

**Biology Mock Exam May 2025**

**Total: 400 marks**

**Time 3 hours**

**Section A- Answer 5 out of 7 questions (Q1-7)- 100 marks**

**Section (B)- Answer 2 out of 3 questions (Q8-10)- 60 marks**

**Section (C)- Answer 4 out of 7 questions (Q11-17)- 240 marks**

## Section A- Answer 5 questions

Q1.

- a) Identify the two constituents in a triglyceride subunit.


- b) Explain how the structure of a lipid subunit maybe altered.


- c) Vitamins can be divided into two categories; name these categories.


- d) Explain the term "trace element".


- e) Name a disorder associated with a **named** mineral found in animal.


- f) State two roles of water in a living organism.


2) From your knowledge of ecology, explain the following terms:

(a) Ecosystem

(b) Habitat

(c) Niche

(d) Edaphic factor

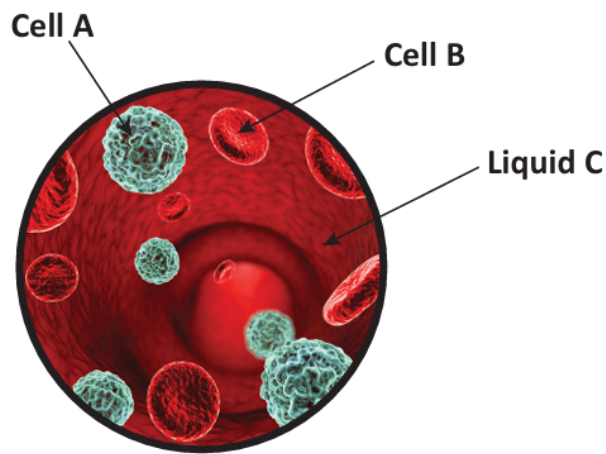
(e) Food Chain

(f) Quantitative study

(g) Conservation

Q3.

Blood is a fluid that transports substances to and from cells in the human body.



- (a) Identify cell **A**, cell **B** and liquid **C** in the above image of blood cells.

Cell A:
Cell B:
Liquid C:

- (b) Explain why blood is considered to be a tissue.


- (c) Name **two** substances, other than blood cells, oxygen and carbon dioxide, that are transported in the blood.

1.
2.

- (d) Where precisely in the human body are red blood cells produced?

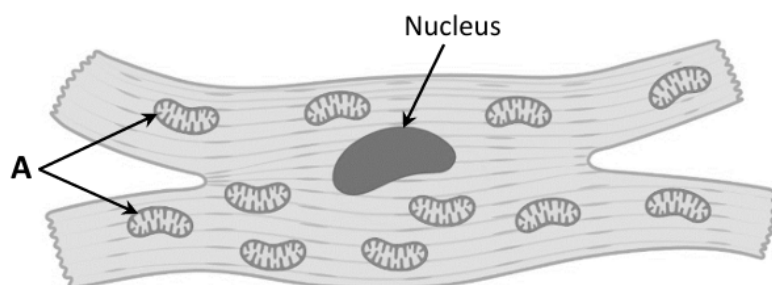
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- (e) Many medical conditions adversely affect the blood. Name **one** blood disorder.

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Q4.

Aerobic respiration is described as a two-stage process. The diagram represents a muscle cell in which aerobic respiration is taking place.



- (a) What name is given to stage 1 of respiration?

- (b) Where in the cell does stage 1 occur?

- (c) Name the cell organelles, labelled **A** in the diagram above, in which stage 2 occurs.

- (d) Explain why muscle cells contain large numbers of the cell organelle named at part (c) above.

- (e) ATP is an energy carrier involved in respiration.  
What does ATP stand for?

- (f) NAD is another energy carrier involved in respiration.  
What is its function?

- (g) Sometimes muscle cells respire anaerobically.  
Name the by-product of anaerobic respiration in a muscle cell.

**Q5.**

Explain the term “cell continuity”

During which phase of the cell cycle are organelles such as the mitochondria replicated.

State the type of cell division responsible for each of the following;

1. One cell divided to produce four new cells

2. The new cell is identical to the parent cell

3. Happens in the meristem of the root tip

4. Production of gametes

What name is given to the group of disorders that results from uncontrolled rate of mitosis

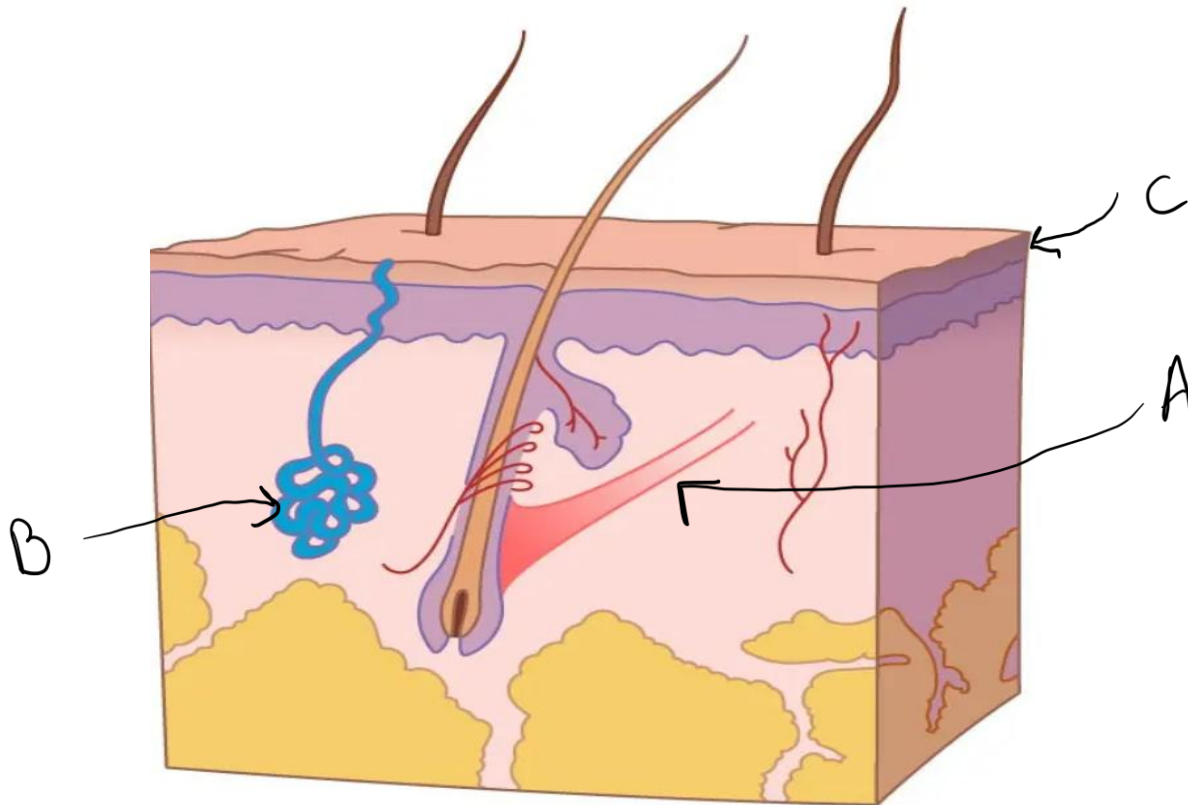
Name the membrane formed in animal cells at the end of mitosis

