2023.M44

2023L025A1EL

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2023

Biology

Sections A and B and Answerbook

Higher Level

Tuesday 13 June Afternoon 2:00 - 5:00

400 marks

Examination Number

Day and Month of Birth

For example, 3rd February is entered as 0302

Centre Stamp

Instructions

Write your Examination Number and your Day and Month of Birth in the boxes on the front cover.

Write your answers to all parts of the examination into this answerbook. This answerbook will be scanned and your work will be presented to an examiner on screen. Anything that you write outside of the answer areas may not be seen by the examiner.

Write your answers in blue or black pen. You may use pencil for sketches, graphs and diagrams only.

There are three sections in this examination. Questions for Section **C** are supplied separately but your answers must be written in this answerbook.

It is recommended that you spend not more than 30 minutes on Section **A** and 30 minutes on Section **B**, leaving 120 minutes for Section **C**.

Section **A**	Answer any **five** questions from this section. Each question carries 20 marks.
Section **B**	Answer any **two** questions from this section. Each question carries 30 marks.
Section **C**	Answer any **four** questions from this section. Each question carries 60 marks.

Section A

Answer any five questions.
Write your answers in the spaces provided.

1. Answer any **five** of the following parts (a) to (f):

(a) Name the **three** chemical elements that are present in **all** carbohydrates.

(b) Give the general formula for carbohydrates.

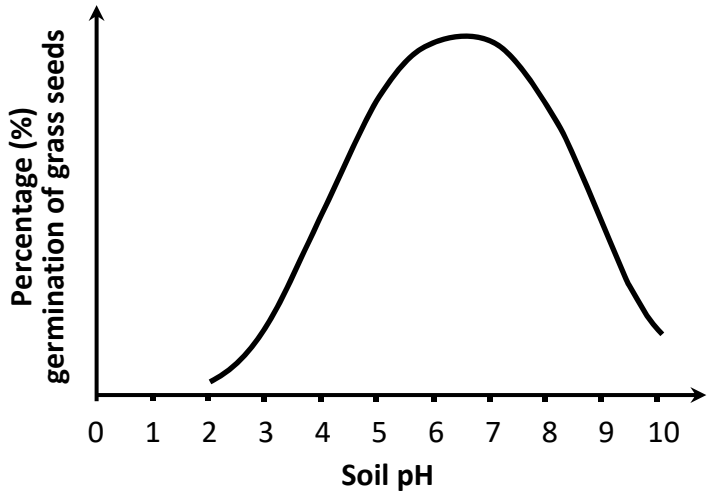
(c) Name the smallest unit of a carbohydrate.

(d) Name the type of carbohydrate formed when many of the smallest units of a carbohydrate bond together.

(e) Give **one** structural role of carbohydrates in living organisms.

(f) Carbohydrates are an important component of the diet.
State **one** dietary source of carbohydrates.

2. A horticulturist was carrying out scientific research into germination. They proposed the following hypothesis: "If soil pH is changed, then germination of grass seeds is affected." They tested this hypothesis and the results of the investigation are shown in the graph below.



(a) Draw a vertical line **on the graph above** that indicates a pH that would be *most* suitable for the germination of grass seeds.

(b) Explain the term *hypothesis*.

(c) State **one** variable from the investigation described above.

(d) Controls are often used in investigations. What is the function of a control?

(e) Where might the horticulturist first publish the results of their research?

(f) Give **two** limitations of the scientific method.

1.
2.

3. The diagram shows the human skeleton. It is structurally divided into two parts – the axial skeleton and the appendicular skeleton.

(a) Give **two** functions of the skeleton.

1.
2.

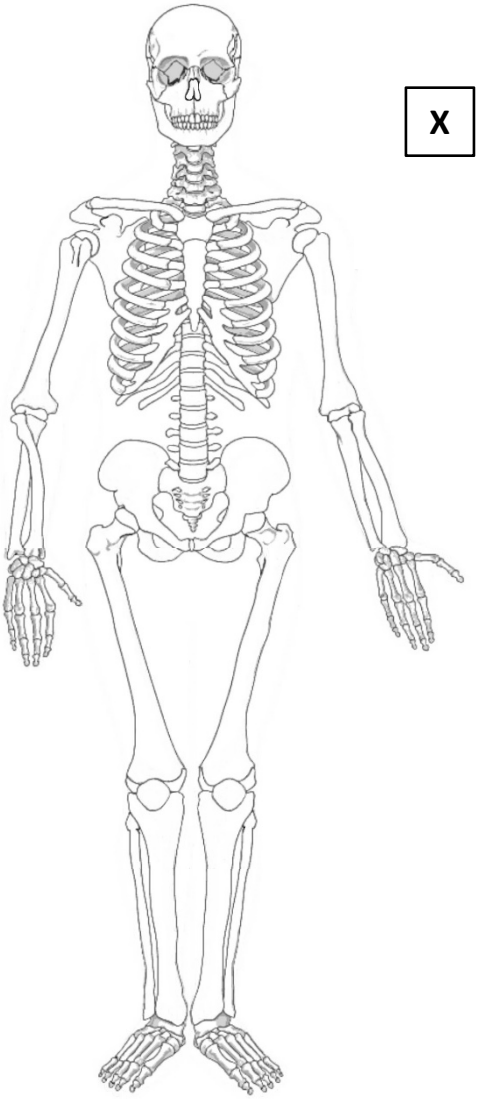
(b) Name any **two** bones of the axial skeleton.

