2025.M43

2025L025G2EL

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2025

Biology

Section C

Ordinary Level

Tuesday 10 June Afternoon 2:00 - 5:00

240 marks

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Section C

Answer any four questions.
Write your answers in the answerbook containing Sections A and B.

11. **(a)** **(i)** What is the main source of energy for the Earth's ecosystems?
(ii) Why are food chains limited in length?
(iii) Which **one** of the following terms describes interconnected food chains?
Food net *Food web* *Food diagram* **(9)**

(b) Read the following passage and answer the questions that follow.

The lesser horseshoe bat is so-named because of the shape of its nose. They live in old houses, stables and churches. Adaptations include hanging by their feet and wrapping their wings around their body. The niche of the lesser horseshoe bat is to keep the numbers of mosquitoes under control by feeding on them. The mosquitoes in turn feed on sap from grasses.
Their population in Ireland is approximately 14 000 and it has been increasing since the 1990s. This increase is the result of conservation legislation and increased woodland cover.

Adapted from "The global importance of Ireland's 14,000 Horseshoe Bats", Irish Examiner, Mon 30 August 2021.

(i) Give **one** adaptation of the lesser horseshoe bat.
(ii) Name a habitat of the lesser horseshoe bat.
(iii) What is the niche of the lesser horseshoe bat?
(iv) Give **one** way the lesser horseshoe bat population has been protected.
(v) From the information provided in the passage, write out a food chain with **three** feeding (trophic) levels, **and** state which is the producer, which is the primary consumer and which is the secondary consumer. **(27)**

(c) Study the following word diagrams, **X** and **Y**, and answer the questions that follow.

Diagram **X**

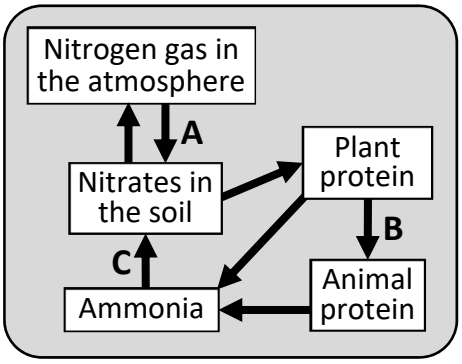
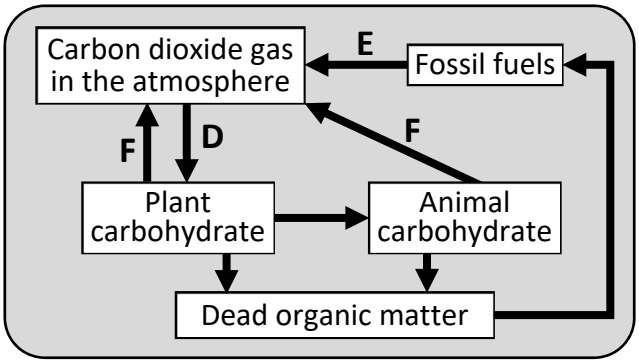


Diagram **Y**



(i) Name the nutrient cycle represented in diagram **X**.
(ii) **In your answer book**, match the terms, *nitrification*, *nitrogen fixation* **and** *nutrition* to the letters **A**, **B** and **C** in diagram **X**.
(iii) Name the nutrient cycle represented in diagram **Y**.
(iv) **In your answer book**, match the terms, *respiration*, *photosynthesis* **and** *combustion* to the letters **D**, **E** and **F** in diagram **Y**. **(24)**

12. **(a)** **(i)** Match the terms *genotype* **and** *phenotype* to the following descriptions:

A: Physical characteristics of an organism

B: Genetic makeup of an organism

(ii) Copy the following sentence **into your answerbook and** complete it using the correct word.

Chromosomes are composed of DNA and _____. **(9)**

(b) In pea plants, the allele for tallness (**T**) is dominant to the allele for shortness (**t**). Shortness is a recessive characteristic. Characteristics are controlled by pairs of alleles.

(i) Match the terms *allele* **and** *recessive* to the following descriptions:

A: Where a gene is only expressed in the homozygous condition.

B: Form of a gene, where a number of different forms exist.

(ii) Give **two** possible genotypes for a **tall** plant.

