Write your Examination Number here ⇨ _____

Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2017

BIOLOGY – ORDINARY LEVEL

TUESDAY, 13 JUNE – AFTERNOON, 2.00 – 5.00

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**.

Total: 400 marks.

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.

Section A
Answer any <u>five</u> questions.
Write your answers in the spaces provided.

1. Use your knowledge of nutrition to answer the following questions.

(a) Lipids are composed of carbon, hydrogen and _____

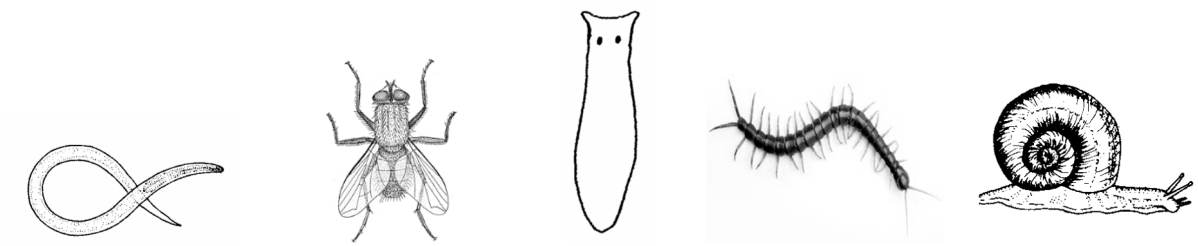
(b) Give **one** function of lipids in the human body. _____

(c) Name **one** water-soluble vitamin. _____

(d) Name **one** mineral needed by plants. _____

(e) Amino acids are the smallest unit of which biomolecule? _____

2. Identify the following organisms using the key given below.
Write the appropriate letter from the diagram after the identified organism in each case.



A **B** **C** **D** **E**

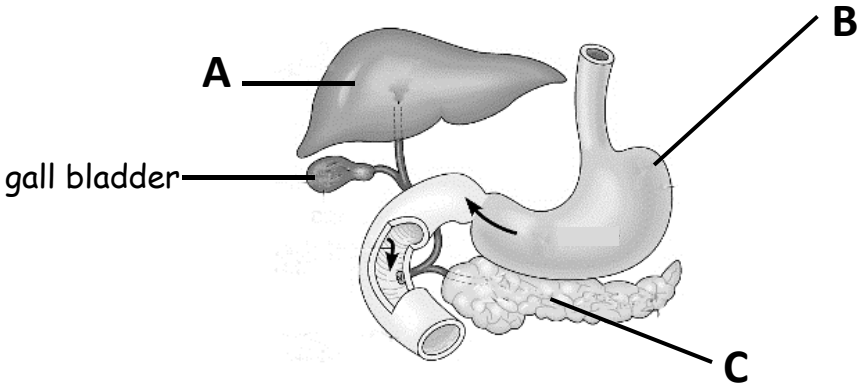
Key	Organism	Letter
1. Animal has a shell ⟹	Helix	_____
Animal does not have a shell ⟹	Go to 2.	
2. Animal has legs ⟹	Go to 3.	
Animal does not have legs ⟹	Go to 4.	
3. Animal has three pairs of legs ⟹	Musca	_____
Animal has more than three pairs of legs ⟹	Chilopod	_____
4. Animal has long cylindrical body ⟹	Nematode	_____
Animal has flat body with two eye spots ⟹	Planarian	_____

3. 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 completed as an example.

List: ~~**Genetic engineering**~~**, Plasmid, Isolation, Weed-killer resistance, Insulin, Enzyme.**

Column A	**Column B**
Manipulation of genes	**Genetic engineering**
(a) Used to cut the DNA	
(b) Removing the required DNA from the cell	
(c) A ring of DNA found in bacterial cells	
(d) A substance produced by bacteria using genetic engineering	
(e) An application of genetic engineering in plants	

4. The diagram shows part of the human digestive system.



(a) Name the parts labelled A, B, C.

