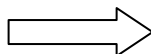


Write your Examination Number here



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**Coimisiún na Scrúduithe Stáit  
State Examinations Commission**

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LEAVING CERTIFICATE EXAMINATION, 2007

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**BIOLOGY – HIGHER LEVEL**

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TUESDAY, 12 JUNE – AFTERNOON, 2.00 TO 5.00

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**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 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.**

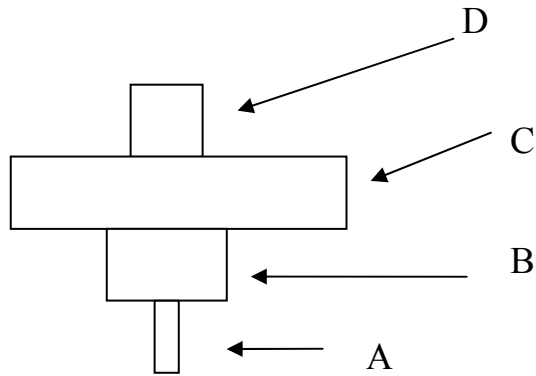
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## Section A

Answer any five questions.

Write your answers in the spaces provided.

1. Give an example of **five** of the following;
- (a) A catabolic reaction in an animal. ....
  - (b) An anabolic reaction in a plant. ....
  - (c) A fat-soluble vitamin. ....
  - (d) A reducing sugar. ....
  - (e) A polysaccharide. ....
  - (f) A trace element in the human diet. ....
2. (a) In ecology what is meant by a trophic level? .....
- .....
- (b) Complete the pyramid of numbers by naming an organism in each case of A, B, C and D.



A ..... B .....

C ..... D .....

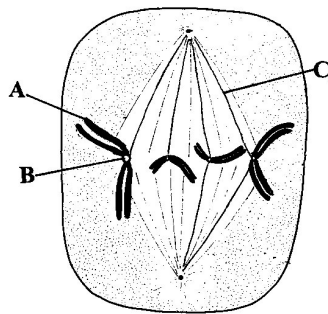
- (c) Which letter represents the producer in the pyramid? .....
- (d) Comment on the relative sizes of an individual producer and an individual primary consumer in the pyramid.

.....

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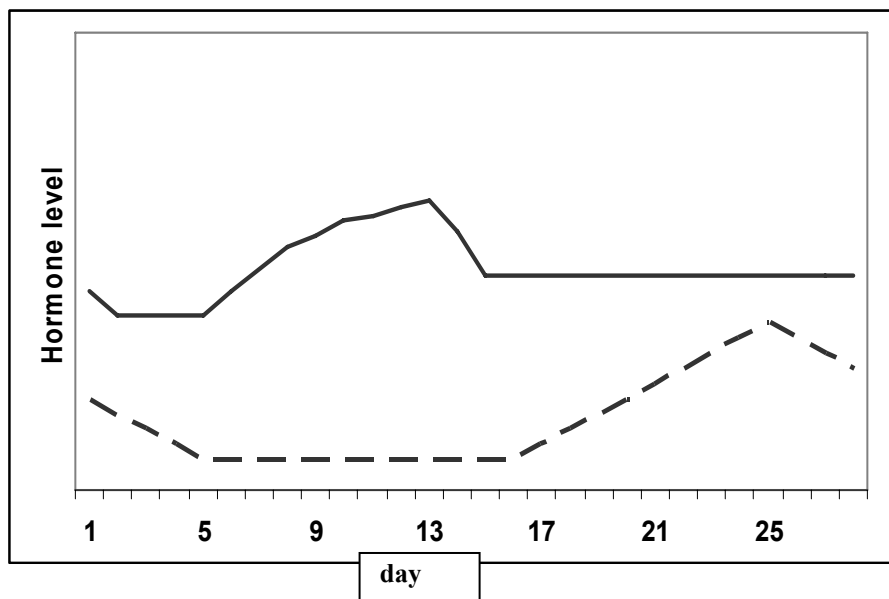
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3. Study the diagram of a stage of mitosis in a diploid cell and then answer the questions below.



- (a) Name A, B and C.  
 A ..... B ..... C .....
- (b) What stage of mitosis is shown? .....  
 Give a reason for your answer. ....
- (c) What is the diploid number of this nucleus which is undergoing mitosis? .....
- (d) Give a role of structure A. ....
- (e) Some cells in the human body undergo meiosis. Give one function of meiosis.....  
 .....