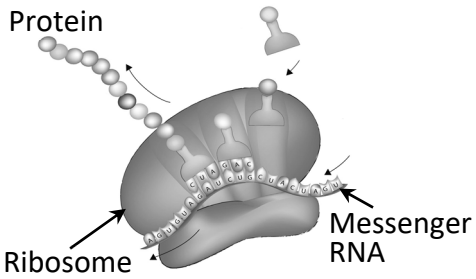
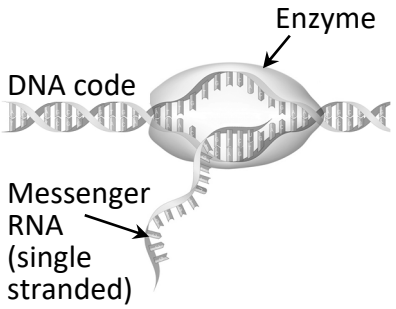
(iii) Give the **only** possible genotype for a **short** plant.

(iv) A gardener planted pea seeds that came from a cross between two short plants. Is it possible that any of these plants grew up to be tall? Justify your answer.

(v) A gardener planted pea seeds that came from a cross between two tall plants. Is it possible that any of these plants grew up to be short? Justify your answer.

(27)

(c) Study the table below showing diagrams of three important cellular processes involving DNA, RNA and amino acids.

A	B	C
 DNA (two identical strands)		

(i) **In your answerbook**, match the diagrams, **A**, **B** and **C** with the following descriptions:

1. *The DNA code is transcribed*

2. *DNA replication*

3. *The code is translated*

(ii) What shape is DNA?

(iii) **1.** Adenine, thymine, cytosine, guanine and uracil are nitrogenous bases. Which **one** of the above bases is found in RNA, but **not** DNA?

2. DNA and RNA have another structural difference. Using the diagrams as an aid, state **one other** structural difference between DNA and RNA.

(iv) DNA profiling and genetic engineering are important biological techniques used by biologists.

1. Give any **one** application (or use) of DNA profiling.

2. Give any **one** application (or use) of genetic engineering. **(24)**

13. **(a)** Photosynthesis and respiration are metabolic reactions in cells.

(i) Which **one** of the following sentences (**A** or **B**) describes metabolism?

A: The sum of all chemical reactions in a cell.

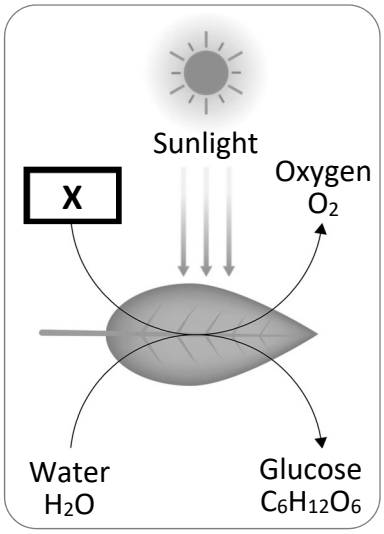
B: The getting rid of undigested material from the body.

(ii) Match the terms *photosynthesis* **and** *respiration* to the following cell organelles:

1. Mitochondrion

2. Chloroplast. **(9)**

(b) Study the diagram showing photosynthesis and answer the following questions.



(i) What is the name of the green pigment in leaves that traps the energy in sunlight?

(ii) Name gas **X** in the diagram.

(iii) Give a possible source for the water required in photosynthesis.

(iv) During photosynthesis, water is split into protons, electrons and oxygen.
Describe **two** possible outcomes for the oxygen produced in photosynthesis.

(v) Is photosynthesis an anabolic **or** catabolic process? Justify your answer.

(vi) From your knowledge of photosynthesis, suggest a way to increase the growth of plants (such as lettuces) in a greenhouse.

(vii) Photosynthesis is critical for human life on Earth.
Suggest **one** reason that life, as we know it, would not continue without photosynthesis. **(27)**

(c) The diagram shows human skeletal muscle cells.

(i) Why do you think a muscle cell needs to carry out large amounts of respiration?

(ii) Aerobic respiration takes place in two main stages – stage 1 and stage 2.

