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Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2024

Biology

Section C

Ordinary Level

Tuesday 11 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.

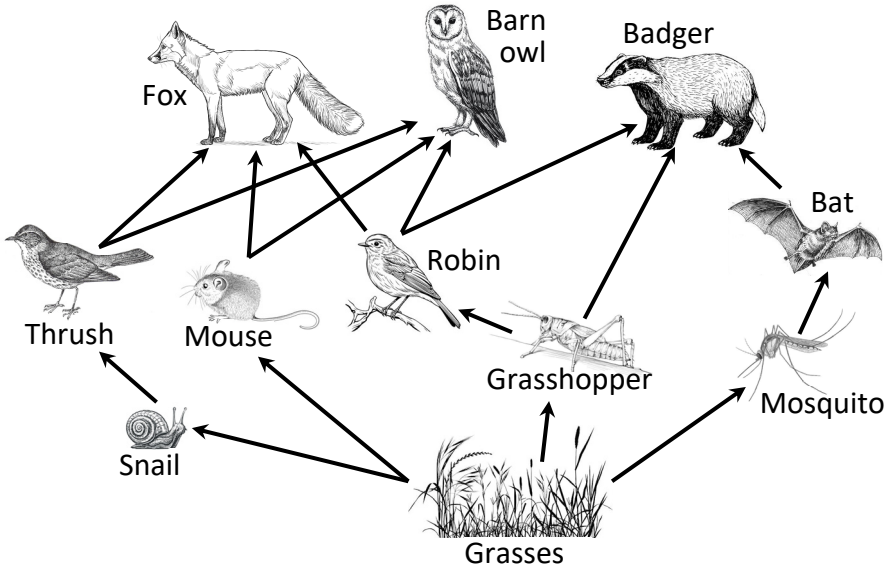
11. **(a)** **(i)** What is the primary source of energy for organisms on Earth?

(ii) Define the following terms as used in ecology:

1. *Biosphere*

2. *Niche*. **(9)**

(b) The diagram shows a food web.



(i) Name the producer from the food web.

(ii) Name a primary consumer from the food web.

(iii) Name a secondary consumer from the food web.

(iv) What do the arrows on the diagram mean?

(v) **1.** Write down any **one** food chain from the food web.

2. How many feeding (trophic) levels are in your food chain?

(vi) Draw a pyramid of numbers for the food chain you wrote down in part (b) (v) 1. above. **(27)**

(c) Pollution, waste management and conservation are three ways humans affect ecosystems.

(i) **1.** What is meant by the term *pollution*?

2. Give **one** example of a pollutant.

3. Give **one** way pollution may be controlled.

(ii) **1.** There are problems associated with waste disposal. Give any **one**.

2. Give **one** way in which waste can be minimised.

(iii) **1.** Explain the term *conservation*.

2. Give **one** conservation practice from **one** of the following areas: **agriculture**; **fisheries**; **forestry**; **and** explain the reason for this conservation practice. **(24)**

12. **(a)** Answer the following questions in relation to metabolism.

(i) Explain the term *metabolism*.

(ii) State whether **each** of the following processes is anabolic **or** catabolic:

1. Respiration

2. Photosynthesis **(9)**

(b) Aerobic respiration is a two-stage process (stage 1 and stage 2) and can be represented by a balanced equation.

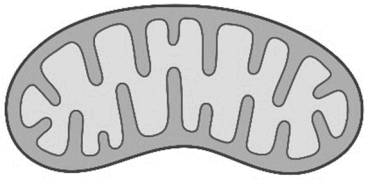
(i) **In your answerbook**, write out **and** complete the following balanced equation for aerobic respiration:

$C_6H_{12}O_6$ + $6O_2$ → 6 _____ + 6 _____ + energy

(ii) What is the name given to the substance with the formula, **$C_6H_{12}O_6$**?

(iii) Where in a cell does stage 1 occur?

(iv) What is the name of the organelle shown in the diagram in which stage 2 of aerobic respiration occurs?