1.
2.

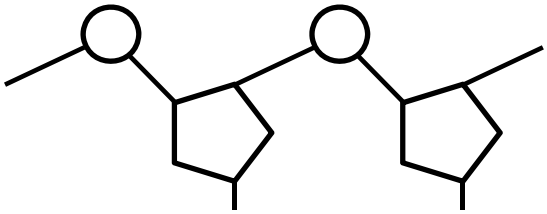
(c) Cartilage is an important part of the skeleton. Name the biomolecule that is the main component of cartilage.

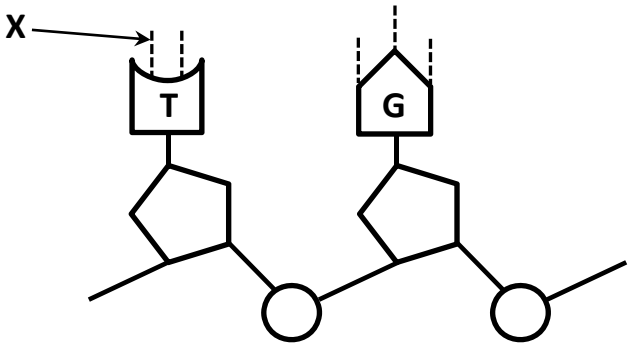
(d) The innominate bones are part of the appendicular skeleton.
What are these bones more commonly known as?

(e) **On the diagram**, draw an arrow from the letter **X** to show the location of a slightly movable joint.



4. DNA is a complex biological molecule. The diagram shows part of a DNA molecule.





(a) Complete the diagram of the DNA molecule by drawing **on the diagram above and** labelling the parts you draw.

(b) **On the diagram above**, draw a rectangle around any **one** DNA nucleotide.

(c) What does DNA stand for?

(d) What type of bonding is represented by the letter **X** on the diagram?

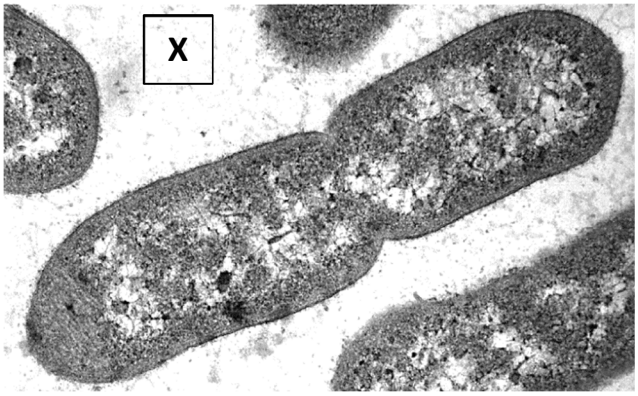
(e) **T** is a pyrimidine base. What type of base is **G**?

(f) Name **one** organelle in eukaryotic cells, other than the nucleus, which contains DNA.

(g) Name the base present in RNA that is **not** present in DNA.

5. The picture shows a transmission electron microscope image of a bacterial cell.

(a) There are three types of bacterial shapes. Which type represents the bacterial cell in the picture?



(b) **On the picture**, draw an arrow from the letter **X** to the location of the bacterial cell wall.

