible] Gibraltar Strait or from the Red Sea through the Suez Canal.



Source: Tropical Signals-Biology UoM

a. Write the number of alien species recorded during the years 2010-2011.

_____ (1 mark)

b. Predict the expected trend in numbers of alien species in the next decade (2010-2019) by comparing the number of alien species during the years 2010-2011 with that in the previous ten-year period 2000-2009.

_____

_____ (2 marks)

c. The Bluespotted Cornetfish *Fistularia commersonii* is an alien species observed in Maltese waters since 2005.

(i) Write the species name of the Bluespotted Cornetfish.

_____

(ii) In the last years the number of this fish species has increased. It was recorded in Maltese waters in shoals (groups) of about 20 individuals. List ONE reason for the rapid growth in the population of this fish.

_____

_____

(iii) Describe the body covering of fish.

_____

(iv) Shoals of fish distract the predator from concentrating on one particular [illegible]. Describe TWO other methods that help prey species to avoid capture.

_____

_____

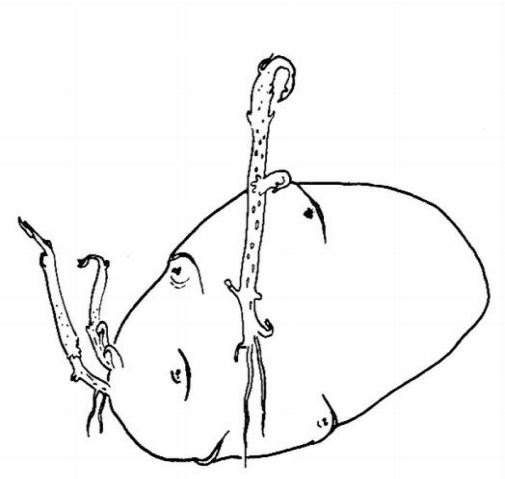
(1, 2, 1, 2 marks)

d. The slipper limpet, *Crepidula fornicata,* a mollusc, was one of the first alien species observed in the Mediterranean sea. Describe ONE characteristic feature of molluscs.

_____ (1 mark)

Total: 10 marks

3a. The diagram below shows the potato tuber with asexual growths arising from it.



(i) List ONE characteristic of plants produced by asexual reproduction.

_____

(ii) Describe ONE advantage of sexual reproduction in plants.

_____

_____

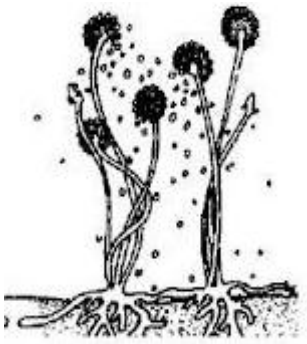
(iii) The potato tuber is defined as a storage organ. Explain why the tuber becomes soft and shrivelled when a new plant grows from it.

_____

_____

(1, 1, 2 marks)

b. The diagram below shows a multicellular fungus reproducing asexually.



(i) Name this type of asexual reproduction.

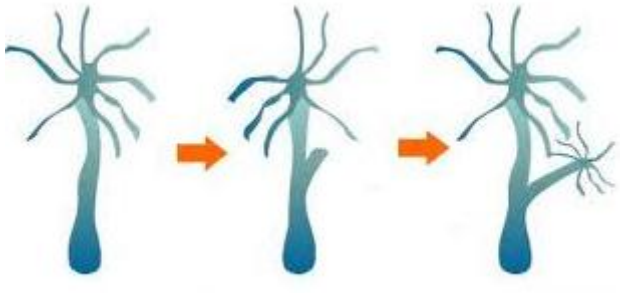
_____

(ii) A biology student decided to grow fungal moulds on a piece of bread. List TWO conditions necessary to grow mould on a piece of bread within a short time.

_____

(1, 2 marks)

c. The following diagram shows another type of asexual reproduction taking place in *Hydra*.



(i) Name the type of asexual reproduction shown in the diagram above.

_____

(ii) *Hydra* shows division of labour between its cells. Explain.

_____

_____

(1, 2 marks)
Total: 10 marks

4. The Għammieri Government Farm uses biological control methods rather than pesticides to control crop eating pests. The predator bug *Orius laevigalus,* is used to control the insect pest thrip. Thrips deposit eggs on leaves of greenhouse plants.

a. List TWO advantages of using biological control methods.

_____

_____ (2 marks)

b. Explain why biological control methods are used mainly in greenhouses.