(v) Describe the differences between stage 1 **and** stage 2 of aerobic respiration using the following headings:

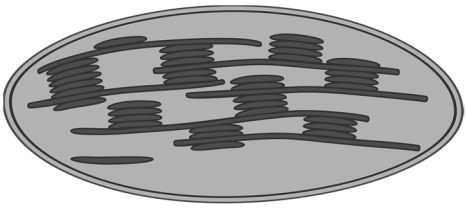
1. Relative amount of energy released in stage 1.

2. Relative amount of energy released in stage 2.

3. Oxygen requirement of stage 1.

4. Oxygen requirement of stage 2. **(27)**

(c) Photosynthesis is a process that occurs in the plant cell organelle shown in the diagram.



(i) What is the name of the organelle shown?

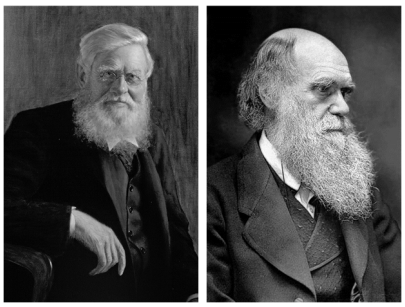
(ii) What is the name given to the green pigment present in the organelle you named at part (c) (i) above that traps sunlight energy?

(iii) The energy in sunlight is used by the pigment you named above to split water. Name the **three** components that result from the splitting of water.

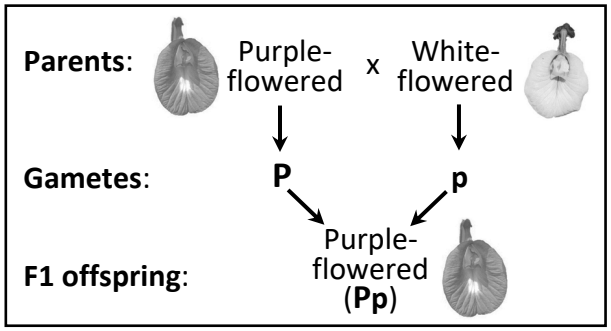
(iv) State what happens to **each** of the components you named at part (c) (iii) above. **(24)**

13. **(a)** **(i)** Explain in detail the term *evolution*.

(ii) Name **either one** of the 19th century British biologists who introduced the theory of evolution by natural selection. **(9)**



(b) Study the diagram of a cross between two pea plants and answer the following questions.

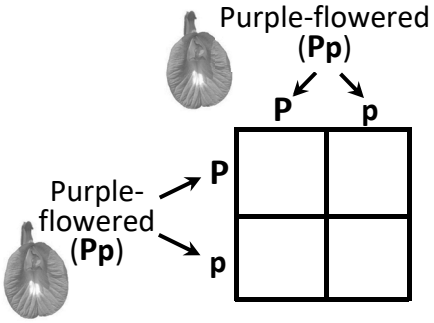


(i) Both parents were <u>homozygous</u> and the F1 (first generation) offspring were <u>heterozygous</u>. Explain the underlined terms.

(ii) Give the genotypes of **both** parents.

Two of the F1 offspring were then self-fertilised.

The F2 (second generation) offspring were **not** all purple-flowered.



(iii) Copy the Punnett square **into your answerbook and** complete it to show the genotypes of the F2 offspring.

(iv) What fraction **or** percentage of the F2 offspring is white-flowered? **(27)**

(c) Variation in offspring can result from sexual reproduction (gamete production) and mutations.

(i) Which type of cell division (**mitosis** or **meiosis**) is directly involved in producing gametes?

(ii) Give **two** agents **or** substances that can increase the rate of DNA mutations and can potentially cause cancer.

(iii) Variation exists within all species. What is meant by the term *species*?

(iv) DNA profiling is a laboratory technique where a unique pattern of bands of DNA is made. Give **two** applications (or uses) of DNA profiling.

