



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2026

Biology

Section C

Higher Level

Tuesday 9 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) The molecule ATP plays an important role in metabolism.
- (i) What is meant by the term *metabolism*?
 - (ii) What do the letters ATP stand for?
 - (iii) What is the role of ATP in metabolism? (9)
- (b) Answer the following questions in relation to aerobic respiration.
- (i) What name is given to the first stage of aerobic respiration?
 - (ii) Describe the events of the first stage of aerobic respiration.
 - (iii)
 - 1. What small gaseous molecule must be present for the second stage of aerobic respiration to occur?
 - 2. Where in the cell does the second stage of aerobic respiration occur?
 - 3. Describe the events of the second stage of aerobic respiration. (27)
- (c) The light-dependent stage of photosynthesis involves energised electrons entering two pathways (1 and 2).
- (i) Why is this stage called the light-dependent stage?
 - (ii) In pathway 1, energised electrons are released from a molecule and passed along a series of electron acceptors.
 - 1. Name the molecule that releases these energised electrons.
 - 2. At the end of this pathway, what happens to these electrons?
 - (iii) Water is split during pathway 2.
 - 1. What name is given to **this** splitting of water?
 - 2. Name the cell organelle where water is split.
 - (iv) Protons (H^+ ions) are released when water is split.
Describe what happens to these protons to allow for carbohydrate production.
 - (v) State **one** method that horticulturists can use to promote crop growth in greenhouses. (24)

- 12 (a) (i) In ecology, what is meant by the term *competition*?
(ii) Name **and** describe **one** type of competition in ecology. (9)

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

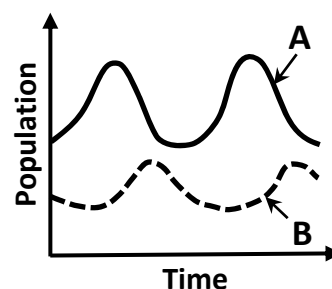
Vine weevils are a common beetle that feed on a wide range of plants. The adult weevils eat leaves during spring and summer, but the young larvae (grubs) cause the most damage over autumn and winter when they feed on plant roots. This damage can result in wilting and plant death. Adult weevils are mainly active after dark to avoid predation, feeding on the foliage of many herbaceous plants and shrubs, especially *Hydrangea* and strawberry. Hedgehogs and shrews, which are natural predators of the weevils and their grubs, help to control infestations. However, numbers of weevils can easily increase again.



Adapted from rhs.org.uk/biodiversity/vine-weevil

- (i) Identify **one** behavioural adaptation of the vine weevil from the passage above.
(ii) From the passage or otherwise, explain how this adaptation benefits the vine weevil.
(iii) Suggest a reason why the vine weevil numbers can easily increase again.
(iv) Using organisms named in the passage above, write out a food chain with three trophic levels.
(v) Construct a pyramid of numbers based on the food chain you wrote above.

The graph shows the relationship between the vine weevil and the shrew populations.



- (vi) Which line, **A** or **B**, represents the vine weevil? Explain your answer.
(vii) Suggest a reason for the population of the vine weevil and the shrew peaking at different times.
(viii) Other than predation and competition, state **two** biological factors that have an effect on population numbers.

(27)

- (c) (i) In terms of ecology, explain the term *conservation*.
(ii) Outline **one** conservation practice, including its benefit, from **one** of the following areas: agriculture **or** fisheries **or** forestry. Indicate clearly to which area your answer refers.
(iii) State **one** example of waste management from **one** of the following areas: agriculture **or** fisheries **or** forestry. Indicate clearly to which area your answer refers.

Pollution is a problem associated with waste disposal.

- (iv) Explain the term *pollution*.
(v) Name any **one** pollutant **and** state its effect.
(vi) State **one** problem associated with waste disposal other than pollution.

