



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2023

Biology

Sections A and B and Answerbook

Ordinary Level

Tuesday 13 June Afternoon 2:00 - 5:00

400 marks

Examination Number

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Day and Month of Birth

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For example, 3rd February
is entered as 0302

Centre Stamp

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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 the following parts (a) to (e):

(a) Give **one** source of carbohydrate in the diet.

(b) Name **one** element found in carbohydrates.

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

(d) Two monosaccharides can join together to form a

(e) Name a polysaccharide found in plants.

2. Indicate whether the following statements are true or false by placing a tick (✓) in the appropriate box in **each** case. The first one has been completed as an example.

Example:

True False

Biology is the study of life

☒ ☐

(a) A hypothesis is a possible explanation for an observation.

☐ ☐

(b) A good experiment requires a small sample size.

☐ ☐

(c) Data always involves numbers.

☐ ☐

(d) Safety is an important principle of experimentation.

☐ ☐

(e) Random selection is an important principle of experimentation.

☐ ☐

(f) The scientific method has limitations.

☐ ☐

(g) A theory is an unsupported hypothesis.

☐ ☐

3. Choose **each** 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.

**Hydrochloric
acid**

Villi

Liver

Bile

Egestion

Peristalsis

Column A	Column B
Present in the stomach	Hydrochloric acid
(a) Contraction and relaxation of the muscles of the gut wall	
(b) Stored in the gall bladder	
(c) Increase surface area for absorption in the small intestine	
(d) Process by which food waste is passed from the body	
(e) Organ that breaks down alcohol	

4. An athlete obtains energy from glucose in aerobic respiration. The following word equation represents a summary of aerobic respiration.



- (a) Identify gases **X** and **Y**.

X:
Y:

- (b) Aerobic respiration consists of two stages (1 and 2). Describe the difference between the two stages in terms of the amount of energy released.

Stage 1:
Stage 2:

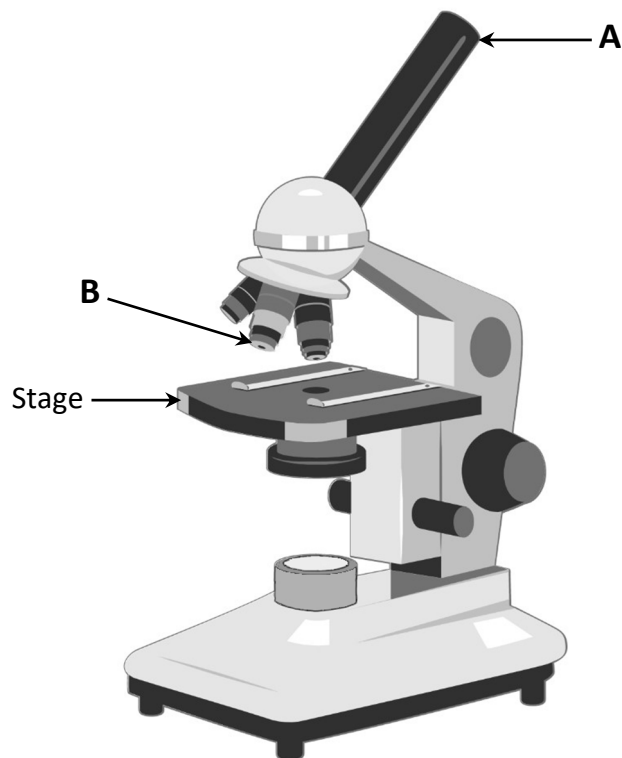
- (c) State **two** ways in which the released energy may be used in living organisms.

1.
2.

- (d) The athlete can also respire anaerobically if there is a lack of gas **X**. Name the product formed in the athlete's muscles as a result of anaerobic respiration.

--

5. The diagram shows a light microscope.



- (a) Names the parts of the microscope labelled **A** and **B**.

A:
B:

- (b) Using the letter '**X**', indicate **on the diagram above** the source of light.

- (c) What is the function of the stage on the microscope?

--

- (d) If the magnification of lens **A** is x10 and the magnification of lens **B** is x40, what is the total magnification?

--

- (e) What is the function of a stain when using the light microscope?

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- (f) The light microscope is one type of microscope. Name another type of microscope.

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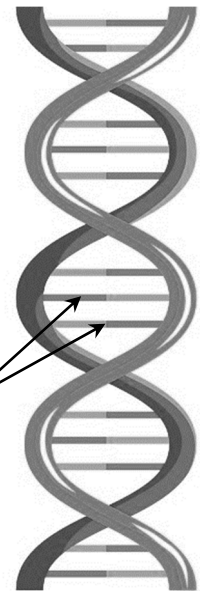
6. The diagram represents a part of a DNA molecule. Complete the following in relation to DNA.

