

Pure Biology CAQ

Commonly Asked Questions for each topic.

Note : Certain concepts below may no longer be in the syllabus .

Chapter 1: Cell Structure and Organization

Q: Describe how proteins made in the cell are released to the outside of the cell. [3]

- Proteins synthesised by ribosomes on the rough endoplasmic reticulum pinch off in vesicles and are sent to the Golgi body
- Here, they are chemically modified, sorted, stored and packaged into vesicles that pinch off from the Golgi body
- The secretory vesicles move to and fuse with the cell membrane to release the proteins outside the cell

Q: Suggest why muscle cells have many mitochondria [2]

- Muscle cells require a lot of energy to contract
- Mitochondria releases energy through aerobic respiration

Q: Describe and explain how red blood cells are adapted for their function [4]

Adaptation	Function
Contains haemoglobin	Allows it to bind to oxygen to be transported throughout the body
Circular, biconcave shape	Increases surface area to volume ratio allowing faster rate of diffusion of oxygen
No nucleus	Allows it to store more haemoglobin
Flexible	Allows it to squeeze through narrow capillaries

Q: Describe and explain how root hair cells are adapted for their function [2]

- Root hair cells have a long and narrow extension. This increases surface area to volume ratio for faster absorption of water and mineral salts.
- Maintains a lower water potential in the vacuole. This allows water to enter the root hair cell via osmosis.

Chapter 2: Movement of Substances

Q: Define the term *diffusion*.

Net movement of particles from a region of higher concentration to a region of lower concentration down a concentration gradient

Q: Define the term *osmosis*.

Net movement of water molecules from a region of higher water potential to a region of lower water potential down a water potential gradient, through a partially permeable membrane

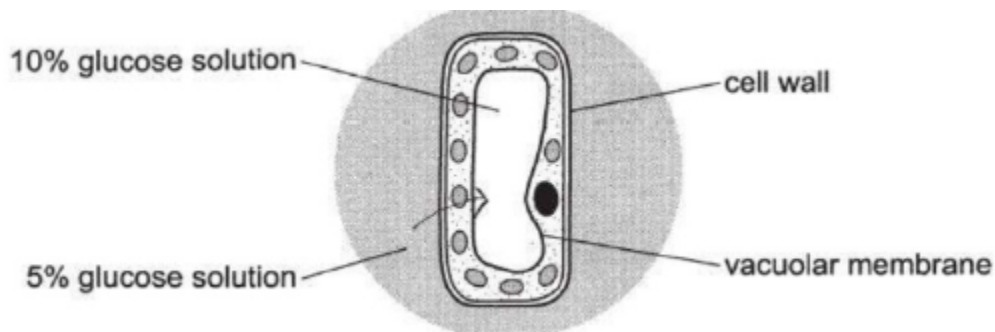
Q: A 5.0 cm potato strip was placed in distilled water. After 20 minutes, the potato strip measured 5.5 cm. Describe and explain the process which caused the change in length of the potato strip.

**Remember: C.M.M.O.O (Cow MMOO)*

1. Compare: The distilled water has a higher water potential than the potato cell
2. Movement: There is net movement of water molecules from water to the potato cell
3. Membrane: past a partially permeable membrane
4. Osmosis: via osmosis
5. Outcome: This caused the potato strip to increase in length by 0.5 cm

Q: The diagram shows a plant cell in a 5% glucose solution.

The concentration of the solution in the vacuole is equivalent to a 10% glucose solution.



Which row states where osmosis occurs and the direction of water movement?

