Write your Examination Number here ⇨ _____

Coimisiún na Scrúduithe Stáit
State Examinations Commission

_____

LEAVING CERTIFICATE EXAMINATION 2018

_____

BIOLOGY – ORDINARY LEVEL

_____

TUESDAY, 12 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**.

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 five questions.
Write your answers in the spaces provided.

1. (a) All proteins are made of carbon, hydrogen, oxygen, and _____

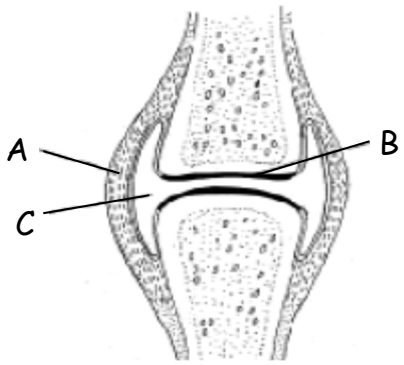
(b) Give **one** example of a monosaccharide. _____

(c) A solution used to test for the presence of a reducing sugar is _____

(d) Name **one** mineral needed for healthy bones. _____

(e) Glycerol is part of a biomolecule. Name the biomolecule. _____

2. The diagram shows a human synovial joint.



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

A. _____ B. _____

C. _____

(b) What type of synovial joint is the elbow? _____

(c) Name the structures that attach muscle to bone. _____

(d) Name **one** disorder of the musculoskeletal system. _____

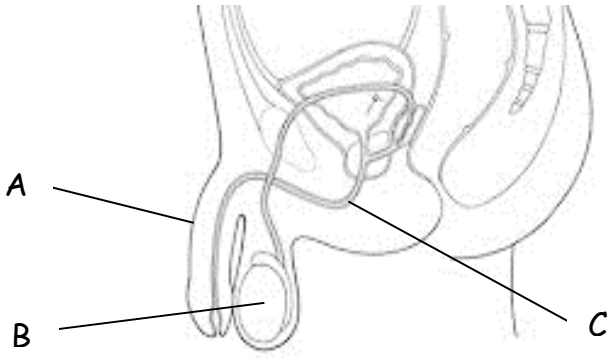
(e) Suggest **one** treatment for the disorder mentioned above. _____

3. Choose a 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: ~~**Immobilised**~~**, Washing powder, Alginate, Calcium chloride, Reusable, Pectinase**

Column A	Column B
Enzyme trapped in a gel	**Immobilised**
(a) An advantage of using immobilised enzymes	
(b) A gel in which enzymes are trapped	
(c) An example of an immobilised enzyme	
(d) The substance that hardens the gel beads containing the trapped enzyme	
(e) Immobilised enzymes can also be used in	

4. The diagram shows the human male reproductive system.



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

A. _____ B. _____

C. _____

(b) Where are sperm cells produced? _____

(c) Name **one** male sex hormone. _____

(d) Explain the term *infertility*. _____

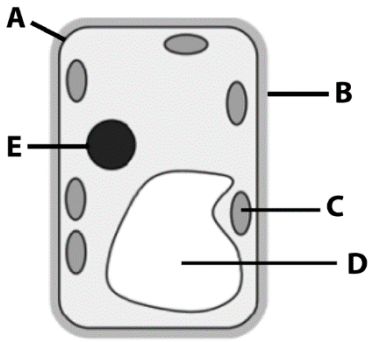
(e) Give **one** cause of infertility in men. _____

[OVER]

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

Example:	The scientific method is used to investigate an observation	(T)	F
(a)	A control is used for comparison in experiments	T	F
(b)	The information collected in an experiment is called data	T	F
(c)	A hypothesis is a proven idea	T	F
(d)	Replicating an experiment means repeating it a number of times	T	F
(e)	A theory is a hypothesis that has been disproved	T	F
(f)	A variable never changes during an experiment	T	F
(g)	Scientific discoveries are first published in newspapers	T	F

6. The diagram shows a plant cell.



(a) Name the parts labelled D and E.

D. _____ E. _____

(b) **Name** any **two** structures from the diagram that indicate this is a plant cell.

1. _____ 2. _____

(c) The cell membrane is composed of two substances. Name **both**.

1. _____ 2. _____

(d) Which labelled part is made of cellulose? _____

(e) What type of microscope is needed to show the ultrastructure of organelles such as C, above?

_____

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) Name **one** muscle involved in breathing. _____

(ii) In which structures does gas exchange occur in the lungs? _____

(b) You investigated the effect of exercise on breathing rate or on pulse rate.