**Q6.**

	True	False
(a) Cellulose and chitin are two structural polysaccharides.	<input type="checkbox"/>	<input type="checkbox"/>
(b) Yeast is an example of a multicellular organism.	<input type="checkbox"/>	<input type="checkbox"/>
(c) Cytosine is an example of a purine base.	<input type="checkbox"/>	<input type="checkbox"/>
(d) Viruses are obligate parasites.	<input type="checkbox"/>	<input type="checkbox"/>
(e) Rhizoids in Rhizopus secrete enzymes for extracellular digestion.	<input type="checkbox"/>	<input type="checkbox"/>
(f) Red blood cells contain a nucleus at maturity.	<input type="checkbox"/>	<input type="checkbox"/>
(g) Osmosis involves the movement of water only.	<input type="checkbox"/>	<input type="checkbox"/>

Q7.

Below is a diagram of the skin



- (a) Indicate on the diagram with "X" the tissue that is composed of lipids  
(b) Name the parts of the skin labelled A -C

A
B
C

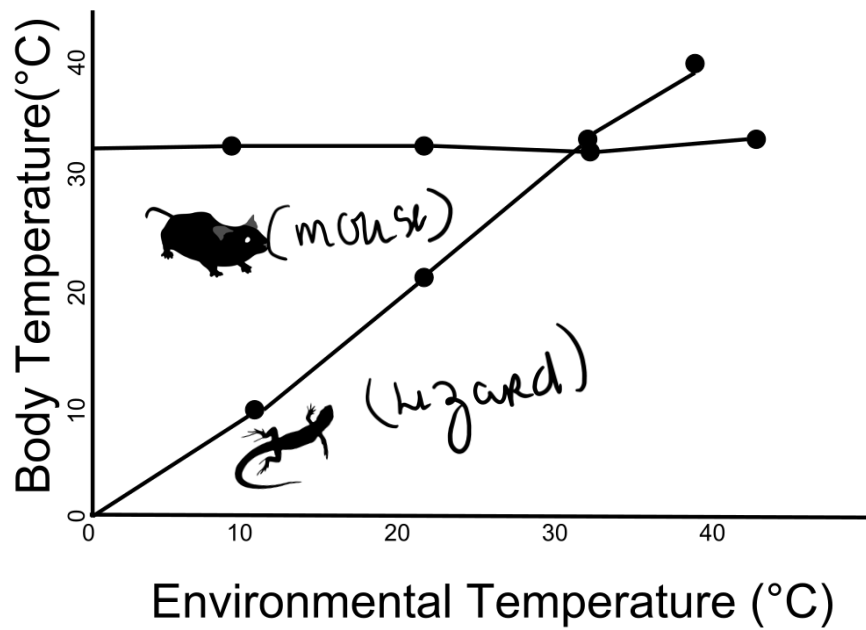
- (c) List two structure in the skin with a role in temperature regulation.

1.
2.



(d) The skin has a role in homeostasis. Define the term “homeostasis”


Study the graph comparing the body temperature of a mouse and a lizard in response to environmental temperature



(e) What conclusion can be drawn about the mouse based on the data given in the graph.


## Section (B)- Answer two questions

**Q8**

(a)

(i) What is the basic unit of life?

(ii) Identify the characteristic of life essential for the survival of the species

(b)

The following tables compare frequency data for the plants, grass and clover, in a habitat when a herbivore (plant-eater) was present and when it was absent.

Herbivore present						Herbivore absent					
	Frequency data						Frequency data				
Grass	✓	x	✓	x	✓	Grass	✓	✓	✓	✓	✓
Clover	x	✓	x	✓	x	Clover	x	✓	x	✓	✓