(v) Genetic screening is also a laboratory technique.
Give **one** application (or use) of genetic screening. **(24)**

14. **(a)** Three kingdoms of organisms include: **Fungi**, **Monera** and **Protista**.
Match **each** of these kingdoms to the following named organisms below:

(i) Bacteria

(ii) *Amoeba*

(iii) *Rhizopus* **(9)**

(b) Bacteria are very small cells and are found in all habitats.

(i) Draw a diagram of a bacterial cell **and** label the following parts:
Cell wall; **DNA**; **Cytosol**

(ii) Bacteria can be classified based on their shape.
Name any bacterial shape.

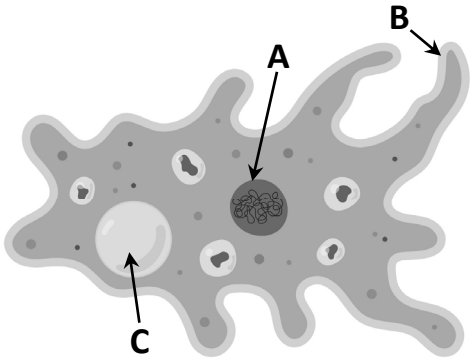
(iii) Some bacteria are pathogenic.
Explain the underlined term.

(iv) Some bacteria can be beneficial.
Give **one** example of a beneficial bacterium.

(v) Bacterial cells undergo binary fission.
What is binary fission?

(vi) State any **one** factor that influences the growth of bacteria. **(27)**

(c) *Amoeba* is a single-celled micro-organism as shown in the diagram.



(i) **In your answerbook**, match **each** of the parts labelled **A**, **B** and **C** with the following terms:

1. **Pseudopod**
2. **Nucleus**
3. **Contractile vacuole**

(ii) Which of the above-mentioned parts does *Amoeba* use to move around?

(iii) Which of the above-mentioned parts does *Amoeba* use to control the amount of water inside the cell?

Care must be taken when handling micro-organisms.
Asepsis and sterility are two techniques often used.

(iv) Match **each** of the sentences below to the terms *asepsis* **and** *sterility*.

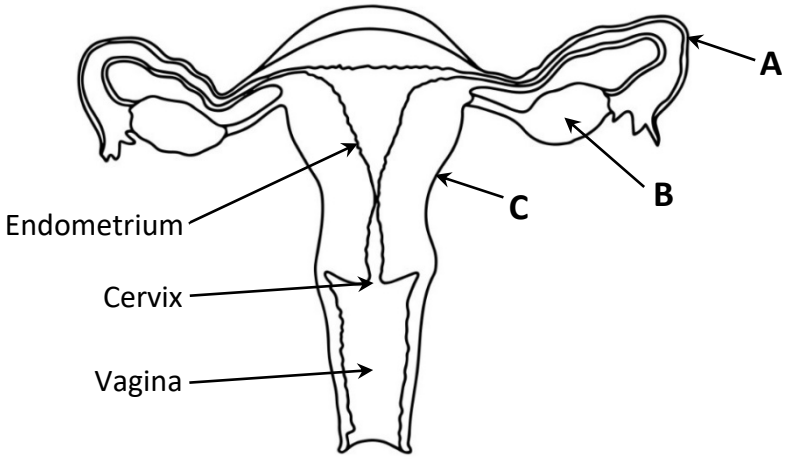
1. **Absence of pathogens**
2. **Absence of all microorganisms**

(v) Describe how you would dispose of micro-organisms safely at the end of a laboratory activity. **(24)**

15. **(a)** **(i)** Explain the term *secondary sexual characteristics*.

(ii) Give **one** example of a secondary sexual characteristic in humans. **(9)**

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



(i) **In your answerbook**, match **each** of the parts labelled **A**, **B**, and **C** with the following terms:

1. **Uterus**

2. **Fallopian tube**

3. **Ovary**

(ii) In which labelled part are egg cells produced?

(iii) Fertilisation is where the sperm cell and egg cell fuse.
In which labelled part does fertilisation occur?

(iv) Sperm cells and egg cells are gametes.
Which gamete is larger, a sperm cell or an egg cell?