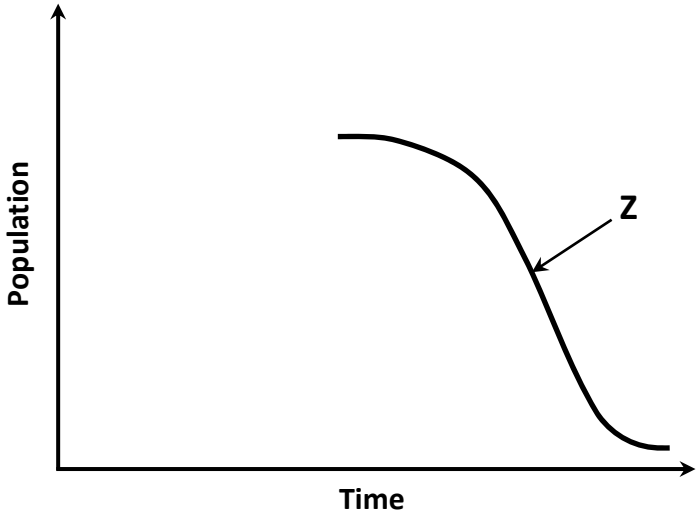
(c) The bacterium in the picture is reproducing asexually.
What term describes how bacteria reproduce asexually?

(d) Give any **one** factor that affects the growth of bacteria.

(e) Name any **one** harmful bacterium.

(f) The partially drawn graph below represents the microorganism growth curve.

(i) By drawing **on the graph**, complete the first part of the curve.



(ii) Name the stage indicated by the letter **Z**.

6. Give a brief biological explanation for **each** of the following:

(a) Food chains are limited in length.

(b) There is always competition between members of a species.

(c) Fruit formation by plants.

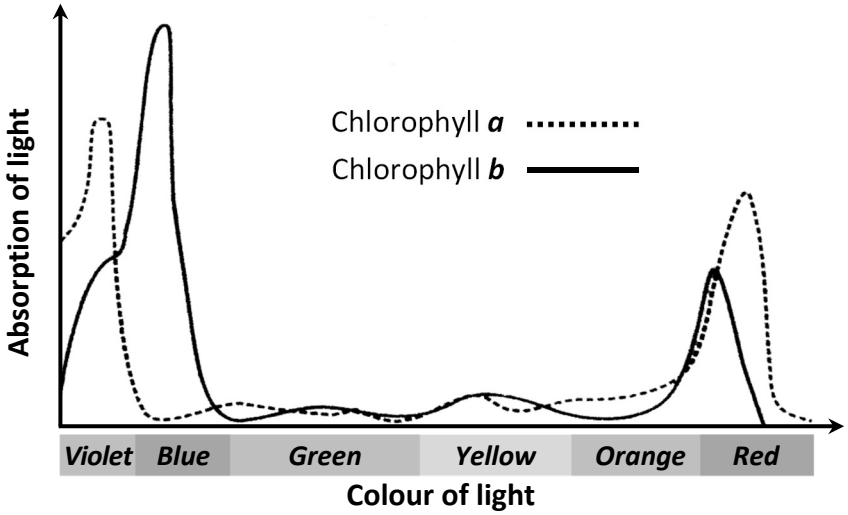
(d) Urine volume will be low if a person does not regularly drink fluids.

(e) Doctors do not prescribe antibiotics for viral infections.

(f) Meiosis halves the number of chromosomes in cells.

(g) The septum separates the two sides of the human heart.

7. The graph shows how the absorption of light varies with the colour of light being shone on chlorophyll ***a*** and ***b***.
Answer the following questions based on the graph and the process of photosynthesis.



(a) (i) Which colour of light is absorbed *most* by chlorophyll ***a***?

(ii) Which colour of light is absorbed *most* by chlorophyll ***b***?

(iii) What happens to green and yellow light when they strike chlorophyll?

(b) The function of chlorophyll is to absorb sunlight energy and transfer this energy to electrons which then leave chlorophyll. From your knowledge of photosynthesis, give **two** possible fates of these energised electrons.

1.
2.

(c) Name another molecule which can provide electrons during photosynthesis.

(d) Identify a source of the molecule you named in part (c) above for photosynthesis in the plant.

(e) Suggest **one** reason why horticulturists might use carbon dioxide enrichment in a greenhouse.

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.

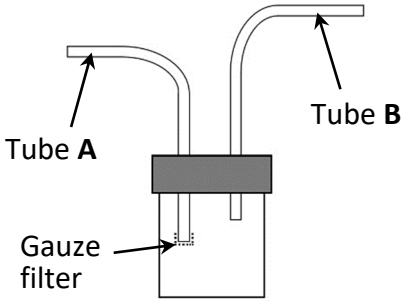
8. (a) Write down the terms that describe each of the following:

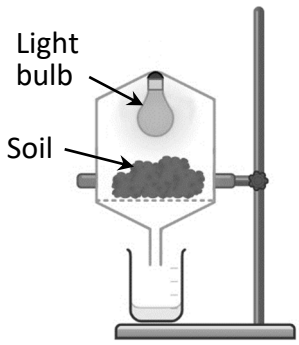
(i) The parts of the Earth where life can exist.

(ii) Living factors that have an effect on an ecosystem.