(24)

13. (a) Deoxyribonucleic acid (DNA) is a polynucleotide.
Draw a labelled diagram of **one** nucleotide of DNA. (9)
- (b) Red-green colour blindness is an inherited, sex-linked condition that occurs mainly in males. It affects about 8% of men and 0.5% of women. The red-green colour blindness allele is recessive (**n**) to the normal colour vision allele (**N**).
- (i) Explain the underlined terms.
 - (ii) State the **full** genotype of a heterozygous female.
 - (iii) State the **full** genotype of a colour-blind male.
 - (iv) State all the genotypes **and** matching phenotypes of the possible offspring of the two parents described in (ii) and (iii) above.
 - (v) Explain why males are more likely than females to be colour-blind. (27)
- (c) The theory of evolution by natural selection was proposed by two famous naturalists. The two naturalists made a number of observations and came up with some conclusions.
- Some of the important observations include: organisms usually produce large numbers of offspring; variation exists within a species; and favourable traits accumulate in a population.
- (i) Explain the underlined terms.
 - (ii) Variation can be caused by mutations. Name **two** types of mutation.
 - (iii) Name **both** of the naturalists who proposed this theory.
 - (iv) Suggest a benefit to species of producing large numbers of offspring.
 - (v) Explain how the accumulation of favourable traits in a population contributes to natural selection.
 - (vi) State **one** piece of evidence for natural selection. (24)

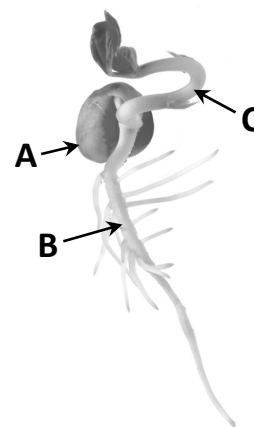
14. (a) Flowering plants can be described as monocotyledonous (monocot) or dicotyledonous (dicot).
- (i) What is a cotyledon?
 - (ii) Other than the number of cotyledons, state **two** structural differences between a monocotyledonous plant **and** a dicotyledonous plant. (9)

- (b) Sexual reproduction in flowering plants involves the formation and dispersal of seeds. These seeds often undergo a period of dormancy before germination.

- (i) Name the part of the flower that develops into the seed.
- (ii) State any **one** method of seed dispersal.
- (iii) State **one** advantage to the plant of seed dispersal.
- (iv) State **one** advantage to the plant of dormancy.

The image shows a seed shortly after the start of germination.

- (v) 1. What is meant by the term *germination*?
2. What name is given to the outer covering of a seed, labelled **A**?
3. Name the parts labelled **B** and **C**.

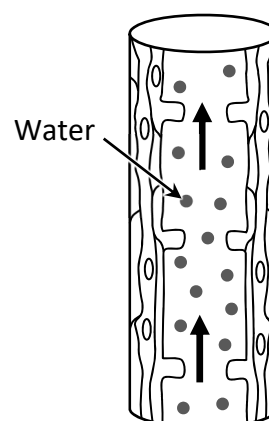


Seeds require water, oxygen and a suitable temperature for germination to occur.

- (vi) Describe the role of water during the process of germination.
- (vii) Outline the role of a suitable temperature during the process of germination. (27)

- (c) The diagram shows a xylem vessel transporting water up the stem of a plant.

- (i) Name **one other** substance transported by xylem.
- (ii) Describe **two** structural features of xylem that allows it to transport water efficiently.
- (iii) The cohesion-tension model explains how water is transported in xylem.
 - 1. Name the **two** Irish scientists who proposed this model.
 - 2. Describe the process of the cohesion-tension model of water movement in xylem. (24)



15. (a) (i) What is meant by the term *contraception*?
(ii) State any **three** methods of contraception. (9)

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

- (i) Draw a large diagram of the human female reproductive system **and** label the following parts:

Ovary; Fallopian tube; Uterus; Endometrium; Cervix; Vagina.

- (ii) The ovary produces oestrogen.