(i) How did you measure the resting rate?

_____

_____

_____

(ii) After measuring the resting rate, what other steps did you carry out to complete the investigation?

_____

_____

_____

(iii) A fit student and an unfit student measured their breathing rates, then carried out the same amount of exercise, and measured their breathing rates again.
These are their results.

Student	Before exercise Breaths per minute	After exercise Breaths per minute
A	14	17
B	15	35

Use the table to identify the:

Unfit student _____ Fit student _____

(iv) Give a reason for your choice. _____

_____

8. (a) (i) What is an enzyme? _____

(ii) From which biomolecule are enzymes made? _____

(b) You investigated the effect of temperature on the rate of activity of an enzyme.

(i) What enzyme did you use? _____

(ii) What substrate did you use? _____

(iii) How did you vary the temperature during the investigation?

_____

_____

(iv) How did you measure the rate of enzyme activity?

_____

_____

_____

(v) During this investigation pH was kept constant.
How did you keep the pH constant?

_____

_____

(vi) What was the result of your investigation?

_____

_____

_____

_____

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

(ii) Name a carbohydrate that is stored in a seed.

_____

(b) You investigated digestive activity in germinating seeds.

(i) Which type of agar did you use in this investigation? _____

(ii) The seeds were divided into two batches.
Batch A seeds were not treated before use.
How did you treat the other batch of seeds (batch B) before using them in the investigation?

_____

(iii) Why was such treatment necessary?

_____

(iv) The seeds were cut in half and placed cut-face-down on the agar.
Why were they placed cut-face-down on the agar?

_____

_____

(v) After a few days the seeds were removed from the agar. A solution was then poured over the agar. Name this solution.

_____

(vi) Which substance is shown to be present by the solution named in (v)?

_____

(vii) Give the results of your investigation.

Untreated seeds – Plate A. _____

Treated seeds – Plate B. _____

[OVER]

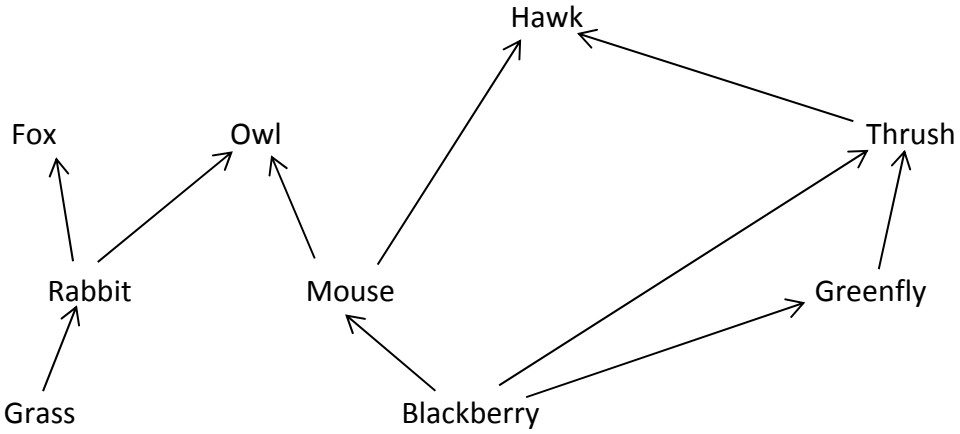
Section C

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

10. (a) Explain the following terms used in ecology:

(i) Niche
(ii) Aquatic
(iii) Flora. **(9)**

(b) The food web below shows the feeding relationships between some plants and animals in a woodland. Study the web and answer the questions below.



(i) Name **one** producer from the web.
(ii) Name **one** omnivore from the web.
(iii) Name **one** herbivore from the web.
(iv) Explain the term c*arnivore*.
(v) If there was a decline in the number of rabbits, what effect would this have on the number of foxes?
(vi) Suggest **two** reasons why the number of rabbits might decline.
(vii) What is an abiotic factor?
(viii) Give **one** example of an abiotic factor.

(27)

(c) Peacock spiders are tiny jumping spiders found in southern Australia. They do not build webs, instead they hunt small insects. They have very good eyesight and they can cover distances of up to fifty times their own length with one jump. They are called peacock spiders because of the brightly-coloured flaps the males have on their abdomens. During courtship, the male also vibrates his abdomen to attract females. Female peacock spiders are brown or beige in colour and are well camouflaged in their environment.

(i) To which kingdom do peacock spiders belong?
(ii) In what country are the peacock spiders found?
(iii) What is the prey of the peacock spiders?
(iv) Suggest **two** ways in which these spiders are adapted to be predators.
(v) In what **two** ways do male peacock spiders attract females?
(vi) What advantage is camouflage to organisms?