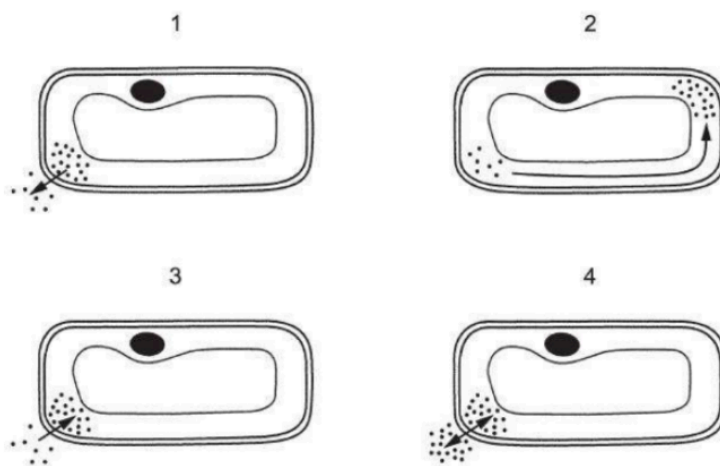
	where osmosis occurs	direction of water movement
A	cell wall	into the cell
B	cell wall	out of the cell
C	vacuolar membrane	into the cell
D	vacuolar membrane	out of the cell

Ans: C

Q: Define the term *active transport*.

Process by which energy is used to move particles of a substance across a partially permeable membrane from a region of lower concentration to a region of higher concentration, against a concentration gradient

Q: Which diagrams show where active transport is taking place?



- A) 1 and 2
- B) 2 and 3
- C) 2 and 4
- D) 3 only

Ans: D

Chapter 3: Biological Molecules

Q: Some tests were done on a sample that contains one or more unknown nutrients.

Test	Colour at start	Colour at end
Benedict's test	blue	blue
Biuret test	blue	blue
Iodine solution test	brown	blue-black
Ethanol emulsion test	clear	cloudy white

Which nutrients are present in the solution?

- A) protein, reducing sugar and starch
- B) protein and starch only
- C) reducing sugar and fats only
- D) starch and fats only

Ans: D

Q: Describe the functions of the following nutrients in living organisms.

carbohydrates	• Source of immediate energy • Form supporting structures such as cellulose cell walls in plants • Form nucleic acids, such as DNA
proteins	• Synthesise new cytoplasm, for growth and repair of worn-out cells • Synthesise enzymes • Synthesise hormones • Synthesise antibodies
fats	• Long-term energy storage • Insulation to prevent excessive heat loss

	• Solvent for fat-soluble vitamins • Used to form cell membranes
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Q: Describe the steps to test for the following nutrients. You should include both positive and negative observations in your answers.

1. reducing sugar [4]

- Add 2cm³ of food sample into test tube and add 2cm³ (equal volume) of Benedict's solution to the food sample
- Shake the mixture and place test-tube in boiling water bath for 2-3 minutes
- If reducing sugar is present: brick-red precipitate (large amount), orange precipitate (moderate amount), green precipitate (trace amount)
- If reducing sugar is absent: solution remains blue

2. protein [4]

- Add 2cm³ of food sample to test tube and add 2cm³ (equal volume) of biuret solution
- Shake well and allow the mixture to stand for 5 minutes
- If protein is present: solution turns purple
- If protein is absent: solution remains blue

3. fats [4]

- Add 2cm³ of ethanol to food sample in a test tube and shake the mixture well
- Add 2cm³ (equal volume) of water to the sample and shake the mixture
- If fats are present: white emulsion produced
- If fats are absent: solution remains clear

Chapter 4: Enzymes

Q: Define the term enzyme.

- Enzymes are proteins that act as biological catalysts
- That speed up chemical reactions
- They remain chemically unchanged at the end of the reaction

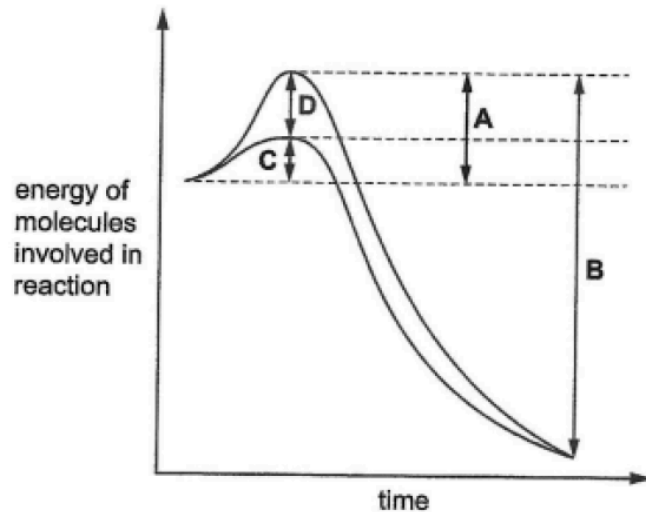
Q: Define the term *activation energy*.

