

DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION
Department for Curriculum Management and eLearning
Educational Assessment Unit
Annual Examinations for Secondary Schools 2012

BIOLOGY – FORM V
TIME: 2 HOURS

NAME: _____ CLASS: _____

Question No.	Section A								Section B					
	1	2	3	4	5	6	7	8	1	2	3	4	5	
Max mark	6	10	6	11	6	5	6	5	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. More than 900 new alien species including the poisonous pufferfish have been encountered in the coastal environments of the Eastern Mediterranean Sea in recent decades. The invasion of alien species affects food chains. The Mediterranean is the world's most invaded sea. Researchers still lack basic knowledge of how alien species affect ecosystems since there is limited information about the animal and plant communities on the coast. The biologist Stefan Kalogirou of the Department of Marine Ecology at the University of Gothenburg remarks that once a species has become established in the Mediterranean Sea, it is almost impossible to eradicate it.

Adapted from Mediterranean Sea invaded by alien species: <http://biologynews.net/archives>

- a. From the passage above, find the term that matches **each** of the following descriptions and write it down in the space provided:

(i) a unit containing all the organisms and their environment interacting together

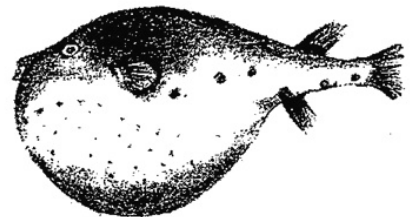
(ii) a group of organisms with similar characteristics that can interbreed with each other to produce fertile offspring

(iii) the organisms of all the different species living in an area at the same time

(iv) a chart showing the flow of energy (food) from one organism to the next, beginning with a producer.

(1, 1, 1, 1 mark)

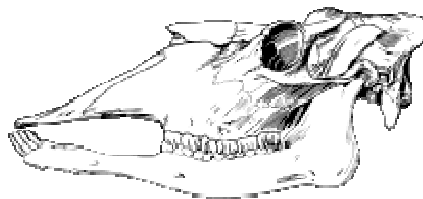
- b. Pufferfish inflate in a ball shape to escape predators. List TWO other possible ways in which organisms avoid being caught by their predators.



(2 marks)

Total: 6 marks

2. Moose are large herbivorous animals. The following diagram shows a moose skull.



- a. On the diagram label the:

(i) teeth used for cropping, as **A**

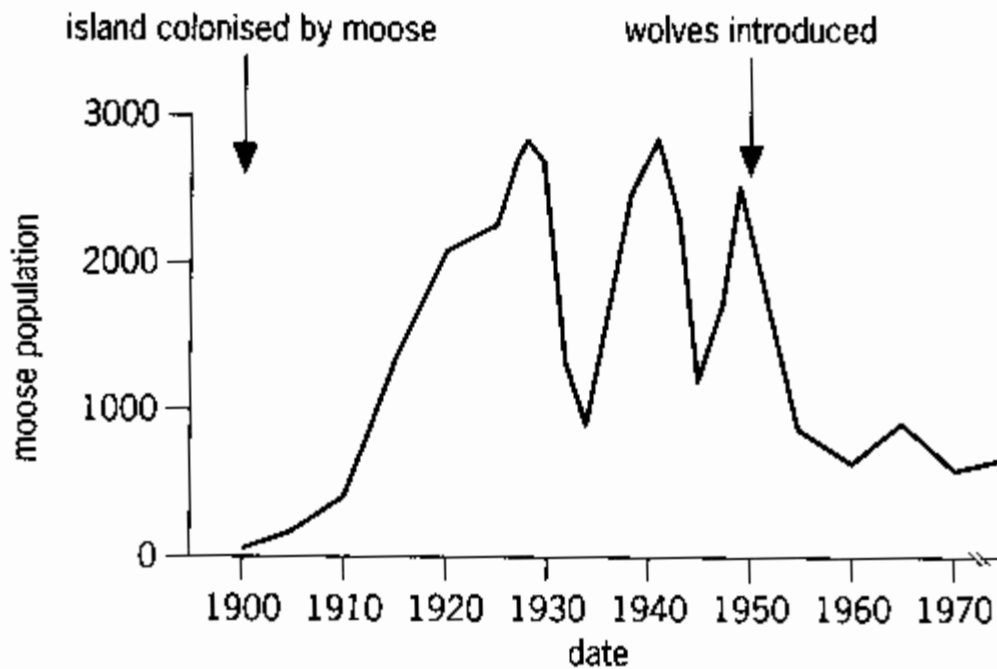
(ii) teeth used for grinding and chewing the chopped vegetation, as **B**.

