Write your Examination Number here ☞

Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2009

BIOLOGY - ORDINARY LEVEL

THURSDAY, 11 JUNE - MORNING, 09.30 to 12.30

Section A Answer any **five** questions from this section.
Each question carries 20 marks.
Write your answers in the spaces provided on **this examination paper**.

Section B Answer any **two** questions from this section.
Each question carries 30 marks.
Write your answers in the spaces provided on **this examination paper**.

Section C Answer any **four** questions from this section.
Each question carries 60 marks.
Write your answers in the **answer book**.

It is recommended that you should spend not more than 30 minutes on Section A and 30 minutes on Section B, leaving 120 minutes for Section C.

You must return this examination paper with your answer book at the end of the examination.

[OVER]

Section A

Answer any five questions.
Write your answers in the spaces provided.

1. Answer any **four** of the following parts:

(a) Name the chemical elements present in carbohydrates.

_____

(b) Which two of these elements always occur in a 2:1 ratio in carbohydrates?

_____

(c) Name a structural carbohydrate.

_____

(d) Give a function of carbohydrates other than a structural one.

_____

(e) Name a chemical element always present in proteins but not in carbohydrates.

_____

2. Choose each term from the following list and place it in **Column B** to match a description in **Column A.** The first one has been done as an example:

trophic level, niche, habitat, ecosystem, biosphere

Column A	Column B
Where an organism lives	**habitat**
All places where life is possible	
Organism's role in ecosystem	
Position in a pyramid of numbers	
Organisms and their environment	

3. Natural selection is an important aspect of the study of evolution. Answer the following parts in relation to evolution and natural selection.

(a) What is meant by natural selection? _____

_____

(b) Name a scientist who is associated with the Theory of Natural Selection.

_____

(c) Variation is essential for natural selection. Mutation can give rise to variation.
Give **two** causes of mutation.

(i) _____

(ii) _____

(d) Give **one** source of evidence for the occurrence of evolution._____

_____

4. Indicate whether the following are true (**T**) or false (**F**) by drawing a circle around **T** or **F** in each case.

Example: The cells produced by meiosis are haploid	(T)	F
The cells produced by mitosis are identical.	**T**	**F**
Meiosis gives rise to variation.	**T**	**F**
Mitosis always produces four new cells.	**T**	**F**
Meiosis is never involved in gamete formation.	**T**	**F**
Single-celled organisms use mitosis for reproduction.	**T**	**F**

[OVER]

5. (a) Name the liquid part of blood.

_____

(b) Give **two** components of this liquid.

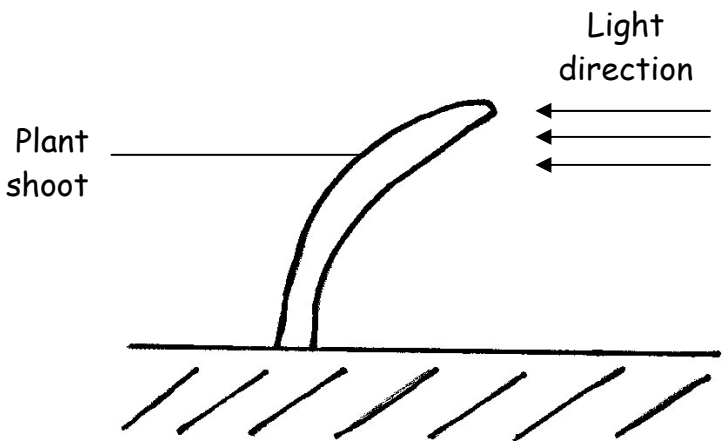
(i) _____

(ii)_____

(c) Complete the following table in relation to blood cells:

Cell type	**One function**
Red blood cell	
White blood cell	
Platelet	

6.



(a) Give the term used for the growth response shown by the plant shoot in the diagram above.

_____

(b) Why is this growth response of benefit to plants?