A _____ B _____ C _____

(b) Name the liquid stored in the gallbladder. _____

(c) Give **one** function of part A. _____

(d) What term is given to the waves of muscular contraction which push the food through the alimentary canal?

_____

(e) Suggest a substance, produced in part B, that is responsible for 'heartburn'.

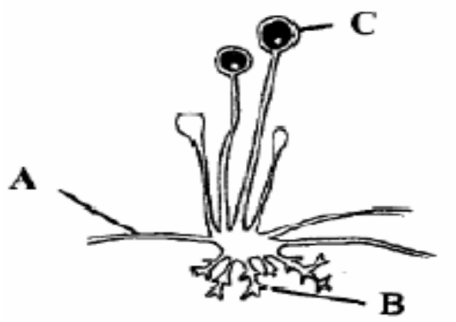
_____

[OVER]

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

	***Example:* An enzyme is a biological catalyst**	**T**	**F**
(a)	Enzymes are made from carbohydrates.	T	F
(b)	The substance with which an enzyme reacts is called its substrate.	T	F
(c)	Enzyme reactions are specific.	T	F
(d)	Amylases are enzymes that digest lipids in the body.	T	F
(e)	Changing pH can affect the rate of activity of an enzyme.	T	F
(f)	Enzyme molecules have a folded shape.	T	F
(g)	An immobilised enzyme is one that has lost its function.	T	F

6. The diagram shows part of the organism *Rhizopus.*



(a) To which kingdom does *Rhizopus* belong? _____

(b) Name **one** other member of this kingdom. _____

(c) Name the parts labelled A, B, C in the diagram.

A _____

B _____

C _____

(d) Give **two** examples of the economic importance of such organisms.

(i) _____

(ii) _____

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 in each question in this section.

7. (a) Give **two** functions of the stem in plants.

(i) _____

(ii) _____

(b) Answer the following questions in relation to how you prepared and examined with a microscope a transverse section (T.S.) of a dicotyledonous stem.

(i) Name the plant that you used. _____

(ii) State **one** reason why you used a herbaceous stem rather than a woody one.

_____

(iii) 1. What did you use to cut the section of stem? _____

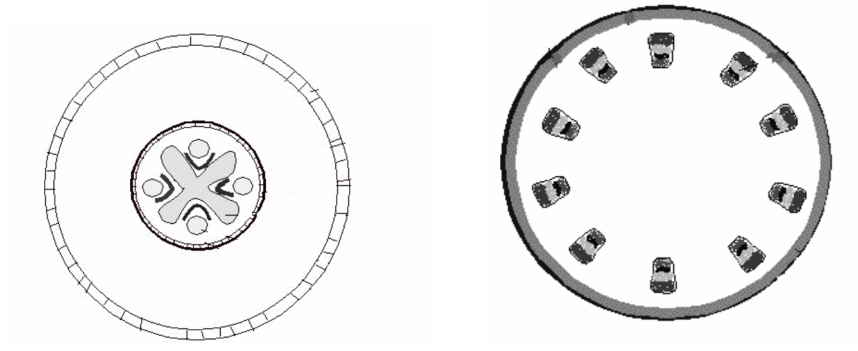
2. What kind of transverse section did you cut?_____

(iv) How did you transfer the section to the microscope slide?

_____

(v) Which of the following diagrams, A or B, best represents what was seen on your slide?

_____



A B

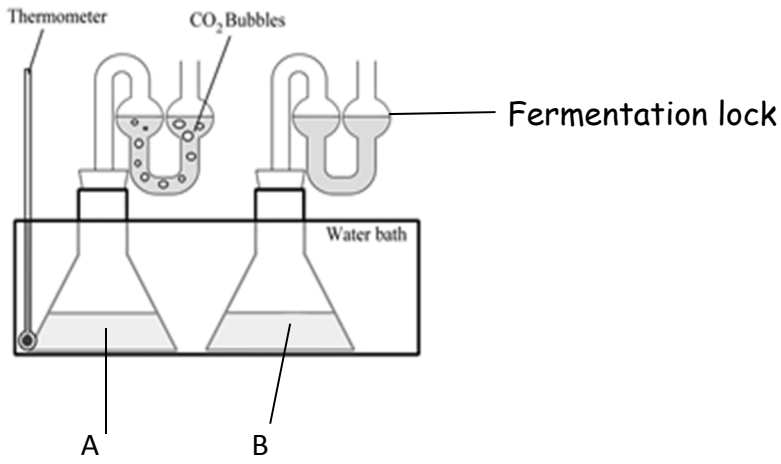
(vi) On your chosen diagram label the following tissues: 1. vascular tissue, 2. dermal tissue.

