



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2021

Biology

Sections A and B and Answerbook

Ordinary Level

Tuesday 15 June Afternoon 2:00 – 5:00

290 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

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 to 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 **four** questions from this section.
Each question carries 20 marks.

Section **B** Answer any **one** question from this section.
Each question carries 30 marks.

Section **C** Answer any **three** questions from this section.
Each question carries 60 marks.

Section A

Answer any four questions.

Write your answers in the spaces provided.

1. Use your knowledge of nutrition to answer the following questions:

(a) Which food biomolecule contains glycerol?

(b) Name a reagent used to test for the presence of a reducing sugar.

(c) Identify **one** other element, contained in protein, in addition to C, H, O.

(d) Name **one** fibrous protein found in the body.

(e) Give **one** example of a water-soluble vitamin.

2. Answer the following in relation to tissues and organs.

(a) A tissue is a group of

(b) Name **one** animal tissue type and **one** plant tissue type.

1.	2.
----	----

(c) An organ is a group of

(d) Name **one** animal organ and **one** plant organ.

1.	2.
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(e) What is tissue culture?

3. Choose **each** structure from the following list and place it in Column B to match a location in Column A. The first one has been completed as an example.

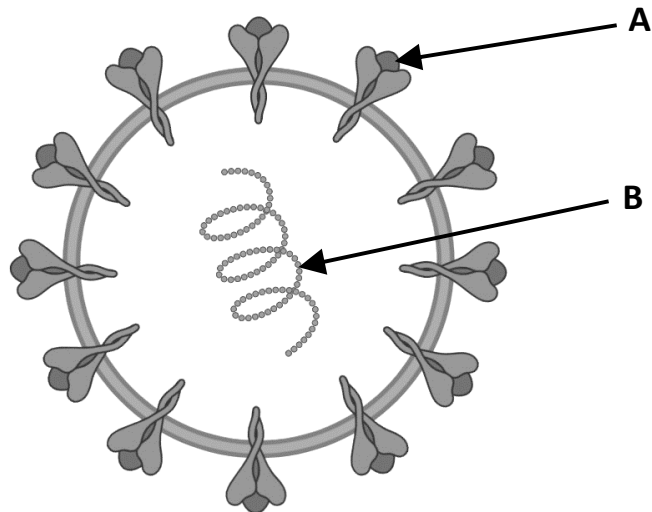
~~Rib cage~~ Ureter Retina Bronchus Grey matter Villi

Column A	Column B
Skeleton	Rib cage
(a) Spinal cord	
(b) Eye	
(c) Lungs	
(d) Small intestine	
(e) Kidney	

4. In squirrels, the allele for black coat colour (B) is dominant to the allele for grey coat colour (b). A heterozygous black squirrel is crossed with a grey squirrel. Complete the blank spaces below to show the genotypes and phenotypes of the cross.

Genotypes of parents	Bb	x	bb
(a) Possible gametes			
(b) Genotype of offspring			
(c) Phenotype of offspring			

5. The diagram shows the structure of a virus such as COVID-19.



(a) Why are viruses not considered to be living organisms?

(b) Identify the **two** parts labelled **A** and **B** that are found in all viruses.

A.

B.

(c) Describe **one** way viruses may be spread from person to person.

(d) State **one** way the body can defend itself against viruses.

(e) Give **one** way in which viruses are beneficial.

(f) Explain why viruses are described as obligate parasites.

6. State whether each of the following statements is true or false by putting a (✓) in the appropriate box in **each** case.

Example:

A line transect shows changes along a gradient

True False

(a) A pooter can be used to collect small insects from leaves.

(b) A mammal trap is used to identify plants.

(c) A cryptozoic trap can capture large animals.

(d) A pitfall trap is used to capture insects in flight.

(e) A net is used to capture small organisms from tall grass or water.

(f) A Tullgren funnel is used to extract small organisms from leaf litter.

(g) Abiotic factors are living factors that affect organisms.

7. The diagram shows the structure of a human skeleton.

(a) What type of joint is found in the skull?

(b) Place an **X** on the diagram in a position to show a free moving or synovial joint.

(c) Name the type of synovial joint you have labelled **X** on the diagram.

(d) Place an **F** on the diagram to show the femur.

(e) Give any **one** function of the skeleton.

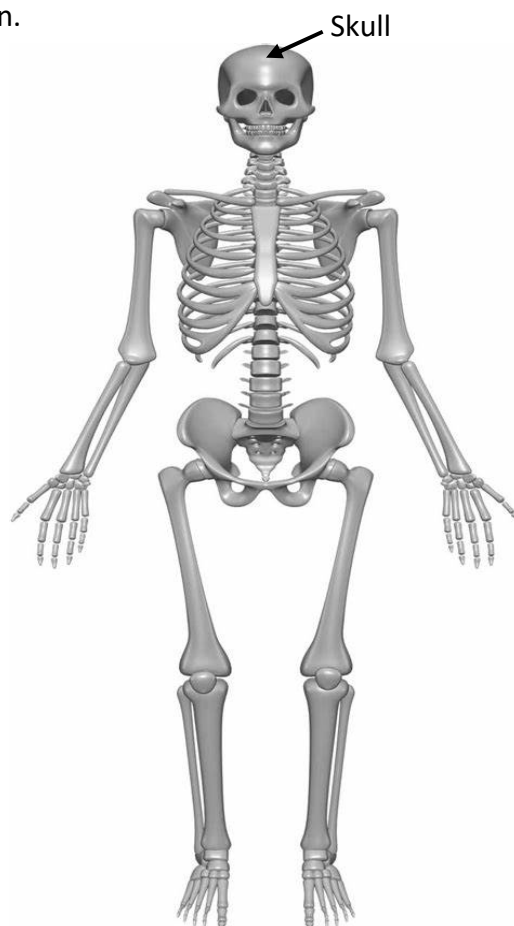
(f) Arthritis and osteoporosis are two disorders of the musculoskeletal system.

Answer the following in relation to **either** of the above disorders.

Name of disorder:

(i) **One** possible cause of the named disorder.

(ii) **One** treatment for the named disorder.



Section B

Answer any one question.

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) (i) Identify with a label **X**, the eyepiece on the diagram of the light microscope.
- (ii) Identify with a label **Y**, the stage or platform on the diagram of the light microscope.