_____

(c) Name the group of substances that controls such responses.

_____

(d) Name the tissue through which the substances named in (c) are transported in the plant.

_____

(e) Name another growth response found in plants.

_____

Section B

Answer any <u>two</u> questions.
Write your answers in the spaces provided.
Part (a) carries 6 marks and part (b) carries 24 marks for all questions in this section.

7. (a) The main ingredient in a sports drink is water.

(i) Give **one** reason why the body needs water.

_____

(ii) Give **one** way in which water is lost from the body.

_____

(b) The composition of a **colourless** sports drink is to be investigated. Use your knowledge of food testing to answer the following:

1. (i) Name the test **or** name the chemical used to test the sports drink for the presence of glucose (reducing sugar).

_____

(ii) If glucose is present in the drink, what colour change would you expect to see? In your answer give the initial **and** final colour of the test solution.

_____

(iii) Is heat necessary for this test?

_____

2. (i) Name the test **or** give the chemicals used to test the sports drink for the presence of protein.

_____

(ii) If protein is present in the drink, what colour change would you expect to see? In your answer give the initial **and** final colour of the test solution.

_____

(iii) Is heat necessary for this test?

_____

[OVER]

8. (a) (i) Define the term *osmosis.* _____

_____

(ii) Give an example of osmosis in plants. _____

_____

(b) Answer the following questions in relation to practical work you carried out to investigate osmosis.

(i) In the space below draw a labelled diagram of the apparatus you used in the investigation.

(ii) Describe how you used this apparatus to carry out the investigation.

_____

_____

_____

_____

_____

(iii) State the result(s) of your investigation.

_____

_____

(iv) Briefly explain the result(s) you have given in part (iii).

_____

_____

_____

9. (a) (i) What is meant by the term *digestion*?

_____

(ii) Why does digestion occur in seeds during germination?

_____

(b) Answer the following questions in relation to practical work you carried out to investigate digestive activity in germinating seeds.

(i) Name a plant that provides suitable seeds for this investigation.

_____

(ii) The seeds were divided into two batches. One batch was used untreated.
How did you treat the other batch of seeds before using them in the investigation?

_____

(iii) Explain why you treated the second batch of seeds in the way described in (ii).

_____

_____

(iv) Describe how you carried out the investigation. In your description outline how you demonstrated that digestion had occurred.

_____

_____

_____

_____

_____

_____

_____

(v) Give the results of your investigation.

_____

_____

_____

_____

[OVER]

Section C

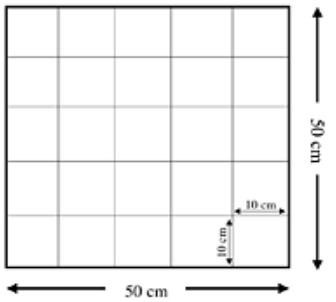
Answer any <u>four</u> questions.
Write your answers in the answer book.

10. (a) (i) Distinguish between biotic and abiotic factors.

(ii) An <u>edaphic</u> factor is an example of an abiotic factor. Explain the underlined term.

(9)

(b)



(i) Distinguish between quantitative and qualitative surveys in an ecosystem.
(ii) Name the piece of equipment shown above which is used in a quantitative study of an ecosystem.
(iii) Why is the above piece of apparatus unsuitable for studying most animal populations?
(iv) Suggest a plant that would not be suitable to survey using the above apparatus.
(v) Outline how this piece of apparatus is used for studying plant populations
(vi) How did you present your results?
(vii) State **one** possible source of error in a survey of an ecosystem. **(27)**

(c) Read the following extract and answer the questions that follow.

'Invasion of the jellyfish: Mediterranean on alert as hundreds suffer from stings.'