(b) Answer the following questions based on your study of an ecosystem.

(i) Identify the following animal collection apparatus **and** describe how they would be used to collect animals.





Apparatus:	Apparatus:
How used:	How used:

(ii) As part of your study of an ecosystem, you carried out a quantitative survey of plants. Describe how you carried this out using the percentage cover technique.

9. (a) Many cells can respire by anaerobic respiration, producing small amounts of ATP.

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

(ii) What other substance is produced in animal cells as a result of anaerobic respiration?

(b) Answer the following in relation to an investigation to prepare alcohol using yeast **and** to show its presence.

(i) In the space provided below, draw a labelled diagram showing how you set up the apparatus to prepare alcohol using yeast.

(ii) Explain the importance of keeping the yeast cells at an optimum temperature.

(iii) Alcohol production eventually stops. Explain why this happens.

(iv) How did you know when the reaction had stopped?

(v) Name a test for alcohol **and** give the final colour observed if alcohol was present.

Name:
Final colour:

10. (a) Distinguish between the terms *asepsis* **and** *sterility*, as applied to living organisms.

Asepsis:
Sterility:

(b) The questions below all relate to Unit 3 practical activities.

(i) Answer the following based on the growth of leaf yeast using agar plates.

1. Name a nutrient added to the agar to enable the growth of leaf yeast.

2. Describe the control you used in this investigation.

(ii) Answer the following based on dissecting, displaying and identifying an ox's or sheep's heart.

1. Name **one** instrument you used to make the incisions.

2. Describe **one** difference between the walls of the right and left ventricles.

(iii) Answer the following based on investigating the effect of IAA on plant tissue.

1. Name a suitable plant tissue you used.

2. Describe how you measured the effect of IAA on plant tissue.

(iv) Answer the following based on viewing a transverse section of a dicot stem using the light microscope.

1. Explain the importance of the section being thin.

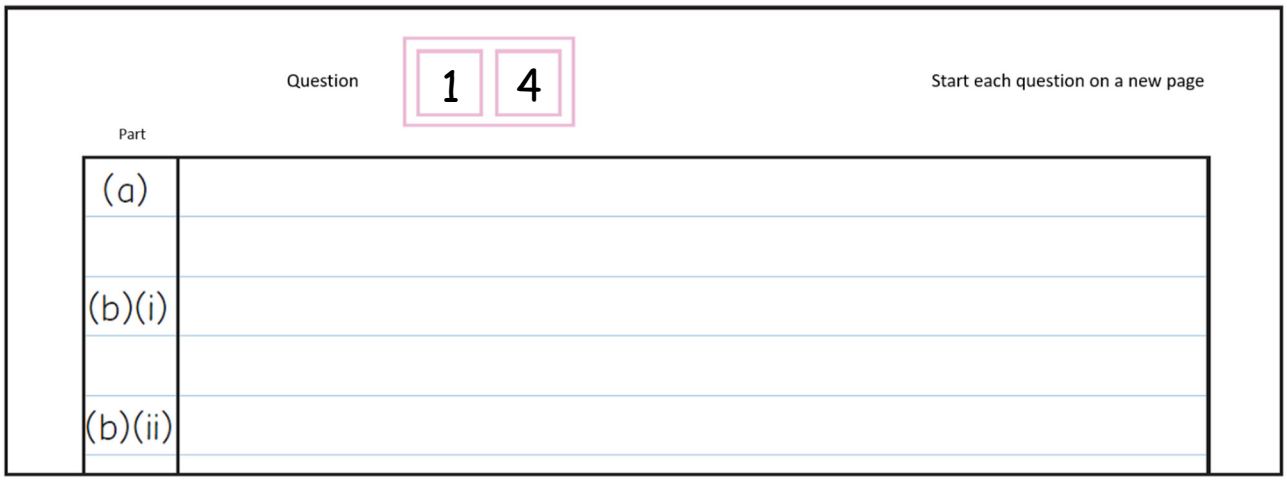
2. **In the space provided**, sketch what you observed under the light microscope.

Sketch:

Instructions

Questions for Section **C** are supplied separately.

Start each question on a new page. Write the question number in the box at the top of each page. Use the left-hand column to label each part, as shown below.



There are two pages of graph paper on the next two pages of this answerbook. On pages with graph paper, the box for the question number is at the bottom of the page.

You do not need to use all of the pages in this answerbook. If you run out of space in this answerbook, you may ask the superintendent for more paper or graph paper.

Write your answers in blue or black pen. You may use pencil for sketches, graphs and diagrams only.

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Leaving Certificate – Higher Level

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Tuesday 13 June

Afternoon 2:00 - 5:00