2026.M44

2026L025A1EL

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2026

Biology

Sections A and B and Answerbook

Higher Level

Tuesday 9 June Afternoon 2:00 - 5:00

400 marks

Examination Number

Date of Birth

For example, 3rd February 2005 is entered as 03 02 05

Centre Stamp

Instructions

Write your Examination Number and your Date 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) State **two** reasons why organisms require food.

1.
2.

(b) Name the chemical elements that are present in **all** lipids.

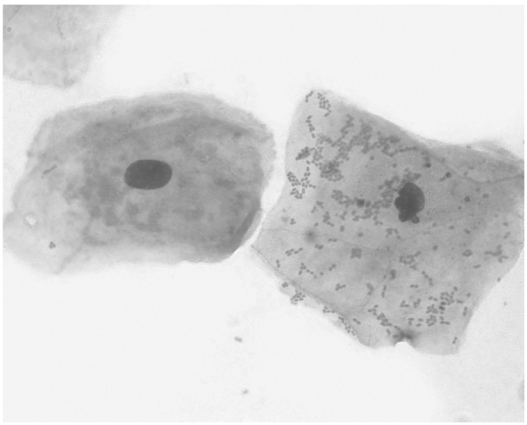
(c) Name the basic unit of a lipid.

(d) State **one** metabolic role of lipids in cells.

(e) Identify **one** vitamin that is soluble in lipids.

(f) State **one** deficiency disorder of the vitamin identified in part (e) **or** of any other **named** vitamin.

2. Human cheek cells are shown in the image below.



(a) In the box above, name a structure visible in the image that shows that the cheek cells are eukaryotic **and** draw an arrow from the box to this named structure.

(b) What term describes cells that are **not** eukaryotic?

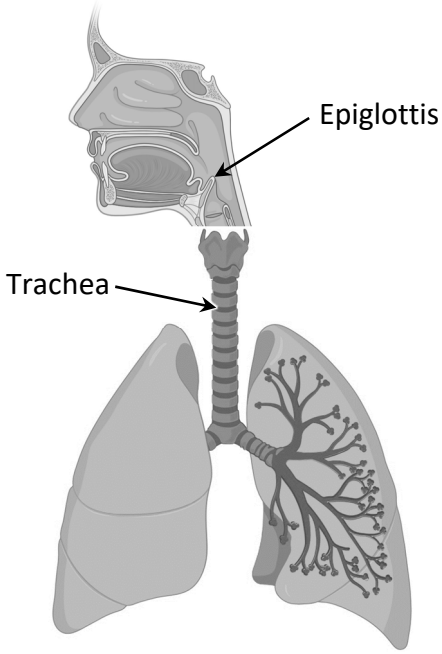
(c) Human cells are used in tissue culture.
Explain the term *tissue culture*.

(d) State **two** conditions necessary for successful tissue culture.

(e) State **two** applications (or uses) of tissue culture.

1.
2.

3. The diagram shows parts of the human breathing system.



(a) Name the body cavity in which the breathing system is located.

(b) State the function of the epiglottis.

(c) The trachea has rings of cartilage in its wall.
What is the function of these rings of cartilage?

(d) **On the diagram above**,

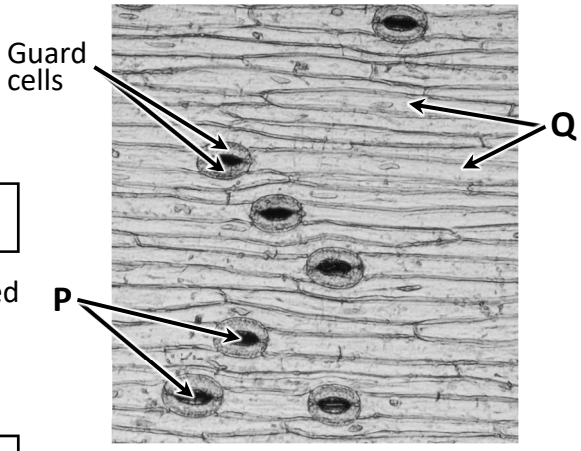
(i) Sketch **and** label the diaphragm muscle in its correct location.