(1, 1 mark)

- b. Moose (*Alces alces*) first colonised the island Isle Royale in 1900. Initially there were no predators on the island. Wolves (*Canis lupus*) which are the predators of moose were introduced on the island in 1950. Coyotes (*Canis latrans*) used to inhabit Isle Royale but were later hunted by wolves to extinction.

(i) From the passage above name the TWO animals that are closely related.

(ii) The following graph shows the population curves of the moose before and after the introduction of wolves.



Explain the changes in the moose population before the introduction of wolves.

(iii) Wolves catch young, old and sick moose. Why is this beneficial to the wolves?

(1, 2, 1 mark)

- c. In 1980 the canine parvovirus was spread to the wolves on the island. Predict how this affected the wolf population.

(1 mark)

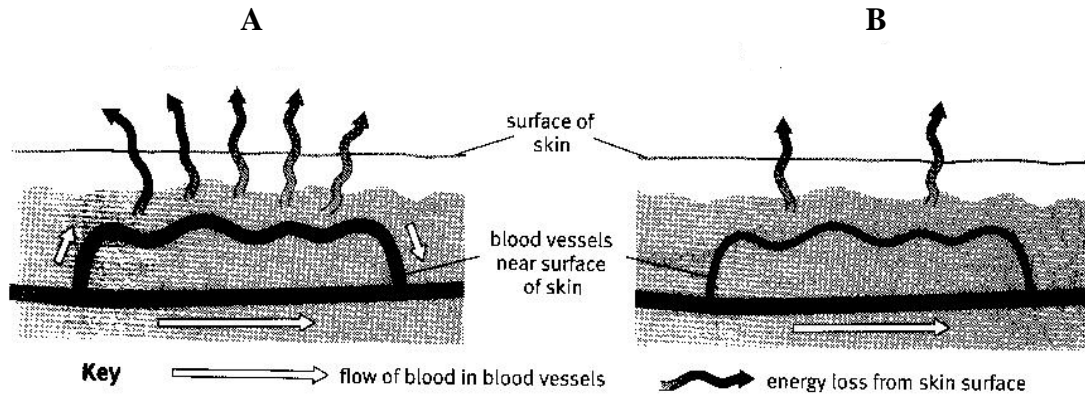
- d. Large numbers of ticks commonly known as Winter Ticks are able to parasitize individual moose. The biting ticks cause a lot of discomfort to the moose, so the moose try to get rid of the ticks by biting off their hair, causing loss of hair. Explain the effect of this hair loss in moose during the cold winter months.

(1 mark)

- e. Research studies show that the moose population in Isle Royale is currently at a low level. Predict how this will affect the wolf population. Give a reason for your answer.

 _____ (2 marks)
Total: 10 marks

3. The following diagrams A and B show two responses that help to control body temperature.



- a. Name **each** process.

A: _____ B: _____ (1, 1 mark)

- b. List TWO other body changes that may take place along with process B.