- (b) Answer the following questions in relation to the preparation and examination of a stained and unstained plant cell using a light microscope.

- (i) Name a plant you used to obtain the sample of cells.

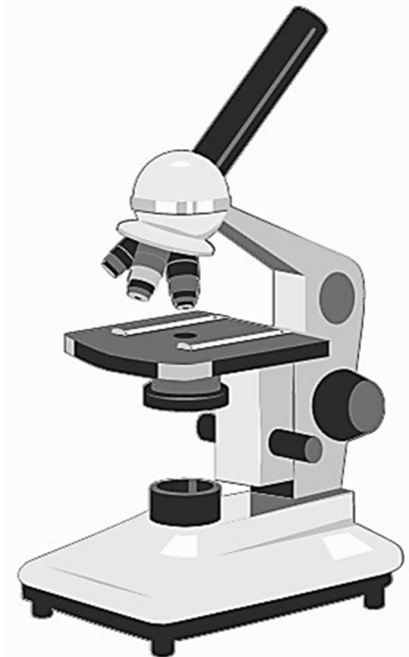
- (ii) How did you prepare an unstained plant cell sample for examination under the light microscope?

- (iii) What stain did you add to the cells?

- (iv) What was the purpose of the stain?

- (v) How did the objective lens help you to see your stained cell sample?

- (vi) Give **one** cell structure that showed you were looking at plant cells.



9. (a) Enzymes play an important role in the body's metabolism.

(i) What is an enzyme?

(ii) Explain the underlined word.

(b) Answer the following in relation to an investigation you carried out into the effect of pH on the rate of enzyme activity.

(i) Name the enzyme you used in the investigation.

(ii) Name the substrate for the enzyme named at part (i) above.

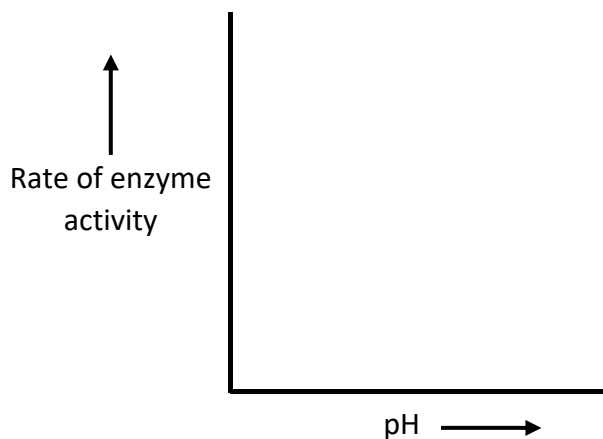
(iii) How did you vary the pH?

(iv) Name the factor that you kept constant.

(v) How was this factor kept constant?

(vi) How did you measure the rate of enzyme activity?

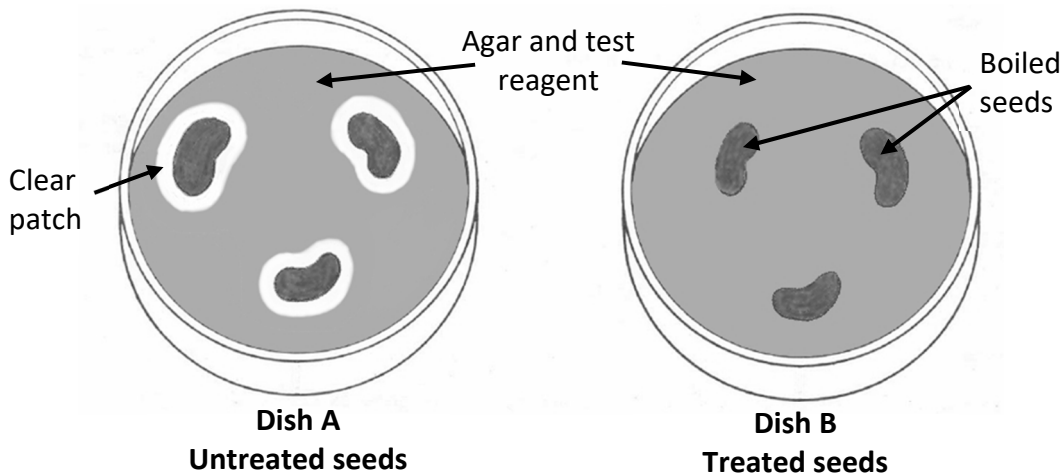
(vii) Sketch a graph to show the results of your investigation using the axis provided.



10. (a) (i) What is digestion?

(ii) Name the product of starch digestion in plants.

(b) The diagram shows the results of an investigation into the digestive activity of germinating seeds.



(i) Name a seed you could use in the investigation.

(ii) Name a type of agar you could use in this investigation.

(iii) Describe **one** step taken to minimise contamination during the investigation.

(iv) Why are there multiple seeds used in each dish?

(v) What test reagent or chemical was added to determine if digestive activity had occurred?

(vi) Why are there no clear patches in dish B?

(vii) What is the purpose of a control in a scientific investigation?

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.