As thousands of tourists head to the Mediterranean, their holiday enjoyment is being threatened by hordes of jellyfish. French emergency services received more than 500 calls for help in a single day. It is a pattern being repeated along the shores of Mediterranean. Much of the southern – and even northern – coastlines of Spain have been hit. Paddlers and swimmers suffered painful stings from a species commonly known as the mauve stinger.
When a person is stung the venom (poison) from the jellyfish stinging cells causes swelling, redness and oozing. The venom can also cause an allergic response. There is no anti-venom and vinegar is useless. Jellyfish have no autonomy of movement and are swept around the oceans by wind and tide. This is the eighth year in succession that they have stormed the smartest resorts in the Mediterranean.

[Article adapted from the Independent on Sunday (U.K.) 24th July 2008. By Matthew Kay in Paris, Elizabeth Nash in Madrid and Peter Popham in Rome.]

(i) What is meant by the term *species*?
(ii) Which species of jellyfish was involved in the invasion along Mediterranean shores?
(iii) Name **one** country that has been affected by this invasion.
(iv) Give **two** ways in which the jellyfish venom can affect a person.
(v) Suggest why jellyfish produce a venom.
(vi) These jellyfish are usually found in tropical waters. Suggest **one** reason for their increased occurrence in the Mediterranean in recent years.
(vii) What do you think is meant by the phrase "Jellyfish have no autonomy of movement"?

(24)

11. (a) Explain the following terms as used in genetics:
(i) *heterozygous*
(ii) *incomplete dominance*
(iii) *phenotype*. **(9)**

(b) In snapdragon plants the allele for red flower **(R)** is incompletely dominant to the allele for white flower **(r)**. Heterozygous plants have pink flowers.

(i) Using a Punnett square, or otherwise, give the genotypes of the parents and find the genotypes and phenotypes of the offspring of the following cross:

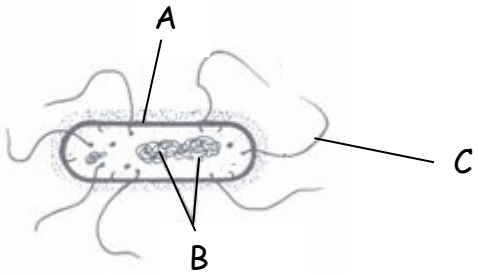
Pink-flowered snapdragon x Pink-flowered snapdragon

(ii) If 120 new plants were produced in this cross, how many of them would you expect to have pink flowers?
Explain how you got this answer. **(27)**

(c) (i) What is meant by DNA profiling?
(ii) In DNA profiling, what are used to cut DNA strands into fragments?
(iii) On what basis are these fragments then separated?
(iv) Give **two** applications (uses) of DNA profiling.
(v) Name the plant from which you isolated DNA in your practical studies.
(vi) For what precise purpose did you use freezer-cold ethanol (alcohol) in your isolation of DNA?
(24)

12. (a) (i) <u>Decomposition</u> is essential for the addition of nutrients to the soil. Explain the underlined term.
(ii) Name two groups of micro-organisms in the soil which are responsible for decomposition. **(9)**

(b) The diagram shows the structure of a typical bacterial cell.



(i) Name the bacterial cell parts A, B and C.
(ii) What is the function of C?
(iii) Name any **two** of the main bacterial types (shapes).
(iv) By which method do bacterial cells reproduce?
(v) Some bacteria are *anaerobic*. What does this mean?
(vi) What are *pathogenic* bacteria?
(vii) Give **two** example of the economic importance of bacteria. **(27)**

(c) (i) Explain why it is difficult to classify viruses as living organisms.
(ii) Give the **two** main chemical components of a virus.
(iii) Briefly describe how viruses reproduce.
(iv) Give **one** way in which viruses are beneficial and **one** way in which they are harmful.
(24)

[OVER]

13. (a) Name the blood vessel referred to in each of the following cases:

(i) The vein connected to the lungs.
(ii) The artery connected to the kidneys.
(iii) The vein that joins the intestine to the liver.