 _____ (2 marks)

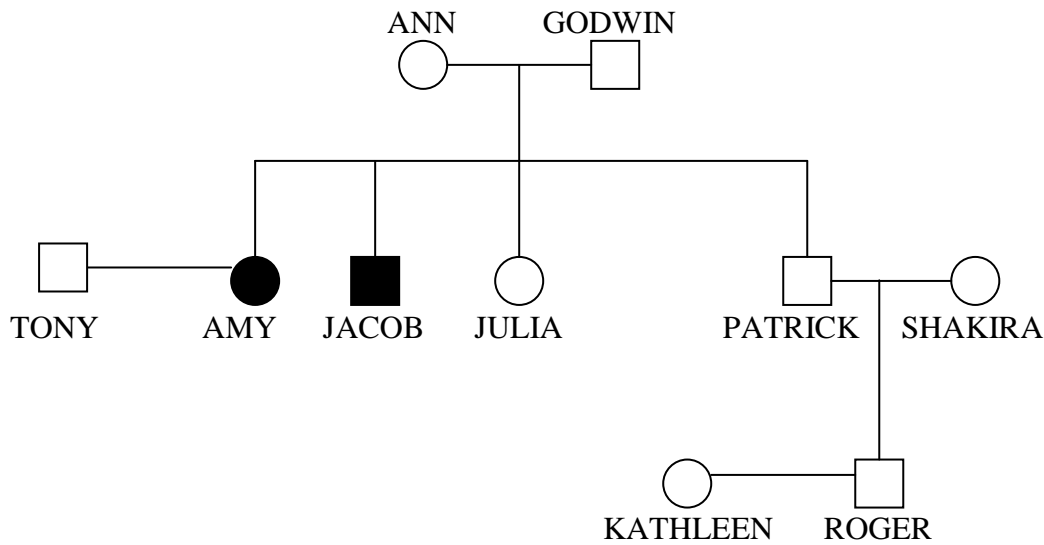
- c. Give a biological explanation for **each** of the following statements:

(i) On a hot day a kangaroo rat produces a lot of saliva which it then licks over the body.

(ii) A mouse exposed to low environmental temperatures lies curled up in a ball.

(1, 1 mark)
Total: 6 marks

4. Canavan disease is an autosomal recessive disorder that causes progressive damage to nerve cells in the brain. The following diagram shows the pattern of inheritance in a family.



Key:



Affected female



Affected male



Normal female



Normal male

- a. Using the letter **R** to represent 'normal' and **r** to represent 'Canavan disease' write the genotypes of:

(i) Godwin _____

(ii) Ann _____

(iii) Jacob. _____

(1, 1, 1 mark)

- b. Roger and his future wife Kathleen were advised by the genetic counsellor that they have a small chance of having a child suffering from the Canavan disease. Use genetic diagrams to work out the percentage chance of having an affected child.

(4 marks)

- c. The genetic counsellor informed Amy and her partner Tony that their children are not affected by the Canavan disorder even though Amy is affected. Explain this by using a pedigree diagram.

(4 marks)

Total: 11 marks

- 5a. Name TWO possible pollutants shown in the following picture.

(2 marks)



- b. List TWO harmful effects of the type of pollution shown in **each** of the following pictures.



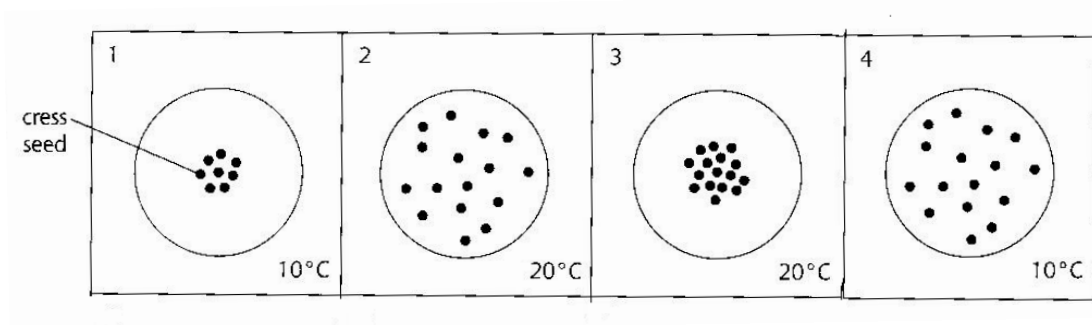
- (i)

(ii) _____

(2, 2 marks)
Total: 6 marks



6. A biology teacher set up an experiment to investigate the effect of temperature on germination and the effect of spacing between seeds on germination. The teacher used cress seeds and a growth medium to set up four Petri dishes (1 to 4) as shown below.