- The amount of energy needed to start a chemical reaction

Q: Which arrow represents the total activation energy of the reaction without the enzyme?

Ans: A

(with enzyme: C)



Q: Using the lock and key hypothesis, explain the mode of action of an enzyme. [7]

- Substrate, the 'key', is complementary to the active site of an enzyme, the 'lock'
- Enzyme active site has a specific three-dimensional shape
- A specific substrate binds to the enzyme's active site
- Enzyme-substrate complex is formed
- Enzyme catalyses the reaction
- After the reaction, products leave the active site
- Enzyme remains chemically unchanged

Q: Explain how changes in temperature affects the rate of an enzyme-catalysed reaction. [7]

- At low temperatures, enzyme is inactive
- As temperature increases, kinetic energy of enzyme and substrate increases
- Frequency of effective collisions between enzyme and substrate increases
- Increased rate of formation of enzyme-substrate complex, rate of reaction increases
- At optimum temperature, rate of reaction is highest
- At temperatures above optimum temperature, active site loses its specific 3D shape
- Enzyme becomes denatured

- Substrate is no longer complementary to active site, no enzyme-substrate complex formed, rate of reaction decreases

Q: Explain how changes in pH affects the rate of an enzyme-catalysed reaction.

- At optimum pH, rate of reaction is the highest
- As pH moves away from optimum pH, active site loses its specific three-dimensional shape
- Enzyme becomes denatured
- Substrate is no longer complementary to active site, no enzyme-substrate complex formed, rate of reaction decreases

Chapter 5: Nutrition in Humans

Q: Define *digestion*.

Physical and chemical breakdown of larger food molecules into smaller and soluble molecules that can be absorbed by the body cells

Q: Define *absorption*.

Uptake of digested food substances into body cells

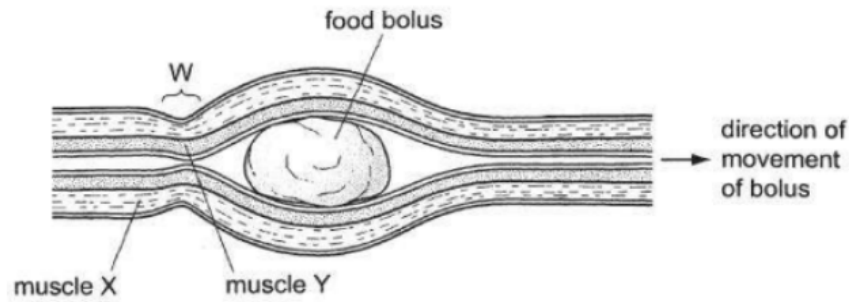
Q: Define *assimilation*.

Absorbed nutrients are converted into new cytoplasm are used to provide energy

Q: Define *detoxification*. State the name of the enzyme in the liver that detoxifies alcohol.

- Detoxification is the process of converting harmful substances into harmless substances.
- Alcohol dehydrogenase.

Q: The diagram shows a food bolus moving down the oesophagus.