4. The graphs illustrate changes in the levels of two hormones, A and B, which are involved in the development of the endometrium, during the human female menstrual cycle.

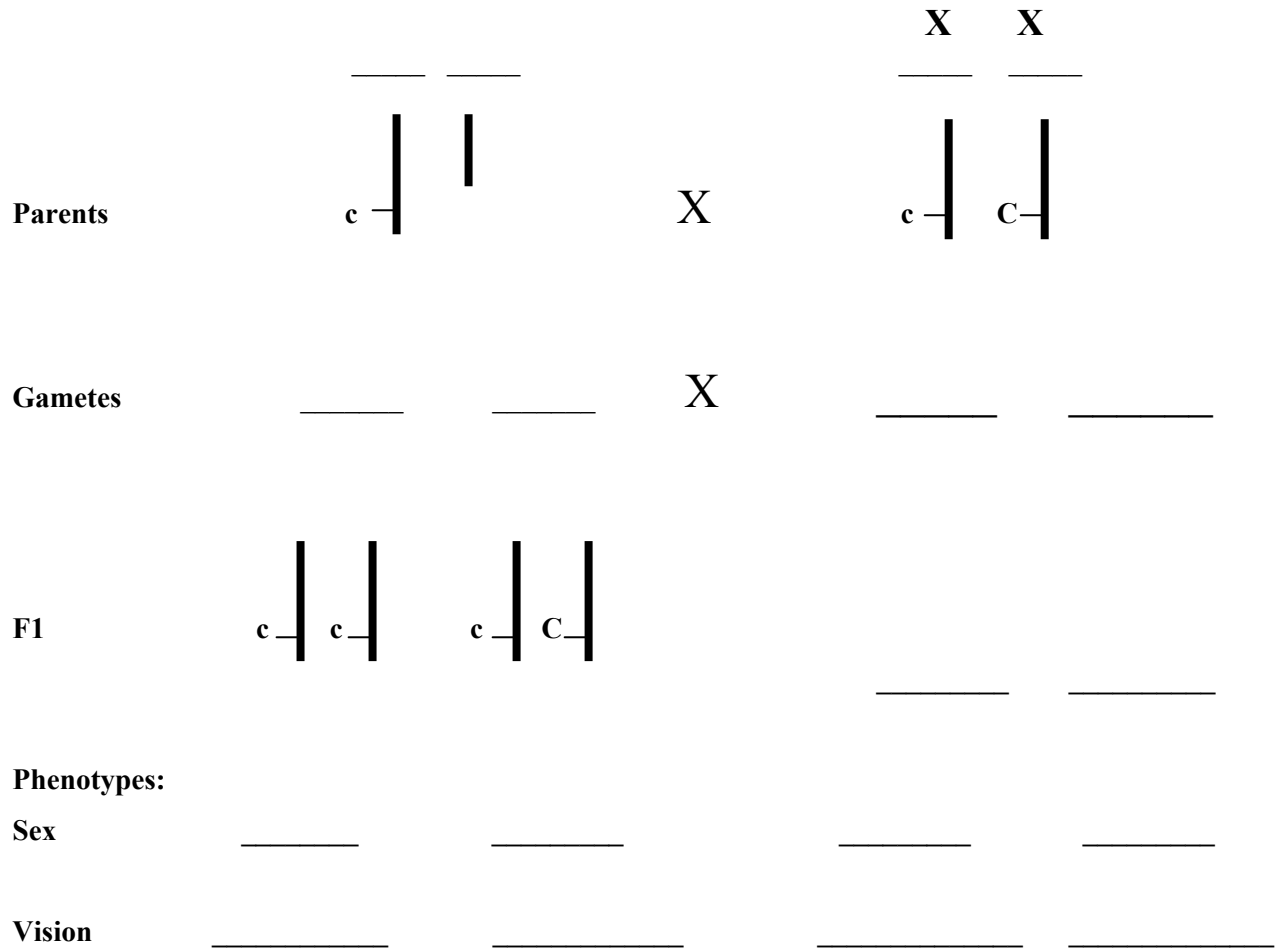


A \_\_\_\_\_  
 B - - - - -

- (a) Name one of these hormones.....
- (b) What happens in the ovary around day 14 of the cycle?  
 .....
- (c) Apart from the two hormones illustrated, another hormone called FSH has a role in the cycle.  
 (i) Where is FSH produced? .....
- (ii) Give one function of FSH.....  
 .....
- (d) Which graph, A or B, represents the hormone secreted by the *corpus luteum* (yellow body)? .....
- (e) Draw a line graph in the space above A and B to illustrate the changes that take place in the thickness of the endometrium over the course of the cycle.