(ii) Draw an arrow to show the direction of movement of the diaphragm during inhalation.

(e) Name **one** other muscle involved in inhalation.

(f) The ribs are not shown on the diagram.
Briefly describe what happens to the rib cage during inhalation.

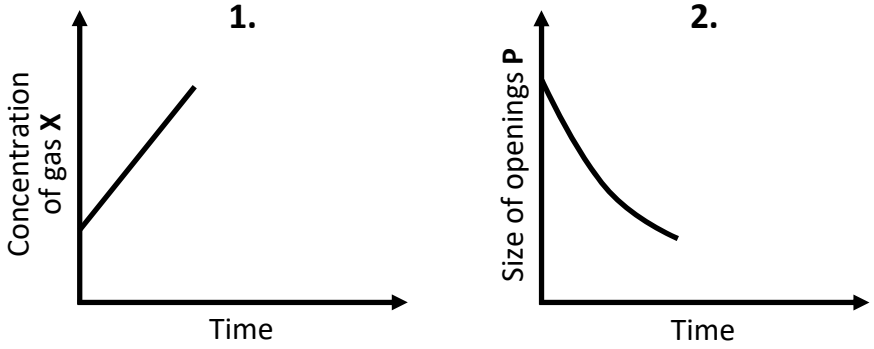
4. The image shows the undersurface of a leaf as viewed using a light microscope.



(a) Name the openings **P** which allow gas exchange to occur.

(b) The size of these openings can be controlled by the level of water in the guard cells, but also directly by a gas **X**.
Identify gas **X**.

The graphs (**1.** and **2.**) below show the relationship between the concentration of gas **X** in the leaf and the size of the openings **P** over the **same** period of time.



(c) State the relationship between the concentration of gas **X** and the size of openings **P**.

(d) **On graph 2.**, **continue the curve** to show what would happen to the size of openings **P** if the concentration of gas **X** in the leaf reduced.

(e) **(i)** The label **Q** in the image above shows the location of other cells on the undersurface of the leaf. To which tissue type do these cells belong?

(ii) Other than gas exchange, state **one** function of the tissue type you named at (e) (i) above.

(f) Name the openings in the stems of plants that are also involved in gas exchange.

5. Answer the following questions in relation to protein synthesis.

(a) The first stage in protein synthesis involves copying the DNA code to make messenger RNA (mRNA). What name is used to describe this stage?

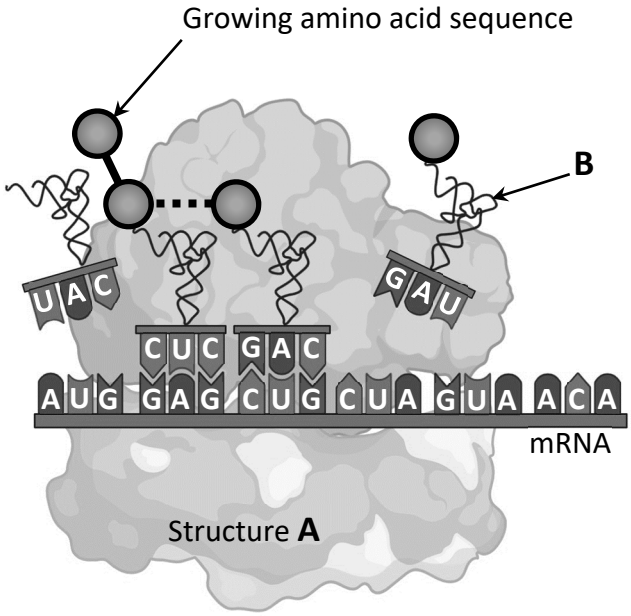
(b) Where in the cell does the stage you named above occur?

The diagram below shows the second stage of protein synthesis involving mRNA.

(c) Name structure **A**, where this stage occurs in the cell.

(d) The part labelled **B** is another type of RNA. Name this type of RNA.

(e) Part **B** attaches to the mRNA at matching three-base sequences (such as **G A G** or **C U G**).
What name is given to these three-base sequences of mRNA?