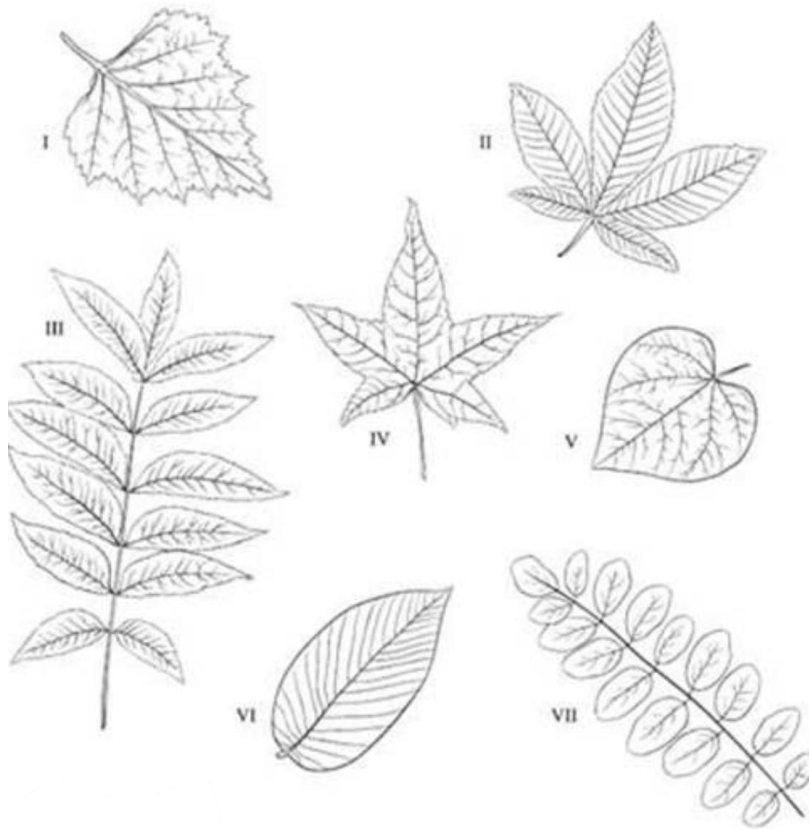
(i) Describe how the frequency data would have been obtained.

(ii) Calculate the percentage frequency for both grass **and** clover when the herbivore was present.

Grass:	Clover:
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(iii)

Use the identification key to identify the tree from which leaf "I" was obtained.



#### Dichotomous Key for Leaves

1. Compound or simple leaf
  - 1a) Compound leaf (leaf divided into leaflets)  
.....go to step 2
  - 1b) Simple leaf (leaf not divided into leaflets)  
.....go to step 4
2. Arrangement of leaflets
  - 2a) Palmate arrangement of leaflets (leaflets all attached at one central point)  
.....*Aesculus* (buckeye)
  - 2b) Pinnate arrangement of leaflets (leaflets attached at several points)  
.....go to step 3
3. Leaflet shape
  - 3a) Leaflets taper to pointed tips  
.....*Carya* (pecan)
  - 3b) Oval leaflets with rounded tips  
.....*Robinia* (locust)
4. Arrangement of leaf veins
  - 4a) Veins branch out from one central point  
.....go to step 5
  - 4b) Veins branch off main vein in the middle of the leaf.....go to step 6
5. Overall shape of leaf
  - 5a) Leaf is heart-shaped.....*Cercis* (redbud)
  - 5b) Leaf is star-shaped  
.....*Liquidambar* (sweet gum)
6. Appearance of leaf edge
  - 6a) Leaf has toothed (jagged) edge  
.....*Betula* (birch)
  - 6b) Leaf has untoothed (smooth) edge  
.....*Magnolia* (magnolia)

Plant I:

(c)

A number of food samples were tested in the laboratory and the following results obtained. The ✓ indicates a positive result.

	<b>Iodine</b>	<b>Biuret</b>	<b>Brown Paper</b>
<b>Food A</b>	x	x	✓
<b>Food B</b>	x	✓	x
<b>Food C</b>	✓	x	x

(i) Identify each of the food **types** A, B and C.

A
B
C

Describe a positive result for food A in the presence of brown paper

--

What is the purpose of the coarse focus wheel on a light microscope

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**Q9.**

**(a)**

(i) Explain the term “selectively permeable” with respect to membranes.

(ii) Identify a material you used in the laboratory to represent a selectively permeable membrane.

**(b)**

**In relation to the experiment to investigate the effect of temperature on enzyme activity answer the following questions;**

(i) Name the enzyme used and the source of the named enzyme.

(ii) How was the rate of enzyme activity measured?

(iii) Name a factor that was kept constant during the experiment.

(iv) How was the named factor kept constant?

**(c)**

Answer the following questions in relation to the production of ethanol by fermentation.

(i) Identify one safety precaution you took while conducting this experiment.

--

(ii) How was it identified that fermentation had ceased?

--

(iii) Identify the reagents used to confirm the presence of ethanol **and** the corresponding positive result.


**Q10.**

**(a)**

Answer the following questions in relation to the dissection, display and identification of the parts of a sheep's or an ox's heart.

**(i)** Explain how you distinguished the front of the heart from the back.


**(ii)** Name **one** piece of equipment you used to make an incision.

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**(iii)** During your dissection you located the tricuspid valve.  
State the exact location of this valve.


**(iv)** What did you do to expose the semi-lunar valve?

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**(v)** Describe **one** difference you observed between the right side of the heart **and** the left side after your dissection.


(b) In an investigation on the growth of leaf yeast, three starch agar plates were set up as shown in the table and stored in an incubator at 30°C for 5 days.

Plate	Set Up	Result after 7 days
A	Unopened starch agar plate	0 colonies
B	Leaf from quiet rural setting	10 colonies
C	Leaf from busy rural setting	4 colonies

(i) Identify a suitable tree that the leaf could be taken from to conduct this experiment.

(ii) how was the leaf named in (i) identified?

(iii) Plate A is acting as a control. What is the purpose of a control in an experiment?

(iv) Why was the incubator set at the stated temperature?

(v) what was the colour of the colonies produced?

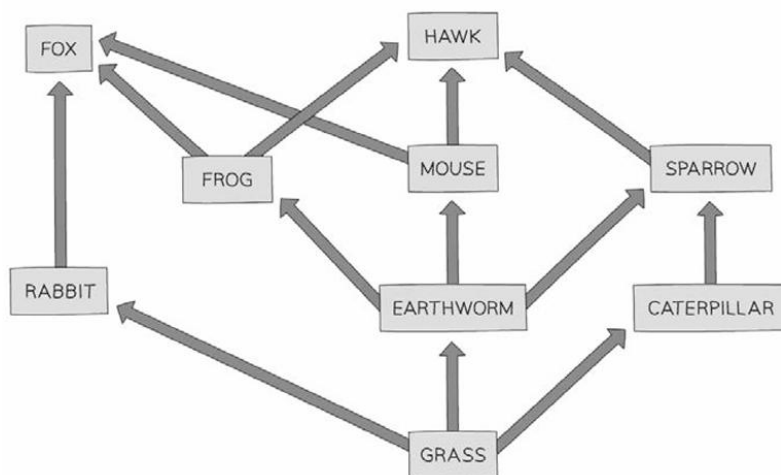


### Section (C)- Answer 4 questions

Q11

(a)

(b) Study the diagram of a food web below and answer the following questions.