[OVER

5. (a) In genetics, what is meant by sex linkage? .....
- .....
- (b) In humans a sex-linked recessive allele **c** is responsible for red-green colour blindness. Complete the blank spaces above the lines in the following cross.



6. The diagrams represent two forms of a vascular plant tissue, as seen under the microscope.



**A**



**B**

- (a) Name this vascular tissue .....
- (b) Identify the two forms of this tissue.
- A ..... B .....
- (c) The walls of A and B are reinforced with a hard material. Name this material .....
- (d) Where precisely is this vascular tissue found in the stem of a young dicotyledonous plant?
- .....
- (e) Name another vascular tissue .....

## Section B

Answer any two questions.

Write your answers in the spaces provided.

Part (a) carries 6 marks and part (b) carries 24 marks in each question in this section.

7. (a) (i) What is meant by an enzyme? .....
- .....
- (ii) Give an example of a protein that has a **structural** role. ....
- (b) Answer the following questions in relation to an investigation that you carried out to determine the effect of temperature on enzyme action.
- (i) Name the enzyme that you used. ....
- (ii) Name the substrate of the enzyme. ....
- (iii) State one factor that you kept constant during the investigation .....
- .....
- (iv) How did you keep this factor constant?
- .....
- .....
- (v) How did you vary the temperature? .....
- .....
- .....
- (vi) How did you measure the rate of activity of the enzyme? .....
- .....
- .....
- (vii) What was the result of your investigation?
- .....
- .....
- .....



9. (a) State a precise role for each of the following in photosynthesis:
- (i) Carbon dioxide .....
  - .....
  - .....
  - (ii) Water .....
  - .....
  - .....
- (b) Answer the following questions in relation to an activity that you carried out to investigate the influence of light intensity OR carbon dioxide concentration on the rate of photosynthesis.
- (i) Name the plant that you used. ....
  - (ii) How did you vary light intensity OR carbon dioxide concentration?  
.....  
.....  
.....
  - (iii) State a factor that you kept constant during the investigation.  
.....
  - (iv) How did you ensure that the factor that you mentioned in (iii) remained constant?  
.....  
.....  
.....
  - (v) How did you measure the rate of photosynthesis? .....
  - .....
  - .....
  - .....
  - .....
  - .....
  - .....
  - (vi) Using labelled axes, sketch a graph to show how the rate of photosynthesis varied with the factor mentioned in (ii) above.

## Section C

Answer any **four** questions.

Write your answers in the answer book.

10. (a) (i) The DNA molecule is composed of two strands held together by paired bases.  
1. Which base can link only to thymine?  
2. Which base can link only to cytosine?  
(ii) Name the type of bonding which occurs between members of a base pair. (9)
- (b) (i) Explain what is meant by the term DNA profiling.  
(ii) Give a brief account of the stages involved in DNA profiling.  
(iii) Give **two** applications of DNA profiling.  
(iv) What is genetic screening? (27)
- (c) "The same amount of DNA is present in nuclei of cells taken from the liver, heart, pancreas and muscle of a rat."  
(i) Use your knowledge of DNA and mitosis to explain this statement.  
(ii) Name a cell produced by the rat which will contain a different amount of DNA in its nucleus to those mentioned above.  
(iii) Briefly outline how you isolated DNA from a plant tissue. (24)
11. (a) (i) For what is ATP an abbreviation?  
(ii) What is the role of ATP in cells? (9)
- (b) (i) What name is given to the first stage of respiration?  
(ii) Where in a cell does this first stage take place?  
(iii) To what substance is glucose normally converted in this first stage of respiration?  
(iv) Is oxygen required for this conversion?  
(v) Name a compound to which the substance that you have named in (iii) may be converted, in the absence of oxygen.  
(vi) In aerobic respiration, the product of the first stage moves to the mitochondrion. Outline subsequent events in the total breakdown of this product. (27)
- (c) Enzymes can be immobilised and then used in bioprocessing.  
(i) What is meant by immobilisation?  
(ii) Name a substance that is used to immobilise enzymes.  
(iii) Give **two** advantages of using immobilised enzymes.  
(iv) Give **one** application of a named immobilised enzyme. In your answer, refer to substrate, enzyme and product. (24)
12. (a) Explain the following terms that are used in ecology: niche, edaphic factor, symbiosis. (9)
- (b) (i) What is the function of the nitrogen cycle?  
(ii) What is meant by nitrogen fixation?  
(iii) What is meant by nitrification?  
(iv) Describe, using words and/or labelled diagrams, the events of the nitrogen cycle. (27)
- (c) (i) What term do ecologists use to describe an animal which kills and eats other animals?  
(ii) What term is used to describe the animal that is killed and eaten?  
(iii) If the population of the animals in (ii) declines suggest **two** possible consequences for the animals in (i).  
(iv) Give **four** factors that influence the size of the human population. (24)