[OVER]

8. (a) (i) What gas must be absent for anaerobic respiration to occur? _____

(ii) Does anaerobic respiration release more or less energy than aerobic respiration? _____

(b) Answer the following questions in relation to the production of alcohol by yeast.



(i) 1. To which flask was the yeast added? _____

2. Give a reason for your choice. _____

(ii) What is the purpose of the other flask? _____

(iii) Name the **two** substances in the original solution in the flasks.

1. _____ 2. _____

(iv) What is the purpose of the water bath? _____

(v) What is the purpose of a fermentation lock? _____

(vi) Say what test you performed to show the presence of alcohol **and** say what colour indicated a positive result.

Name of test: _____

Positive colour: _____

9. (a) Complete the following sentence.

Osmosis is the movement of water molecules through a selectively-permeable membrane,

from a region of (i) _____ concentration of water molecules to a region of

(ii) _____ concentration of water molecules.

(b) Answer the following in relation to an activity you carried out to demonstrate osmosis.

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

(ii) Suggest a control that you might use in this activity.

_____

_____

(iii) State the result(s) of the demonstration.

_____

_____

(iv) Briefly explain the result(s).

_____

_____

(v) Suggest how storing food in salty water prevents the growth of bacteria or fungi.

_____

_____

[OVER]

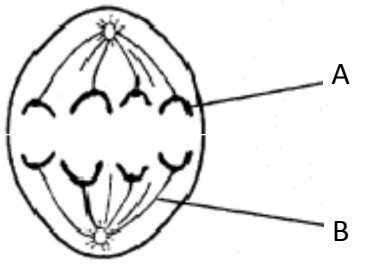
Section C
Answer any four questions.
Write your answers in the answer book.

10. (a) (i) Explain the term *phenotype.*
(ii) How many characteristics are involved in a monohybrid cross?
(iii) Are heterozygous alleles the same as each other or different? **(9)**

(b) (i) Cell division is one stage of the cell cycle. Name the other stage.

(ii) There are two types of cell division. Name **both**.

The diagram shows a cell undergoing cell division.



(iii) Structure A is a chromosome. From which **two** substances are chromosomes made?

(iv) What is the function of structure B in the above diagram?

(v) How many chromosomes will be in each new cell formed from the above division?

(vi) Cancer occurs when there is uncontrolled cell division in one or more tissues.
Give **two** possible causes of cancer.

(27)

(c) Mutations are changes in the genetic material of a cell. They can affect chromosomes or genes. A mutagen is something that causes a mutation. Examples of mutagens include gamma rays and asbestos. An example of a disease that results from a gene mutation is Huntington's disease. Symptoms of this disease include restlessness and difficulty in walking, thinking and remembering. Down syndrome is a condition that is caused by a change in chromosome number. People who have Down syndrome possess three copies of chromosome 21 in every body cell.

(i) What is a mutation?
(ii) Give an example of a disease caused by mutation.
(iii) Give **two** symptoms of the disease.
(iv) What is a mutagen?
(v) Give **two** examples of mutagens.
(vi) How many copies of a chromosome are usually present in a gamete? **(24)**

11. (a) (i) Why are plants known as producers?

(ii) What is the main source of energy for living things?

(iii) What term is given to a diagram showing a number of interlinked food chains?