(i) Draw a labelled pyramid of numbers for any food chain represented in the food web.

(ii) what name is given to the shape of the pyramid that you have drawn.

(b)

(i) List **three** methods of waste minimisation.

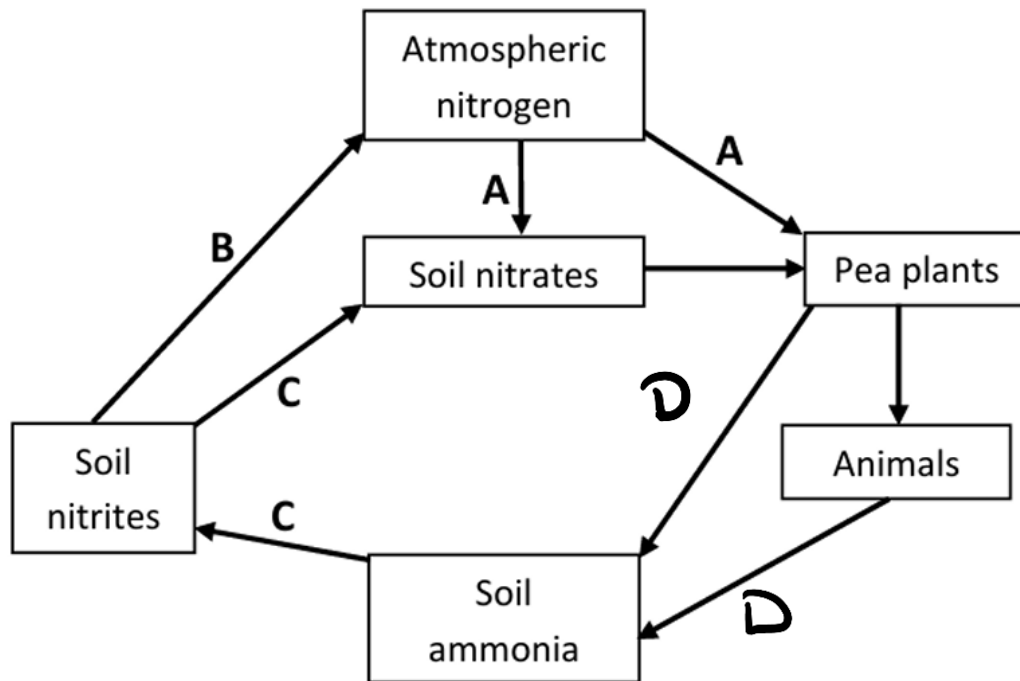
(ii) The size of the human population is controlled by a number of factors. List any **two** of these factors.

(iii) Waste management is a matter of growing concern in Ireland. Outline **two** problems associated with waste disposal of domestic waste. *to landfill.*

(iv) Give **one** example of waste produced in agriculture **or** fisheries **or** forestry and describe how it is managed.

(v) Give **one** example of the use of microorganisms in waste management.

(c) Answer the following questions in relation to the Nitrogen Cycle

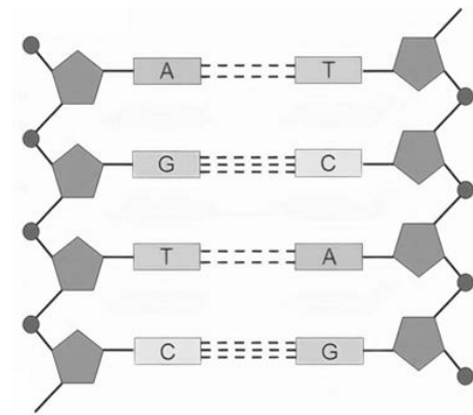


The diagram above represent the events of the Nitrogen Cycle

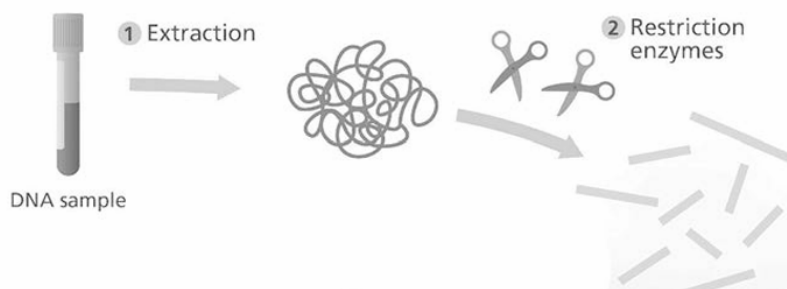
- (i) What is the role of the nitrogen cycle?
- (ii) Identify a use of nitrogen in plants and animals
- (iii) Name process A.
- (iv) State another method by which A can happen apart from the use of microorganisms.
- (v) D is the process of decomposition by decomposing microorganisms. Provide an explanation why if the bacteria in (D) were to die out why they cannot be replaced by another type of decomposing microorganisms.
- (vi) Name the type of bacteria involved in process C.
- (vii) Part of the nitrogen cycle involves the manufacture of urea in humans. Name the process of making urea in the human body.