1. Where in a cell does stage 1 occur?

2. **In your answerbook**, state whether **each** of the following statements refers to stage **1 or** stage **2**.

A: Requires oxygen.

B: Does not require oxygen.

C: Releases a small amount of energy.

D: Releases a large amount of energy.

(iii) Anaerobic respiration can occur in human muscle cells.
Suggest a situation where anaerobic respiration might occur in a human muscle cell.

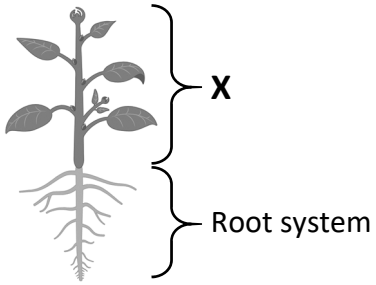
(iv) Anaerobic respiration can also occur in micro-organisms.
Which **one** of the following terms describes this form of anaerobic respiration?
Filtration *Fermentation* *Diffusion* **(24)**

14. **(a)** The diagram shows the two major systems of a flowering plant.

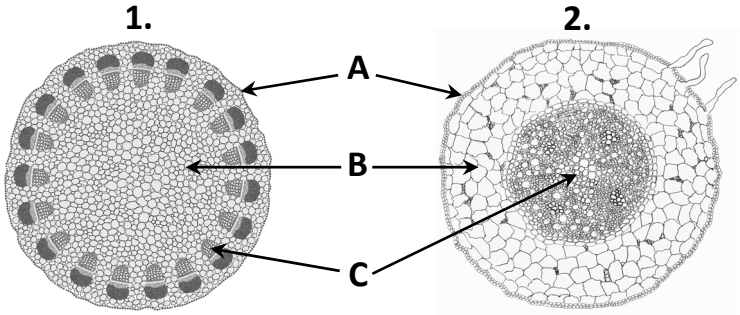
(i) Give a function for the root system.

(ii) Name the system represented by the letter **X**.

(iii) Give a function for the system you named in (a) (ii) above. **(9)**



(b) The diagrams show transverse sections of a root and a stem from the same plant.



(i) Which diagram, **1** or **2**, represents the transverse section of the root? Justify your answer.

(ii) Is this plant monocotyledonous **or** dicotyledonous? Justify your answer.

(iii) The labels in the diagram represent three different plant tissue types. **In your answerbook**, match the tissues labelled **A**, **B** and **C** with the following terms: *Ground*, *Dermal*, *Vascular*.

(iv) Which **one** of the tissues named above contains xylem and phloem?

(v) Give **one** function for **either** xylem **or** phloem. **(27)**

(c) Answer the following questions in relation to reproduction in plants.

(i) Plants use seed dispersal as part of reproduction.

1. Is seed formation part of asexual **or** sexual reproduction in plants?

2. Why do you think seed dispersal is an important part of plant reproduction?

3. Plants use various methods for seed dispersal including: *animal*, *wind* and *water*. **In your answerbook**, match **each** type of seed dispersal to the following images, **A**, **B** and **C**.

(ii) Plants can also undergo vegetative propagation.

1. Is vegetative propagation part of asexual **or** sexual reproduction in plants? Justify your answer.

2. Give any **one** method of vegetative propagation in plants. **(24)**

15. The following questions relate to the human reproductive system.

(a) **(i)** Name the male hormone responsible for male secondary sexual characteristics.

(ii) Two hormones in females that are involved in the menstrual cycle include: *progesterone* and *oestrogen*.

From the hormones named above, identify which hormone is mainly responsible for:

1. Building-up of the endometrium.

2. Maintaining the endometrium for pregnancy. **(9)**

(b) Answer the following questions in relation to the female reproductive system.

(i) What happens in the womb (or uterus) during menstruation (approximately days 1 – 5)?

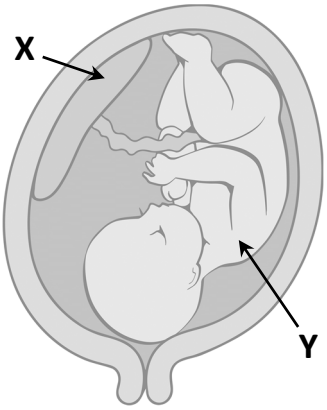
(ii) Ovulation occurs on approximately day 14.
What happens during ovulation?