Which row identifies the muscles and their actions at region W?

	muscle X		muscle Y	
	muscle type	action	muscle type	action
A	circular	contracting	longitudinal	relaxing
B	circular	relaxing	longitudinal	contracting
C	longitudinal	contracting	circular	relaxing
D	longitudinal	relaxing	circular	contracting

Ans: D

Q: Describe the digestion of protein in the body. [2]

- Protein is digested into polypeptide by pepsin in the stomach, and by pancreatic protease in the small intestine
- Polypeptide is further digested into amino acids by protease from the intestinal juice in the small intestine

Q: Describe the digestion of carbohydrates in the body. [3]

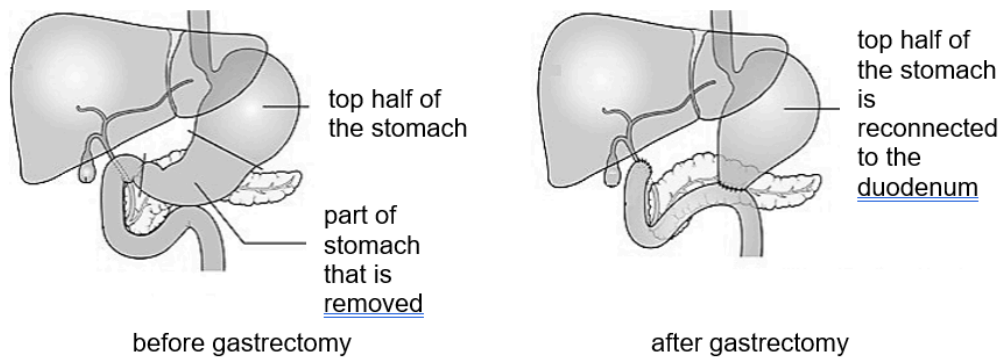
- Salivary amylase digests starch into maltose in the mouth
- Pancreatic amylase further digests starch into maltose in the small intestine
- Maltase digest maltose into glucose in the small intestine

Q: Describe the digestion of fats in the body. [3]

- Bile is produced in the liver and secreted from the gall bladder into the small intestine
- Bile emulsifies large fat droplets into smaller fat droplets

- This increases surface area to volume ratio for more efficient digestion of fats by lipase into glycerol and fatty acids

A patient was recently diagnosed with stomach cancer. The part of the stomach which is affected has to be surgically removed, in a surgery called gastrectomy. The figure shows the patient's stomach before and after the gastrectomy.



Q: State and explain two dietary changes that the patient should make after her surgery. [2]

- The patient should ingest lesser proteins after the surgery because she has a smaller stomach and less pepsin, and thus a less efficient process of digesting proteins.
- Take smaller meals as stomach has smaller capacity

Q: The patient consumes a meal of steamed chicken. Describe how the digestive process will be affected due to the result of this surgery. [2]

- Less pepsin in stomach as stomach is now smaller
- This slows the rate of digestion of protein in the stomach for the patient after the surgery.

Q: Describe how the small intestine is adapted for absorption of digested food substances. [6]

adaptation	function
Long and folded	Large surface area for absorption of food and sufficient time for digestion and absorption
Numerous villi	Increase surface area to volume ratio for faster absorption of nutrients
Epithelial cells contain many mitochondria	To release energy for active transport of nutrients into villi
Wall of villus (epithelium) is only one cell thick	Short diffusion distance for rapid diffusion of nutrients
Epithelial cells on each villus have microvilli	To further increase surface area to volume ratio for faster absorption of nutrients.
Each villus contains a dense network of blood capillaries and lacteal	Blood capillaries transport glucose and amino acids to liver and lacteal transport fats away from the small intestine to maintain a steep diffusion gradient

Q: Describe the functions of the liver. [5]

**Remember: BiG HAT*

Bile production	Emulsifies fats for higher surface area to volume ratio for more efficient digestion by lipase
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Glucose Regulation	Insulin: stimulate liver to convert excess glucose to glycogen Glucagon: stimulate liver to convert stored glycogen into glucose Converting glucose to glycogen(vice versa)
Breakdown of Hormones	After the hormones served their purpose it is broken down in the liver
Deamination of Amino acids	Removing excess amino acids and converting it into urea .
DeToxification	Conversion of harmful substances into harmless ones.

Q: State the short-term and long-term effects of excessive alcohol consumption.