- a. Write the numbers of the TWO Petri dishes that should be compared to find the effect of temperature on germination.
 _____ (1 mark)
- b. Write the numbers of the TWO Petri dishes that should be compared to investigate the effect of spacing between seeds on germination.
 _____ (1 mark)
- c. List TWO variables that need to be kept the same in both investigations.

 _____ (2 marks)
- d. Describe ONE method that the teacher can use to measure how much germination has taken place within each Petri dish.

 _____ (1 mark)

Total: 5 marks

7. The table below shows the results of an investigation into how the distribution of three species of grass varied with soil depth.

Soil depth (m)	Species of grass		
	<i>Panicum maximum</i>	<i>Themedia triandra</i>	<i>Eragrostis superba</i>
0-0.4	64.9	66.5	73.6
0.4-0.8	14.2	25.9	15.5
0.8-1.2	12.1	5.6	7.4
1.2-1.6	4.7	1.4	2.6
1.6-2.0	2.6	0.6	0.8
2.0-2.4	1.2	0	0.1
2.4-2.8	0.3	0	0
Total dry mass (g per plant)	114	58	27

- a. List ONE reason why the three grass species have the bulk of the roots close to the soil surface.
_____ (1 mark)
- b. From the table above name the plant that grows best if the ground is lightly sprinkled with water at regular intervals.
_____ (1 mark)
- c. All three species of grass grow in hot dry conditions. From the table above name the species that is able to survive better than the other two species during lengthy periods of hot dry weather. Give a reason for your answer.

_____ (2 marks)
- d. The following diagrams A and B show two types of root systems.



A



B

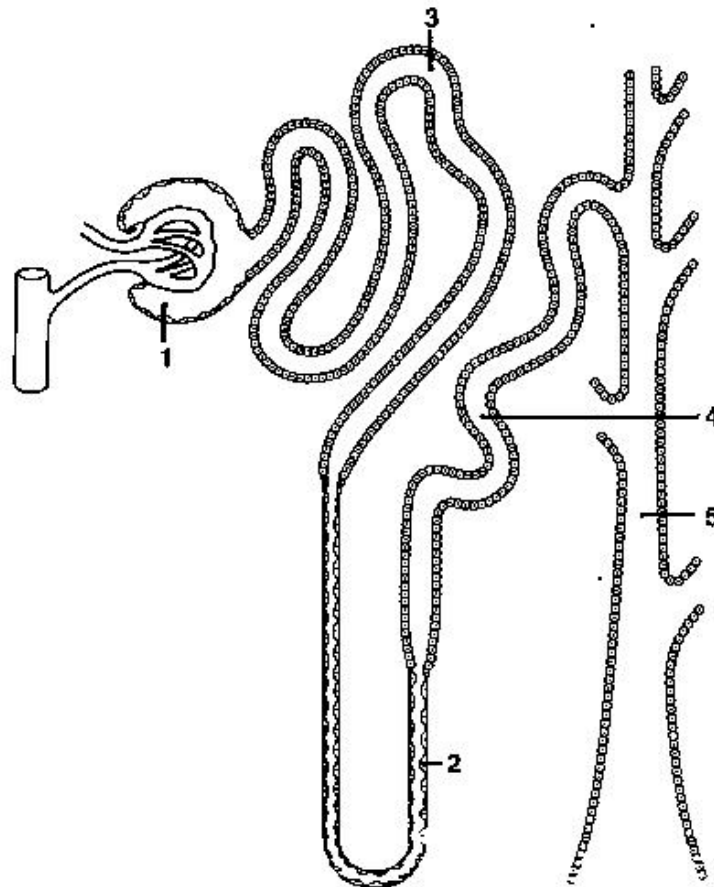
Write the letter of the root system you would expect to find in a dicot plant.