(a) How many strands make up a DNA molecule?

(b) Name any **two** nitrogenous bases found in DNA.

1.
2.

Nitrogenous
base pairs



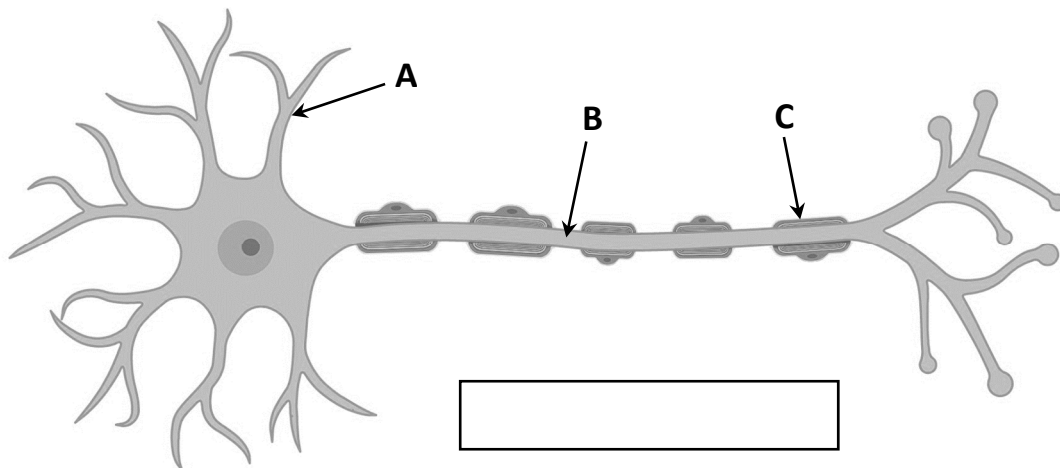
(c) Three bases together are known as a

(d) Where in the human cell would you expect to find most DNA?

(e) DNA contains the instructions needed to make protein. This is called the code.

(f) Name a complementary structure to DNA that is involved in protein synthesis.

7. The diagram shows a neuron (nerve cell).



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

A:
B:
C:

- (b) Give the function of the part labelled **A**.

--

- (c) **In the box on the diagram above**, draw an arrow showing the direction the nerve impulse will travel in **this** neuron.

- (d) Name the chemicals used to transmit nerve impulses from one neuron to another.

--

- (e) Name any **one** disorder of the nervous system.

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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) Describe the difference between the terms, *flora* and *fauna* by writing a note on **each**.

Flora:
Fauna:

- (b) The table shows the results of an ecological survey (percentage frequency) of dandelion and grass in a habitat. Answer the questions that follow based on this survey.

	Presence (✓) / absence (x)				
Dandelion	✓	x	✓	x	✓
Grass	✓	✓	✓	✓	✓

- (i) Describe how this survey may have been carried out.

- (ii) Calculate the percentage frequency of dandelion **and** grass in this habitat.

Dandelion:
Grass:

- (iii) **On the axes below**, sketch (using pencil) a bar chart to represent the percentage frequency of dandelion and grass. Label both axes.



9. (a) What is meant by the term *osmosis*?

- (b) (i) Draw a labelled diagram of the apparatus that you used to demonstrate osmosis.

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- (ii) Describe how you carried out the experiment to demonstrate osmosis.

- (iii) How were you able to tell that osmosis had taken place?

10. (a) It is important to use sterile apparatus when working with micro-organisms.

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

(ii) Give **one** method of sterilising apparatus.

(b) The following data table shows the difference in the growth of leaf yeast (number of colonies in malt agar) in the months of May and September.

	May	September
Number of colonies	5	14

(i) Name a suitable plant from which leaves can be obtained to carry out this investigation.

(ii) Name a suitable container that can be used to grow leaf yeast.

(iii) Suggest a reason for the presence of malt in the agar.

(iv) Describe how leaf yeast could be introduced into the malt agar.

(v) Describe a suitable control for this investigation.

(vi) What colour are leaf yeast colonies on malt agar?

(vii) Suggest a reason for the lower number of leaf yeast colonies present on leaves obtained from a plant in May versus September.

Answerbook for Section C

Instructions

Questions for Section C are supplied separately.