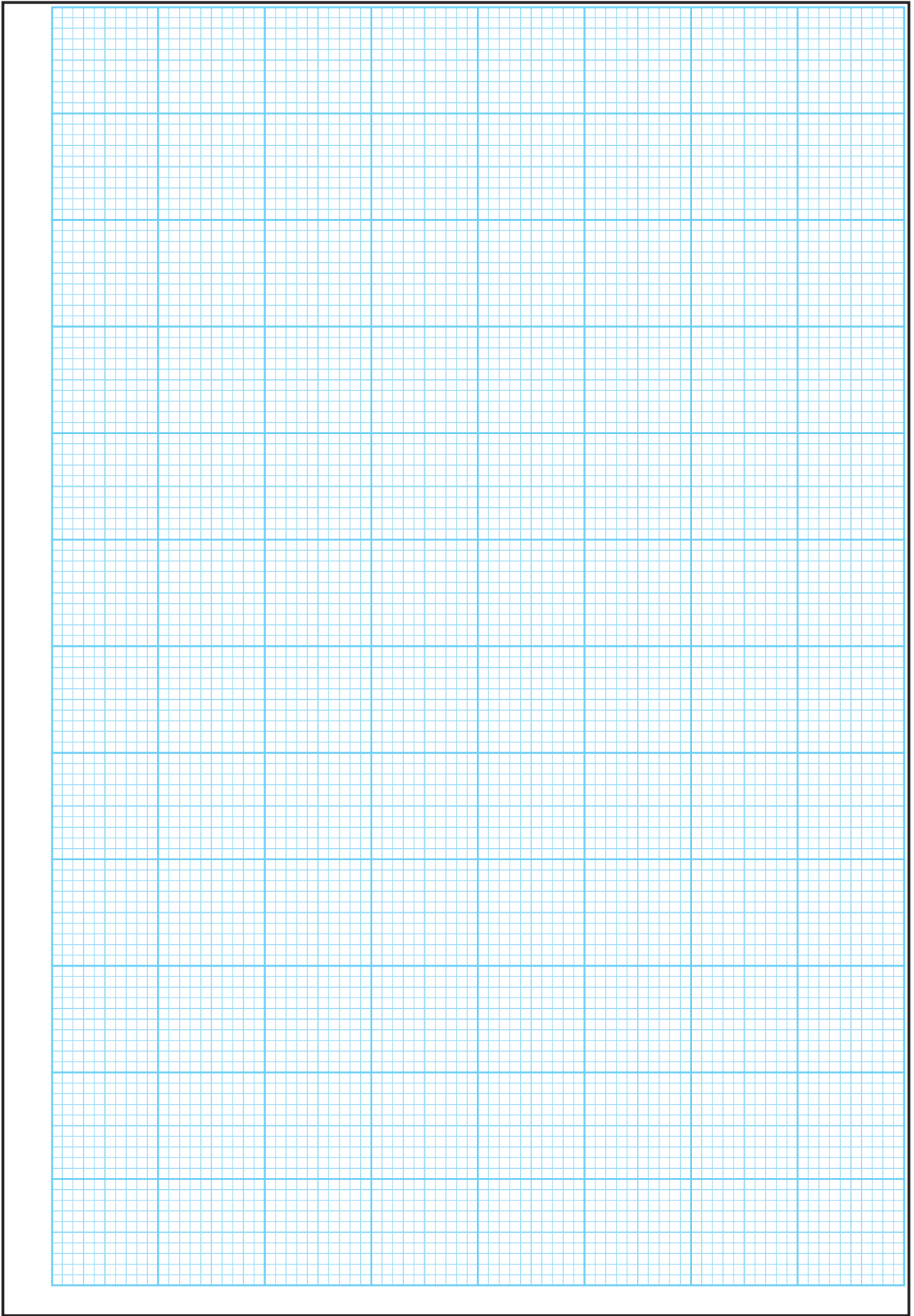
Part <i>Cuid</i>	Question <i>Ceist</i>
(a)	
(b)(i)	
(b)(ii)	

Start each question on a new page
Cuir tús le gach ceist ar leathanach nua

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

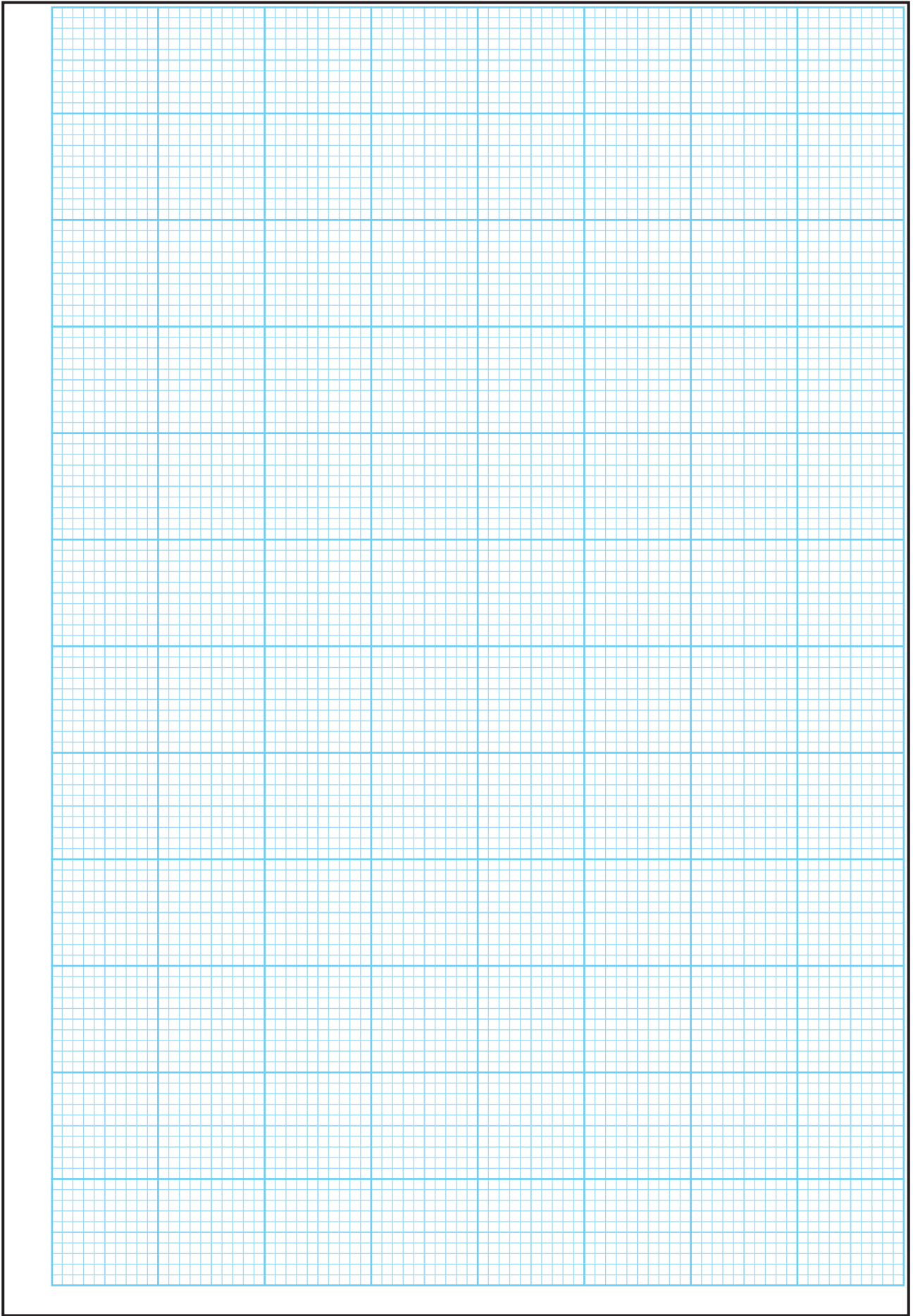
You do not need to use all of the pages in this answerbook. If you run out of space in this answerbook, you may ask the superintendent for more paper or graph paper.