- _____ (1 mark)
- e. Root hair cells have a large surface area (relative to other cells). List the advantage of this adaptation in root hair cells.

_____ (1 mark)

Total: 6 marks

8. The following diagram represents a single nephron from a mammalian kidney.



- a. Write the number of the region that is:
- (i) the main site for the reabsorption of glucose and amino acids _____
 - (ii) the site of ultrafiltration _____
 - (iii) the site that takes urine to the pelvis of the kidney. _____

(1, 1, 1 mark)

- b. Which of the numbered regions would be particularly long in a desert mammal? Give a reason for your answer.

 _____ (2 marks)

Total: 5 marks

Section B

Answer any **THREE** questions from this section. Answer the questions of Section B in full.

1. The water hyacinth is a monocotyledonous plant that floats on the water surface. In many subtropical and tropical countries it is a significant weed that completely covers many lakes and rivers.
 - a.
 - (i) Define the term *monocot*.
 - (ii) In water hyacinth plants stomata are open most of the time. Explain. (1, 1 mark)
 - b. Explain why the native aquatic plants under the dense cover of water hyacinth plants have difficulty to carry out photosynthesis. (1 mark)
 - c. Explain why few species of fish can survive in lakes covered by a dense mat of water hyacinth plants. (2 marks)
 - d. The water hyacinth plants create a prime habitat for a species of snail known to host a parasitic flatworm that causes a disease called snail fever.
 - (i) Name the phylum to which the snail belongs.
 - (ii) Parasites have effective dispersal mechanisms. Give ONE advantage of this adaptation of parasites.
 - (iii) Explain why diffusion alone can supply all the transport needs in flatworms. (1, 2, 2 marks)
 - e. Some experiments were carried out to find out if the beetle *Neochetina eichhorniae* was suitable for the biological control of water hyacinth plants.
 - (i) List ONE possible limitation of using biological control methods.
 - (ii) Describe the exterior structure of a typical insect like the beetle. (2, 3 marks)
2. Chlamydia is a sexually transmitted disease named for the bacterium *Chlamydia trachomatis* that causes it. *Chlamydiae* were initially considered to be more closely related to viruses than to bacteria but research indicates that these organisms are cellular. Even so they are obligate parasites due to their inability to produce ATP molecules.
 - a. Define the term *parasite*. (2 marks)
 - b. Give a biological explanation for **each** of the following statements:
 - (i) Bacteria are called prokaryotic cells.
 - (ii) Bacteria vary in their shape.
 - (iii) Some bacteria are surrounded by a slimy capsule. (2, 2, 1 mark)
 - c. Name the type of white blood cell that produces antibodies when bacteria invade body tissues. (1 mark)
 - d. The skin that acts as a barrier against the entry of bacteria, is a waterproof layer. Explain the importance of the waterproof layer in skin. (2 marks)

- e. List ONE
- (i) difference between viruses and bacteria
 - (ii) way in which sexually transmitted diseases can be prevented. (2, 2 marks)
- f. Patients suffering from Chlamydia can develop pelvic inflammatory disease (PID) in which the infection spreads from the cervix to the oviducts. As a result there is blockage of the oviducts. What is a possible consequence of this? (1 mark)