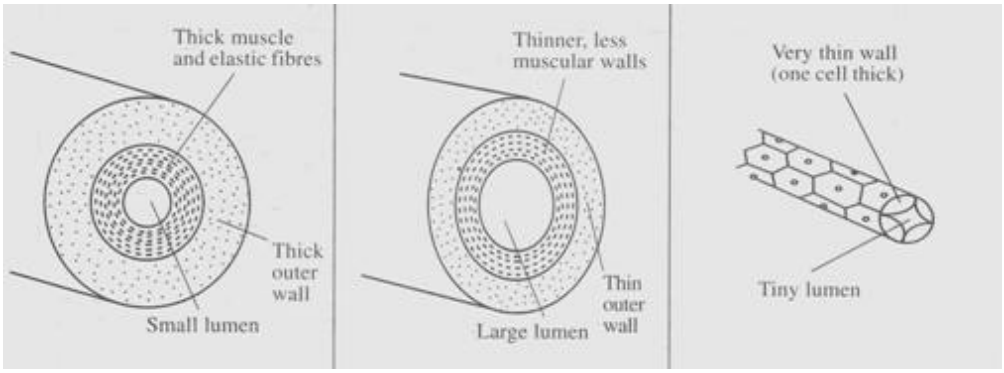
(9)

(b) The following questions relate to the human heart.

(i) Give the precise location of the heart in the human body.
(ii) What structure(s) protects the heart?
(iii) Name the upper chambers of the heart.
(iv) Name the valve between the upper and lower chambers on the left-hand side.
(v) What is the average resting human heart rate?
(vi) Give **two** factors which cause an increase in heart rate.
(vii) Name the blood vessels that bring oxygen to the heart muscle.
(viii) Explain why the walls of the lower chambers of the heart are thicker than the walls of the upper chambers.

(27)

(c) **Copy the table below into your answerbook** and use your knowledge of blood vessels and the information in diagrams A, B and C to complete the table. Some boxes have been filled as examples.



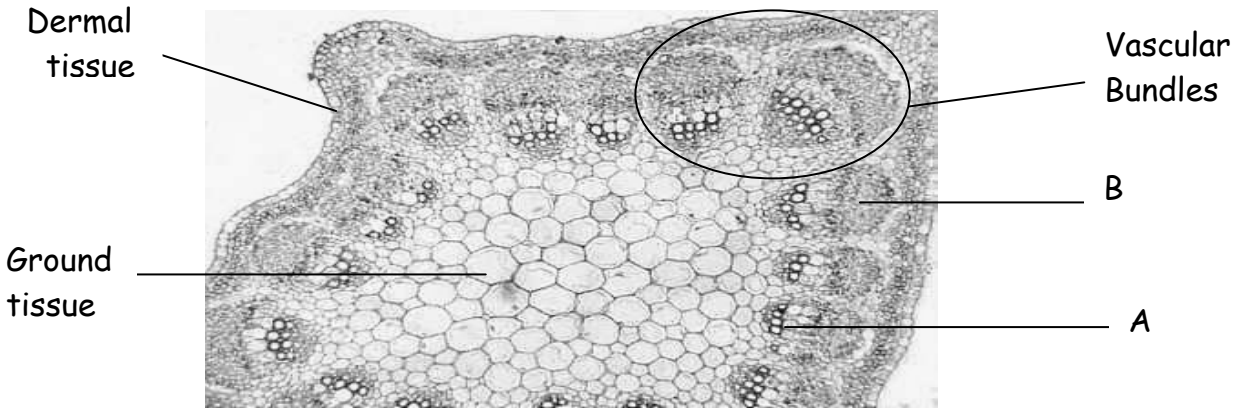
A B C

Vessel	**A**	**B**	**C**
Name		Vein	
Lumen	Small		
Wall			
Direction of blood flow			
Valves present			

(24)