(v) Sketch the structure of a sperm cell.

(vi) The vagina and endometrium are shown in the diagram.
Give **one** function for **each**. **(27)**

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

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

(ii) Give **one** cause of infertility in the human.

(iii) Give a possible corrective measure for infertility.

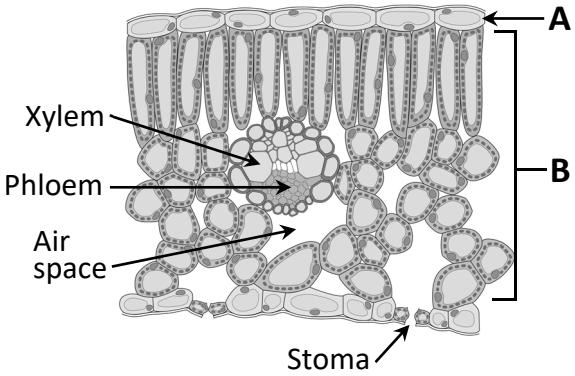
(iv) **1.** What is meant by the term *birth control*?

2. Give **two** methods of birth control.

(v) Breastfeeding has many biological benefits for mother and baby.
Give any **two** biological benefits. **(24)**

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

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



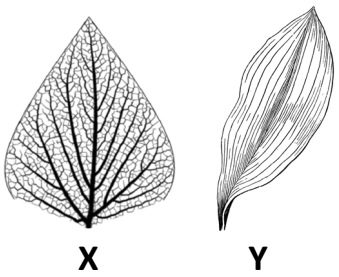
(i) **In your answerbook**, match tissues **A** and **B** to the following terms:
1. **Ground**
2. **Dermal**

(ii) Xylem and phloem are shown in the diagram.
1. Give **one** function of xylem.
2. Give **one** function of phloem.

(iii) Which of the following terms describes the evaporation of water into the airspaces of the leaf?
Transpiration; **Respiration**

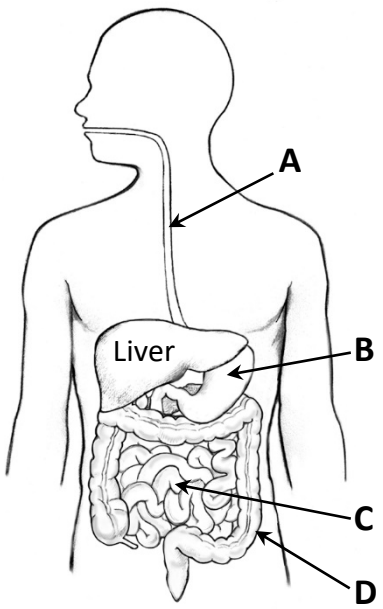
(iv) When the water evaporates into the airspaces, through which labelled structure does it exit the leaf?

(v) Veins in leaves can be arranged in a parallel pattern or a net (reticulate) pattern. Match **each** of the leaves **X** and **Y** to the following terms:
1. **Parallel venation**
2. **Net venation**



(vi) The type of leaf venation usually indicates whether a plant is monocotyledonous (monocot) or dicotyledonous (dicot). Match **each** of the types of leaf venation (**parallel** and **net**) to the following terms:
1. **Monocotyledonous**
2. **Dicotyledonous**

(b) The diagram shows the human digestive system.



(i) **In your answerbook**, match **each** of the parts labelled **A**, **B**, **C** and **D** with the following terms:
1. **Stomach**
2. **Large intestine**
3. **Oesophagus**
4. **Small intestine**

(ii) Explain the following terms:
1. *Ingestion*
2. *Digestion*

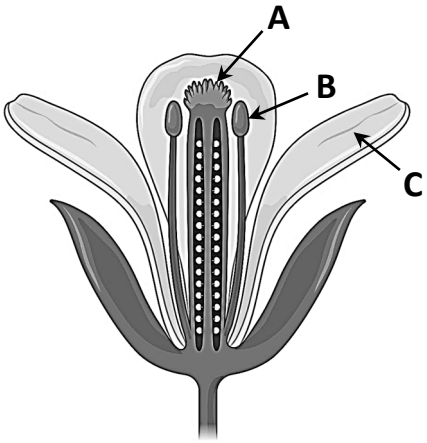
(iii) Why is digestion important in the body?

