SECONDARY SCHOOL ANNUAL EXAMINATIONS 2009

Directorate for Quality and Standards in Education
Educational Assessment Unit

BIOLOGY – FORM V
TIME: 1H 45 MIN

NAME: _____ CLASS: _____

Question No.	Section A								Section B				
	1	2	3	4	5	6	7	8	1	2	3	4	5
Max mark	6	5	7	8	10	7	5	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. List ONE effect of **each** of the following blocked passages:

a. blocked fallopian tubes _____

b. blocked bile duct _____

c. blocked oesophagus _____

d. blocked stomata _____

e. blocked artery _____

f. blocked synapse. _____

(1, 1, 1, 1, 1, 1 mark)
Total 6 marks

2. Alien species are among the major causes of decreased biodiversity. Alien species also known as introduced or invasive species, do not belong to ecosystems in which they are intentionally or unintentionally placed.

a. Define the term ecosystem.

_____ (1 mark)

b. A well known invasive species is the bivalve mussel called zebra mussel (*Dreissena polymorpha*).
Fill in the following classification table for the zebra mussel. The first one has been done as an example.

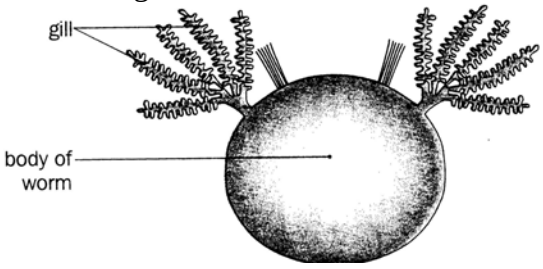
Kingdom	**Animal**
Phylum	
	Bivalvia
	Veneroida
	Dreissenidae
Genus	
Species	

(3 marks)

c. List ONE effect of an alien species on the native species.

_____ (1 mark)
Total 5 marks

3. The lugworm is a marine annelid that lives in a burrow in the mid-shore. The lugworm has gills along its body that extract oxygen from seawater. The following diagram shows a cross-section through the body and gills of the lugworm.



a. From the diagram list ONE feature that makes the structure of the gill an efficient g… surface.

_____ (1 …

b. Name and describe the gas exchange system in insects.

_____

_____ (2 marks)

c. Animals that use their body surface for gas exchange must have a high surface area to volume ratio. Explain.

_____

_____ (2 marks)

d. The following table shows the carbon dioxide concentration in blood and the amount of air taken in by breathing movements, at each carbon dioxide concentration.

Carbon dioxide concentration in blood (arbitrary units)	40	42	44	46	48	50	52
Air taken in (dm^3 min^{-1})	8	15	22	29	36	43	50

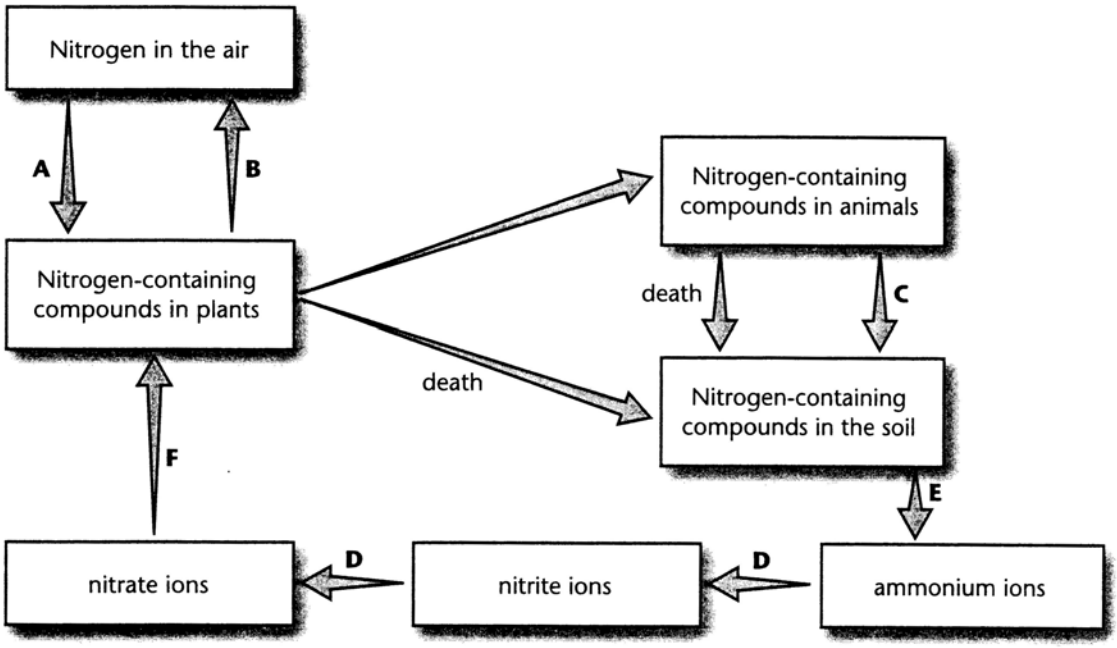
Describe what happens to the amounts of air taken in, with increasing carbon dioxide concentration in blood. Give a reason for your answer.

