APOLLO

FBISE Biology Class 12
Topical workbook - Volume 2 of 2

122 questions arranged by official framework topic.
National Curriculum 2022-23; supported examinations from 2027.

APOLLO

Urinary system

Domain R: Human Physiology

FBISE model paper | Section B Q1(i) | 3 marks

(i)	Name any two types of urinary tract infections (UTI) based on site. Name any one bacterium involved in UTI. How can we prevent UTI?	1+1+1	

FBISE model paper | Section B Q1(ii) | 3 marks

	How can we prevent UTI?		
(ii)	Following is the diagram of human nephron, identify and write the role of parts X, Y and Z in this diagram? 	1+1+1	C

FBISE model paper | Section B Q2(xi) OR | 3 marks

OR	In which condition is a kidney transplant required? Write two characteristics of matching kidney donors required for successful transplant.	1+2

First Annual 2025 | Section B Q2(ii) | 3 marks

(ii)	Describe the role of kidneys in regulating fluid balance.	**03**

Second Annual 2025 | Section A Q4 | 1 mark

4.	The **nitrogenous** waste excreted by sparrow is:	Ammonia	Uric acid	Urea	Carbon dioxide

Second Annual 2025 | Section A Q5 | 1 mark

5.	Which one of the following structures filters blood at high pressure to form glomerular filtrate?	Loop of Henle	Collecting duct	Proximal convoluted tubule	Renal corpuscle

Second Annual 2025 | Section B Q2(iv) | 3 marks

(iv)	State the principle of peritoneal dialysis. Also write its process.	1+2

First Annual 2026 | Section B Q2(i) | 3 marks

(i)	What is meant by Pyelonephritis?	03

First Annual 2026 | Section B Q2(ii) | 3 marks

(ii)	Enlist any three problems associated with kidney transplant.	1x3

First Annual 2026 | Section B Q2(xi) | 3 marks

(xi)	What is meant by kidney failure? Enlist any four causes of chronic renal failure.	1+2

First Annual 2026 | Section C Q3 | 7 marks

Q.3	Explain the structure of nephron. Make diagram as well.	**4+3**

First Annual 2026 | Section A Q10 | 1 mark

). Glomerular filtration occurs in the:	Collecting duct	Ureter	Loop of Henle	Bowman's capsule

First Annual 2026 | Section B Q2(i) | 3 marks

Make a comparison between functions of Glomerular capillaries and peritubular capillaries. (Three points)	1x3

First Annual 2026 | Section B Q2(xi) OR | 3 marks

OR	Briefly explain the significance of selective re-absorption during urine formation.	03
	Write names and briefly discuss any two species that	1.5

First Annual 2026 | Section C Q6 OR | 6 marks

OR	How ammoniotelic, ureotelic and uricotelic animals mange the excretion of waste materials in there habitat? Elaborate.	2x3

FBISE model paper | Section A Q1(viii) | 1 mark

(viii)	If you took a drug that inhibited the reabsorption of Na^+ in the loop of Henle, you would:	have an increased urine output	have a decreased urine output	have glucose in urine	have access of Na+ in blood

First Annual 2026 | Section C Q6 OR | 3 marks

OR	Describe the counter current Multiplier mechanism with the help of diagram.	3

FBISE model paper | Section A Q2 | 1 mark

2. Antidiuretic hormone promotes the retention of water by stimulating the:

A. Active transport of water ◯
B. Active transport of chloride ◯
C. Active transport of sodium ◯
D. Permeability of collecting duct to water ◯

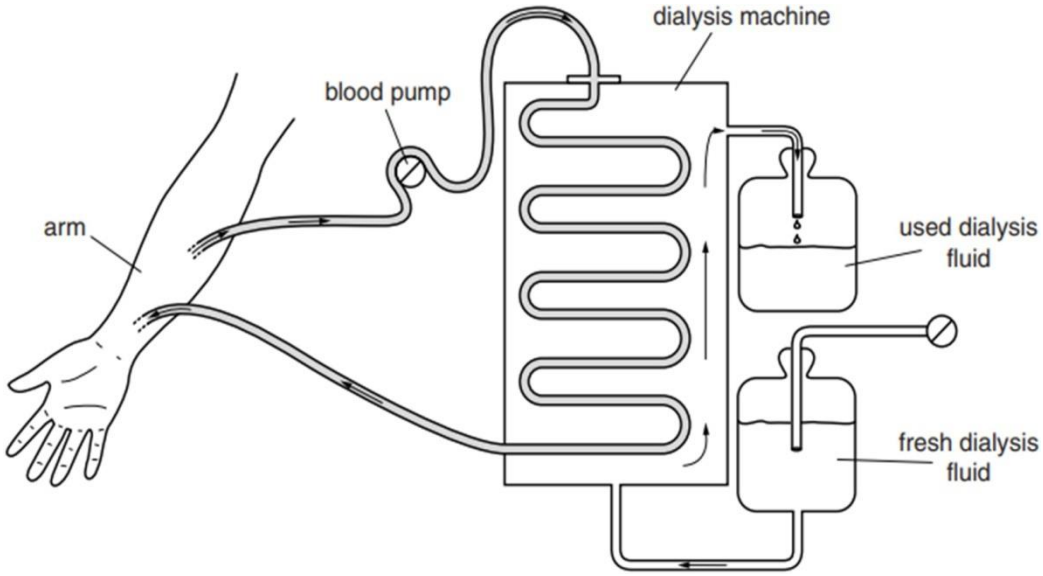
FBISE model paper | Section A Q3 | 1 mark

3. Vasa recta is the cluster of capillaries present in the nephron of human beings. It is derived from "X" and surrounds "Y", where "X" are arterioles and "Y" are tubelike structures. Which one of the following correctly identifies "X" and "Y"?