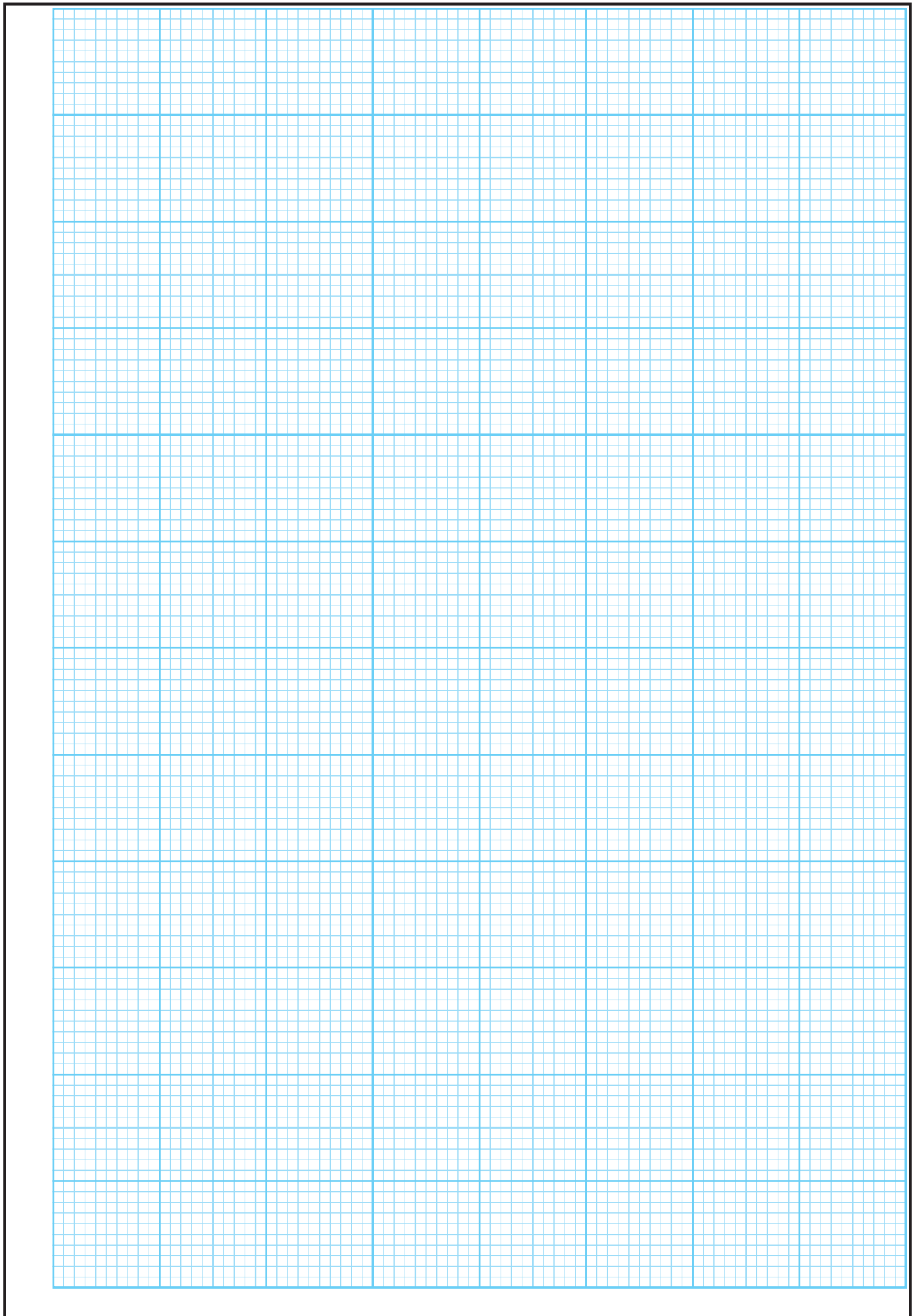
Start each question on a new page. Write the question number in the box at the top of each page. Use the left-hand column to label each part, as shown below.

Question		1	4	Start each question on a new page
Part				
(a)				
(b)(i)				
(b)(ii)				