_____

_____ (2 marks)

Total 7 marks

4. The following diagram shows the nitrogen cycle.



a. Name the process occurring at:

(i) A: _____

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

b. Write the letter representing the process of excretion.

_____ (1 mark)

c. Name ONE biological molecule that contains nitrogen, that is present in animals.

_____ (1 mark)

d. Name the micro organism necessary for process:

(i) B: _____

(ii) D: _____ (1, 1 mark)

e. Explain why ploughing fields regularly can bring about a reduction of process B.

_____

_____ (1 mark)

f. Give ONE reason why farmers do not like the soils in their fields to become waterlogged.

_____ (1 mark)

Total 8 marks

5. Sickle cell anaemia is an inherited disease in which the body makes sickle-shaped red blood cells; sickle cell means that the red blood cells are shaped like a "C". Sickle shaped red blood cells contain abnormal haemoglobin. Sickle shaped red blood cells do not move easily through the blood vessels. They are stiff and sticky and tend to form clumps that get stuck in the blood vessels.

a. (i) Describe the structure of normal red blood cells.

_____

(ii) Where are red blood cells produced?

_____

(1, 1 mark)

b. Name the mineral necessary for the formation of haemoglobin in red blood cells.

_____ (1 mark)

c. List ONE effect of the sickle red blood cells clumping and getting stuck in blood vessels.

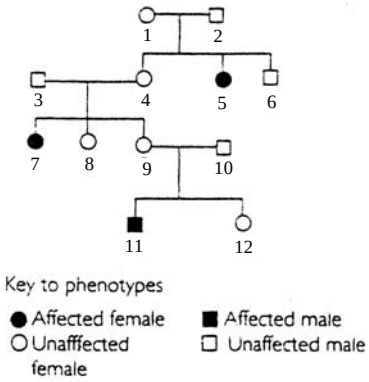
_____ (1 mark)

d. Two concerned parents asked their son to avoid sitting in class near a child diagnosed with the sickle cell disorder. Explain whether the parents are correct in being concerned that their son will become affected by the sickle cell disorder.

_____

_____ (1 mark)

e. The following diagram shows the pedigree of a family affected with sickle cell anae
cell anaemia is an autosomal recessive inherited disorder.



(i) From the pedigree chart above, list TWO numbers of individuals , that are **definitely** heterozygous.

_____ _____ (2 marks)

(ii) Individual 12 marries a male with no history of sickle cell anaemia in his family. Their three children did not suffer from the sickle cell disorder.
Using '**A**' to represent **normal** and
'**a**' to represent **sickle cell anaemia** write the genotype of:

- the male married to individual 12 _____
- the TWO possible genotypes of individual 12 _____

(1, 2 marks)
Total 10 marks

6. When the back of the hand accidentally touches a hot object, the biceps muscle in the arm contracts and the hand is rapidly removed. This is an example of a reflex action involving three neurones.

a. List TWO characteristics of reflex actions.