(iii) The time around ovulation is described as the fertile period.
Where in the female reproductive system should the sperm be in order for fertilisation to occur?

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

(v) Give **one** method used to treat infertility.

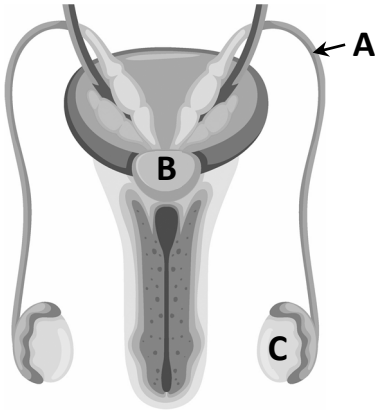
(vi) The diagram shows a developing foetus.
Using the terms *placenta* **and** *foetus*, identify **X** and **Y**.



(vii) Give **one** function of the placenta.

(viii) Lactation is the production of milk.
Which **one** of the following hormones is involved in lactation?
Growth hormone *Prolactin* **(27)**

(c) The diagram shows the male reproductive system.



(i) **In your answerbook**, match **each** of the parts labelled **A**, **B** and **C** with the following terms: *testis*, *prostate gland*, *sperm duct*.

(ii) Which part named above produces sperm?

(iii) Name any method of contraception.

(iv) Sketch the basic structure of a sperm cell **and** label the following **two** parts:
head *tail* (or *flagellum*).

(24)

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

(a) Enzymes are important biological molecules.

(i) Which **one** of the following terms best describes the shape of enzymes?
Fibrous *Folded* (*globular*)

(ii) Copy the table below **into your answerbook**.
Using the words listed, complete the table.
List: **Protease** **Maltose** **Starch** **Lipase**

Substrate	Enzyme	Product
	Amylase	
Lipids		Triglycerides
Protein		Amino acid

(iii) **1.** Enzymes and living cells can be immobilised.
Describe briefly how enzymes or living cells can be immobilised.

2. Give **two** advantages of using immobilised enzymes.

3. What name is given to containers in which bioprocessing occurs?

(b) Answer the following questions in relation to genetics.

(i) What is meant by non-coding DNA?

(ii) Genetic variation within members of the same species occurs from sexual reproduction and mutations.

1. What is a mutation?

2. Give any **two** causes of mutations.

(iii) **In your answerbook**, match **each** of the following terms, *heredity*, *species* **and** *gene expression* to **each** description below:

A: Group of similar organisms that can interbreed to produce fertile offspring.

B: Passing on of characteristics from one generation to the next.

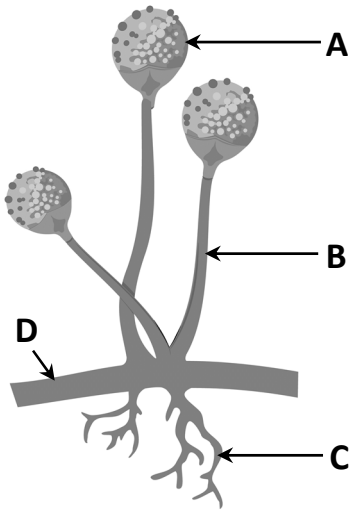
C: The production of a protein using the code in DNA.

(iv) Darwin and Wallace came up with a famous theory that describes how species are better able to compete and better able to survive.

1. What is this theory called?

2. Name **and** briefly describe **one** piece of evidence that supports this theory.

(c) Answer the following questions in relation to *Rhizopus* and yeast.



(i) *Rhizopus* and yeast both belong to the same kingdom of living organisms. Identify this kingdom from the following list: **Fungi**, **Monera**, **Protista**.

(ii) The diagram shows *Rhizopus* (a type of bread mould).
In your answerbook, match **each** of the parts labelled **A**, **B**, **C** and **D** with the following terms: *rhizoid*, *sporangiophore*, *sporangium*, *stolon*.

(iii) Which part named above contains spores?

(iv) What is the function of the spores?