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



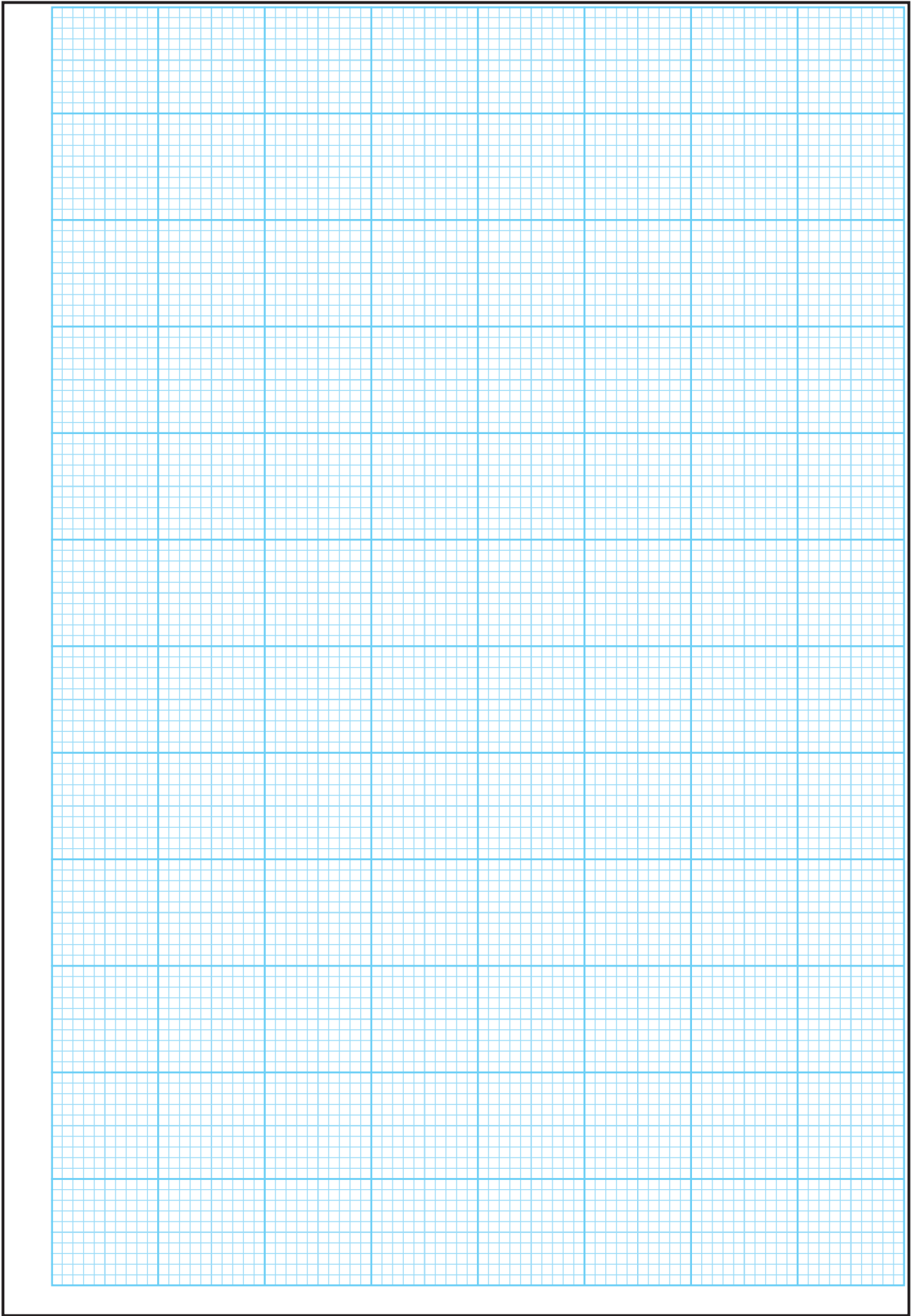
Question





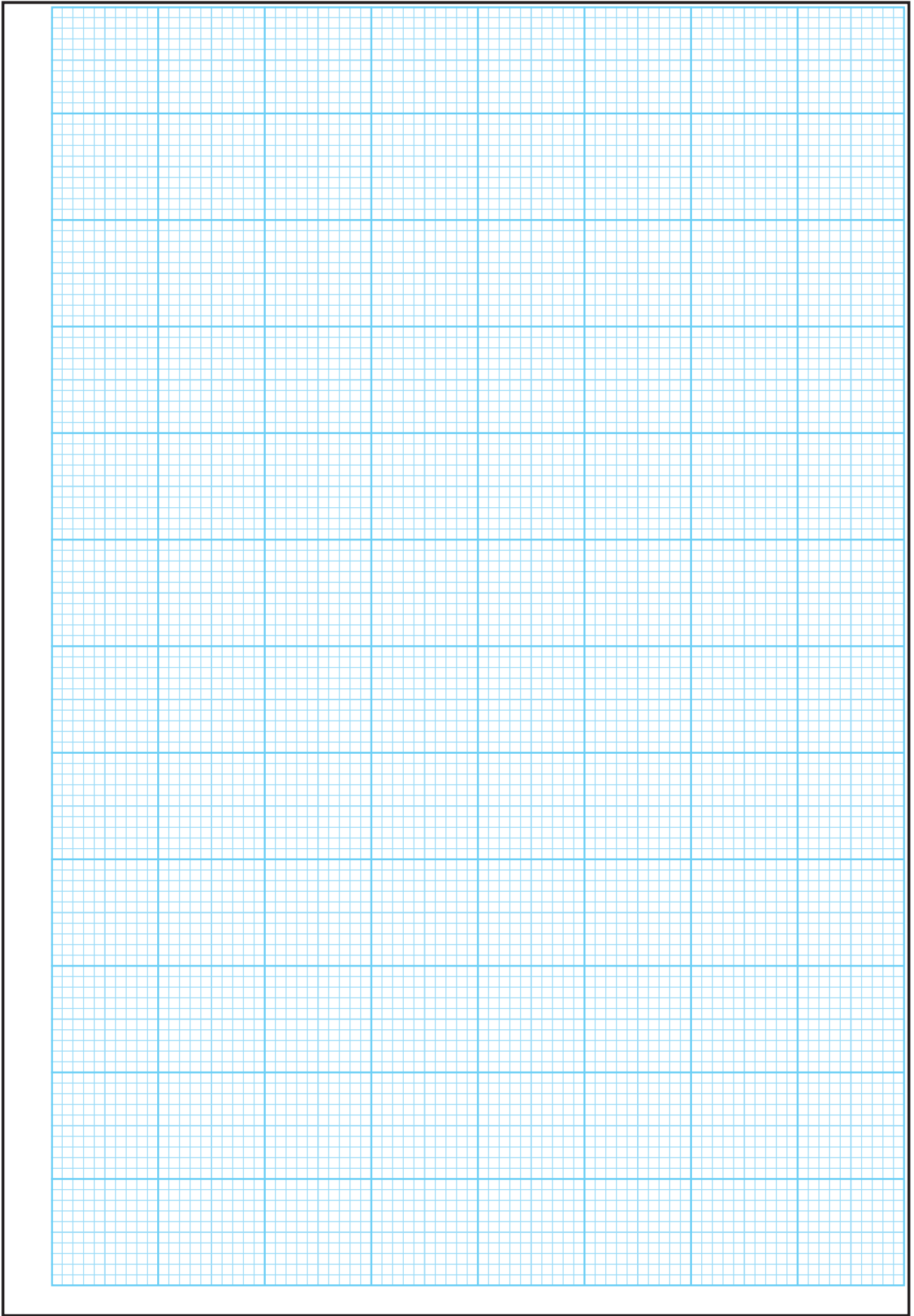
Question





Question





Question



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Leaving Certificate – Ordinary Level

Biology Sections A and B and Answerbook

Tuesday 15 June

Afternoon 2:00 – 5:00



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2021

Biology

Section C

Ordinary level

Tuesday 15 June Afternoon 2:00 – 5:00

180 marks

Do not hand this question paper up

Section C

Answer any three questions.

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

11. (a) Explain the following terms used in ecology:

- (i) *Biosphere*
- (ii) *Edaphic factors*
- (iii) *Food web.*

(9)

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

Game of cones: how the red squirrel is making a big comeback

The mammal fauna found in Ireland has changed over recent years. The number of native red squirrels has decreased due to the arrival of the larger grey squirrels to Ireland in 1911. Grey squirrels outcompeted the red squirrel for foods, such as pine nuts and carried a disease called squirrel pox virus that was fatal to the native species. A recent series of surveys of the squirrel species has shown that grey squirrels have begun to disappear from certain midland counties.



Research conducted in 2019 has linked the loss of grey squirrels to another native species, the pine marten. The pine marten has been on the island of Ireland for thousands of years, but had suffered a huge decline themselves through hunting and habitat loss. The pine marten has made a recovery since becoming protected by the Wildlife Act of 1976 and is one of the few predators that can climb trees to hunt for squirrel.

The new study shows that grey squirrels disappeared from woodlands where pine martens had returned and suggests that red squirrels who have evolved alongside pine martens in Ireland over thousands of years, showed a tendency to avoid the carnivorous animal while grey squirrels showed a "predator naivety" when it came to the pine marten.