	X	Y	
A	Efferent arterioles	Proximal convoluted tubule	◯
B	Afferent arterioles	Proximal convoluted tubule	◯
C	Efferent arterioles	Loop of Henle	◯
D	Afferent arterioles	Loop of Henle	◯

How concentration of urine is regulated by counter current multiplier? (03)

xiv. After kidney failure, dialysis is performed. The given figure shows how blood, fresh and used dialysis fluid move through a dialysis machine. The composition of the dialysis fluid changes as it passes through the dialysis machine.



a. Redraw and complete the table using words "low", "high", "same" or "none" to show how concentration of each substance changes in the dialysis fluid and blood. (2)

	Concentration of substance in			
Substance	Blood before Dialysis	Fresh dialysis fluid	Used Dialysis fluid	Blood After Dialysis
Glucose	Low			
Salts	High			
Urea	High			
Toxin	High			

FBISE model paper | Section B Q2(xiii) OR | 3 marks

Explain that concentration of urine is regulated by counter current and hormonal mechanisms.

FBISE model paper | Section B Q2(xv) | 3 marks

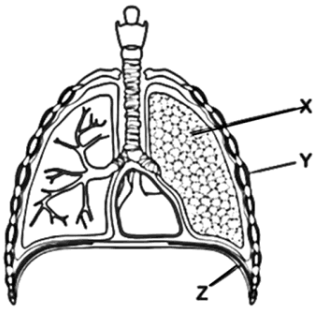
xv. Explain in detail the mechanism and problems related to dialysis.

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Digestive system

Domain R: Human Physiology

Q1. Fill the relevant bubble against each question. Each part carries one mark.

<table>
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Which structures contain muscles that contract during inspiration?</td><td>X only</td><td>X and Y only</td><td>Y and Z only</td><td>X, Y and Z</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
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FBISE model paper | Section B Q1(iii) OR | 3 marks

OR	Name the sites of production, storage and action of bile juice. Give the role of bile juice in digestion?	1.5+1.5

FBISE model paper | Section C Q5 | 6 marks

Q. 5	Describe and sketch the internal structure of the **stomach** and relate each component with the **mechanical** and **chemical digestion** in the stomach.	3+2+1

First Annual 2026 | Section B Q2(iii) | 3 marks

(iii)	Which component of bile helps in digestion? And how? Explain briefly.	1+2	OR	What changes occur in sarcomere during contraction?	03

First Annual 2026 | Section C Q5 OR | 7 marks

OR	Explain the sequence of events that take place during swallowing and peristalsis of food.	07

First Annual 2026 | Section A Q7 | 1 mark

transports.	2 K⁺ in	in and out	2 K⁺ out	3 K⁺ out
Which enzyme is primarily responsible for protein digestion in the small intestine?	Lipase	Maltase	Amylase	Trypsin
			Greater	

First Annual 2026 | Section B Q2(viii) OR | 3 marks

	in regulating the blood pressure.	
OR	How are fats absorbed in small intestine?	03

First Annual 2026 | Section B Q2(xii) | 3 marks

(xii)	State any three roles of liver.	1x3	OR

	endocrine gland.			taking the example of production of insulin.	
Q.5	**a.** Draw labelled diagram of human stomach. **b.** Explain chemical digestion process in human stomach.	**3+4**	**OR**	**a.** Describe the role of B-cells in antibody-mediated immunity. **b.** Draw the structural model of an antibody molecule.	**4+3**

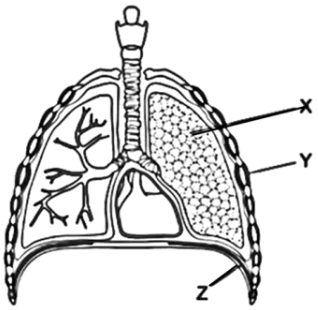
Give the names of substrates and products of the following enzymes: a) Amylopsin, b) Trypsin c) Enterokinase. (1+1+1)	1+1+1

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Blood circulatory system

Domain R: Human Physiology

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<tr><td>(vi)</td><td>Antiretroviral drugs differ from general antivirals as they:</td><td>only treat bacterial infections</td><td>specifically target retroviruses like HIV</td><td>cure all viral infections permanently</td><td>work only against influenza viruses</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(vii)</td><td>Which of the following events occur during ventricular systole?</td><td>Contraction of atria</td><td>Relaxation of ventricles</td><td>Opening of AV valves</td><td>Closing of AV valves</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
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FBISE model paper | Section B Q1(iv) OR | 3 marks