(24)

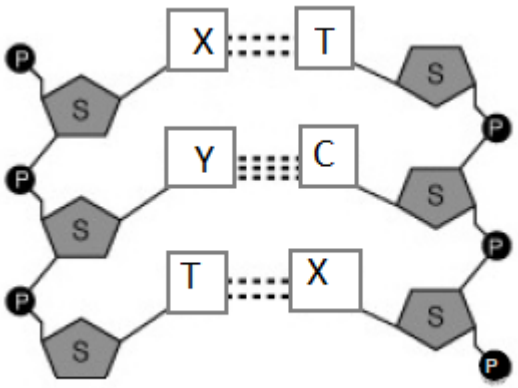
11. (a) Explain the following terms used in genetics:

(i) Heredity

(ii) Gene

(iii) Homozygous. **(9)**

(b) DNA has four bases: Adenine (A), Guanine (G), Cytosine (C), and Thymine (T).
The diagram below outlines part of the structure of DNA.



(i) 1. Which of the above four bases is represented by the letter X in the diagram?
2. Which of the above four bases is represented by the letter Y in the diagram?

(ii) Chromosomes are made of DNA and which other substance?

(iii) How many chromosomes are in a normal human cheek cell?

(iv) Where are chromosomes located in the cell?

(v) Another molecule in the cell also has four bases, one of which is uracil.
Name this molecule.

(vi) In this molecule, uracil replaces one of the four DNA bases mentioned above.
Which base does uracil replace?

(vii) DNA contains the code for making proteins.
Where are proteins made in the cell?

(viii) What molecule carries the DNA code to where proteins are made?

(27)

(c) In plants the allele for tall (T) is dominant to the allele for short (t).

(i) Give the genotype for a heterozygous plant.

(ii) Give the genotypes of the gametes of the plant mentioned in (i).

(iii) Give the genotype for a small plant.

In humans, sex is determined by two chromosomes, X and Y.

(iv) Give the genotype of a male **and** the genotype of a female.

(v) It is often said that the male determines the sex of the child.
Explain fully why this is the case.

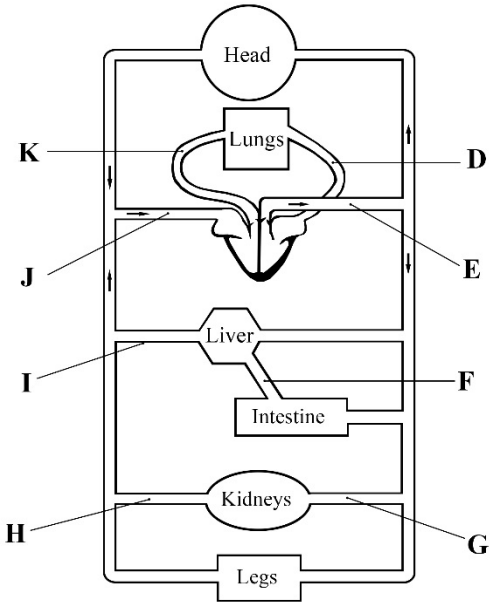
(24)

[OVER]

12. (a) Most animals and plants have vascular systems.

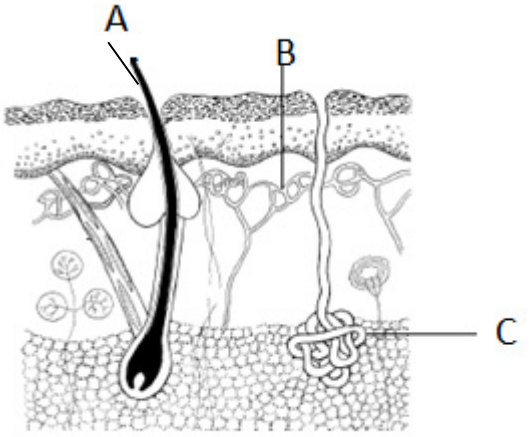
(i) Name the **two** main types of vascular tissue in flowering plants.
(ii) Which tissue carries water? **(9)**

(b) The diagram represents the human blood circulatory system.



(i) **In your answer book**, state which letter represents **each** of the following parts:
1. Aorta; 2. Hepatic portal vein; 3. Pulmonary vein; 4. Vena cava.
(ii) State what changes occur in the blood as it passes through:
1. The lungs
2. The kidneys.
(iii) Name or give the letter from the diagram of **one** blood vessel that is rich in oxygen.
(iv) The human circulatory system is said to be a closed system.
What is meant by a closed circulatory system? **(27)**

(c) The diagram shows a section through human skin.