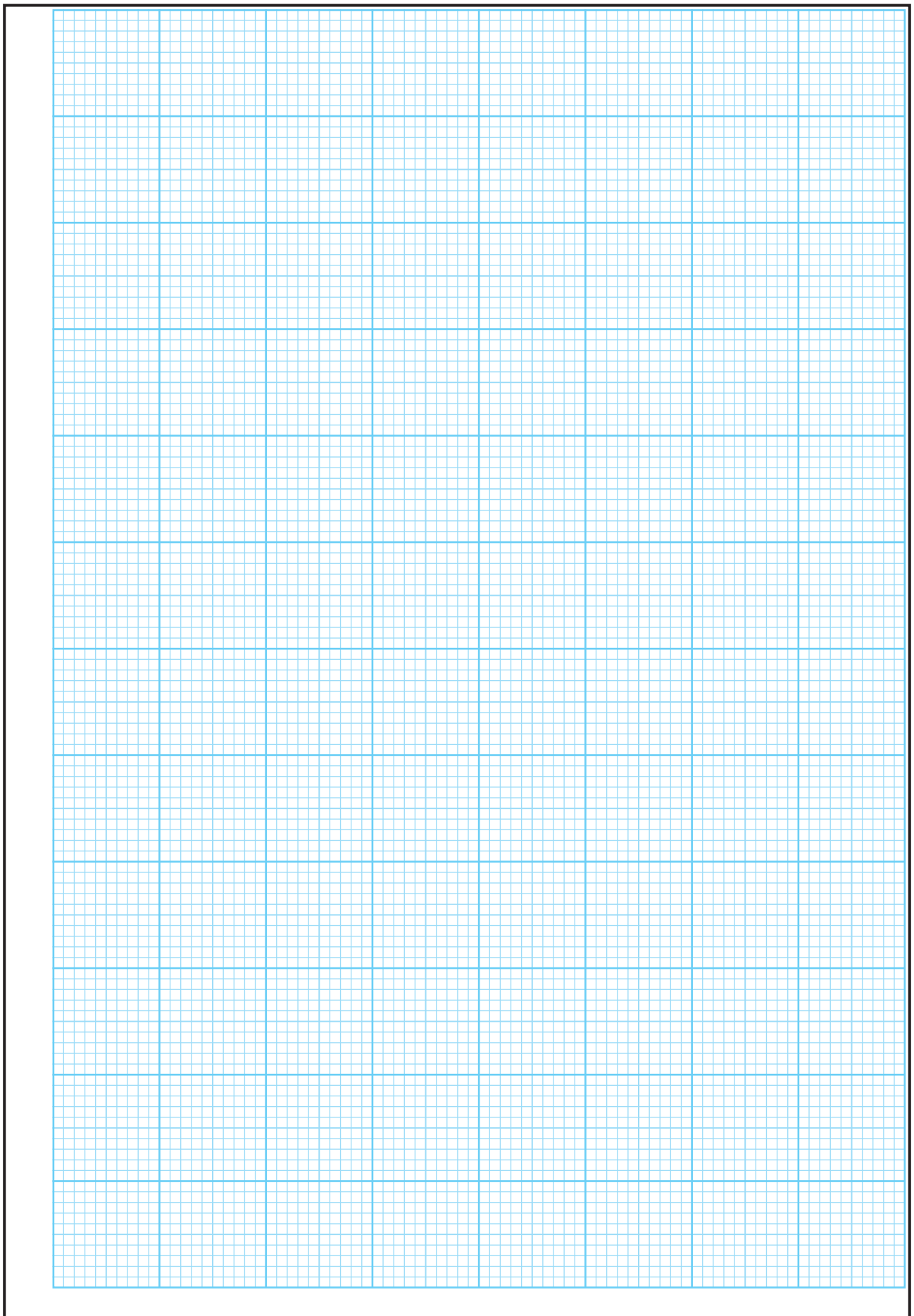
There are two pages of graph paper on the next two pages of this answerbook. On pages with graph paper, the box for the question number is at the bottom of the page.

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.



Question



Question

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Part

[illegible]

Part

[illegible]

Part

[illegible]

Part

[illegible]

Part

[illegible]

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Part

[illegible]

Part

[illegible]

A diagram showing a large rectangle divided into four smaller squares by a horizontal and a vertical line. The top-left and top-right squares are empty, while the bottom-left and bottom-right squares contain a single dot each.

Part

[illegible]

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Part

[illegible]

Part

[illegible]

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Part

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Part

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Leaving Certificate – Ordinary Level

Biology Sections A and B and Answerbook

Tuesday 13 June

Afternoon 2:00 - 5:00



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2023

Biology

Section C

Ordinary Level

Tuesday 13 June Afternoon 2:00 - 5:00

240 marks

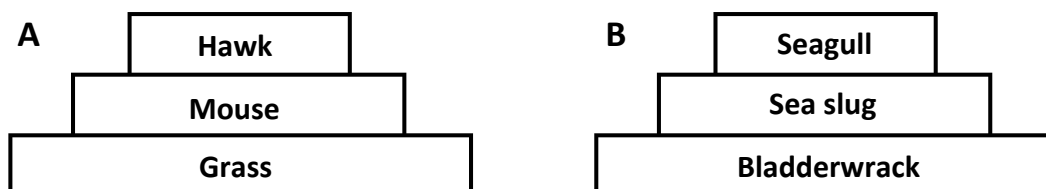
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State Examinations Commission.

Section C

Answer any four questions.

Write your answers in the answerbook containing Sections A and B.

11. (a) (i) What is meant by the term *pollution*?
(ii) Describe **one** human activity that may cause pollution **and** suggest **one** way in which this pollution could be controlled. (9)
- (b) Answer the following questions in relation to ecological pyramids.