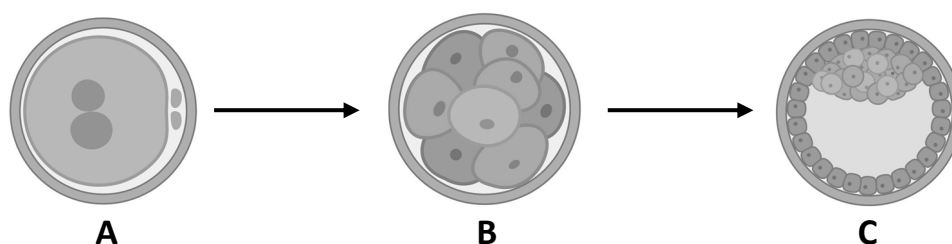
State any **one** role of oestrogen during the menstrual cycle.

- (iii) Name **one other** female sex hormone that is active during the menstrual cycle **and** state its precise function.

- (iv) State **one** cause of a **named** menstrual disorder. (27)

(c) The diagram (not drawn to scale) shows the early stages of human embryo development.

Structure **A** forms immediately after fertilisation.



- (i) Identify structures **A**, **B** and **C**.

- (ii) Where in the female reproductive system does structure **B** usually develop?

- (iii) What must happen to structure **C** to allow for further development and growth?

- (iv) Three germ layers form within structure **C** during embryonic development. Name the **three** germ layers **and** state **one** structure that develops from **each** layer you named.

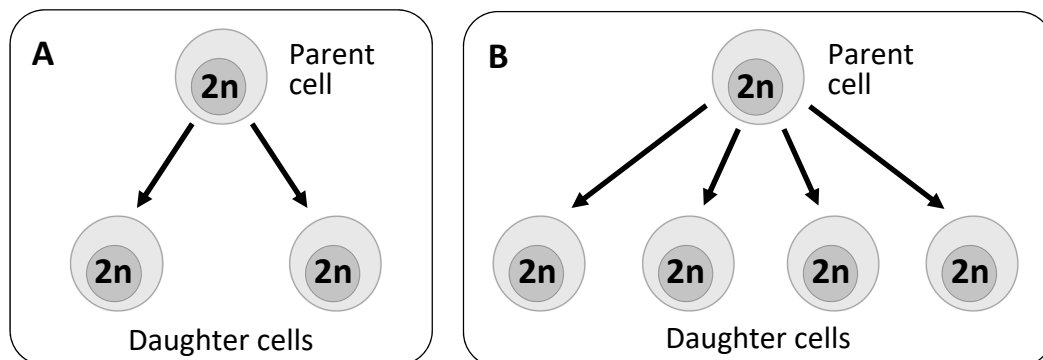
- (v) Infertility is the inability to produce offspring.

State **two** possible corrective measures for infertility. (24)

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

(30, 30)

(a) Study the diagrams below and answer the following questions.

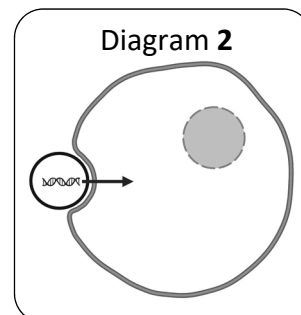
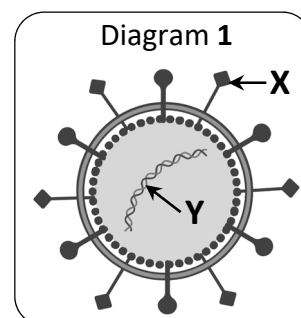


- (i) Using diagrams **A** and **B** as an aid, explain in detail the following terms:
 1. *Mitosis*
 2. *Meiosis*
- (ii)
 1. State a role of mitosis in multicellular organisms.
 2. State a role of meiosis in multicellular organisms.
- (iii) Explain the terms *haploid* and *diploid*.
- (iv) Draw a diagram of a cell with a diploid number of 4, during anaphase of mitosis. Label any **three** parts that are only visible during mitosis.
- (v) What term describes uncontrolled mitosis and cell division?

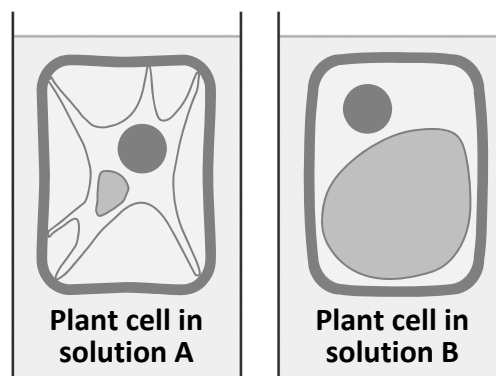
(b) Viruses can have a variety of shapes, but always contain two types of biomolecules (**X** and **Y**).