**Q12.**

- (a) The diagram shows a section of the DNA molecule.
- Name the type of chemical bond located between the bases in a DNA molecule.
  - Name the base present in DNA that is absent in RNA.
  - To which group of bases does the base named in (a) (ii) above belong? **(9)**

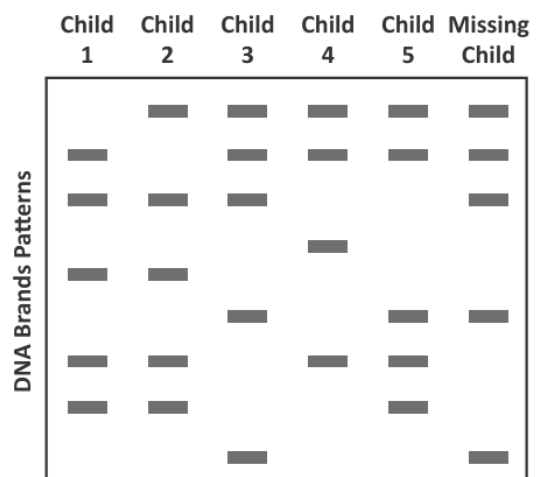


- (b) The diagram shows the first two steps in the process of DNA profiling.



- Isolating DNA from plant tissue was one of the laboratory investigations you carried out. During the procedure, washing-up liquid was added to the chopped tissue, and the solution was then heated to 60°C for exactly 15 minutes.
  - What is the purpose of adding washing-up liquid?
  - Why is the mixture heated?
  - Suggest why it is important that the heat is removed after 15 minutes.

- Name the sections of the DNA molecule targeted by restriction enzymes.
- On what basis are the fragments separated?
- Why are the separated fragments then stained?
- Under what circumstance could two individuals have the same DNA profile? Why is this possible?
- Study the DNA profile in the diagram and indicate which of the five profiles correspond to that of the missing child.



**(27)**

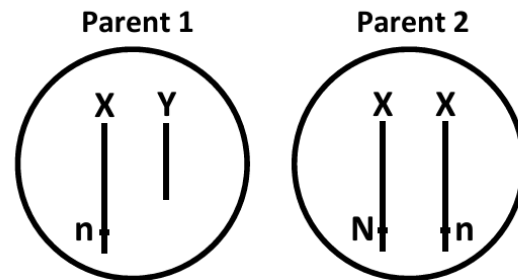
(c)

Red-green colour vision is controlled by an allele present on the X chromosome. There is no corresponding allele on the Y chromosome. The allele for normal red-green colour vision (**N**) is dominant to the allele for red-green colour blindness (**n**).

(i) What term describes the presence of a gene on the X chromosome?

(ii) What is meant by the term *dominant*?

(iii) The chromosome diagrams show the genetic makeup of two parents.



1. Write down the **full** phenotypes of parent **1** **and** parent **2**.

2. If parents **1** and **2** had a child, there are four possible genotypes. Write down **each** genotype **and** its corresponding phenotype.

(iv) Explain why red-green colour blindness is more common in males than females.

(a)

(i) Write a balanced chemical equation to represent photosynthesis.

(ii) State one benefit of plants have more than one chlorophyll pigment

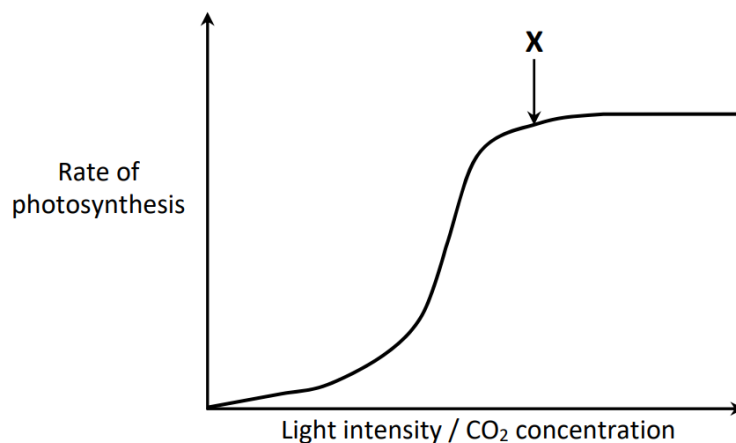
(b)

(i) State two role of light in photosynthesis

(ii) Explain why the dark stage is 1. Anabolic, 2. Affected by temperature 3. described as a reduction reaction

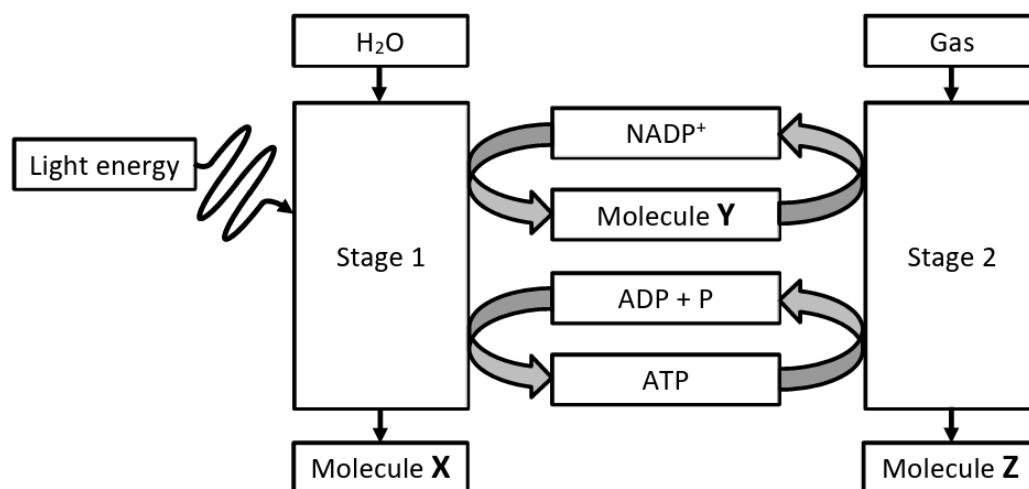
(iii)

Light intensity and carbon dioxide ( $\text{CO}_2$ ) concentration affect the rate of photosynthesis as shown in the graph.  
Explain why the graph levels off at X.



(iv) Name the plant used in the experiment to investigate the effect of light intensity/carbon dioxide concentration on the rate of photosynthesis and provide an explanation was this plant is chosen for the investigation.