- (i) Match pyramids **A and B** above with a possible correct ecosystem from the following list: **rocky seashore; grassland; woodland; marine.**
(ii) Name the producer in pyramid **A**.
(iii) Name a source of energy for a producer.
(iv) Name the primary consumer in pyramid **B**.
(v) What information do ecological pyramids provide us with?
(vi) Suggest what might happen if the bladderwrack was removed from the habitat represented in pyramid **B**.
(vii) Suggest what might happen if the top consumer in pyramid **A** died off due to disease.
(viii) How might you identify the animals and plants listed in the pyramids? (27)
- (c) Read the passage below and answer the questions that follow.

Essential nutrients, such as nitrogen and potassium compounds, can be stored in the soil and made available when crops need them. The ability to supply these nutrients to plants relies on a number of soil properties, e.g. pH, temperature and moisture content of the soil.

Moist soil allows chemical reactions to work better and allows nutrients to diffuse more easily into the plant roots. Organic matter, clay type, particle size and the presence of micro-organisms and other decomposers, such as worms, are also important for healthy soils.

Adapted from “The dark mysteries of the soil beneath our feet”, www.rte.ie, 17th September 2021.

- (i) What ecological term describes soil factors?
(ii) Name any **two** essential nutrients present in healthy soil.
(iii) Name any **two** soil factors that can have an effect on living organisms present in the soil.
(iv) Give **one** biotic factor mentioned in the article.
(v) Suggest a possible source of nitrogen compounds in the soil.
(vi) Decomposers are important in recycling nutrients. Give a reason why it is important for nutrients to be recycled. (24)

12. (a) (i) Name the **two** biochemicals that make up chromosomes.
(ii) How many chromosomes are in a diploid human cell? (9)

(b) In humans, the allele for brown eyes (**B**) is dominant to the allele for blue eyes (**b**).



Blue eye



Brown eye

- (i) Explain the underlined terms.
(ii) Jack's genotype is **Bb**. What colour are Jack's eyes?
(iii) Which of the following terms describes Jack's genotype?
homozygous; heterozygous.
(iv) Sarah has blue eyes. Write out Sarah's genotype for eye colour.
(v) Give the genotypes of the **two** possible gametes that Jack can produce.
(vi) If Sarah and Jack were to have children, write out the **two** phenotypes of their possible offspring. (27)
- (c) Tissue culture is an important biological technique where cells divide rapidly in a nutrient medium.
- (i) Distinguish between a tissue **and** an organ by writing a brief sentence on **each**.
(ii) Name **two** types of tissue found in animals.
(iii) Suggest **one** reason why sterile conditions are necessary in tissue culture.
(iv) Name the type of cell division that occurs in tissue culture where genetically identical cells are grown.
(v) How many cells result from one cell undergoing the type of cell division you named at part (c) (iv) above?
(vi) Give **one** application of tissue culture. (24)

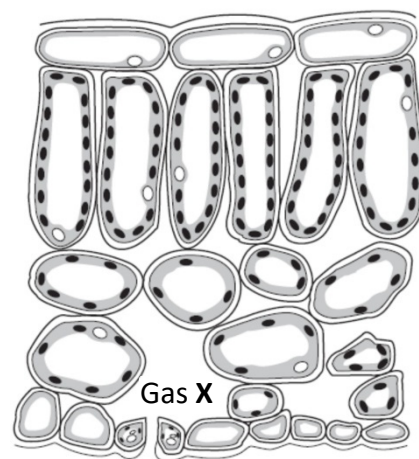
13. (a) Photosynthesis is an important metabolic reaction in biology.

- (i) Name a pigment essential for photosynthesis.
- (ii) Where in a plant cell can the pigment you named in part (a) (i) above be found?
- (iii) This pigment is involved in trapping energy.
Give **one** source of this energy.

(9)

(b) The diagram shows a cross section of the internal structure of a leaf. The reactions of photosynthesis occur within the cells of the leaf.

- (i) Water is split into three products during photosynthesis. Name the **three** products.
- (ii) Where does the plant obtain the water required for photosynthesis?
- (iii) Suggest a reason for the leaf being very thin.
- (iv) Gas **X** is required for photosynthesis and can come from the atmosphere or the cells of the leaf.
Name gas **X**.

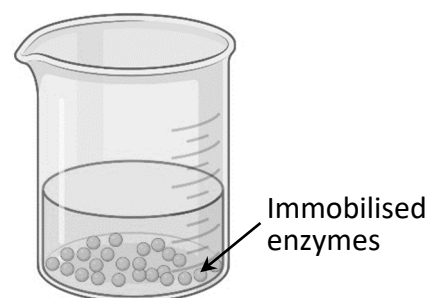


- (v) What is the main product of photosynthesis?
- (vi) Using your knowledge of photosynthesis, describe **two** methods horticulturists can use to improve crop growth in greenhouses.