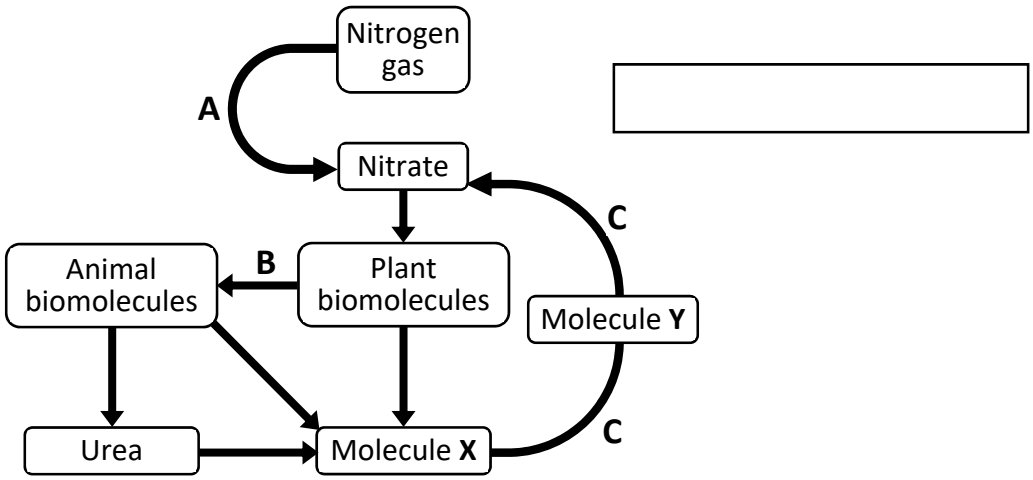


(f) Part of the mRNA sequence above is: **C U A G U A A C A**.
Write the corresponding sequence of the gene (**DNA**) for this mRNA sequence.

(g) What happens to the fully translated amino acid sequence to allow for the formation of a functional protein?

6. Answer the following questions in relation to the nitrogen cycle.

(a) The diagram below shows the nitrogen cycle.
One important process has been omitted.
Complete the cycle by drawing an arrow **on the diagram and** writing the name of the missing process in the box provided.



(b) Write down the names of processes **A**, **B and C** that are indicated on the diagram.

A:
B:
C:

(c) **(i)** Outline **one** way in which process **A** occurs.

(ii) Suggest an advantage to plants of process **A**.

(d) Name molecules **X and Y**.

X:
Y:

7. For **each** of the following structures, identify its precise location **and** its main function.

(a) Retina

Precise location:
Main function:

(b) Sino-atrial node

Precise location:
Main function:

(c) Gall bladder

Precise location:
Main function:

(d) Adrenal gland

Precise location:
Main function:

(e) Cerebellum

Precise location:
Main function:

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)** In relation to scientific investigations, distinguish between the terms, *qualitative* **and** *quantitative* by writing a brief sentence on **each**.

(b) You carried out various investigations during your practical studies.

(i) Outline a qualitative test for a reducing sugar.

(ii) Describe how you prepared a sample of stained plant cells to view using a light microscope.

(iii) When isolating DNA from plant tissue, state a reason for using the following:
1. Washing up liquid or detergent **2.** Ice cold ethanol

Washing up liquid or detergent:
Ice cold ethanol:

9. **(a)** **(i)** What is an enzyme?

(ii) What happens to an enzyme when it becomes denatured?

(b) During your practical studies, you investigated the effect of pH on the rate of enzyme activity. Describe how you carried out this investigation. Include the results and one safety precaution. You may include a labelled diagram if you wish.

10. **(a)** **(i)** In Biology, what is meant by the term *geotropism*?

(ii) State **one** location in plants where growth regulators are produced.

(b) During your practical studies, you investigated the effect of IAA (indole acetic acid) growth regulator on plant tissue.

(i) Describe how you set up this investigation. Include one safety precaution. You may include a labelled diagram if you wish.