_____

_____ (2 ma

c. The wasp, *Aphidius colmani*, is used to control the population of aphids. The female wasp lays an egg in the body of an aphid. The young wasp feeds on the body of the aphid until it kills its host. Write the term that describes the association between the wasp and the aphid.

_____ (1 mark)

Total: 5 marks

5a. Diffusion is a passive type of transport. Explain.

_____

_____ (1 mark)

b. Students were provided with three blocks (A, B and C) of gelatine of different sizes containing an indicator which is red in an alkali solution but yellow in acidic conditions. The three blocks were simultaneously put in an acidic solution and the time for the red colour to disappear was recorded. The results are shown in the table below:

Block	***Surface area: Volume ratio***	***Time for colour to disappear (minutes)***
A	3:5	12
B	4:5	6.5
C	1:1	4.75

(i) From the results shown in the table above, compare the time taken for the colour to disappear in relation to surface area to volume ratio.

_____

(ii) Describe ONE other factor that affects the rate of diffusion, apart from the surface area to volume ratio.

_____

(1, 1 mark)

c. In living things, molecules and ions are sometimes pumped across the cell membranes. Name this type of transport.

_____ (1 mark)

d. Describe TWO functions of the cell membrane.

_____

_____ (2 marks)

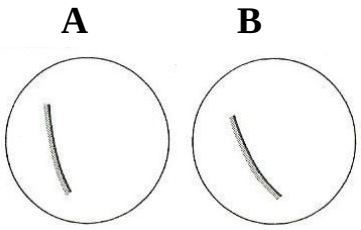
e. Name the outer layer surrounding the cell membrane in plant cells.

_____ (1 mark)

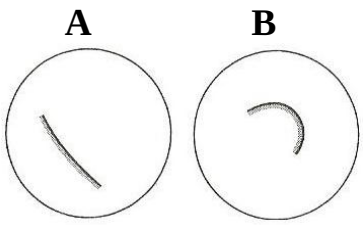
Total: 7 marks

6. In an investigation to observe the process of osmosis, narrow strips of the dan[illegible] were cut. One strip was put in a concentrated sugar solution while another strip was [illegible] an isotonic (same concentration) solution. The following diagram shows the two strips [illegible] and after the experiment.

Before experiment



After experiment



a. Write the letter of the strip placed in concentrated sugar solution. Give a reason for your answer.

Letter: _____ (1 mark)

Reason: _____

_____ (2 marks)

b. Explain why the strips used in this investigation were cut of equal size and thickness.

_____

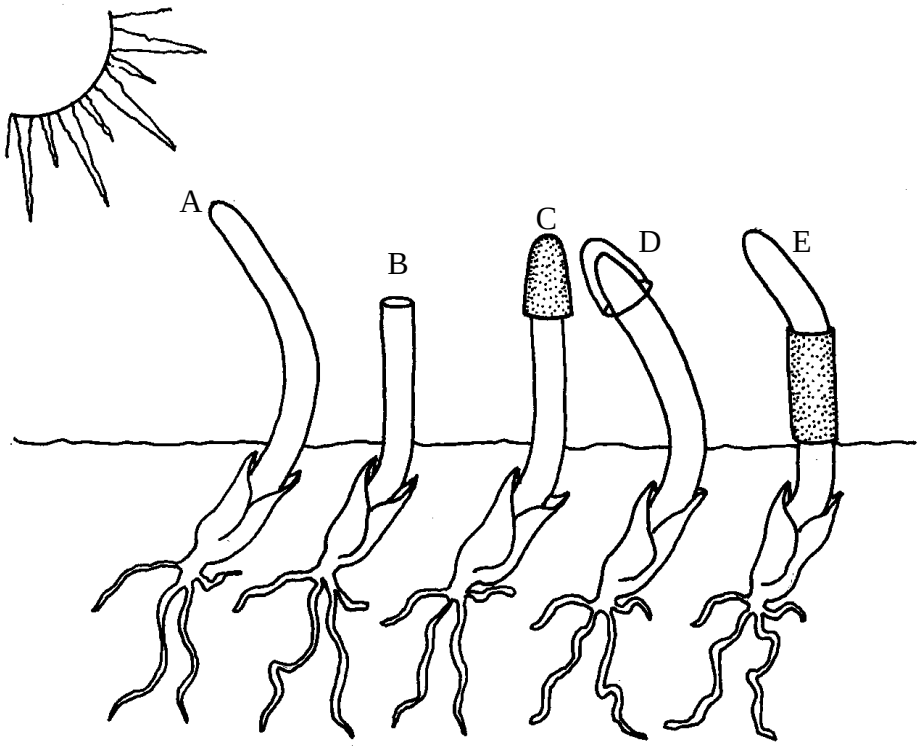
_____ (2 marks)

c. List ONE other variable, besides stem size and thickness, that must remain constant throughout the investigation.