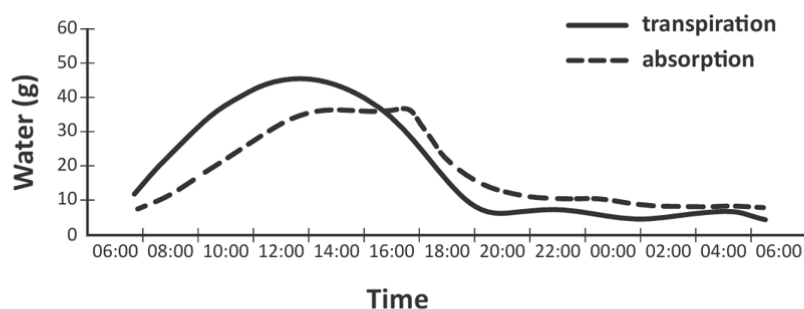
Below is a summary of the events of photosynthesis.



(v) Identify the molecules X,Y and Z in the process of photosynthesis.

(vi) Explain why pathway 1 of the light stage is described as a cyclic process.

(c)



The diagram above shows **two** curves: transpiration rate and water absorption rate in a 24-hour period compared to the rate of water loss/uptake.

- (c)
- Name the process by which water enters the root hairs.
  - In which zone of the root is water absorbed?
  - What tissue transports water up the plant? List **one** of its adaptations to its functions.
  - Explain what happens to both the rate of transpiration **and** water absorption at mid-afternoon (between 12:00 and 16:00).
  - State **one** consequence of an excessive rate of transpiration.
  - How can the plant respond to adverse rates of transpiration?

(vii) An adaptation of a leaf is that the cells in the spongy mesophyll are loosely packed together. State a benefit of this adaptation.

(i) Identify one other adaptation of a leaf.

**Q14.**

**(a)**

- (i) Identify the two parts of the Central Nervous System
- (ii) For either Parkinson's or paralysis; state a cause of the named disorder.

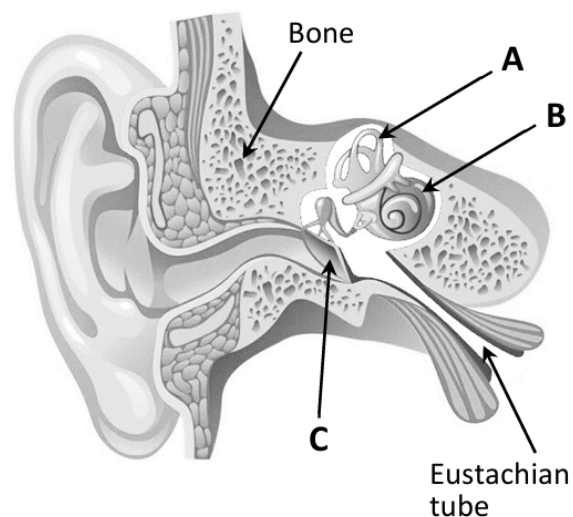
**(b)**

Answer the following questions from your knowledge of the human nervous system.

- (i) The medulla oblongata controls involuntary actions. Name **one** such involuntary action.
- (ii) Name the part of the brain that controls voluntary actions.
- (iii) With regard to the spinal cord:
  - 1. Name the fluid located in the central canal.
  - 2. State the function of this fluid.
  - 3. Indicate in which part of the spinal cord the grey matter is located.
  - 4. Identify the part of a neuron located in the grey matter.
  - 5. Indicate the part of the spinal cord through which motor neurons leave.
- (iv) Name the type of neuron responsible for transmitting impulses from sense organs to the central nervous system.
- (v) What causes the conduction of nerve impulses along neurons?
- (vi) Why do nerve impulses cross the synaptic cleft in one direction only?

The diagram shows the internal structure of the human ear.

- (i) Name the parts labelled **A, B and C**.
- (ii) Give the functions of the parts labelled **A and B**.
- (iii) What is the name of the bone that helps to protect the internal parts of the ear?
- (iv) The function of **C** is to transfer sound vibrations to three small bones.  
What is the collective terms for these three bones?
- (v) The Eustachian tube connects the middle ear to another structure.  
Name this other structure.
- (vi) Name any **two** sense organs, other than the eye and the ear.
- (vii) Name **one** disorder of the eye **or** the ear **and** suggest **one** treatment.





Q15

female  
^

(a) Draw a labelled diagram of the reproductive system.

Indicate on the diagram the location of;

- (i) Meiosis
- (ii) **Fertilisation**
- (iii) **Implantation**

(b) (i) Explain what is meant by the term "Fertilisation".

(ii) Contraception is used to prevent fertilisation and implantation. Identify one type of mechanical (physical) contraception and explain how it works.

(iii) Explain the term "In vitro fertilization"

(iv) What happens to the product of "in vitro fertilisation"?

(c) Answer the following questions from your knowledge of human embryo development.

(i) Identify event A in the diagram above.

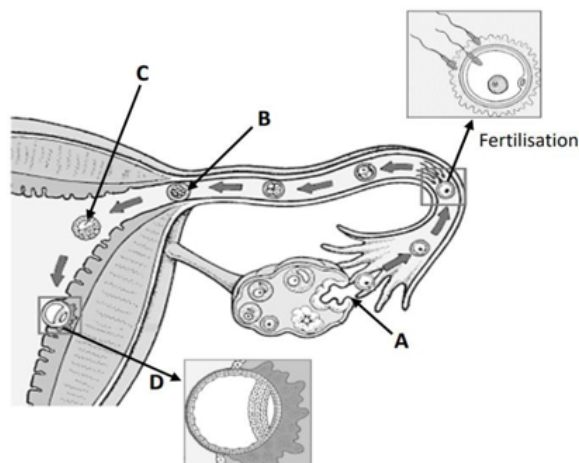
(ii) Name the hormone responsible for event A.

(iii) After fertilisation, the zygote first develops into a morula. The morula then continues to divide forming a blastocyst.

1. Explain the underlined term.

2. Identify the type of cell division that results in the morula forming.

The diagram shows some of the early stages in the development of a human embryo.