1.5+1.5	OR	What is represented by P wave, QRS complex and T wave in following graph.	1+1+1

FBISE model paper | Section B Q1(vii) OR | 3 marks

OR	What is pericardium? State its structural composition.	1+2

	antibodies.	
OR	What is pacemaker? Give application of artificial pacemaker. Explain how **SA node, AV node** and **Purkinje fibers** are important in coordinating different phases of heartbeat.	1+1+4

First Annual 2026 | Section B Q2(iv) OR | 3 marks

1+2	OR	a. How can ECG help in detecting heart abnormalities? b. State any two conditions that can be diagnosed using ECG.	1+2
		Identify and briefly	

First Annual 2026 | Section B Q2(vii) OR | 3 marks

	membrane?	
OR	a. What is meant by Double-Walled sac in context of pericardium? b. State any two functions of pericardium.	1+2
	Why does stomach produce HCl and mucin?	1.5

First Annual 2026 | Section C Q5 | 7 marks

Q.5	Discuss the path of blood through pulmonary and systemic circulation. Draw diagram as well.	**4+3**

First Annual 2026 | Section A Q9 | 1 mark

9.	Blood enters the right atrium from the body through the:	Vena cava	Pulmonary artery	Pulmonary vein	Aorta

First Annual 2026 | Section B Q2(iv) OR | 3 marks

OR	Compare arteries and veins. (any three points)

First Annual 2026 | Section B Q2(vii) OR | 3 marks

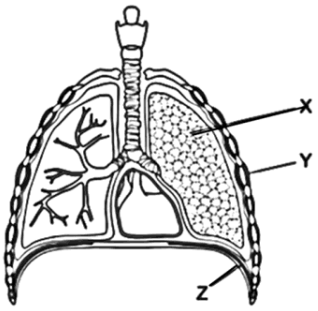
OR	State the role of baroreceptors and volume receptors in regulating the blood pressure.

APOLLO

Skeletal system

Domain R: Human Physiology

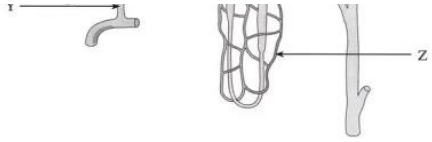
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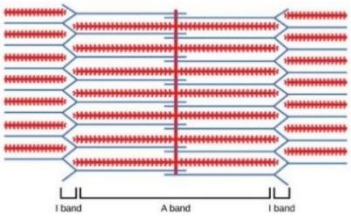
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(xiii)	The feature which describes **tropomyosin** is/are: I. globular protein II. thin thread-like structure III. wound around actin filament	I only	III only	II and III	I and III

FBISE model paper | Section B Q1(iii) | 3 marks



(iii)	Identify the phenomenon shown in the following diagram:  What changes occur in I-band, A-band, H-zone, and sarcomere length?	1+2

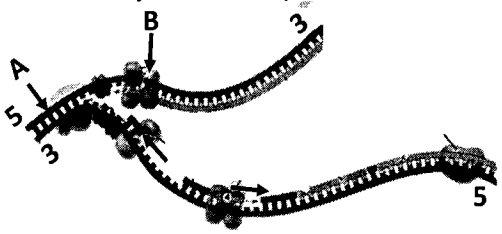
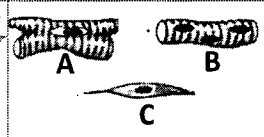
FBISE model paper | Section B Q1(vii) | 3 marks

(vii)	a) What are the main components of an intervertebral disc?	1+2

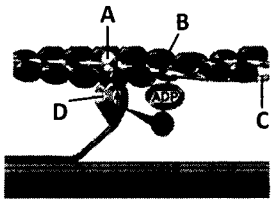
(vii)	a) What are the main components of an intervertebral disc? b) Give two causes of disc slip or herniation of disc.	1+2

OR	Describe the steps of **bone fracture repair** with diagrams.	4.5+1.5

arks 26)

Describe the mechanisms involved in the transport of carbon dioxide from the tissues to lungs in human blood. Also name the process. Explain what would happen if no carbonic anhydrase is present in red blood cells?	**4+2**
What are ecological pyramids? Draw and explain pyramids of energy, Biomass and number.	**1+6**
Describe the events of the process of DNA replication. Interpret how DNA conserve one strands during this process? Identify the labelled parts **A** and **B**. 	**5+1+1**
The given figure shows three types of muscles for movement in animals. Identify and compare the properties of these muscles. 	**2+2+2**

First Annual 2025 | Section C Q4 | 7 marks

Identify the labelled parts from A – D. How cross bridges are formed during muscle contraction? Explain.		2+5
Explain the mechanism of transcription. Why the length of transcribed mRNA shortens as it enters the cytoplasm for translation?		5+2

Second Annual 2025 | Section A Q6 | 1 mark

The bone dissolving cells are:	Chondrocytes	Osteocytes	Osteoblasts	Osteoclasts

Second Annual 2025 | Section A Q7 | 1 mark

7.	The immobility and fusion of vertebral joints is called:	Spondylosis	Arthritis	Sciatica	Sprain

Second Annual 2025 | Section B Q2(v) OR | 3 marks

	Differentiate between skeletal and cardiac muscles. (Any three differences)	
OR		03

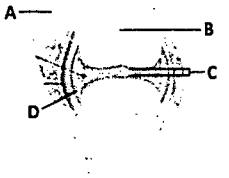
Second Annual 2025 | Section B Q2(vi) | 3 marks

(vi)	Briefly describe three types of joints with one example of each.	1x3	OR	Elaborate the role of any three neurotransmitters.