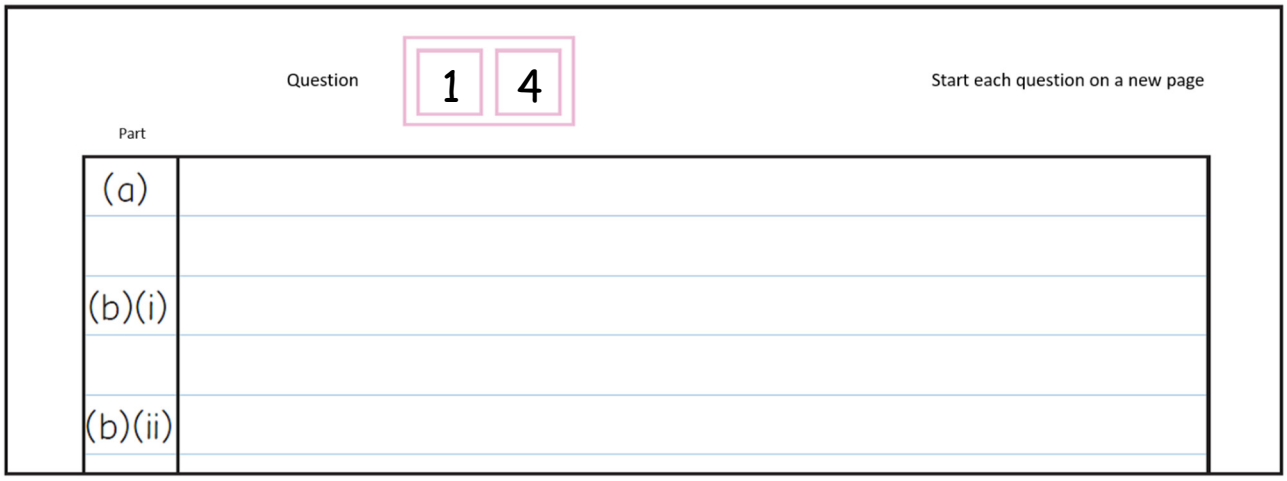
(ii) State **one** result of your investigation.

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.



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

Biology Sections A and B and Answerbook

Tuesday 9 June

Afternoon 2:00 - 5:00

2026.M44

2026L025A2EL

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

Do not hand this up.

This document will not be returned to the State Examinations Commission.

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.

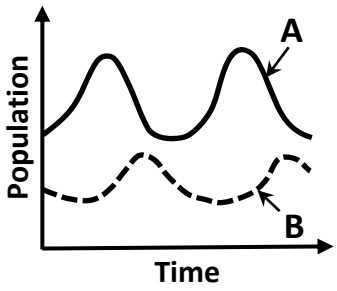
(ii) From the passage or otherwise, explain how this adaptation benefits the vine weevil.

(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.

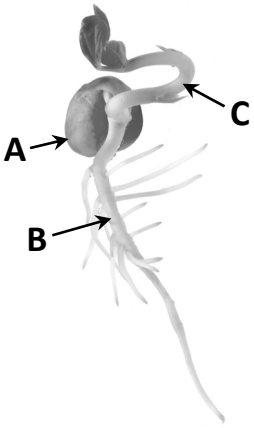
(i) Name the part of the flower that develops into the seed.

(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**?

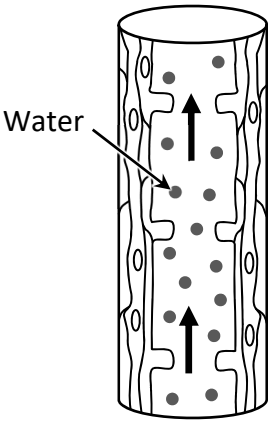
3. Name the parts labelled **B and C**.

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**.