(v) Which **one** of the following types of nutrition does *Rhizopus* use?
Saprophytic **Autotrophic**

(vi) **1.** Is yeast a unicellular **or** multicellular organism?

2. What term describes how yeasts reproduce?

(d) Answer the following questions in relation to microbiology.

(i) Draw a diagram of a virus **and** label the following parts:
Protein coat **Nucleic acid**.

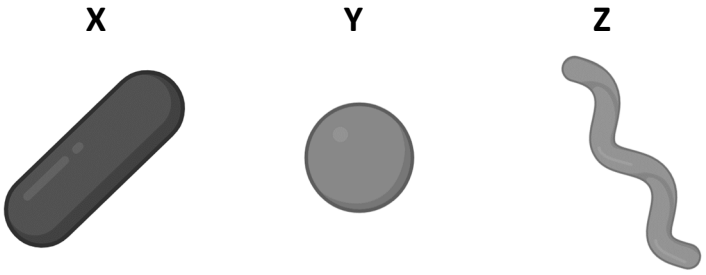
(ii) Why is it difficult to classify viruses as living organisms?

(iii) Name any **two** harmful examples of viruses.

(iv) Antibiotics are not given to a person suffering from a viral infection. Suggest a reason for this.

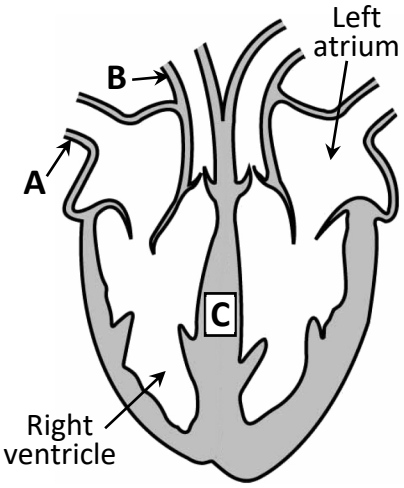
Bacteria can also be harmful. Bacteria can be classified based on their shape.

(v) Match **each** of the shapes *spherical*, *rod* **and** *spiral* to the diagrams **X**, **Y** and **Z**.



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

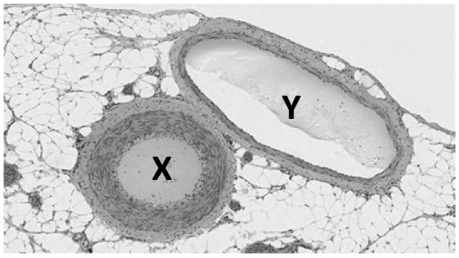
(a) The diagram shows the human heart.



(i) **In your answerbook**, match **each** of the parts labelled **A**, **B** and **C** with the following terms: *septum*, *vena cava*, *pulmonary artery*.

(ii) The left atrium receives blood from the lungs and the right ventricle pumps blood towards the lungs.
In your answerbook, match **each** chamber, the *left atrium* **and** the *right ventricle*, to the type of blood listed below:
1. Deoxygenated blood
2. Oxygenated blood.

(iii) The heart contains valves.
What is the function of these valves?



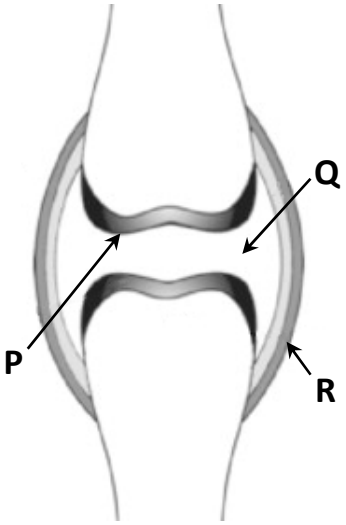
(iv) The image shows a transverse section of a vein and an artery.
Which do you think is the artery, **X** or **Y**?
Justify your answer.

(v) There are four main blood groups in humans. Name any **two**.

(b) **(i)** State **two** functions of the human skeleton.

(ii) Vertebrae are a type of bone found in the human skeleton.
They are classified into the following types:
lumbar, *thoracic*, *cervical*, *sacral*, and *coccyx*.
1. Which type of vertebra is found in the neck region?
2. Which type of vertebra forms joints with the ribs?