First Annual 2026 | Section B Q2(iii) OR | 3 marks

OR	What changes occur in sarcomere during contraction?	03

First Annual 2026 | Section B Q2(v) | 3 marks

(v)	Identify the joint shown in diagram. Also label its parts A, B, C and D.		1+2

First Annual 2026 | Section B Q2(vii) | 3 marks

(vii)	Compare arthritis and osteoporosis.	03

First Annual 2026 | Section C Q3 OR | 7 marks

OR	How sliding and filament model explain muscle control action? Support your answer with suitable diagram.	5+2

First Annual 2026 | Section A Q5 | 1 mark

cold conditions?	tion			
In the sliding filament model, muscle contraction occurs due to:	Breaking of filaments	Sliding of actin over myosin	Shortening of myosin filaments	Fusion of filaments
The sodium potassium pump actively	3 Na^+ out and	Equal Na^+, K^+	3 Na^+ in and	2 Na^+ in an

First Annual 2026 | Section A Q15 | 1 mark

15. In given diagram part iii shows:		A band	H zone	I Band	Sarcomere	○ ○ ○ ○
					Have an	

First Annual 2026 | Section B Q2(iii) | 3 marks

(iii)	a. Describe the role of calcium ions in muscle contraction. b. What happens to sarcomere during contraction?	1.5 + 1.5

First Annual 2026 | Section B Q2(v) OR | 3 marks

OR	What is sprain? Enlist its symptoms. How it can be managed?

First Annual 2026 | Section B Q2(vii) | 3 marks

(vii)	Briefly describe osteoporosis. Mention its causes and symptoms.	1x3	OR	State the role of baroreceptors and volume receptors in regulating the blood pressure.	03

FBISE model paper | Section B Q1(v) OR | 3 marks

a) How are Ca^{++} released into the muscle cell?	1+1+1

a) How are Ca^{++} released into the muscle cell? b) From where is Ca^{++} released at the time of muscle contraction?	1+1+1

a) How are Ca^{++} released into the muscle cell? b) From where is Ca^{++} released at the time of muscle contraction? c) How do Ca^{++} play the role in skeletal muscle contraction?	1+1+1

FBISE model paper | Section B Q2(vii) | 3 marks

(vii)	a) What are the main components of an intervertebral disc? b) Give two causes of disc slip or herniation of disc.	1+2

First Annual 2026 | Section B Q2(iii) | 3 marks

Name three types of arthritis and one cause of each.	1x3

First Annual 2026 | Section C Q6 | 7 marks

	crosses of drosophila.	
Q.6	Explain sliding filament model of muscle contraction. Draw a labelled diagram of muscle cell.	5+2

FBISE model paper | Section A Q13 | 1 mark

13. I. Globular proteins
II. Thin thread-like structures
III. Wound around actin filaments
The feature(s) which describes tropomyosin is/are:

A. I only ◯ B. III only ◯
C. II and III ◯ D. I and III ◯

FBISE model paper | Section B Q2(i) OR | 3 marks

OR

Name cranial and facial bones with paired and unpaired classification. (1.5+1.5)

FBISE model paper | Section B Q2(ii) OR | 3 marks

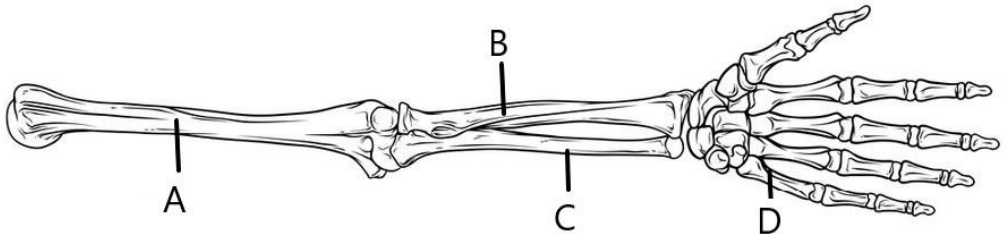
OR

Briefly explain the structure of intervertebral disc. (3)

Q.3 Describe and sketch sliding filament model of a skeletal muscle fibre. (4+2)

OR

Q2. (i) Identify labelled bones from following diagram. (2)