(iv) The liver has many functions. Give any **one**.

(v) Symbiotic bacteria are found in the human digestive system.
Give any **one** function of these bacteria.

(vi) Why is fibre an important part of the diet?

(c) The diagram shows the structure of a flower.



(i) **In your answerbook**, match **each** of the parts labelled **A**, **B** and **C** with the following terms:

1. **Petal**
2. **Stigma**
3. **Anther**

(ii) **In your answerbook**, match **each** of the parts of the flower (**petal**, **stigma** and **anther**) with the following functions:

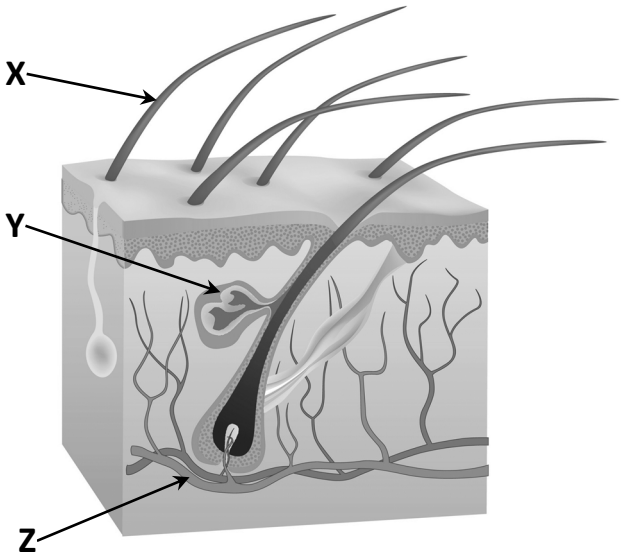
1. Traps pollen
2. Attracts pollinators (e.g. insects)
3. Produces pollen

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

(iv) State **two** types of pollination.

(v) Is part **B** the female **or** male part of the flower?

(d) The diagram shows a section through the human skin.



(i) **In your answerbook**, match **each** of the parts labelled **X**, **Y** and **Z** with the following terms:

1. **Blood vessel**
2. **Hair**
3. **Sebaceous gland**

(ii) The skin is a part of the excretory system in humans. Name **one** substance that the skin excretes.

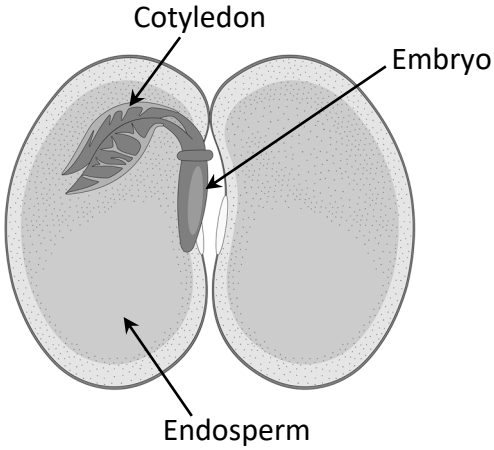
(iii) The skin is also part of the general defence system. Explain its role in the general defence system.

(iv) Using information in the diagram, or otherwise, briefly describe **one** way the skin can help regulate body temperature.

(v) Name **two** other excretory organs in the human body **and** name a substance that **each** organ excretes.

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

(a) Answer the following questions in relation to seeds and germination.



(i) The diagram shows the internal structure of a seed.

1. Which of the labelled structures contains food?

2. Which of the labelled parts consists of a radicle and plumule?

(ii) The testa is also part of the seed, but it is not indicated on the diagram.