(27)

(c) (i) Chemicals called enzymes are involved in metabolism within cells.
Explain the underlined terms.

- (ii) Where in a cell are enzymes produced?
- (iii) Name **two** factors that can affect enzyme action.
- (iv) The diagram shows immobilised enzymes. What is meant by the immobilisation of an enzyme?
- (v) Give **two** advantages of bioprocessing using immobilised enzymes.



(24)

14. (a) Oestrogen is one of the female reproductive hormones.

(i) State **one** function of oestrogen.

(ii) Name **one** other female reproductive hormone **and** state its function.

(9)

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

(i) Name the parts labelled **A**, **B**, and **C**.

(ii) In which labelled part is the ovum (egg) formed?

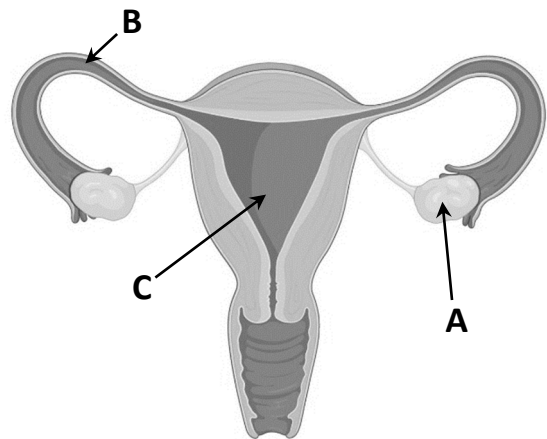
(iii) What type of cell division is involved in the production of the ovum (egg)?

(iv) State **one** way in which the ovum (egg) differs from a sperm cell.

(v) Explain the term *fertilisation*.

(vi) State the location from the diagram above where each of the following occurs:

1. Fertilisation
2. Implantation



(27)

(c) Answer the following questions in relation to pregnancy and birth.

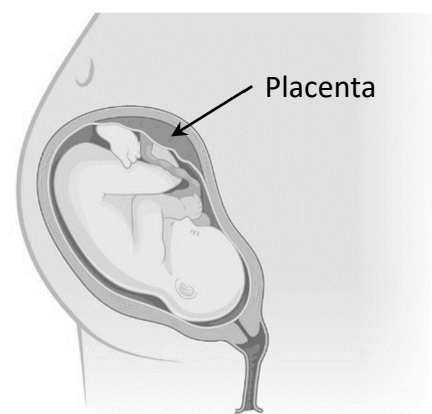
(i) The placenta is a very important organ in pregnancy.

Give any **one** function of the placenta.

(ii) Describe the main events of the birth process in humans.

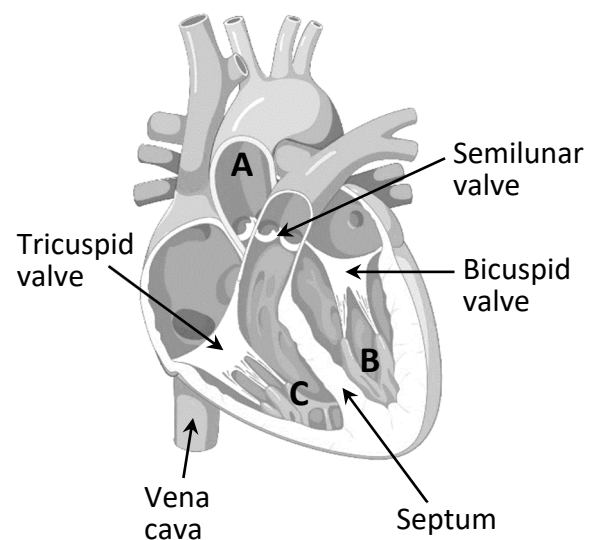
(iii) Describe any **two** biological benefits of breastfeeding.

(iv) Name **two** methods of contraception.