A:_____ B:_____

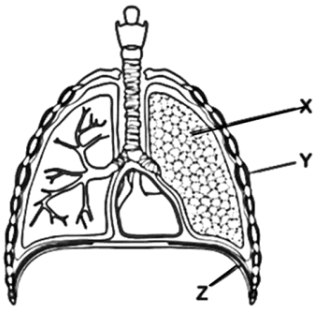
C:_____ D:_____

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Thermoregulation, homeostasis

Domain R: Human Physiology

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<tr><td>C</td><td>×</td><td>√</td><td>×</td></tr>
<tr><td>D</td><td>×</td><td>×</td><td>√</td></tr>
</table></td><td colspan="4"></td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
</table>

OR	Enlist osmoregulatory problems faced by freshwater, marine and terrestrial animals. Give at least one problem from each group.	1+1+1

FBISE model paper | Section B Q2(x) | 3 marks

(x)	State any two thermoregulatory strategies in man for heat gain in cold stress.	1.5+1.5	OR

First Annual 2025 | Section B Q2(i) | 3 marks

(i)	Describe briefly the adaptation of the human body to extreme temperature.	03

First Annual 2025 | Section B Q2(ii) | 3 marks

(ii)	Explain briefly the mechanism of water and electrolyte balance in the human body.	03

First Annual 2025 | Section B Q2(i) | 3 marks

(i)	Briefly explain the concept of set point and its significance in homeostasis.	03	OR	Describe the significance.

Second Annual 2025 | Section B Q2(i) OR | 3 marks

OR	Briefly narrate the osmoregulatory adaptations which help freshwater animals to live in their habitat successfully.	1x3

First Annual 2026 | Section B Q2(ix) OR | 3 marks

1.5 + 1.5	OR	State three challenges faced by marine osmoregulators.	1x3

First Annual 2026 | Section B Q2(xiv) | 3 marks

	b. Structural Homology				
(xiv)	Briefly explain the role of 'receptors' and 'control center' in homeostatic mechanism.	1.5 + 1.5	OR	Briefly discuss the clinical development in process of drug development.	03

First Annual 2026 | Section C Q6 OR | 6 marks

OR	Explain physical responses (Vasodilation and Sweating) of human body to hot conditions. Also make a simple sketch.	4+2

First Annual 2026 | Section A Q4 | 1 mark

Which process helps to conserve heat in cold conditions?	Vasoconstric-tion	Evaporation	Sweating	Vasodilation

First Annual 2026 | Section B Q2(ix) OR | 3 marks

Compare ectotherms and endotherms. Give one example of each.	03

First Annual 2026 | Section B Q2(xiv) | 3 marks

(xiv)	Briefly describe two mechanisms used by the human body to lose heat.	1.5 + 1.5	OR

First Annual 2026 | Section C Q3 OR | 7 marks

3+4	OR	How the negative feedback loop help body in regulating homeostasis? Explain with a suitable example.	07

First Annual 2026 | Section B Q2(xiii) OR | 3 marks

	conventional energy resources?			
(xiii)	Taq polymerase and thermocycler are necessary for PCR. Why?	03	OR	A 30 year old athlete is competing in a marathon in extreme heat. What thermoregulatory strategies can he use to prevent heat stroke?
				What are holandric traits? What is their pattern of

i. What are osmo regulators? How do they adapt in fresh water? Give example.
(1+1.5+0.5)

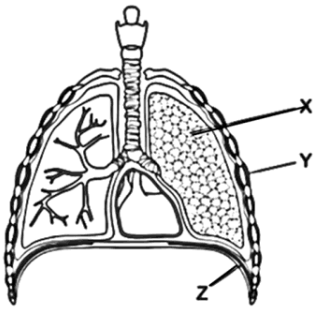
OR

APOLLO

Pharmacological drugs

Domain T: Pharmacological drugs

Q1. Fill the relevant bubble against each question. Each part carries one mark.

<table>
<tr><th>S #</th><th>Question</th><th>(A)</th><th>(B)</th><th>(C)</th><th>(D)</th><th>(A)</th><th>(B)</th><th>(C)</th><th>(D)</th></tr>
<tr><td>(i)</td><td>The diagram below represents the human respiratory system.
 

Which structures contain muscles that contract during inspiration?</td><td>X only</td><td>X and Y only</td><td>Y and Z only</td><td>X, Y and Z</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(ii)</td><td colspan="5">When the outer temperature is higher than body temperature, which of the following adaptations is most likely to occur?
<table>
<tr><th></th><th>Constriction of blood vessels in skin</th><th>Shivering</th><th>Sweating</th></tr>
<tr><td>A</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>B</td><td>√</td><td>×</td><td>×</td></tr>
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</table></td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(iii)</td><td>Which of the following is associated with muscle relaxation?</td><td>Z-line move apart</td><td>I band become shorten</td><td>H-zone disappeared</td><td>Length of sarcomere is reduced</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(iv)</td><td>Maintaining a resting membrane potential across the membrane requires energy from ATP. In which of the events ATPs are hydrolyzed?</td><td>Movement of Na^+ ions into the neuron</td><td>Movement of Na^+ ions out of the neuron</td><td>Movement of K^+ ions out of the neuron</td><td>Movement of Cl^- ions into the neuron</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(v)</td><td>In small intestines, the dipeptides are converted to amino acids by the enzyme:</td><td>Aminopeptidase</td><td>Erypsin</td><td>Trypsin</td><td>Enterokinase</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(vi)</td><td>Antiretroviral drugs differ from general antivirals as they:</td><td>only treat bacterial infections</td><td>specifically target retroviruses like HIV</td><td>cure all viral infections permanently</td><td>work only against influenza viruses</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
</table>