Total: 15 marks

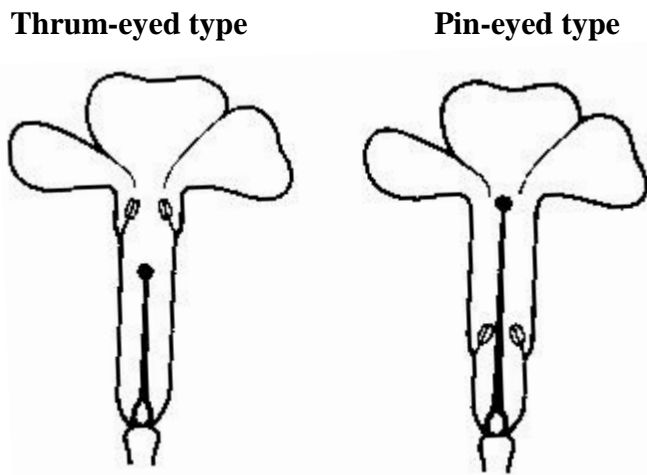
3. Describe the role of:
- a. magnesium and nitrogen in plant growth (3 marks)
 - b. the pancreas in digestion (5 marks)
 - c. feathers in keeping birds warm (3 marks)
 - d. the liver in digestion (2 marks)
 - e. intercostal muscles during inspiration (breathing in). (2 marks)

Total: 15 marks

- 4a. A person drinks a glass of lemonade. Name the parts of the brain to which **each** of the following descriptions would apply:
- (i) receives impulses from touch receptors in the lips
 - (ii) contains receptors that respond to a change in the concentration of the blood plasma
 - (iii) enables the person to coordinate the movements necessary to drink from the glass. (1, 1, 1 mark)
- b. When the lemonade touches receptors in the throat a swallowing reflex action occurs. List TWO other examples of reflex actions. (2 marks)
- c. The pituitary gland located in the brain produces hormones that stimulate other glands to produce their secretions.
- (i) What type of glands produce hormones?
 - (ii) How do hormones travel from the site where they are produced to the target organs?
 - (iii) The Luteinising hormone (LH) controls the secretion of sex hormones. Puberty is brought about by sex hormones. List TWO changes that boys undergo during puberty. (1, 1, 2 marks)
- d. During puberty females start menstruating. The menstrual cycle is a regular series of changes that take place in the female reproductive system to prepare for fertilisation and possible pregnancy.
- (i) Define the term *fertilisation*.
 - (ii) Explain why the sheath (condom) is considered as an effective way of preventing fertilisation.
 - (iii) What happens to the uterus lining if a female becomes pregnant? (2, 2, 2 marks)

Total: 15 marks

5. The primrose is native to Britain and Europe. It produces flowers that generally vary in colour from pale cream to pale yellow. There are two different types of primrose flowers. One is called the pin-eyed while the other is called the thrum-eyed primrose. In pin-eyed flowers, the stigma is at the top of the flower tube and can be seen in the centre of the flower, looking like a small green pin head. In this type of flower, the anthers are in a ring around the style, halfway down the central flower tube. In the thrum-eyed type, the style reaches only halfway up the flower tube, so that the stigma is also positioned halfway up inside the tube. The anthers in the thrum-eyed type are located at the top of the flower tube. The following diagram shows the two different types of primrose flowers.



- a. From the passage above select the term that best describes:
- the part of the flower that contains the pollen sacs
 - the slender stalk that connects the stigma to the ovary
 - the reproductive structure of flowering plants. (1, 1, 1 mark)
- b. The production of two different types of flowers in primroses is an adaptation to promote cross pollination. What is the advantage of cross pollination? (1 mark)
- c. Primroses prefer rich humus soil.
- In which layer of the soil is humus mostly found?
 - List TWO advantages of humus.
 - Explain why oxygen is needed for material to decay into humus.
 - What happens to the amount of oxygen in waterlogged soils? (1, 4, 1, 1 mark)
- d. Holly trees are known for their spiny evergreen leaves and vivid red berries popular during the Christmas season. The male and female flowers of the holly tree are produced on separate plants.
- What must a gardener do to ensure berry production?
 - Holly trees grow best in acidic soils. Describe ONE method that can be used to increase the pH of acidic soil. (2, 2 marks)

Total: 15 marks