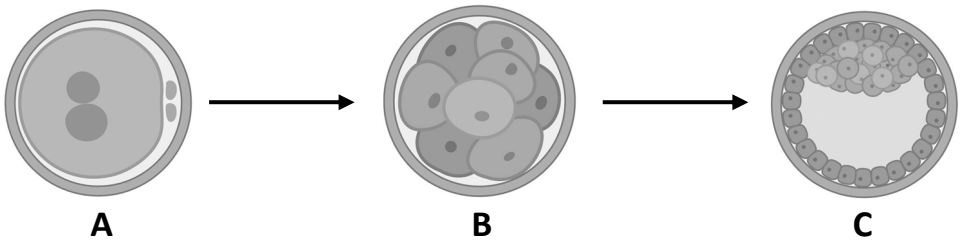
(ii) The ovary produces oestrogen.
State any **one** role of oestrogen during the menstrual cycle.

(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?

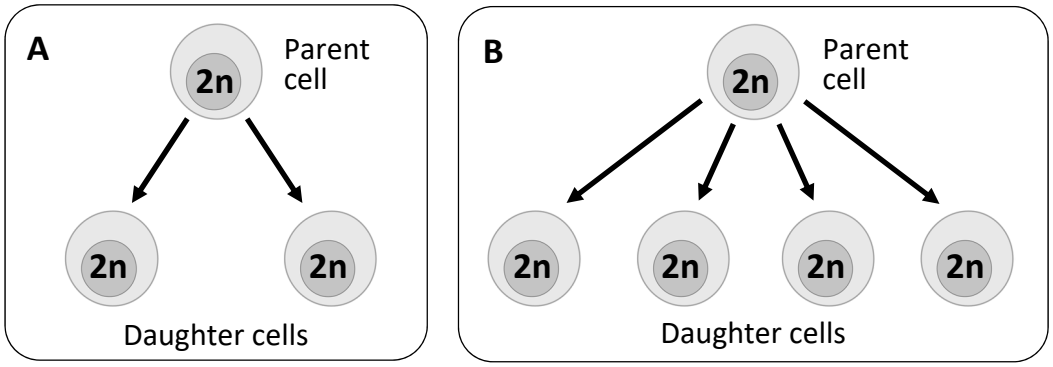
(iii) What must happen to structure **C** to allow for further development and growth?

(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.

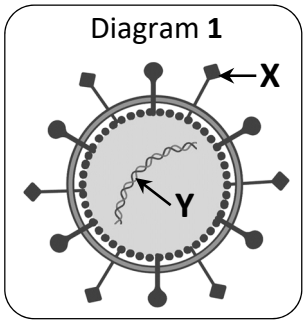
2. State a role of meiosis in multicellular organisms.

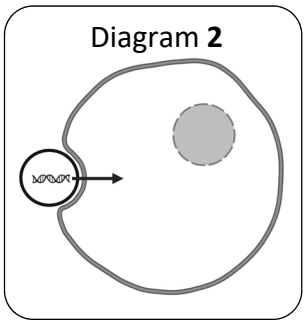
(iii) Explain the terms *haploid* **and** *diploid*.

(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.

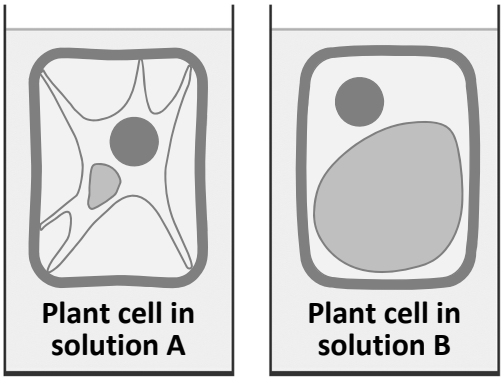
(iii) Diagram **2** shows a virus attaching to a host cell.
Describe how the virus uses this host cell to produce a large number of viruses.

(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**.



(i) What has happened to the cell in solution **A**?

(ii) Name the condition that describes the cell in solution **B**.

(iii) Osmosis is a special type of diffusion that contributes to the condition you named above.

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

2. Explain in detail why osmosis is referred to as a special type of diffusion.

3. Why is diffusion described as passive transport?

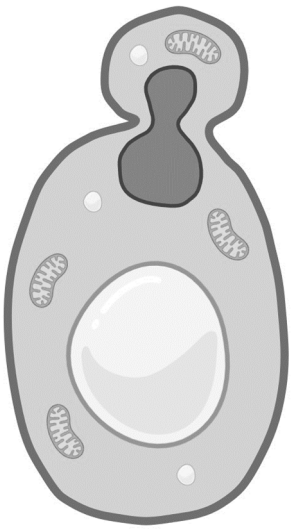
(iv) Outline how a **named** structure in the cell in solution **B** helps to maintain the shape of the cell.