(iv) Identify structure C in the diagram above.

(v) The embryo develops from 3 germ layers. Explain the term "germ layer" and name the three germ layers.

(vi) Name a structure that develops from each of the germ layers named in (v).

(vii) Name the **two** tissues from which the placenta develops.

(viii) State two functions of the placenta.

(ix) Name the hormone responsible for the maintenance of the endometrium during pregnancy.

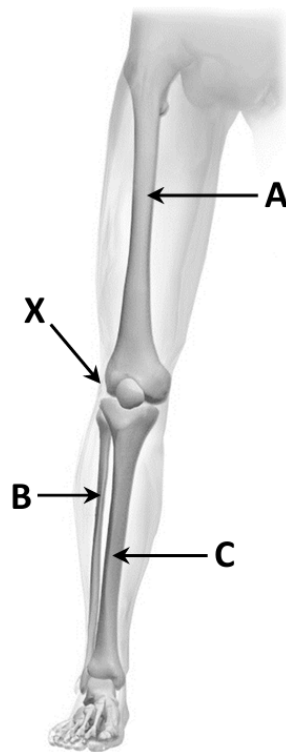
(x) Identify the structure that produces the hormone named in (ix) from week 1- 12 of pregnancy.

**Q16. Answer two parts of (a),(b), (c), (d) .**

**(a)**

- (i) State **two** functions of the skeleton.
- (ii) Name the type of bone cell that lays down new bone.
- (iii) Other than diet, give **two** factors that affect bone renewal.

The diagram shows the bones of a human leg.



- (iv) Name bones **A**, **B** and **C**.
- (v) Synovial joints are one type of joint found in the human body. Identify the type of synovial joint indicated by the letter '**X**'.
- (vi) Name **one** other type of joint found in the human body **and** give its location.
- (vii) Explain the term “antagonistic muscle pair”

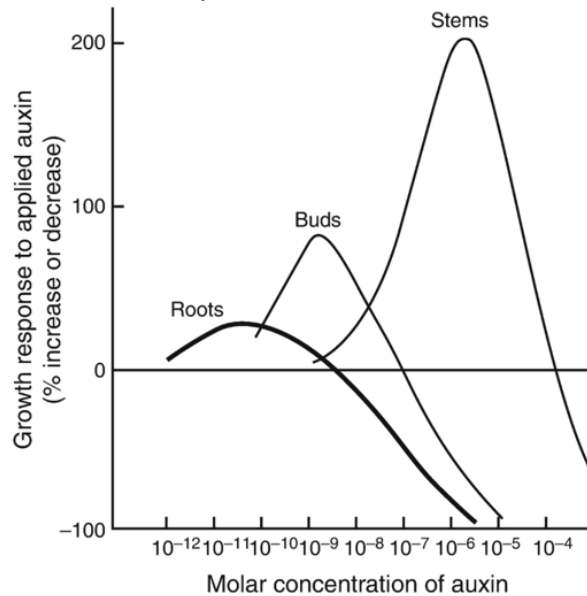
**(b)**

Enzymes play an important role in controlling metabolic reactions in plants and animals.

- (i) Explain the term *metabolism*.
- (ii) What is an enzyme?
- (iii) Name the **organelle** in the cell where enzymes are made.
- (iv) Comment on the molecular shape of enzymes.
- (v)
  - 1. Name **one** factor that causes an enzyme to become denatured.
  - 2. Describe what happens to an enzyme when it becomes denatured.
- (vi) Bioprocessing often involves the use of immobilised enzymes in a bioreactor.
  - 1. What does the term *immobilisation* mean when used in relation to enzymes?
  - 2. What is a *bioreactor*?
  - 3. Give **one** example of the use of immobilised enzymes in bioreactors. In your answer, name the enzyme, the substrate **and** the product.

(c)

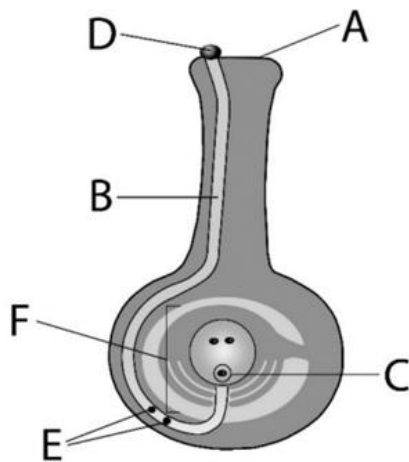
- (i) Name the plant tissue used when investigating the effect of different concentrations of IAA on plant growth.
- (ii) How were different concentrations of IAA achieved in this experiment.
- (iii) Identify the plant tissue that the Auxin growth regulators are produced and one location of this tissue in a plant.
- (iv) How are growth regulators transported around plants
- (v) Below is a graph of the results of the experiment.



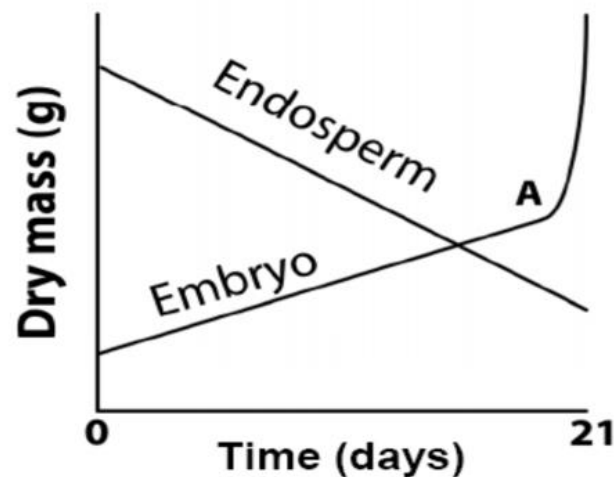
- b. Provide a description for the results obtained with respect to roots and stems.  
Make reference to the results for a control experiment in your answer.
- (vi) Identify the type of cell division involved in growth promotion.
- (vii) Give two commercial uses of **growth inhibitors**

(d)

Below is a diagram of the female reproductive system in a plant during fertilisation.