Short-term	Long-term
Increase reaction time	Liver cirrhosis
Reduce self control	Gastric ulcer
Slows down brain function	Neglect of social responsibilities

Chapter 6: Transport in Humans

Q: Describe and explain how the blood entering the heart from the body organs reaches the lungs. [4]-

- Deoxygenated blood from the body organs enters the right atrium via the vena cava.
- During atrial systole, right atrium muscles contract, tricuspid valve is forced open and blood flows from the right atrium to the right ventricle.
- During ventricular systole, right ventricular muscles contract and tricuspid valves close to prevent the backflow of blood from right ventricle to right atrium.
- Semi-lunar valve opens, blood is pumped into the pulmonary artery until it reaches the lungs.

Q: Some people are born with a hole in the muscular wall between the left ventricle and the right ventricle. Suggest the effects on the body of having a hole between the two ventricles. [3] -

- Deoxygenated blood from the right ventricle enters and mixes with oxygenated blood in the left ventricle.
- There will be a lower concentration of / less oxygen in the blood that leaves the left ventricle ; Less oxygen will be delivered to organs
- Less aerobic respiration occurs to release less energy, causing patient to experience fatigue easily

Q: Explain how training at high altitudes could improve an athlete's performance at sea level.-

- At high altitude, the level of oxygen is low.
- Insufficient oxygen is transported to tissues, hence more red blood cells are produced to transport more oxygen.
- There is an increase in aerobic respiration, hence more energy is released
- Lesser lactic acid will be produced, hence less fatigue

Q: Describe the role of white blood cells in protecting the body from foreign pathogens.-

- Lymphocytes produce antibodies which bind to and neutralise harmful toxins from pathogens.
- Antibodies also cause bacteria to clump together / agglutinate
- Phagocytes engulf and ingest pathogens and destroy them.

Q: Describe the blood clotting process. [4]-

- Platelets are activated and release thrombokinase
- Thrombokinase converts prothrombin to thrombin
- Thrombin converts soluble fibrinogen into insoluble fibrin threads
- Fibrin forms a mesh and traps red blood cells, preventing pathogens from entering

Q: Explain why:

a) The walls of arteries are much thicker than those of veins. [2]-

- Arteries carry blood directly from the heart which has high pressure
- Having thick walls allow it to withstand the high pressure

b) The walls of the left ventricle are much thicker than that of the right ventricle. [2]-

- Left ventricle needs to generate enough force to pump blood to the rest of the body

- Right ventricle is less muscular because it only needs to pump blood to the lungs

c) Veins have valves but arteries do not. [2]-

- Veins carry blood which have low pressure
- Valves prevent backflow of blood

Q: Describe the differences between arteries and veins, with reference to their functions.-

“Arteries have _____(A)_____, while veins have _____(B)_____”

(A)	(B)
Thick elastic and muscular walls, to withstand the high blood pressure	Thin elastic and muscular walls, because blood pressure is lower
Smaller lumen, to withstand the high blood pressure	Larger lumen, as blood pressure is lower
No valves, as high blood pressure will ensure that blood does not backflow	Have valves, as there is low blood pressure, and this might cause blood to backflow
Arteries carry oxygenated blood away from the heart, except for pulmonary artery which carries deoxygenated blood away from heart	Veins carry deoxygenated blood towards the heart, except for pulmonary vein which carries oxygenated blood towards the heart

Q: Describe coronary heart disease. [2]-

- Build up of excess cholesterol in the coronary artery
- This causes the arteries lumen to narrow, blocking flow of blood and causing less oxygen to reach the heart

Q: Suggest the effects of occluded coronary arteries.-

- Coronary arteries transport oxygen and glucose to heart muscle cells
- When coronary artery is blocked, less oxygen is transported to heart muscle cells

- Heart muscle cells undergo less aerobic respiration, hence less energy is released for muscular contraction of the heart
- This could lead to a heart attack

Q: Describe the pathway a molecule of oxygen takes to travel from inside an alveolus to the heart muscles.-