_____ (1 mark)

Total: 6 marks

7. The diagram below shows five coleoptiles (small shoots) receiving unidirectional li



a. Name the type of response shown by shoot A.

_____ (1 mark)

b. Use your biological knowledge to explain why shoot C grows upwards but shoot D bends towards light.

_____

_____

_____ (3 marks)

c. A biology student remarked that shoot B whose tip was cut and removed will start growing after two weeks. Discuss whether you agree with the student's remark. Give a reason for your answer.

_____

_____

_____ (3 marks)

Total: 7 marks

Section B

Answer question 1 and any TWO other questions. This section carries 45 marks.
Write the answers for section B on a foolscap.

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

Wild pollinators support farm productivity and stabilize yield.

Around 84% of European crops are partially or entirely dependent on insect pollination. While managed honeybees pollinate certain crops, wild bees, flies and wasps cover a very broad spectrum of plants, and thus are considered the most important pollinators in Europe. The serious decline in the number of managed honeybees and wild bees reported in Europe over the last few decades can cause yield decreases with threats to the environment. Although honeybees are important pollinators in large scale plantations, for some crops, including sunflowers, a combination of wild bees and honeybees is essential to provide optimal pollination. Wild bees can support farm productivity when the honeybees cannot do the work, for example when their number is insufficient, or when weather conditions prevent them from flying.

Adapted from e! Science News 17/8/2012

a. Distinguish between insect pollinated flowers and wind pollinated flowers by listing THREE characteristics of **each**. You may present your answer in a table. (3 marks)

b. Name the male plant gamete and the female plant gamete. (2 marks)

c. Describe the path followed by the male plant gamete from when it lands on the stigma until it reaches the female gamete. (3 marks)

d. Edible sunflower seeds are usually dispersed by animals such as birds. Explain TWO benefits of seed dispersal away from the parent plant. (2 marks)

e. Bees, flies and wasps are three types of insects that undergo complete metamorphosis. Explain **each** stage of the life cycle of these insects. (4 marks)

f. In some plant species the anthers and stigmas of flowers are ripe at different times. Explain the benefit of this. (1 mark)

Total: 15 marks

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

a. The skin of a lizard is different from that of a frog. (4 marks)

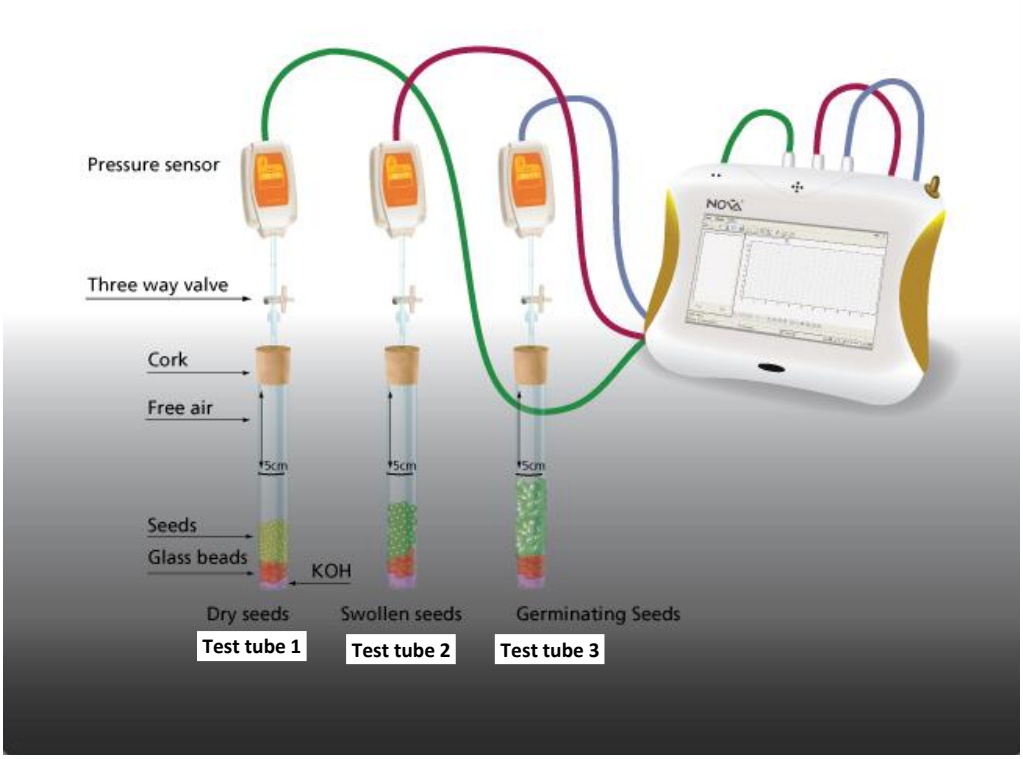
b. A bacterial population grows rapidly in ideal conditions but its numbers will not keep increasing after a while. Then the population decreases suddenly. (3 marks)