(Adapted from RTE Brainstorm 2020)

- (i) What is meant by the term *fauna*?
- (ii) Give **two** reasons why the population of red squirrels declined after 1911.
- (iii) Name an ecological technique used to calculate the population of an animal species.
- (iv) Name a predator mentioned in the passage above.
- (v) Give **two** activities that affected the population of the named predator at part (iv) above.
- (vi) Why has the population of grey squirrels declined in recent years?
- (vii) Draw a food chain using the information from the above passage. (27)

(c) (i) Explain the term *pollution*.

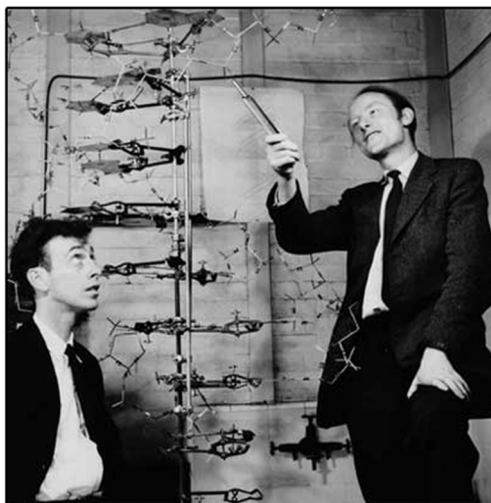
- (ii) Name **one** pollutant from agriculture **or** industry **or** the home, **and** describe how it affects the ecosystem.
- (iii) How could the pollutant named at part (ii) above be controlled?
- (iv) Give **one** reason why waste management is important.
- (v) Give **one** example of a good waste management practice from agriculture **or** fisheries **or** forestry.
- (vi) Name any **two** sets of factors that affect the distribution of organisms in a habitat. (24)

12. (a) Explain the following terms used in genetics:

- (i) *Heredity*
- (ii) *Gene*
- (iii) *Chromosome*.

(9)

(b) The photograph shows Watson and Crick in 1953, with a model of the newly discovered DNA structure.



(DNA model in 1953. BBC News)

- (i) How many strands are there in a molecule of DNA?
- (ii) Explain why some parts of DNA may be described as 'junk DNA'.
- (iii) Name a complementary base pair found in DNA.
- (iv) What happens structurally, to the DNA molecule, before replication begins?
- (v) Name the complementary structure to DNA that is involved in protein synthesis.
- (vi) Describe **one** way this molecule differs from DNA.
- (vii) What is a codon?
- (viii) Name the smaller molecules that are put together to form a protein molecule.
- (ix) What further step must be taken before these chains of molecules become functional proteins?