- Oxygen dissolves in the thin film of moisture and diffuses into red blood cells in the blood capillary
- Blood from lungs enter left atrium of the heart via the pulmonary vein
- Left atrium contracts and pumps blood past bicuspid valve into left ventricle
- Left ventricle contracts and pumps blood past the semi-lunar valves into the aorta
- Blood travels from aorta to coronary artery and oxygen is transported to the heart muscles

Chapter 7: Respiration in Humans

Q: Describe how a molecule of oxygen present in the air breathed in reaches a muscle cell in the wall of the left atrium.-

- The molecule of oxygen dissolves in the thin film of moisture on the surface of the alveolus diffuses across the one-cell thick capillary wall into the bloodstream
- Oxygen molecule binds to haemoglobin in a red blood cell and is transported through the pulmonary vein into the left atrium.
- The left atrium muscle contracts and blood is forced into the left ventricle. The left ventricle contracts, and blood travels through the aorta to the coronary arteries.
- The oxygen molecule then leaves the red blood cell and diffuses into tissue fluid, and subsequently the muscle cell of the wall of the left atrium

Q: Describe and explain how the alveolus is adapted for its function.-

Adaptation	Function
Covered with a thin film of moisture	Allows oxygen to dissolve and diffuse into red blood cells
One-cell thick alveolar wall	Shorter distance for diffusion → higher rate of diffusion of gases

Surrounded by dense network of <u>blood capillaries</u>	Transports oxygen away quickly Maintains steep concentration gradient of gases
Numerous alveoli in lungs	Provides large surface area to volume ratio for efficient gas exchange

Q: Describe the role of gland cells and cilia in the trachea.-

- Gland cells secrete mucus to trap dust particles and bacteria
- Cilia sweep dust particles and pathogens trapped in mucus up the trachea

Q: Explain why the oxygen used increases as the level of exercise increases.-

- As exercise increases, more energy is needed by the body
- There is increase in muscular contractions, resulting in increase in demand for oxygen
- Hence, aerobic respiration increases to release more energy

Q: Explain why the oxygen uptake remains at a high level in the five minutes after the end of the exercise.-

- The muscle cells incurred an oxygen debt after carrying out anaerobic respiration.
- Oxygen uptake remains high to take in more oxygen repay the oxygen debt,
- where oxygen is used to oxidise lactic acid to release energy to convert the remaining lactic acid to glucose.

Q: Describe what happens during inhalation, in terms of breathing mechanisms.-

- Diaphragm contracts and flattens.
- External intercostal muscles contract and the internal intercostal muscles relax, causing the ribs to move upwards and outwards.
- Lungs then expand and increase in volume, causing the air pressure in the lung to decrease.
- The atmospheric pressure is now higher than the air pressure in the lungs, hence air is forced into the lungs.

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Q: Describe what happens during exhalation, in terms of breathing mechanisms.

- Diaphragm relaxes and arches upwards.
- External intercostal muscles relax and the internal intercostal muscles contract, causing the ribs to move downwards and inwards.
- Lungs compress and decrease in volume, causing the air pressure in the lung to increase.
- The atmospheric pressure is now lower than the air pressure in the lungs, hence air is forced out of the lungs.

Q: Suggest why mothers who smoke during pregnancies are likely to have babies with a low body mass.-

- Carbon monoxide, found in tobacco smoke, binds irreversibly to haemoglobin
- Less haemoglobin available to transport oxygen, hence less oxygen will reach the foetus.
- Carbon monoxide also increases the risk of formation of fatty deposits on the walls of arteries supplying the foetus,
- Hence less oxygen will reach the foetus.