c. Bacteria in the gut of cows exhibit mutualism. (3 marks)

d. A shoot was enclosed in a plastic bag. When the plastic bag was removed, the inside of the plastic bag was covered with a thin layer of water. (5 marks)

Total: 15 marks

3. In a laboratory investigation a student used a data logger to measure the respira[illegible] of germinating seeds. The diagram below shows the experimental set up. Test-tube 1 co[illegible] seeds, test-tube 2 contains the same amount of swollen seeds and test-tube 3 c[illegible] germinating seeds. A pressure sensor that measures the change in air pressure resulting f[illegible] oxygen uptake was attached to each test-tube.



a. Write the number of the test-tube with the largest change in the pressure sensor. Give a reason for your answer. (3 marks)

b. Explain why the seeds in test-tube 2 were left to soak for two days before the experiment. (2 marks)

c. A student observes the germination of a Jasmine seed. The student records that the hypocotyl grows from the seed and pulls the cotyledons out of the soil. The cotyledons become the first leaves of the Jasmine seedling.

(i) Name this type of germination.

(ii) The first leaves turn green quickly. What is the biological significance of this?

(iii) Define the term *cotyledons*. (1, 2, 1 mark)

d. The Jasmine plant is a dicotyledonous angiosperm. Describe TWO characteristic features of dicot plants. (2 marks)

e. Mosses are small plants with no vascular system. Describe the environmental conditions necessary for these plants to grow and reproduce. (2 marks)

f. Explain the biological significance of small reduced leaves in conifers. (2 marks)

Total: 15 marks

4. A MEPA report about local soil stated:

> **Around 77% of soils in Malta are either loamy, clay loam or clay soils and have clay co higher than 48%. Such soils may be difficult to work but have higher nutrient retention a water filtration capacities.**

Source: SOER05 Background Report – Soil MEPA

a. In clay soils the spaces between soil particles are small. Explain how this affects soil air. (2 marks)

b. Explain why soils with a high clay content may be difficult to work. (2 marks)

c. Name the type of soil that is loose, light and easy to dig. (1 mark)

d. Name and describe the mode of nutrition which releases minerals into the soil. (3 marks)

e. The MEPA report states that one of the main threats to soil is soil erosion.

(i) Describe TWO ways how soil erosion may occur.

(ii) Describe TWO farming practices that increase the chances of soil erosion. (2, 2 marks)

f. Earthworms present in soil collect leaf litter from the surface and take it to their burrows. Explain why this is beneficial to the soil. (1 mark)

g. Describe the structure of the earthworm that makes the organism well adapted to burrow through the soil. (2 marks)

Total: 15 marks

5a. A virus is not a living thing.

(i) Draw a labelled diagram of a typical virus.

(ii) Explain why viruses need a host to reproduce. (5, 2 marks)

b. A student wrote: **All viruses and bacteria cause disease.** Explain why this statement is incorrect. (2 marks)

c. The Australian bat lyssavirus (ABLV) is distributed throughout Australia in a variety of bat species. Describe the body covering of bats. (1 mark)

d. Some types of bats known as megabats eat fruit and nectar while most microbats eat insects; others may feed on the blood of animals.

(i) Where is nectar produced?

(ii) Blood is a tissue. List TWO types of blood cells. (1, 2 marks)

e. The Bean Pod Mottle virus (BPMV) is a virus disease in soybeans and other legumes. Explain why farmers include legumes in crop rotation. (2 marks)

Total: 15 marks