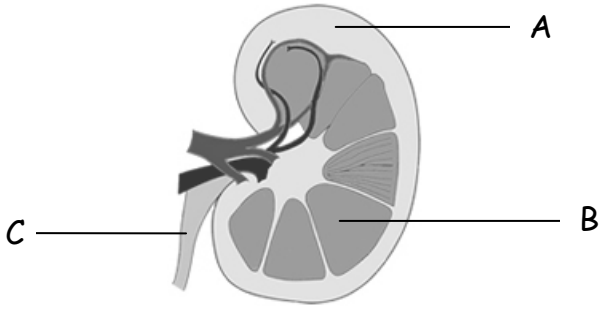
14. Answer any **two** of (a), (b) and (c) **(30, 30)**

(a) The photograph below shows the tissues in a **transverse** section of a dicotyledonous (dicot) stem.



(i) Give **one** feature shown in the photograph that allows you to identify the section as a stem and not a root.
(ii) Name the **two** vascular tissues, A and B, found in a vascular bundle.
(iii) Draw a labelled diagram to show a **longitudinal** section of tissue B.
Include the following labels in your diagram:
sieve tube; sieve plate; companion cell.
(iv) Give **one** function of **each** of the following:
1. Dermal tissue.
2. Ground tissue.
(v) 1. In which of the vascular tissues does water transport occur?
2. State **one** way in which this tissue is adapted for water transport.
3. In which direction does this transport take place?

(b) The diagram shows a vertical section through a human kidney.



(i) Name the parts labelled A, B and C.
(ii) Which organ is attached to the kidney by part C?
(iii) In which of the three labelled parts does filtration of the blood occur?
(iv) Explain the term *excretion*.
(v) Name **two** substances excreted by the kidneys.
(vi) Give **two** other excretory organs in the human body.

(c) (i) Name a part of the flower from which fruit forms.
(ii) Give **three** examples of the ways in which fruits are involved in seed dispersal.
(iii) Suggest why it is necessary for a plant to disperse its seeds.
(iv) Following dispersal most seeds enter a period of *dormancy*. What is *dormancy*?
(v) Give an advantage of dormancy.
(vi) Name the stage in the plant's life cycle that follows dormancy.
(viii) State **one** way in which it is possible to produce seedless fruits in horticulture.

[OVER]

15. Answer any **two** of (a), (b) and (c) **(30, 30)**

(a) (i) Write the balanced equation for photosynthesis.
(ii) What is the main source of light for photosynthesis?
(iii) During photosynthesis water molecules are split into **three** products. Name **each** of these products.
(iv) Describe what happens to **each** of the products referred to in (iii).
(v) Name the structures in which photosynthesis occurs in plant cells.

(b) (i) What is meant by the term *aerobic respiration*?
(ii) Aerobic respiration takes place in two main stages – stage 1 and stage 2. Indicate clearly **in your answer book** whether each of the following statements refers to stage 1 or to stage 2.
A. Takes place in the mitochondria.
B. Produces a large amount of energy.
C. Takes place in the cytoplasm.
D. Does not require oxygen.
(iii) One of your practical activities was to prepare alcohol using yeast. **In your answer book** answer the following questions in relation to this activity:
A. Name the solution in which you placed the yeast at the start of the activity.
B. Give the temperature at which you then kept the solution.
C. How did you know that alcohol production had ceased?
D. Name the test **or** chemical(s) used to show that alcohol had been produced.

(c) (i) To what group of biomolecules do enzymes belong?
(ii) Name the small molecules which are the building blocks for these biomolecules.
(iii) The action of the enzyme amylase on its substrate starch is an example of a catabolic reaction. Explain **each** of the underlined terms.
(iv) What is meant by immobilisation of an enzyme?
(v) Describe how you immobilised an enzyme in the course of your practical work.
(vi) Give **one** advantage of bioprocessing using an immobilised enzyme.
(vii) Suggest **one** reason why enzymes are not found in body soap or shampoo.

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