There is a difficulty in classifying viruses as living.

- (i) Name the types of biomolecules **X** and **Y** shown in diagram 1 of this virus.
- (ii) The virus in diagram 1 is a round-shaped virus. State any **other** possible shape of a virus.
- (iii) Diagram 2 shows a virus attaching to a host cell. Describe how the virus uses this host cell to produce a large number of viruses.
- (iv) Suggest a reason why a red blood cell is not a suitable host cell for viruses.
- (v) State **two** examples of harmful viruses.
- (vi) State **one** example of the beneficial use of viruses.



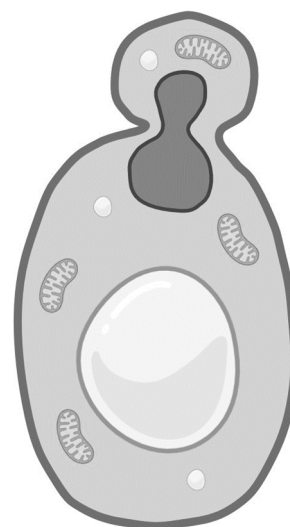
- (c) The diagram (not drawn to scale) shows a plant cell in solution **A** and the same plant cell when placed in solution **B**.



- What has happened to the cell in solution **A**?
- Name the condition that describes the cell in solution **B**.
- Osmosis is a special type of diffusion that contributes to the condition you named above.
 - What is meant by the term *diffusion*?
 - Explain in detail why osmosis is referred to as a special type of diffusion.
 - Why is diffusion described as passive transport?
- Outline how a **named** structure in the cell in solution **B** helps to maintain the shape of the cell.
- Explain how solution **B** differs from solution **A**.
- Suggest what might happen to an animal cell if it was placed in solution **B**.
- Foods can be preserved using different solutions. Which solution (**A or B**) is most suitable to be used in food preservation? Explain your answer.

- (d) The diagram shows a yeast cell undergoing asexual reproduction.

- Name the kingdom to which yeast belong.
- Name the type of asexual reproduction shown in the diagram.
- Identify **one** advantage of asexual reproduction.
- Copy the diagram into your answerbook and** label any **three** parts.
- Micro-organisms, such as yeasts, can be grown in the laboratory. Precautions such as asepsis and sterility should be taken.
Explain **both** underlined terms clearly.
- Name **one other** species you have studied that is a member of the same kingdom as yeast.
- State how the process of asexual reproduction you named at part (ii) above differs in the species you named at part (vi) above.
- Name **one other** unicellular organism you have studied **and** the kingdom to which it belongs.

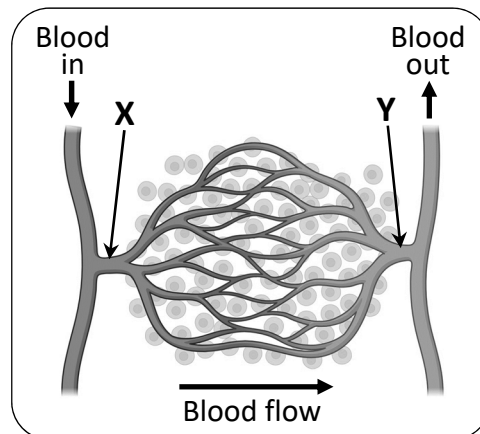


17. Answer any **two** of (a), (b), (c), (d).

(30, 30)

(a) The diagram shows a capillary network and associated blood supply in an organ.

X and Y are blood vessels. One connects to a vein and the other connects to an artery.



(i) Identify **each** type of blood vessel, X and Y.

(ii) Explain the following terms:

1. *Blood pressure*
2. *Pulse*

(iii) How does the blood pressure change as blood flows in the direction indicated on the diagram?