(27)

- (c)
- (i) What is cancer?
 - (ii) Give **two** causes of cancer.
 - (iii) Name the **two** types of cell division **and** give **one** difference between them.
 - (iv) Draw **one** simple labelled diagram which represents both stages of the cell cycle.

(24)

13. (a) (i) What is the liquid part of the blood called?
(ii) Name **one** cell type found in the blood **and** give **one** function for this named cell type.

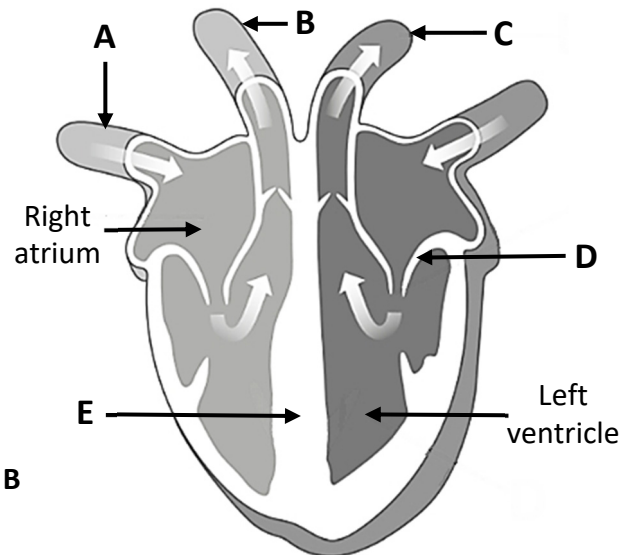
(9)

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

- (i) **In your answer book**, state which letter represents each of the following parts:

1. Septum
2. Vena cava
3. Aorta
4. Bicuspid valve.

- (ii) Describe **two** ways the blood in the left ventricle differs from the blood in the right atrium.
(iii) Where does the blood in structure **B** flow to next?
(iv) What is the purpose of structure **D**?
(v) Name **one** factor that causes the pulse rate to increase.



(27)

(c) The human circulatory system is described as a closed system.

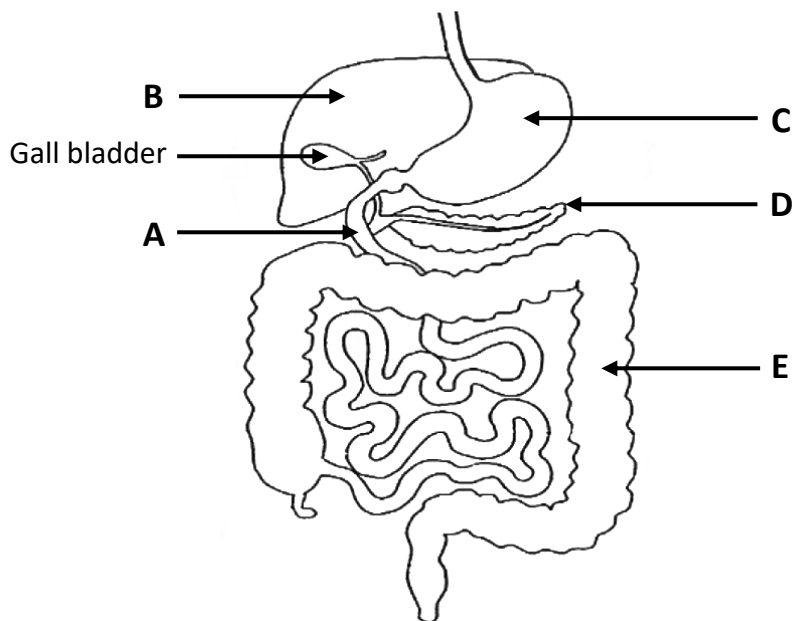
- (i) What is meant by a closed circulatory system?
(ii) Distinguish between an artery and a vein under the following headings:
 1. Size of lumen (cavity)
 2. Thickness of wall.
(iii) Give **one** feature of capillaries which is related to their function.
(iv) Name another system that carries fluid in the body.
(v) Name the fluid carried by the system named at part (iv) above.
(vi) Give **two** functions of the system named at part (iv) above.

(24)

14. (a) (i) Name **two** types of digestion that take place in the human body.
(ii) Food is moved along the digestive system by muscular contractions.
What is this process called?

(9)

- (b) The diagram shows the human digestive system.



- (i) Name the parts labelled **A, B, C, D, E**.
(ii) Name the acid released by part **C**.
(iii) What liquid is stored in the gall bladder?
(iv) Give any **two** functions of the part labelled **B**.

(27)

- (c) The human endocrine system produces hormones.

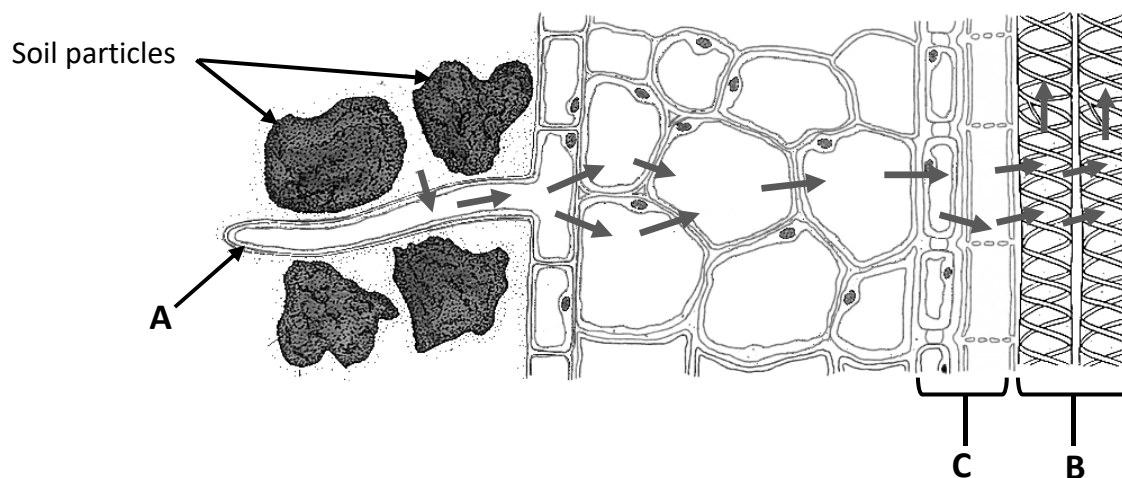
- (i) Explain the underlined term.
(ii) Draw an outline diagram of the human body and on it indicate the location of any **three** of the following endocrine glands listed below:

Pituitary Thyroid Pancreas Adrenals Ovaries Testes

- (iii) Name a hormone produced by **each** of the **three** glands referred to in your diagram at part (ii) above.
(iv) Name **one** gland from the above list that is both an endocrine and an exocrine gland.