- Identify the parts labelled A-F.  
Explain the formation of structure E.
- What happens to structure (F) after fertilisation has occurred
- Draw a labelled diagram of a dicot seed including the following labels on the diagram;  
Testa, cotyledon, plumule, radicle
- What is the role of the plumule and radicle
- From which part of the female reproductive system does the seed develop from
- The role of the cotyledon is to provide a source of food for an embryo. Identify another possible source of food for a developing embryo.
- The graph below shows the changing in mass of a seed over time.



Provide an explanation why the mass of the endosperm decreases AND provide an explanation why the mass of the embryo increases over a 21 day period.

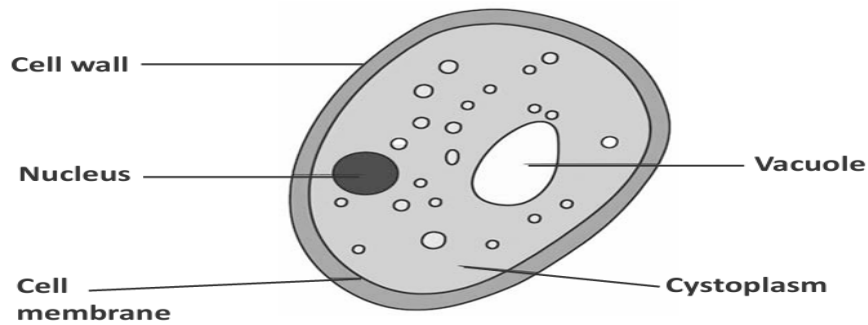
**Q17. Answer two parts of (a), (b), (c) , (d) .**

(a)

- (i) Outline the function of any **one** named feature of the human general defence system.
- (ii) Name **two** organs in the human body that are specific to the immune system.
- (iii) Distinguish clearly between an antigen and an antibody.
- (iv) T cells are a type of lymphocyte, with different sub-types having different roles in our immune system.
  - 1. Describe the specific roles of killer T cells **and** helper T cells in an immune response.
  - 2. Name the T cells that stop the immune response.
- (v) Vaccination against the SARS-CoV-2 (Covid-19) virus has proved very successful, yet further 'booster' vaccinations seem to be required to maintain immunity. However, one vaccination for pneumococcal pneumonia is enough for many years or even for life. Suggest a reason for this difference.

(b)

The diagram shows a yeast cell.



- (i) Name the kingdom to which yeast belongs.
- (ii) State **one** feature visible in the diagram which indicates that yeast is a eukaryotic organism.
- (iii) Name **one** other kingdom that contains eukaryotic organisms.
- (iv) Identify which of the labelled parts contain the structural carbohydrate *chitin*.
- (v) What term is used to describe reproduction in yeast? Name the type of cell division involved in this process.
- (vi) With regard to their mode of nutrition, explain why the members of this kingdom play an important role in the recycling of nutrients in nature.
- (vii) Name any **two** harmful effects of members of this kingdom.

(c)



In an investigation, ten small cylinders of tissue were taken from a potato using a cork borer. The cylinders were divided into two sets of five. The total length and total mass of each set of potato cylinders were measured and recorded.

One set was immersed in distilled water and the other in a concentrated salt solution for 30 minutes. The cylinders were measured again, and the results recorded in the table below.

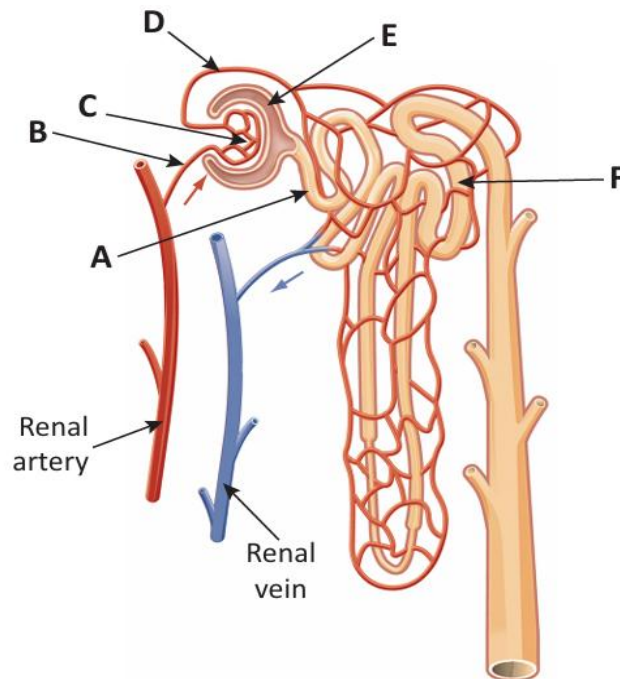
	Distilled water	Salt solution
Before	13.2 g	13.9 g
	29.4 cm	30.3 cm
After	14.1 g	12.8 g
	31.3 cm	29.8 cm

- (i) Give a precise biological explanation of the results for the samples that were placed in distilled water.
- (ii) '*Osmosis* is a special case of *diffusion*'. Discuss the validity of this statement.
- (iii) Using your knowledge of osmosis, explain the application of a high salt **or** high sugar concentration in food preservation.
- (iv) What is meant by the term *active transport*?
- (v) Give **one** example of active transport you have studied in your course.

(d)

- (i) Explain the term *excretion*.
- (ii) Outline the role of the kidneys in homeostasis.

A diagram of the nephron of the kidney and its associated blood supply is shown.



- (iii) Name the parts labelled **A**, **B**, **C**, **D**, **E** and **F**.
- (iv) Excretion in the kidneys involves filtration and reabsorption.  
Explain the underlined terms.
- (v) State the precise location in the nephron where the following processes occur:
  1. Filtration
  2. Reabsorption of glucose.
- (vi) Describe the effect of **each** of the following on the volume and the concentration of urine produced by the kidneys:
  1. A high protein diet
  2. A very low salt diet.