(9)

(b) Over the years many new plant and animal species have spread to Ireland. The giant hogweed is now found growing along the banks of many Irish rivers. Its leaves are toxic and can damage the skin, causing blisters. Zebra mussels, possibly from the Black Sea, have colonised some of our waterways, and are replacing our native mussels in many places. New Zealand flatworms are attacking and killing our native earthworms, which play an important role in soil drainage and aeration. But not all non-native species are harmful. Our sheep, pigs and potatoes are examples of species not native to Ireland that have proved quite beneficial to us.

(i) What plant is spreading along the river banks?

(ii) How does this plant damage our skin?

(iii) What is meant by the term *species*?

(iv) Where did zebra mussels come from?

(v) What species is attacking the earthworms?

(vi) Mention **two** ways in which earthworms are important in the soil.

(vii) Name **one** resident animal that is not native to Ireland.

(27)

(c) Answer the following questions in relation to the ecosystem you have studied.

(i) Name the ecosystem.

(ii) Name **one** plant **and one** animal from that ecosystem.

(iii) What is a quantitative survey?

(iv) Describe how you carried out a quantitative survey to estimate the population of **either** the plant **or** the animal referred to in part (ii) above.

(24)

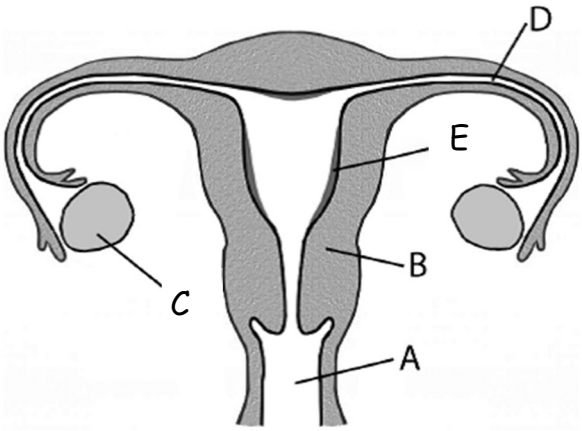
[OVER]

12. (a) (i) Name the **two** main types of reproduction.

(ii) Which type of reproduction occurs in humans?

(9)

(b) The diagram shows the human female reproductive system.



(i) Name the parts labelled A, B, C, D, E.

(ii) State **one** function of the part labelled C in the diagram.

(iii) In which labelled part does fertilisation usually occur?

(iv) What is meant by the term *contraception*?

(v) Give **one** method of contraception. **(27)**

(c) (i) How long does an average human pregnancy last?

(ii) Birth takes place in three stages. Describe what happens at **each** stage.

(iii) The hormones oxytocin and progesterone play a role in birth.
1. What happens to the level of progesterone at birth?
2. What effect has oxytocin on the muscles of the wall of the womb?

(iv) What hormone controls the production of milk in humans?

(v) Suggest **one** reason why colostrum is important for new-born babies.

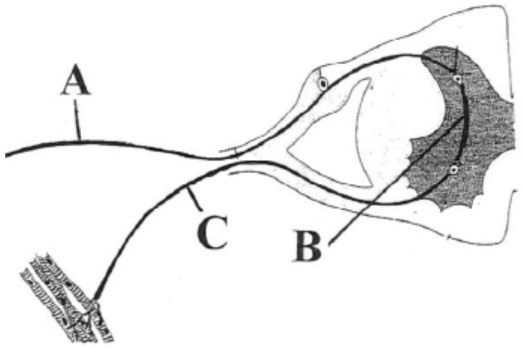
(24)

13. (a) The nervous system and the endocrine system both play a role in human responses.

(i) Name the chemicals that act as messengers in the endocrine system.
(ii) The central nervous system is made up of two parts. Name **both**.

(9)

(b) The diagram shows the nerve cells (neurons) in a reflex arc.