(24)

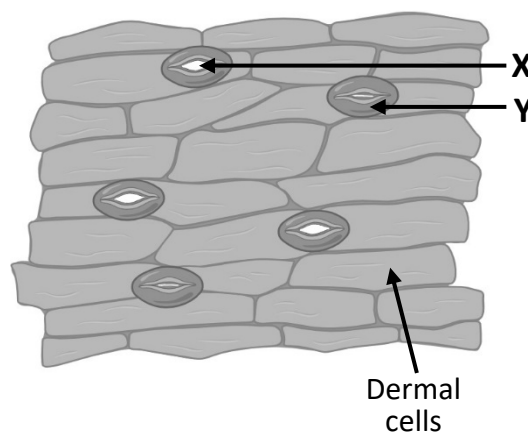
15. (a) (i) What is phototropism?
(ii) Name a part of a plant that responds positively to phototropism.
(iii) What benefit does phototropism give to a plant? (9)



- (b) The diagram shows the path that water takes as it is absorbed into the roots of a plant.
- Name the method which water moves from the soil into the roots.
 - Name the structure labelled **A** that absorbs water from the soil.
 - What else could be absorbed through structure **A** into the root in addition to water?
 - Name the vessels labelled **B** that transport water within the roots of a plant.
 - Describe **two** ways the vessels labelled **B** are adapted to their function.
 - Name the process responsible for the upward movement of water through the vessels labelled **B**.
 - Food is transported throughout the plant by **C**. Name structure **C**.
 - Give **one** way structure **C** is adapted to carry out its function. (27)
- (c) (i) What is meant by the term *homeostasis*?
(ii) Give **one** reason why homeostasis is essential in living organisms.

The diagram below shows the under surface of a leaf.

- Name the small openings labelled **X** through which gas exchange occurs.
- Name **one** gas excreted through these small openings during respiration.
- Name the cells labelled **Y** that regulate the size of these small openings.
- Name the openings in stems through which gas exchange occurs.
- State any **two** ways in which plants have adapted to protect themselves.

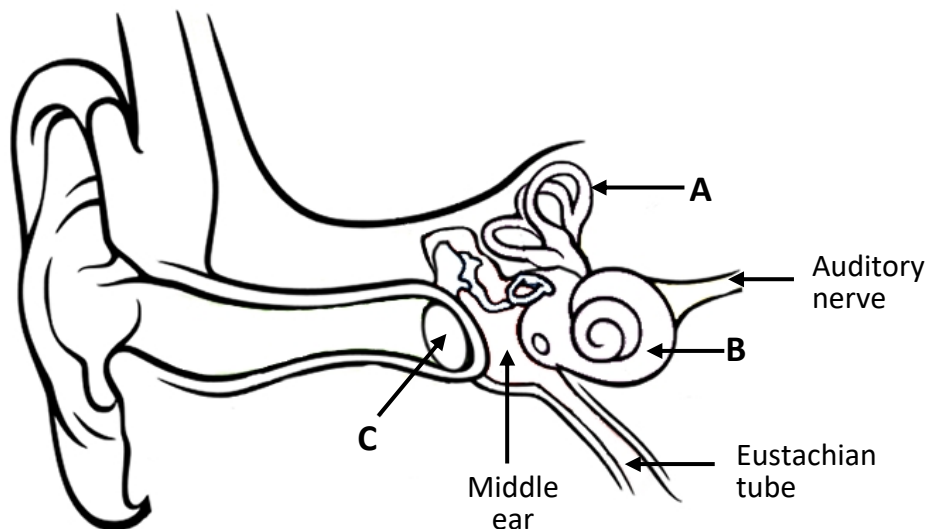


(24)

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

(30, 30)

(a) The diagram shows the human ear.



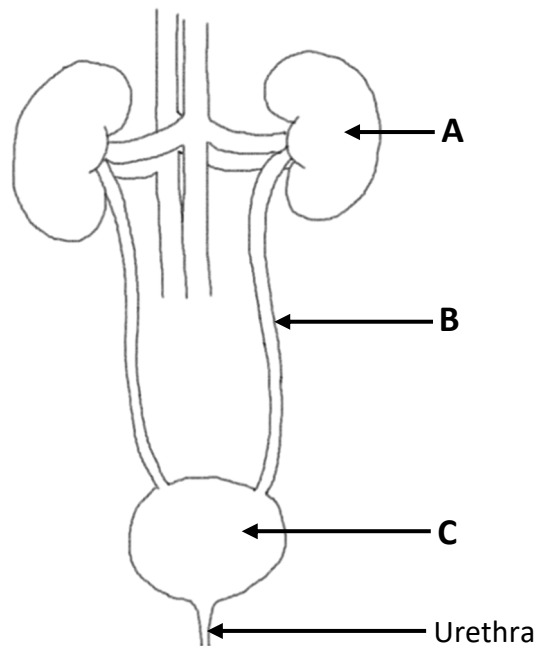
- (i) Name the part labelled **A** and give its function.
- (ii) Name the part labelled **B** and give its function.
- (iii) Name the part labelled **C** and give its function.
- (iv) What is connected to the middle ear by the Eustachian tube?
- (v) The auditory nerve connects the ear to which organ?
- (vi) State how any **named** disorder of the ear **or** the eye can be corrected.

- (b) (i) What is meant by the term *respiration*?
- (ii) Write a word equation to represent aerobic respiration.
- (iii) Aerobic respiration is a two-stage process.
State clearly where stage one **and** stage two occur within the cell.

- (iv) What is meant by fermentation?
- (v) In bread making yeast is used to make the bread rise.
Name the **two** products of fermentation produced by yeast.
- (vi) Describe a laboratory test for either one of the products named at part (v) above.