13. (a) (i) Name the blood vessel that returns blood to the heart from the lungs.  
(ii) Name the main gas transported in the blood vessel that you have named in (i).  
How is this gas transported? (9)
- (b) (i) Draw a large diagram of the human breathing system. Label the trachea, bronchus and lung.  
(ii) State the function of the following: epiglottis, larynx.  
(iii) Describe briefly the role of the diaphragm and intercostal muscles in inhalation.  
In your answer refer to volume and thoracic air pressure. (27)
- (c) (i) Give **three** ways in which an alveolus is adapted for efficient gas exchange.  
(ii) Name the process involved in the passage of gas between the alveolus and the blood.  
(iii) Name a breathing disorder.  
(iv) In the case of the breathing disorder that you have named in (iii) state:  
1. a cause,  
2. a means of prevention,  
3. a treatment. (24)

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

- (a) (i) From what structure in the carpel does the seed develop?  
(ii) State **two** locations in the seed where food may be stored.  
(iii) The embryo plant within the seed has a number of parts. List **two** of these parts, apart from food stores, and give a role for each of them.  
(iv) Following dispersal, the seed undergoes a period of dormancy. What is dormancy?  
(v) Suggest **two** advantages of dormancy.
- (b) (i) Comment on the difficulty of defining viruses as living organisms.  
(ii) What are the two main biochemical components of a virus particle?  
(iii) Name **two** diseases caused by viruses.  
(iv) Give an example of a beneficial application of a virus.  
(v) What is an antibiotic?  
(vi) Antibiotics should not be prescribed for a person suffering from a viral infection.  
Suggest a reason for this.
- (c) (i) What is meant by the term immunity?  
(ii) Outline briefly the role of B lymphocytes in the human immune system.  
(iii) Distinguish between active and passive immunity.  
(iv) "Vaccination gives rise to active immunity". Explain this statement.  
(v) In certain situations a person is given a specific antibody rather than being vaccinated.  
1. Is this an example of active or passive immunity?  
2. Under what circumstances might an antibody, rather than a vaccination, be given?  
3. Comment on the duration of immunity that follows the administration of an antibody.

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

**(30, 30)**

- (a) (i) Draw a detailed diagram of the reproductive system of the human male. Label the following parts on your diagram: testis, seminal vesicle, urethra, sperm duct (vas deferens), epididymis, prostate gland.
- (ii) Place an X on your diagram where meiosis occurs.
- (iii) Place a Y on your diagram where sperm are stored.
- (iv) State **two** functions of testosterone.
- (v) Give a cause of male infertility and suggest a corrective measure.
- (b) (i) Other than the secretion of hormones, how does an endocrine gland differ from an exocrine gland?
- (ii) State **two** ways in which hormone action differs from nerve action.
- (iii) Copy the following table into your answer book and fill each of the empty boxes.

Endocrine Gland	Location	Hormone	Role of Hormone
	Pancreas	Insulin	
Thyroid Gland			
			“fight or flight”

- (iv) In the case of a **named** hormone give:
1. a deficiency symptom,
  2. a corrective measure.
- (c) (i) What is homeostasis? Note **one** reason why it is important in the human body.
- (ii) Draw a diagram of a section through human skin to show **two** structures involved in temperature regulation. Label each of these structures.
- (iii) For one of the structures that you have labelled in your diagram briefly describe its role in temperature regulation.
- (iv) What is meant by an ectotherm?