1. Where is the testa located?

2. What is the function of the testa?

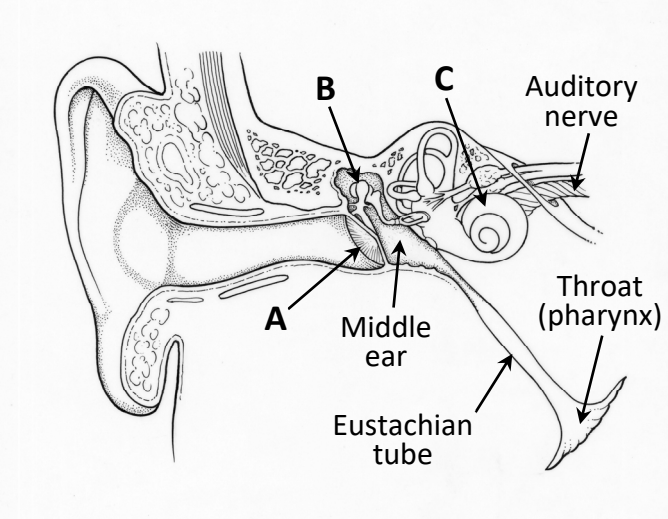
(iii) Seeds usually go through a period of dormancy before germinating.

1. What is meant by the term *dormancy*?

2. Give **two** advantages of dormancy.

(iv) Germination often follows dormancy.
List the **three** factors that are essential for germination.

(b) The diagram shows the structure of the human ear.



(i) The human ear senses sound and sets up nerve impulses.
To which major organ are these impulses sent?

(ii) **In your answerbook**, match **each** of the parts labelled **A**, **B** and **C** with the following terms:

1. **Ossicle**

2. **Eardrum**

3. **Cochlea**

(iii) **In your answerbook**, match **each** of the parts of the human ear (**ossicle**, **eardrum** and **cochlea**) with the following functions:

1. Transfers sound vibrations through the middle ear

2. Receives sound waves from the auditory canal

3. Generates nerve impulses

(iv) The Eustachian tube is shown in the diagram.
Why is the middle ear connected to the throat by the Eustachian tube?

(v) Hearing is one of the five senses. Name any other **two** senses.

(c) Answer the following questions in relation to vegetative propagation.

(i) What is meant by the term *vegetative propagation*?

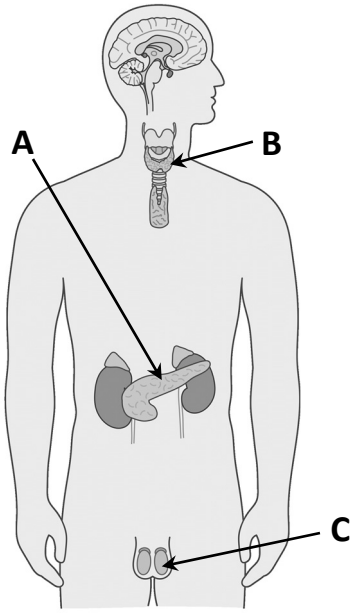
(ii) Give **two** examples of plants that undergo vegetative propagation.
For **each**, state which organ (**stem**, **root**, **leaf** or **bud**) the plant uses.

(iii) **1.** Give **one** advantage that vegetative propagation has over reproduction by seed.

2. Give **one** advantage that reproduction by seed has over vegetative propagation.

(iv) Artificial propagation methods are widely used in horticulture.
Name any **three** of these methods.

(d) The diagram shows some parts of the human male endocrine system.
The endocrine system produces hormones.



(i) What is meant by the term *hormone*?

(ii) **In your answerbook**, match **each** gland labelled **A**, **B** and **C** with the following terms:

1. **Thyroid**

2. **Pancreas**

3. **Testis**

(iii) **In your answerbook**, match **each** gland labelled **A**, **B** and **C** with the following hormones:

1. **Insulin**

2. **Thyroxine**

3. **Testosterone**

(iv) Some glands in the body have both endocrine and exocrine functions.
Name **one** gland in the body that has an endocrine **and** exocrine function.

(v) Give **one** example of the **use** of a hormone supplement.

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Tuesday 11 June

Afternoon 2:00 - 5:00