_____

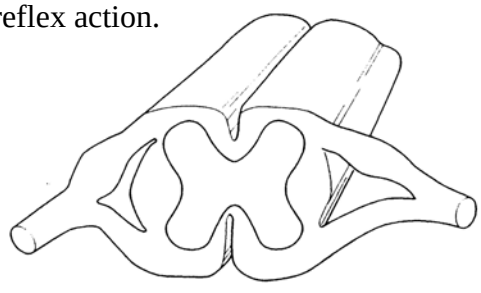
_____ (2 marks)

b. Name the:
(i) receptor
and (ii) effector
in the reflex action describe above.

(i) _____

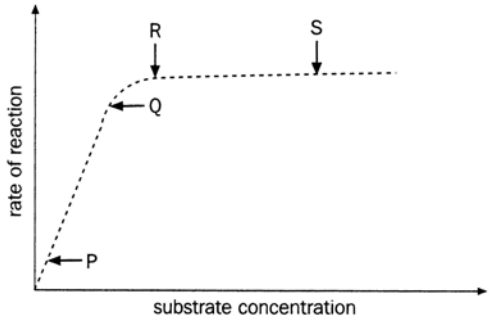
(ii) _____ (1, 1 mark)

c. Complete the following cross-sectional diagram through the spinal cord by showing the neurones involved in the reflex action.



(3 marks)
Total 7 marks

7. A biology student investigated the effect of increasing substrate concentration on th
enzyme catalysed reaction. The following graph shows the results obtained by the stud



a. (i) Name the factor that determines the rate of reaction between points P and Q.

_____

(ii) Describe what happens to the rate of reaction between points R and S.

_____

(iii) Name ONE factor that could account for the rate of reaction between R and S.

_____

(1, 1, 1 mark)

b. What should be measured in order to determine the rate of an enzyme-catalysed reaction?

_____ (1 mark)

c. Bile contains no digestive enzymes but it is important in the digestion of lipids. Explain.

_____

_____ (1 mark)

Total 5 marks

8. List ONE positive effect of **each** of the following pro-environmental actions:

a. Using low-sulphur fuels in power stations.

_____

b. Composting vegetable scraps.

_____

c. Treating sewage before being released into the sea.

_____

d. Building rubble walls around fields.

_____

e. Re-using the blank side of printed paper matter.

_____

f. Reducing the use of artificial fertilisers.

_____

g. Recycling.

_____

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

Total 7 marks

Section B

Choose any THREE questions from this section. Answer the questions you choose on a foolscap.

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

Dutch elm disease (DED) is a disease caused by a fungus. It is one of the most devastating tree diseases in Europe and North America. The fungus causing DED is transmitted by bark beetles carrying spores on their bodies.

After an elm tree is infected with only a few spores of the DED fungus, the spores reproduce rapidly in the vascular system of the tree. As a result they begin to block the tree's xylem vessels.

a. (i) Name the reproductive organs in fungi in which spores are produced.
(ii) List ONE beneficial effect of fungi. (1, 2 marks)

b. There are three types of bark beetles:
the large Elm bark beetle *Scolytus scolytus*,
the native Elm bark beetle *Hylurgopinus rufipes*
and the European Elm bark beetle *Scolytus multistriatus*.

Which two types of beetle are most closely related? Give a reason for your answer. (2 marks)

c. There are two types of vascular tissue in plants, the xylem and the phloem.
(i) Name the substances transported in the phloem and xylem.
(ii) Describe the direction of the transport of the substances you mention in c (i). (2, 3 marks)

d. Draw a diagram to show the arrangement of the xylem and the phloem in a root. (5 marks)

Total 15 marks

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

a. A sheep has no incisors on the upper jaw and no canines at all.

b. Polar bears have small ears and oily fur.

c. Some protists such as the Euglena are bright green in colour.

d. Frogs have a moist skin.

e. The drone-fly is a species of hoverfly that resembles bees and wasps. (3, 3, 3, 3, 3 marks)

Total 15 marks

3. Prostate cancer is a disease in which cancer develops in the prostate gland in the male reproductive system. The gland is located in the pelvis under the urinary bladder and in front of the rectum. The prostate gland surrounds part of the urethra.