(iii) The vertebrae and ribs form part of the axial skeleton.
Name **one other** bone of the axial skeleton.



(iv) The diagram shows the structure of **one** type of joint.
In your answerbook, match **each** of the parts labelled **P**, **Q** and **R** with the following terms:
ligament, *cartilage*, *synovial fluid*.

(v) Give a function of any **one** of the parts named in (b) (iv) above.

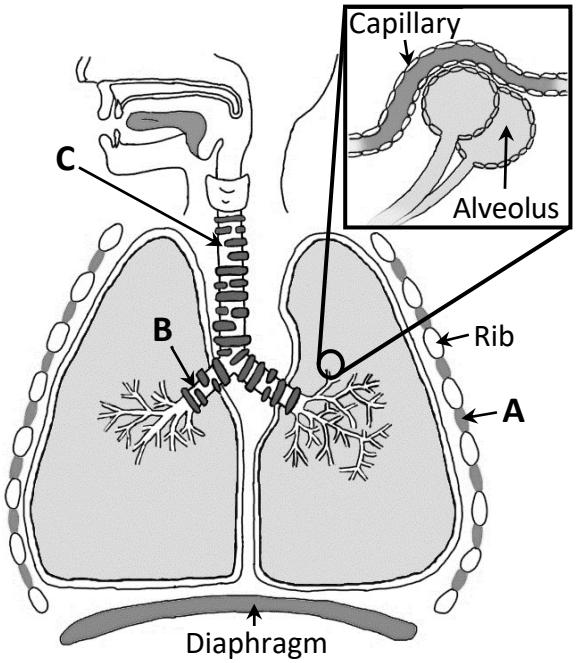
(vi) Arthritis and osteoporosis are two disorders of the musculoskeletal system.
Give **one** possible cause of **either** of the disorders named above.

(c) The diagram below shows the human breathing system.

(i) **In your answer book**, match **each** of the parts labelled **A**, **B** and **C** with the following terms: *trachea*, *bronchus*, *intercostal muscle*.

(ii) **1.** What is the function of the alveolus?

2. Give **one** adaptation (or characteristic) that enables the alveolus to carry out its function.



(iii) Which **one** of the following statements (**X** or **Y**) describes how the diaphragm moves during inhalation?

X: Contracts and moves down.

Y: Relaxes and moves up.

(iv) Which **one** of the following statements (**X** or **Y**) describes how the ribcage moves during inhalation?

X: Moves downwards and inwards.

Y: Moves upwards and outwards.

(v) Name a disorder of the breathing system **and** give a treatment for this disorder.

(vi) The trachea (or windpipe) is surrounded by rings of cartilage.
What is the function of these rings of cartilage?

(d) The human body's defence (immune) system has general and specific parts that defend against pathogens.

(i) What is a pathogen?

(ii) Describe **two** ways the general defence system prevents entry of pathogens.

(iii) Which **three** of the following organs are specific parts of the immune system?
Spleen *Heart* *Thymus* *Lung* *Lymph node*

The presence of antibodies provides induced immunity. There are two types of induced immunity – **active** and **passive**.

(iv) Match the terms *active* **and** *passive* to the sentences below:

A: Develops after vaccination **or** after an infection.

B: Occurs when individuals are given antibodies produced in another organism.

(v) White blood cells are involved in both the general and specific defence systems. They are found in the blood and in another circulatory fluid of the body.

1. What is the name given to this other circulatory fluid?

2. A certain type of circulatory vessel transports the fluid you mentioned above. Give **one** way in which this vessel is structurally similar to a vein.

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Diagram in Q17 (b) on page 9:	Adapted from "The Development of Synovial Joints", I.M. Khan *et al.*, 2007, Current Topics in Development Biology.
Diagram in Q17 (c) on page 10:	State Examinations Commission

Text:

Text on page 2:	Adapted from "The global importance of Ireland's 14,000 Horseshoe Bats", Irish Examiner, Mon 30 August 2021.

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Leaving Certificate Examination – Ordinary Level

Biology Section C

Tuesday 10 June

Afternoon 2:00 - 5:00