(24)

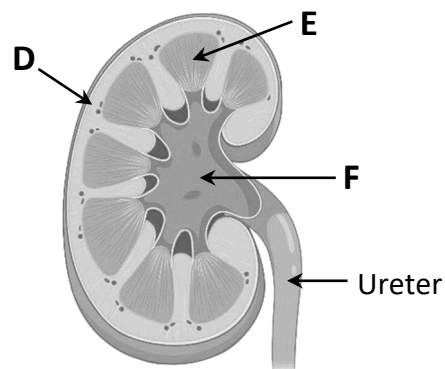
15. (a) (i) Give **two** differences between an artery and a vein.
- (ii) Name the small blood vessels that are responsible for exchange of substances with body cells. (9)
- (b) The following questions relate to the human breathing system.
- (i) Where in the body are the lungs located?
- (ii) What is the function of the rings of cartilage found in the trachea?
- (iii) Give the function of the alveoli in the lungs **and** give **one** feature of an alveolus that enables it to carry out this role.
- (iv) Describe the role of each of the following during inhalation:
1. Diaphragm
 2. Intercostal muscles
 3. Brain
- (v) Name **one** breathing disorder **and** give a possible cause. (27)
- (c) The diagram shows a section through a human heart.
- (i) Name the blood vessel labelled **A**.
- (ii) Give **one** reason why the wall of chamber **B** is thicker than the wall of chamber **C**.
- (iii) What is the role of the bicuspid valve?
- (iv) Which part of the heart prevents oxygenated blood mixing with deoxygenated blood?
- (v) 1. Name the artery through which the heart muscle itself receives blood.
2. Suggest what might happen if this artery became blocked.
- (vi) Give **one** factor that can cause an increase in heart rate.
- (vii) State **one** feature of the diet that can harm the circulatory system. (24)



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

(30, 30)

- (a) The diagram shows a section through a human kidney, an organ responsible for excretion.

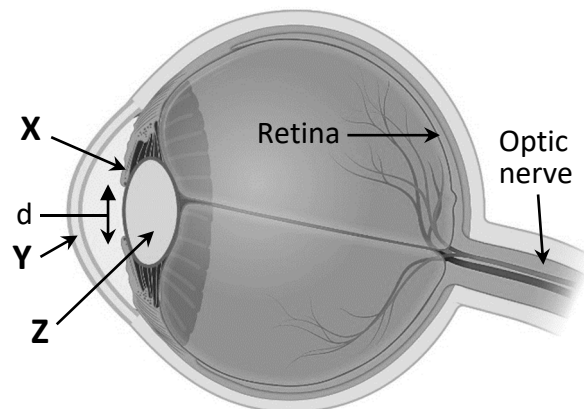


- (i) Explain in detail the term *excretion*.
(ii) Match the parts labelled **D**, **E** and **F** with the following terms:

medulla; renal pelvis; cortex

- (iii) The ureter connects the kidney to another part of the urinary system.
Name this other part.
(iv) The kidneys are surrounded by a thick layer of fat.
Give **one** function of this layer of fat.
(v) Filtration, reabsorption and secretion are essential processes in the formation of urine.
Give the location in the kidney for each of the following:
1. Filtration
2. Reabsorption
(vi) Name an excretory organ in the human body, other than the kidney.

- (b) The diagram shows a section through the human eye.



- (i) Match the parts labelled **X**, **Y** and **Z** with the following terms:
lens; iris; cornea
(ii) What is the function of the part labelled **Y**?
(iii) Which labelled part focuses the light rays?
(iv) Where are light rays usually focused?
(v) The diameter (**d**) of the pupil changes depending on light levels.
What would you expect to happen to the diameter of the pupil in bright light?
(vi) The optic nerve carries impulses.
To which organ do these impulses travel?
(vii) Name a disorder of the eye **or** the ear **and** give a corrective measure.

- (c) The diagram shows a transverse section through part of a root.

- (i) Match the plant tissues labelled **A**, **B** and **C** with the following terms:

ground; vascular; dermal

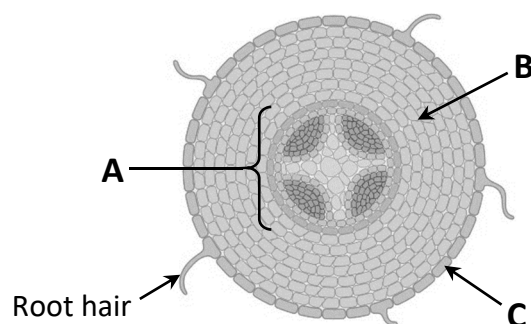
- (ii) Give **two** substances that are transported by the tissue labelled **A**.

- (iii) Name a type of cell located in the tissue labelled **A**.

- (iv) What is the function of the root hair?

- (v) Name any **two** ways in which a section through the stem would differ from the section shown in the diagram above.

- (vi) What term describes a root's growth in response to gravity?



- (d) The diagram shows the structure of an animal-pollinated flower.

- (i) Match the parts labelled **X**, **Y** and **Z** with the following terms:

ovule; sepal; stigma

- (ii) What is the function of the part labelled **Z**?

- (iii) Pollen is produced by the anther. On which labelled part are pollen grains received?