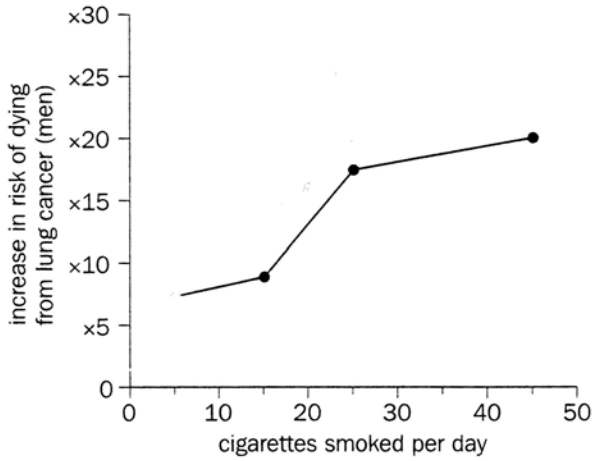
a. Describe the function of the prostate gland. (2 marks)

b. Name:
(i) the liquid stored in the urinary bladder
(ii) the substance stored in the rectum. (1, 1 marks)

c. Draw a labelled diagram to illustrate the urinary system in humans.

d. Some males undergo the process of vasectomy as a birth control method.
   (i) Describe the process of vasectomy.
   (ii) Explain why vasectomy is considered as a permanent birth control method. (1, 2 marks)

e. Another common cancer in males is lung cancer. Smoking cigarettes is the main cause of lung cancer. The following graph shows the relationship between the number of cigarettes that a person smokes and the risk of dying from lung cancer.



   (i) Describe the relationship between the number of cigarettes smoked and the risk of dying from lung cancer.

   (ii) List ONE measure taken locally to help reduce the incidence of lung cancer.

(2, 2 marks)
Total 15 marks

4. Distinguish between:

a. identical and non-identical twins

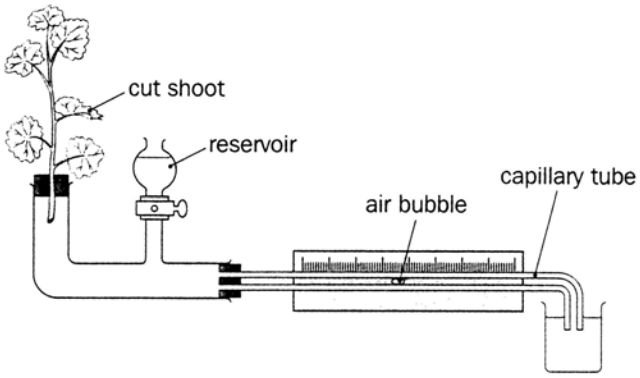
b. fertilisation and implantation

c. pollination and germination

d. phototropism and geotropism

e. ingestion and egestion. (4, 3, 3, 2, 3 marks)
Total 15 marks

5. The following apparatus is used to measure the rate of transpiration in a leafy shoot.



a. (i) Name the apparatus shown.
(ii) Define the term transpiration. (1, 2 marks)

b. List TWO factors that affect the rate of transpiration. (2 marks)

c. Stomata are tiny pores on the surface of a leaf.
(i) Name the gas that enters the stomata during the day.
(ii) Draw a labelled diagram of an opened stoma. (1, 3 marks)

d. Mineral salts in the form of ions are drawn into the roots. Some mineral ions are taken up by passive diffusion while others are taken up by active transport.
(i) Distinguish between passive and active transport.
(ii) List TWO minerals needed by plants and write the importance of **each** mineral you mention. (2, 4 marks)

Total 15 marks