(i) Name the parts labelled A, B, C.
(ii) A function of the skin is to maintain a constant body temperature.
Give **one** role of **each** of the three parts A, B, C, in cooling the body on a warm day.
(iii) Give **two** other functions of the skin. **(24)**

13. (a) Name the cell part associated with **each** of the following:

(i) Photosynthesis

(ii) Aerobic respiration

(iii) Anaerobic respiration. **(9)**

(b) The equation below represents photosynthesis.

$$\text{Water} + X \longrightarrow Y + \text{Oxygen}$$

(i) Name the gas X.

(ii) Name substance Y.

(iii) What is the main source of energy for photosynthesis?

(iv) Chlorophyll is used to trap energy in the plant.
What colour is chlorophyll?

(v) What happens to the oxygen that is formed in photosynthesis?

(vi) Name **two** environmental factors that may affect the rate of photosynthesis.

(vii) Through which part of the plant does gas X enter?

(viii) Name the process by which water enters the plant. **(27)**

(c) (i) Explain the term *respiration*.

(ii) Why is aerobic respiration considered to be more efficient than anaerobic respiration?

(iii) Fermentation is another name for anaerobic respiration.
Name **one** organism used in the fermentation process that produces beer and wine.

(iv) Name the **two** molecules produced by this fermentation.

(v) Cramps may be caused by the absence of gas G in muscle cells.
Name gas G.

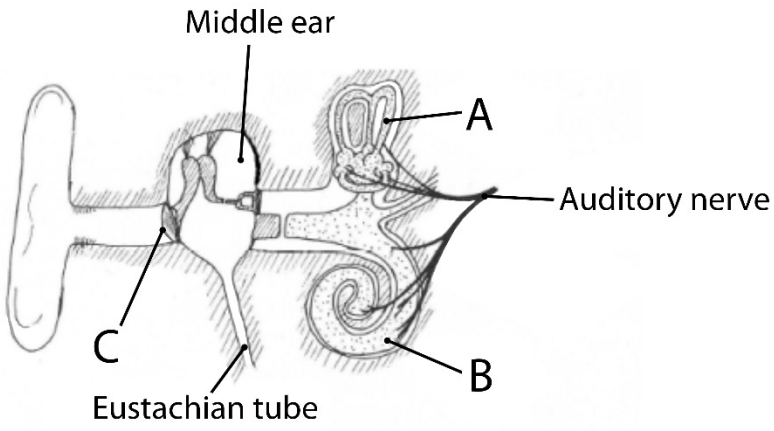
(vi) Cramps may be caused by the presence of substance S in muscle cells.
Name substance S.

(24)

[OVER]

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

(a) The diagram shows the human ear.

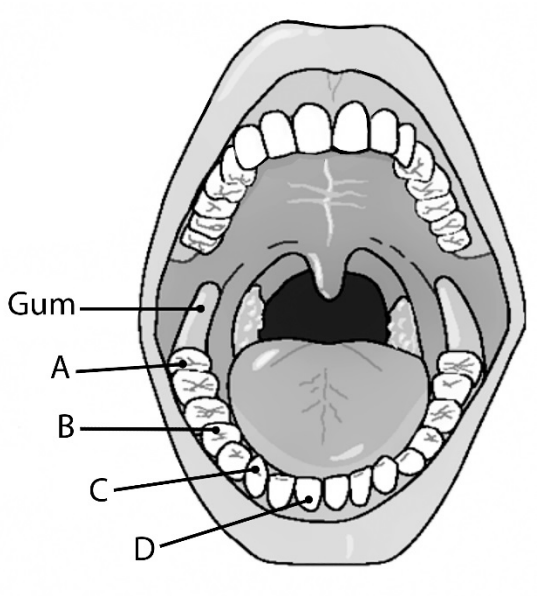


(i) Name the part labelled A **and** give its function.
(ii) Name the part labelled B **and** give its function.
(iii) Name the part labelled C **and** give its function.
(iv) What is connected to the middle ear by the Eustachian tube?
(v) To which organ does the auditory nerve connect the ear?
(vi) State how any **named** disorder of the ear **or** of the eye may be corrected.

(b) In 1796 an English doctor-scientist called Edward Jenner inserted pus from a cowpox blister into a young boy's arm. Later, he infected the boy with the much more serious disease of smallpox but the boy never developed smallpox. Jenner concluded that infection with cowpox must protect people from smallpox. This discovery led to the modern practice of vaccination (from the Latin 'vacca' for cow). Following worldwide vaccination in the second half of the 20th century, smallpox was declared eradicated in 1980.