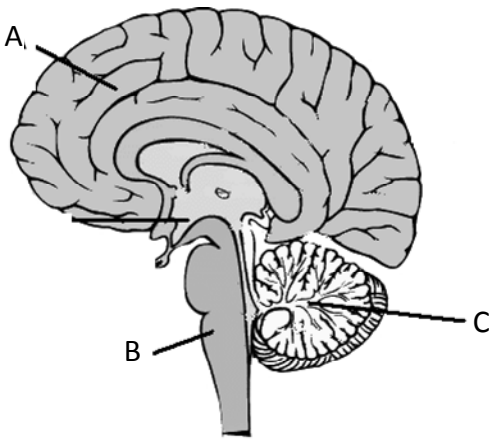
(i) Name the neurons labelled A, B, C.
(ii) Is the impulse transmitted from A to B to C **OR** from C to B to A?
(iii) Give **one** example of a reflex action in humans.
(iv) Why are reflex actions important to humans?
(v) What name is given to the gaps between neurons?
(vi) Neurotransmitters are released into the gaps between the neurons. Why does this occur?
(vii) What happens to neurotransmitters once they have carried out their function?

(27)

(c) The diagram shows the structure of the human brain.

(i) Name the parts labelled A, B, C.

(ii) Give **one** function of the part labelled B.



(iii) Give **one** function of the part labelled C.

(iv) What are the **two** main structures that protect the brain?

(v) The hypothalamus in the brain plays a role in homeostasis.
What is meant by the term *homeostasis*?

(24)

[OVER]

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

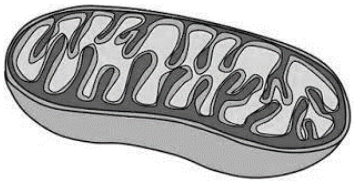
(a) (i) What is meant by the term *metabolism*?

(ii) Catabolism and anabolism are the two main types of metabolism.
State whether each of the following processes is an example of catabolism or anabolism:
1. Photosynthesis.
2. Respiration.

(iii) Give **two** reasons why living things need energy.

(iv) In stage 1 of respiration glucose is partly broken down. Where in the cell does this occur?

(v) Name the cell structure shown below in which stage 2 of respiration takes place.

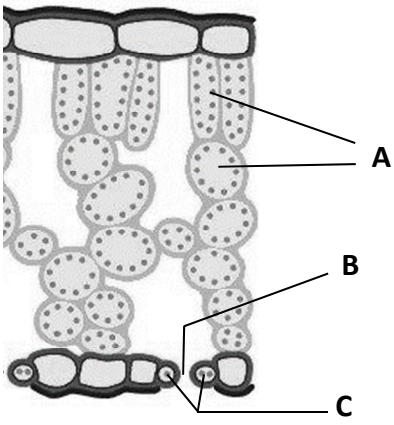


(vi) Which type of respiration results in the production of acid in our muscles?

(vii) What is the name of the acid produced in the muscles?

(viii) Suggest what might happen to this acid in the muscles afterwards.

(b) The diagram shows a section through a leaf.



(i) Name the green pigment present in leaves that is essential for photosynthesis.

(ii) Name the cell structures, present in large numbers in the cells labelled A that are needed for photosynthesis.

(iii) Name the opening labelled B that is used for gas exchange.

(iv) Name the cells labelled C that control the opening of B.

(v) Name the gas in the air that is needed for photosynthesis.

(vi) In photosynthesis, water is split into three parts.
Name these **three** parts.

(vii) From your knowledge of photosynthesis, suggest **two** ways of improving the rate of photosynthesis of plants in a greenhouse.

(c)

(i) What is an organ?

(ii) Name **one** plant organ **and one** animal organ.

(iii) What is a tissue?

(iv) Name **one** plant tissue **and one** animal tissue.