(iv) Draw labelled diagrams of a vein **and** an artery **and** a capillary to clearly show the structural differences between them.

(v) Name the type of vessel that is also present in capillary networks that absorbs the excess tissue fluid around the cells.

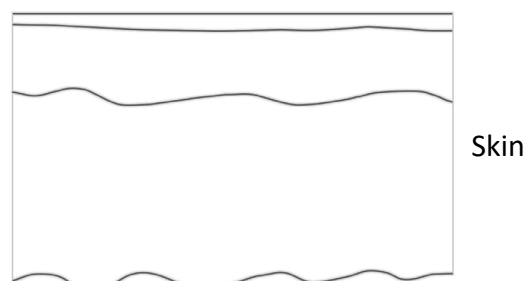
(vi) Describe the effects of the following factors on the circulatory system:

1. Exercise
2. Diet

(b) The diagram shows the basic structure of the skin.

(i) **Copy the diagram into your answerbook and sketch and label each** of the named structures below in their correct locations.

1. A sweat gland
2. A hair



(ii) Name the **two** main components of sweat.

(iii) In warm conditions, sweat is produced. Describe how this helps to regulate body temperature.

(iv) State **and** explain how hair on the skin contributes to temperature regulation in cold conditions.

(v) Explain the term *endotherm*.

(vi) What name is given to the ability of organisms to maintain a constant internal environment?

(vii) State **one** reason why it is important for organisms to maintain a constant internal environment.

(c) The urinary system functions in excretion.

(i) Explain the term *excretion*.

(ii) 1. Draw a large diagram of the human urinary system labelling the following parts:

Kidney; Ureter; Bladder; Urethra.

2. **On the diagram you have drawn**, place an arrow to clearly show the pathway of urine flowing through the ureter.

(iii) The diagram on the right shows the functional unit of the kidney.

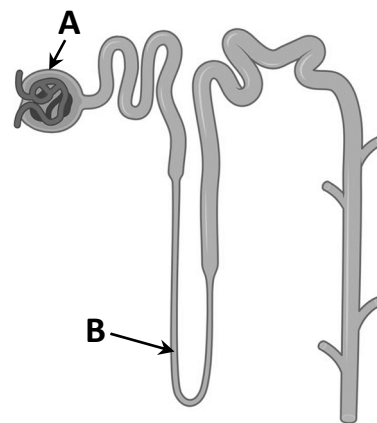
1. What name is given to this structure?

2. Name the parts labelled **A** and **B**.

3. Outline what happens in **each** part labelled **A** and **B** during urine production.

(iv) Under normal conditions, there is no protein in urine.

State a reason for its absence from urine.



(d) The human nervous system can be divided into two main parts – the central nervous system (CNS) and the peripheral nervous system (PNS). The CNS contains the brain and the spinal cord. Electrical impulses are carried through these systems by neurons. The diagram shows a section through the spinal cord.

(i) Name the fluid found in the central canal.

(ii) 1. Name the protective tissue **Y** surrounding the spinal cord that has three layers.

2. Name **one other** structure that protects the spinal cord.

(iii) Name the regions of the spinal cord labelled **P** and **Q**.

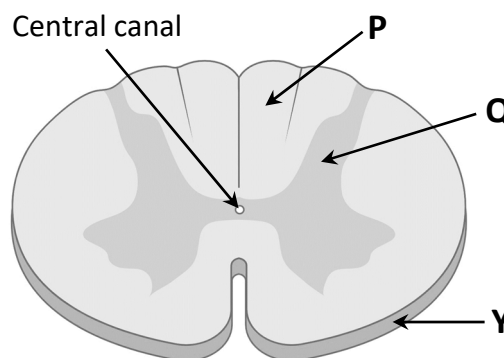
(iv) 1. Draw a large diagram of a neuron.

2. **On your diagram** label the following parts:

Axon; Dendrite; Myelin sheath

3. **On your diagram** indicate with an arrow the direction of travel of an impulse.

(v) Describe the mechanism of a reflex action.



Acknowledgements:

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Texts:

Text on page 3:	Adapted from https://www.rhs.org.uk/biodiversity/vine-weevil
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