- (c) (i) Name the part of the flower which forms the fruit.
(ii) Why is seed dispersal important?
(iii) Give **three** examples of how seeds are dispersed.
(iv) Seeds contain an embryo plant, a food store and a testa.
1. What is the function of the testa?
2. Name a structure in seeds that stores food.
3. Name the structures in the embryo plant that form:
a. The root
b. The shoot.
(v) Before germination, seeds undergo a period of dormancy.
What is dormancy?
- (d) (i) Explain the term *excretion*.
(ii) The diagram shows the human urinary system.
Name the parts labelled **A**, **B**, **C**.

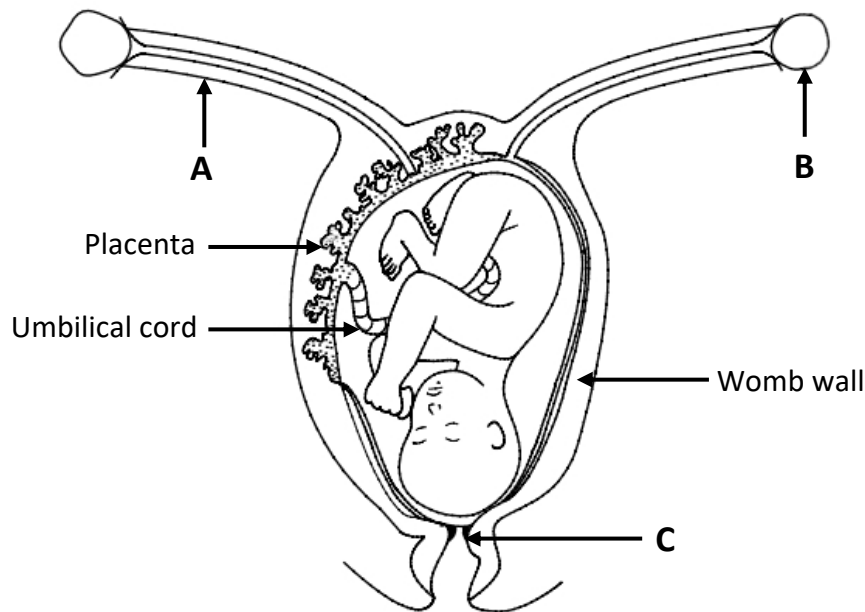


- (iii) Name **two** substances excreted by part **A**.
(iv) Give the function of the part labelled **C**.
(v) Name the region of part **A** in which each of the following takes place:
1. Filtration
2. Reabsorption.
(vi) Give the function of the urethra.

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

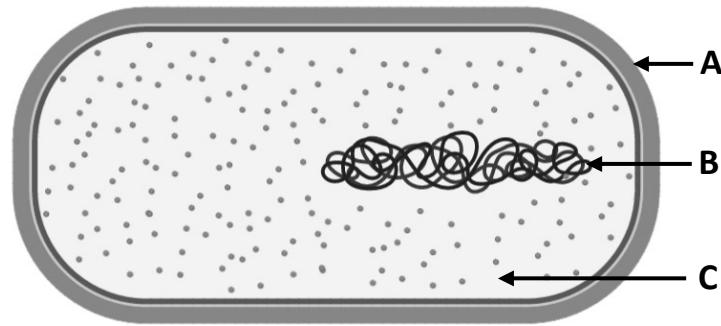
(30, 30)

(a) The diagram shows a foetus in the womb before birth.



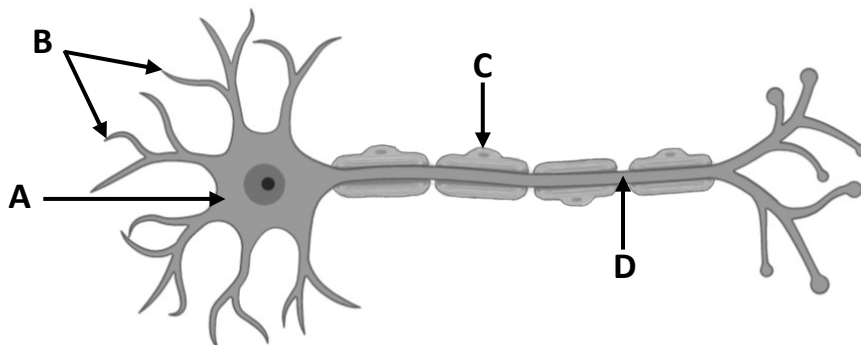
- (i) Identify the structures labelled **A**, **B**, **C** on the diagram.
 - (ii) Give **two** functions of the placenta.
 - (iii) Describe **two** stages that occur during childbirth.
 - (iv) Name the hormone that stimulates the production of breast milk.
 - (v) Give **two** benefits of breastfeeding.
- (b)
- (i) What is meant by the term *photosynthesis*?
 - (ii) Name the gas in the air that is needed for photosynthesis.
 - (iii) Name the cell organelle in which photosynthesis occurs.
 - (iv) During photosynthesis water is split to release three components.
 - 1. Name the product that is released to the atmosphere.
 - 2. Name the product that is used to form carbohydrates.
 - 3. Name the product that passes to chlorophyll.
 - (v) What is the carbohydrate called that is formed by plants in photosynthesis?
 - (vi) What is the role of chlorophyll in photosynthesis?
 - (vii) Give **two** environmental factors that affect the rate of photosynthesis.

(c) The diagram shows the structure of a typical bacteria cell.



- (i) Identify the bacterial structures labelled **A**, **B**, **C** on the diagram.
- (ii) What is the function of **C**?
- (iii) What is meant by the term *asexual reproduction*?
- (iv) Name the type of asexual reproduction used by bacteria.
- (v) State any **two** factors that affect the growth of bacteria.
- (vi) Describe **two** examples of the economic importance of bacteria.

(d) The diagram shows a neuron.



- (i) Name the parts **A**, **B**, **C**, **D**.
- (ii) What type of neuron is shown in the diagram?
- (iii) Name the gap or region between two neurons.
- (iv) What helps the nerve impulse travel across the gap named at part (iii) above?
- (v) Name **one** disorder of the nervous system.
- (vi) Give a cause **and** a possible treatment of the disorder named at part (v) above.

Do not hand this question paper up

Leaving Certificate – Ordinary Level

Biology

Tuesday 15 June

Afternoon 2:00 – 5:00

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