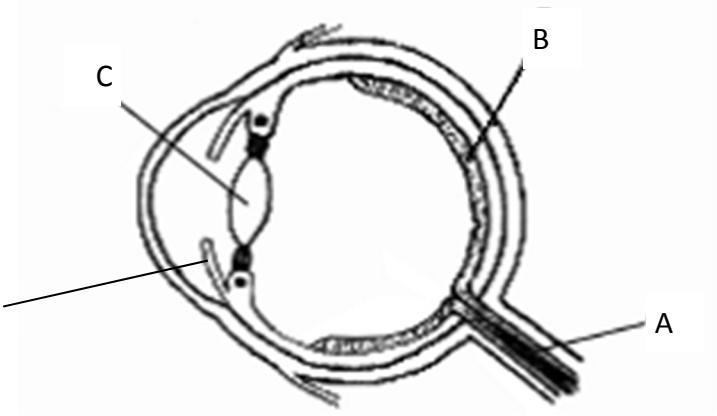
(v) Tissue culture can be used to grow new tissues in the laboratory.

1. What gas would be needed for the growth of animal tissue in the laboratory?
2. What gas would be produced by animal tissue in the laboratory?
3. Why are sterile conditions needed to grow tissue in the laboratory?
4. Which type of cell division is involved in tissue culture?

[OVER]

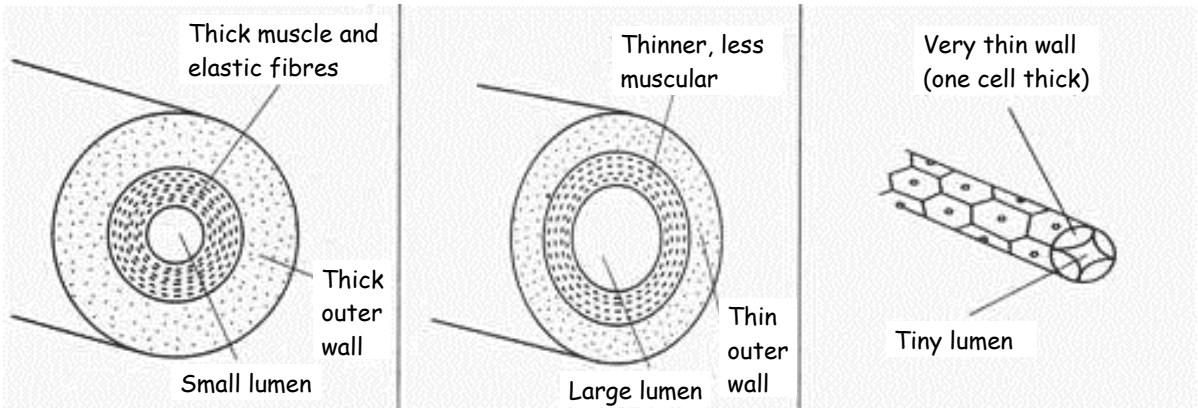
15. Answer any **two** of (a), (b), (c). **(30, 30)**

(a) The human eye is an example of a sense organ.



(i) Name the parts labelled A, B, C.
(ii) What is the function of the iris in the eye?
(iii) In what labelled part would you find the rods and cones?
(iv) Give the precise function of the rods in the eye.
(v) To which organ does part A connect the eye?
(vi) Name a part of the ear that has a similar function to part B of the eye.
(vii) Name **two** other sense organs.

(b) The diagram below shows three blood vessels that form part of the circulatory system in the human body.



A B C

(i) Name the blood vessels labelled A, B, C.
(ii) **In your answer book**, use **one** of the above letters A, B, C, to match a blood vessel to **each** of the following statements.

1. Carries blood towards the heart.
2. Contains valves.
3. Brings blood to the heart muscle.
4. Has a pulse.
5. Delivers substances to cells.

(iii) Suggest **two** ways to keep our circulatory system healthy.

(c) Breathing supplies us with oxygen and gets rid of carbon dioxide.

(i) What other gas is excreted from the lungs with carbon dioxide?
(ii) Draw a labelled diagram to show the structure of the human lungs.
(iii) What is the function of the diaphragm in the human breathing system?
(iv) Are the intercostal muscles (in the ribcage) relaxing or contracting when a person is inhaling (breathing in)?
(v) Name **one** disorder associated with the breathing system.
(vi) Give **one** possible cause **and one** possible treatment of the disorder.

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