FBISE model paper | Section B Q1(v) | 3 marks

(v)	Enlist three applications of monoclonal antibodies compared to other drug classes.	1+1+1

FBISE model paper | Section B Q1(v) OR | 3 marks

OR	What are interferons? How do they inhibit viruses from infecting cells?	1+2

FBISE model paper | Section B Q2(x) OR | 3 marks

		Give at least one problem from each group.	
1.5+1.5	OR	Write three steps of drug discovery.	1+1+1

First Annual 2026 | Section B Q2(xiv) OR | 3 marks

1.5 + 1.5	OR	Briefly discuss the clinical development in process of drug development.

ON ... Q (Marks 26)

First Annual 2026 | Section A Q8 | 1 mark

protein digestion in the small intestine?				
Main advantage of using monoclonal antibodies is:	Target multiple antigens	Low cost of production	Greater specificity and consistency	Longer shelf life
Blood enters the right atrium from the body		Pulmonary	Pulmonary	

First Annual 2026 | Section B Q2(v) | 3 marks

(v)	What are monoclonal antibodies? State two advantages of monoclonal antibody over conventional drugs.	03	OR	What is sprain? Enlist its symptoms. How it can be managed?	1x3

First Annual 2026 | Section B Q2(xiv) OR | 3 marks

1.5 + 1.5	OR	Briefly explain the working of antivirals and antiretrovirals.	1.5 + 1.5

APOLLO

Climate change

Domain U: Climate Change

FBISE model paper | Section A Q1(xi) | 1 mark

(xi)	Which oceanic region is more susceptible to ocean acidification?	Equatorial regions	Arctic and Southern Oceans	Subtropical regions	Mediterranean Sea

FBISE model paper | Section B Q2(xii) OR | 3 marks

OR	List three ways by which climate change impacts ocean temperature.	1+1+1

FBISE model paper | Section C Q3 | 6 marks

Q. 3	Describe how **climate changes** impacts fauna (animals)	6

First Annual 2025 | Section B Q2(xiv) | 3 marks

(xiv)	Explain briefly the concept of ozone depletion and its significance.	**03**	**OR**	What is the role of diaphragm in respiration?	**03**

First Annual 2025 | Section B Q2(xi) OR | 3 marks

OR	What are the three main causes and effects of climate change?	**03**

Second Annual 2025 | Section A Q17 | 1 mark

The compound(s) mainly responsible for depletion of the ozone layer is/are:	Nitrous oxide	Chlorofluorocarbons (CFCs)	Carbon dioxide	Methane

Second Annual 2025 | Section B Q2(xi) OR | 3 marks

OR	What are greenhouse gases? Briefly explain their effect on global warming.	**1+2**

First Annual 2026 | Section B Q2(x) | 3 marks

(x)	State any three harmful effects of climate change on ocean biology.	1x3
(xi)	What is meant by kidney failure? Enlist any four causes	

First Annual 2026 | Section B Q2(xii) OR | 3 marks

	bacteria.	
OR	Write names and briefly discuss any two species that have gone extinct.	1.5 + 1.5
	Give a brief comparison of MRI and CT scan	

First Annual 2026 | Section A Q13 | 1 mark

	technique.	degradation	hybridization	sequencing	amplification
13.	An increase in ocean temperature mainly leads to:	Coral bleaching	Reduced sunlight	Increased salinity	Decreased evaporation
		Observing	Designing		

First Annual 2026 | Section B Q2(x) OR | 3 marks

	example of each.	
OR	Highlight any three harmful effects of ocean acidification.	1x3

First Annual 2026 | Section C Q3 | 7 marks

Discuss any three impacts of climate change on plants. How are animals affected by climate change? (Four points)	3+4	OR	How the negative feedback loop help body in regulating homeostasis? Explain with a suitable example.	07
describe the location and function of pancreas as an			Elaborate the steps of recombinant biotechnology	

FBISE model paper | Section B Q2(x) OR | 3 marks

Enlist any three natural factors causing climate change. Give the effect of anyone on climate change.	1.5+1.5

FBISE model paper | Section C Q3 | 7 marks

Q. 3	Describe how **climate change** impacts fauna (animals)	7

First Annual 2026 | Section B Q2(iii) OR | 3 marks

OR	Outline any three long term effects of global warming.	1x

APOLLO

Selected topics

Domain V: Selected Topics

FBISE model paper | Section A Q1(xii) | 1 mark

(xii)	Biological computers primarily differ from traditional electronic computers as they:	use microchips, while electronic computers use proteins.	use biological components like cells and proteins instead of electronic circuits.	do not process information, while electronic computers do	require electricity, whereas electronic computers do not