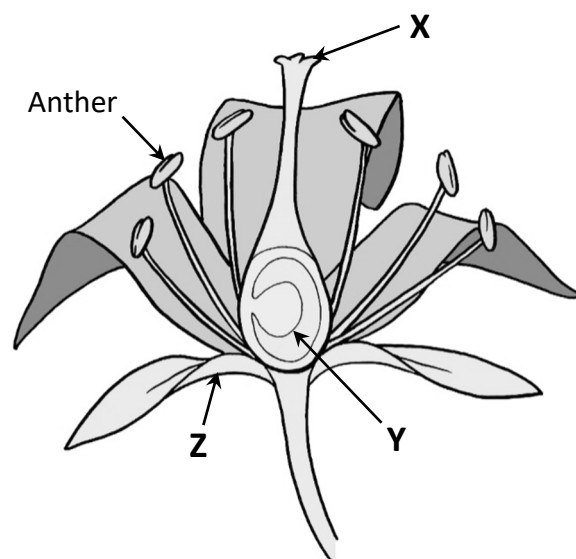
- (iv) Give **one** possible adaptation of this flower that shows it is animal-pollinated.

- (v) Give **one** feature of a wind-pollinated flower.

- (vi) In which labelled part does the seed develop?

- (vii) Fruit formation follows seed formation. Give **one** function of the fruit of a plant.

- (viii) Dormancy is a period during which the seed of a plant is not growing. Give **one** reason why dormancy is of benefit to a plant.

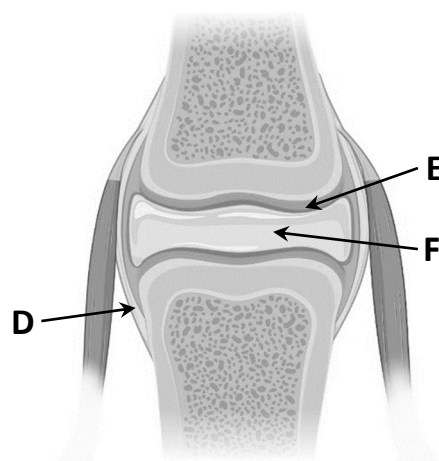


17. Answer any **two** of (a), (b), (c), (d).

(30, 30)

(a) Answer the following questions based on the human skeletal system.

- (i) Give **two** functions of the human skeleton.
- (ii) Give **one** location in the human body where a hinge joint is found.
- (iii) Name **one** other type of synovial joint.
- (iv) The diagram shows a typical synovial joint. Match the parts labelled **D**, **E** and **F** with the following terms:



synovial fluid; cartilage; ligament

- (v) There are seven cervical vertebrae in the spine. Name another **two** types of vertebrae.
- (vi) Name **one** disorder of the musculoskeletal system.

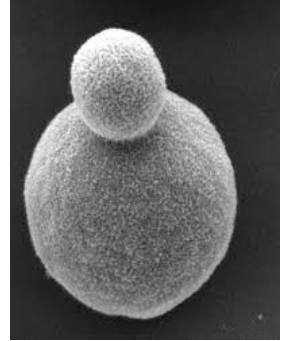
(b) Answer the following questions based on the human endocrine system.

- (i) Explain in detail the term *hormone*.
- (ii) **Copy the table below into your answerbook** and complete it. Some boxes have been filled in as examples.

Name of gland	Hormone	Function of hormone
	Thyroxine	
	Adrenaline	To prepare the body for “fight or flight”
Testes		

- (iii) State **two** ways in which hormone action differs from nerve action.
- (iv) Give **one** example of the use of hormone supplements.

- (c) (i) To which kingdom does *Rhizopus* belong?
- (ii) Draw a labelled diagram of *Rhizopus*.
- (iii) Name **one** food on which *Rhizopus* commonly grows.
- (iv) In terms of nutrition, is *Rhizopus* a parasite or a saprophyte?
Explain your answer.
- (v) *Rhizopus* can undergo both sexual and asexual reproduction.
Describe asexual reproduction in *Rhizopus*.
- (vi) Yeast belong to the same kingdom as *Rhizopus*.
The diagram shows a yeast cell undergoing asexual reproduction.
What term describes asexual reproduction in yeast?



- (d) (i) To which kingdom do bacteria belong?
- (ii) What shape of bacterium is shown?
- (iii) Name the method by which bacteria reproduce.
- (iv) In terms of nutrition, bacteria can be either autotrophic or heterotrophic.
Explain the underlined terms.



- (v) Give **one** example of how bacteria can be useful to humans.
- (vi) 1. What are pathogenic bacteria?
2. Give **one** example of a pathogenic bacterium.
- (vii) 1. What are antibiotics?
2. Give **one** reason why is it important that antibiotics are not misused.

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Leaving Certificate – Ordinary Level

Biology

Tuesday 13 June

Afternoon 2:00 – 5:00