(i) Edward Jenner discovered a vaccination against which disease?
(ii) Explain what we now understand about how vaccination works.
(iii) What is meant by the term *immunity*?
(iv) Outline the difference between active immunity and passive immunity.
(v) What is a pathogen?
(vi) Colostrum is the first milk a baby gets from its mother.
How does colostrum help to protect the baby from disease?

(c) The diagram shows a human mouth.



(i) **In your answer book**, match **each** type of tooth from the list below to one of the letters in the diagram above.

List: **Canine, Molar, Incisor, Pre-molar.**

(ii) Give the full dental formula for an adult human.

(iii) Suggest, from the above list, a type of tooth that is much larger in dogs.

(iv) Give a reason for your answer to part (iii).

(v) The mouth has glands that make a liquid. The liquid contains an enzyme.

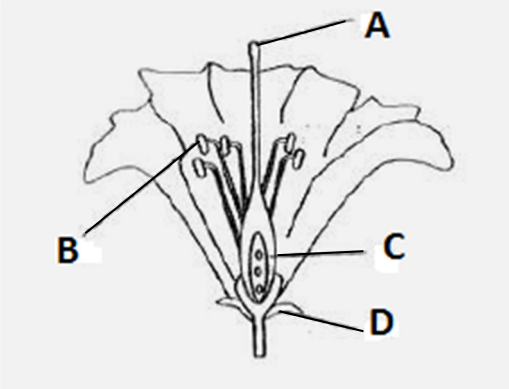
1. Name the liquid.

2. Name the enzyme the liquid contains.

[OVER]

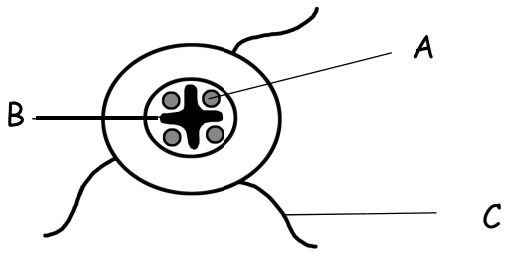
15. Answer any two of (a), (b), (c). **(30, 30)**

(a) The diagram shows a flower.



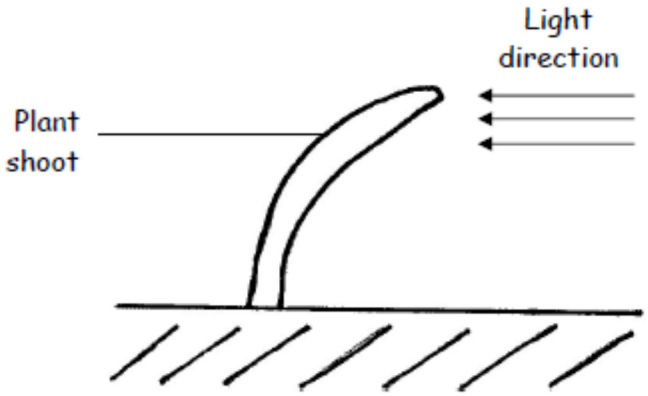
(i) Name the parts labelled A, B, C.
(ii) What substance produced by flowers causes hay fever in some people?
(iii) Which labelled part will contain the seeds?
(iv) Some seeds undergo a period of dormancy.
1. Explain the term *dormancy*.
2. Give **two** advantages of dormancy.
(v) It is possible to produce seedless fruits.
1. Give **one** example of a seedless fruit.
2. Suggest **one** advantage of seedless fruits.

(b) The diagram shows a transverse section of a dicotyledonous (dicot) root.



(i) Name the parts labelled A, B, C.
(ii) Give **one** example of a root modified for food storage.
(iii) Other than food storage, state **two** functions of roots.
(iv) What is the first root called that grows from a seed?
(v) Flowering plants can be monocotyledonous (monocot) or dicotyledonous (dicot). Give any **one** difference between a monocot plant and a dicot plant.
(vi) Give **one** example of a monocot plant and **one** example of a dicot plant.

(c) (i) What are tropisms?



(ii) Which tropism is shown in the above diagram?
(iii) Name **one** factor to which plants respond, other than light.
(iv) Name **one** growth regulator in plants.
(v) State **two** uses in horticulture of artificial growth regulators.
(vi) How do thorns protect some plants?
(vii) Give **two** other features that plants use to protect themselves.

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