FBISE model paper | Section B Q2(xii) | 3 marks

(xii)	Write any three possible applications of biological computers.	1+1+1

First Annual 2025 | Section C Q5 | 7 marks

Explain the mechanism of transcription. Why the length of transcribed mRNA shortens as it enters the cytoplasm for translation?	5+2
Describe innate behaviour. Explain with examples taxis	

First Annual 2026 | Section B Q2(xii) | 3 marks

(xii)	Briefly explain any two applications of synthetic biology.	1.5 + 1.5
(xiii)	Briefly explain the following and give one example of	

First Annual 2026 | Section A Q14 | 1 mark

leads to:	bleaching	sunlight	salinity	evaporation
4. Synthetic biology primarily involves:	Observing natural ecosystems only	Designing new biological systems	Study of fossils	Classifying organisms

First Annual 2026 | Section B Q2(iii) OR | 3 marks

1.5 + 1.5	OR	a. How does synthetic biology differ from traditional genetic engineering? b. Briefly state any one application of synthetic biology.	2+1
		Compare arteries and veins. (any three points)	

APOLLO

Experimentation Skills

Domain X: Experimentation Skills

Q.1 Figure 1.1 shows the setup of an experiment in which activity of catalase enzyme is being studied.

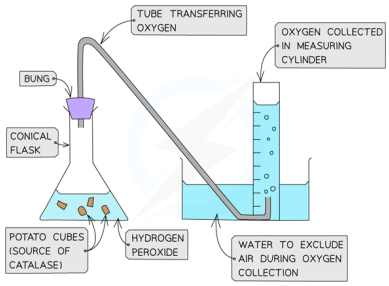


Fig: 1.1

a) If the effect of substrate concentration is to be investigated, what would be the independent variable and dependent variable in this activity: [2]

being studied.

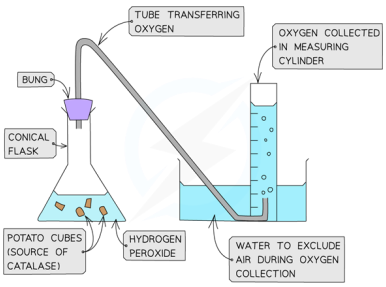


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b) If the conditions for the above experiment are kept constant and the amount of oxygen collected in the cylinder is 10ml at 5 minutes. Predict the amount of oxygen at 15 minutes: [1]

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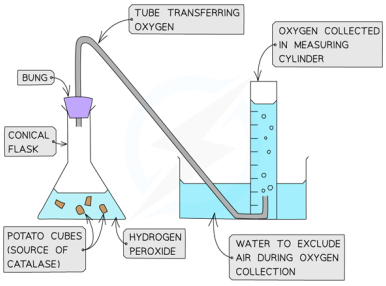


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c) In the above experiment 1 molar solution of hydrogen peroxide is taken in the flask, how the solution of this concentration is prepared. Show your calculation: [2]

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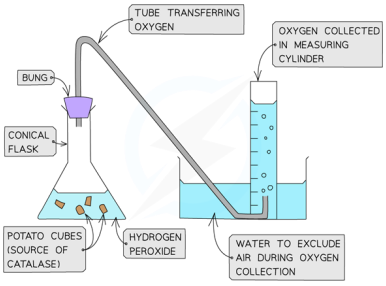


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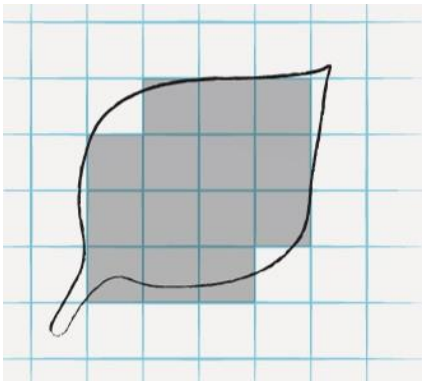
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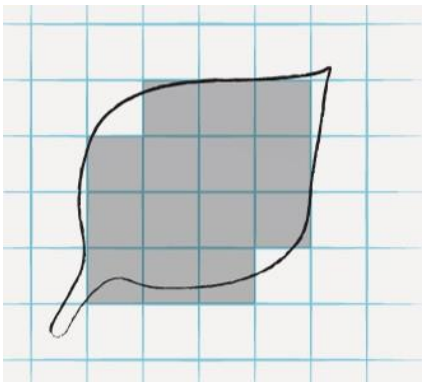
c) In the above experiment 1 molar solution of hydrogen peroxide is taken in the flask, how the solution of this concentration is prepared. Show your calculation: [2]

d) Which apparatus can be used to maintain the temperature in the above experiment: [1]

Q4. Leaf surface area is calculated by placing it on a graph paper as shown below:



1 square = 1 cm^2

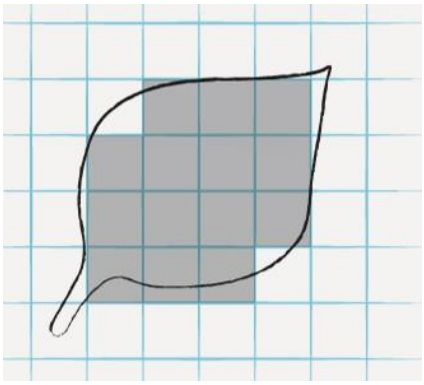


1 square = 1 cm^2

a) Calculate the surface area of the given leaf with all steps. [2]

b) How leaf surface area affect the rate of transpiration in plants? [1]

c) Describe how the graph-paper method can be used to estimate the surface area of an irregularly shaped leaf. [2]



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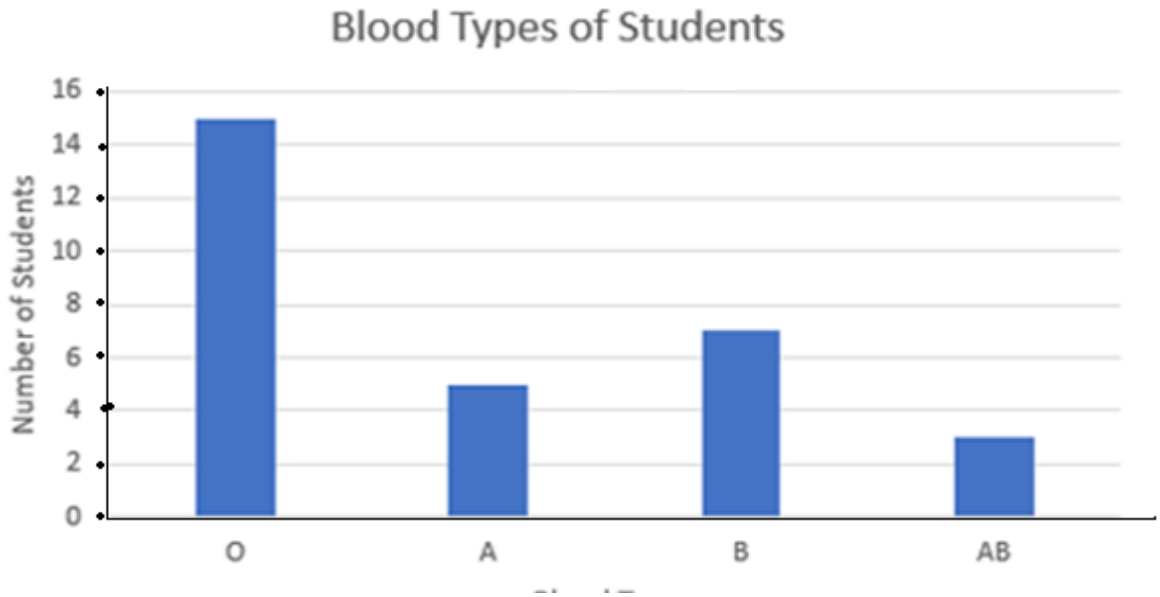
d) A student counts only the complete squares inside the outline of the leaf and ignores all incomplete squares. Explain how this would affect the estimated area. [1]

FBISE PBA model | Section B Q7 | 2 marks

b) Explain how to prepare temporary slides of plant cells of leaf epidermis to observe under light microscope. [2]

FBISE PBA model | Section A Q1(iii) | 2 marks

Q1. A group of students performed ABO blood group testing in biology lab. After getting results, the data was plotted into following graph.



iii. Write the numbers of students having each blood type according to this graph. (2)

_____

_____

Figure 1.1 shows the setup of an experiment in which activity of catalase enzyme is being studied.

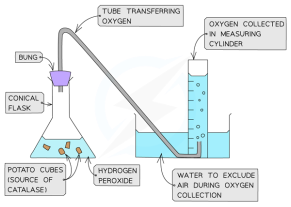


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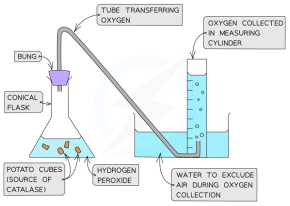


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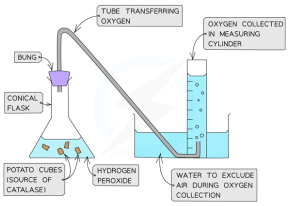


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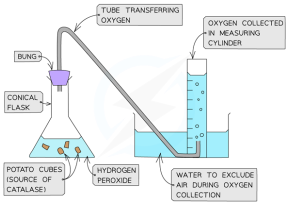


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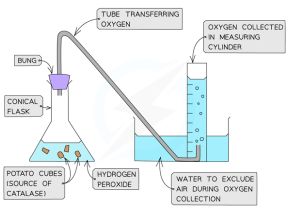


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Q.2 The antibiotic sensitivity test, also known as the Kirby-Bauer test, is a widely used laboratory method for determining the effectiveness of antibiotics against specific bacterial strains. Table 2.1 below presents the diameters of the zones of inhibition for

a) Analyze the data given in table 2.1 and pinpoint the anomalous reading: [1]