(v) Explain how solution **B** differs from solution **A**.

(vi) Suggest what might happen to an animal cell if it was placed in solution **B**.

(vii) 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.



(i) Name the kingdom to which yeast belong.

(ii) Name the type of asexual reproduction shown in the diagram.

(iii) Identify **one** advantage of asexual reproduction.

(iv) **Copy the diagram into your answerbook and** label any **three** parts.

(v) 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.

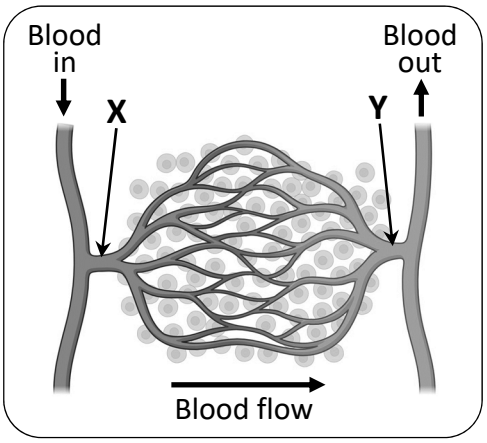
(vi) Name **one other** species you have studied that is a member of the same kingdom as yeast.

(vii) State how the process of asexual reproduction you named at part (ii) above differs in the species you named at part (vi) above.

(viii) 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.

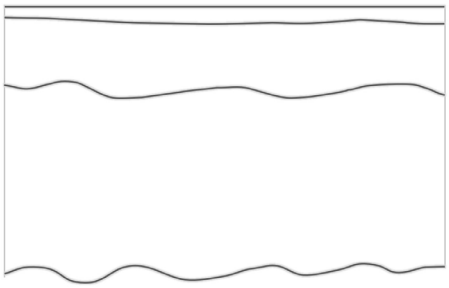
(v) Name the type of vessel that is also present in capillary networks that absorbs the excess tissue fluid around the cells.

(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.

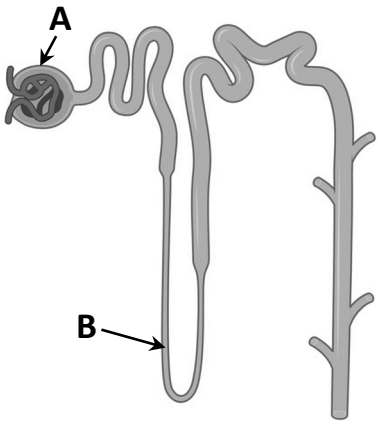
(i) Explain the term *excretion*.

(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**.

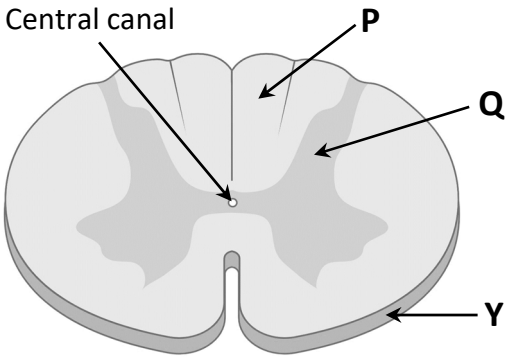
3. Outline what happens in **each** part labelled **A and B** during urine production.

(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:

Images/diagrams/graphs:

Image in Q12 (b) on page 3:	dreamstime.com
Graph in Q12(b) on page 3:	State Examinations Commission
Image in Q14 (b) on page 5:	dreamstime.com
Diagram in Q14 (c) on page 5:	State Examinations Commission
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Diagram in Q17 (c) on page 10:	biorender.com
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Texts:

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

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Leaving Certificate – Higher Level

Biology Section C

Tuesday 9 June

Afternoon 2:00 - 5:00