Q: Describe how any two named toxic components of tobacco smoke may affect health.-

Carbon monoxide

- Carbon monoxide binds irreversibly to haemoglobin
- Less haemoglobin available to transport oxygen, hence less oxygen transported to body cells
- Carbon monoxide increases risk of formation of fatty deposits on the walls of arteries
- Leading to increased risk of high blood pressure and coronary heart disease

Tar

- Tar causes uncontrolled cell division and increases risk of lung cancer
- Tar paralyses the cilia lining the air passages, hence dust particles trapped in the mucus lining cannot be removed
- Results in excessive mucus production and increases risk of bronchitis or
- Results in persistent and violent coughing which may lead to emphysema
- Partition walls of alveoli break down
- Reduces surface area for gaseous exchange, resulting in shortness of breath

Nicotine

- Nicotine increases risk of blood clots in the arteries
- Results in increased risk of coronary heart disease
- Nicotine is also an addictive stimulant that increase heart rate and blood pressure

Chapter 8: Excretion in Humans

Q: Define the term excretion and state its importance in the functioning of the body.-

- Excretion is the removal of metabolic waste products and toxic substances from the body.
- They must be excreted as they are toxic to the body when accumulated to high concentrations
- When excess water is excreted, it helps to maintain the concentration of blood.

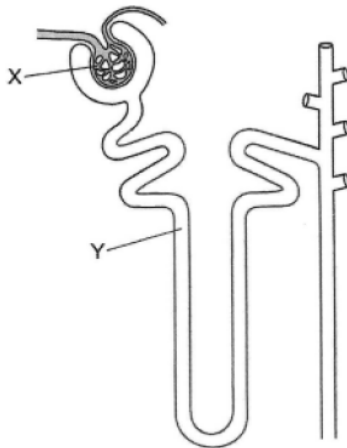
Q: Define *ultrafiltration*.-

Process where blood plasma and small molecules are forced out of the glomerulus into the Bowman's capsule by high blood pressure

Q: Define *selective reabsorption*.-

Process where useful substances are reabsorbed from the glomerular filtrate back into the blood as the filtrate passes through the nephron

Q: Describe and explain how the concentrations of glucose and protein at Y differ from their concentrations at X in a healthy person.-



- X is glomerulus, Y is just after the proximal convoluted tubule
- Y will have lower concentration of glucose than X
- As all glucose has been selectively reabsorbed back into the bloodstream at the proximal convoluted tubule
- Y will have lower concentration of protein than X

- As protein molecules are too large to pass through the partially permeable basement membrane surrounding the glomerulus into Bowman's capsule, hence will not enter the nephron

Q: Describe the function of a nephron.-

- Nephron removes urea and excess water in the form of urine.
- Urine is produced via ultrafiltration and selective reabsorption.
- Ultrafiltration happens in the glomerulus.
- The afferent arteriole has a wider lumen than the efferent arteriole, creating a high blood pressure
- The high pressure at the glomerulus forces water, glucose and amino acids and urea past the partially permeable basement membrane out of the glomerulus and into the Bowman's capsule.
- At the proximal convoluted tubule, all glucose and amino acids are selectively reabsorbed into the bloodstream by diffusion and active transport. Most water is reabsorbed into the bloodstream by osmosis.
- At the loop of Henle and distal convoluted tubule, some water is reabsorbed by osmosis and some mineral salts are reabsorbed by active transport
- At the collecting duct, some water is reabsorbed by osmosis.

Q: Explain why proteins/blood cells/platelets are not present in the Bowman's capsule and the collecting duct.-

- During ultrafiltration,
- Proteins/blood cells/platelets are too large to pass through the partially permeable basement membrane at the glomerulus

Q: Explain why glucose is present in the Bowman's capsule but not present in the collecting duct.-

- During ultrafiltration,
- Glucose molecules are small enough to be filtered through the partially permeable basement membrane at the glomerulus into the Bowman's capsule
- During selective reabsorption at the proximal convoluted tubule, all glucose is selectively reabsorbed into the bloodstream by active transport, hence no glucose is found at the collecting duct

Q: Describe the function of the kidney dialysis machine and explain how it is adapted for its function.-

- It contains a partially permeable tubing to allow urea to diffuse out of the blood

- Dialysis fluid contains same concentration of useful substances such as glucose, amino acids, mineral salts as healthy blood, ensuring there is no diffusion of these substances from blood to dialysate
- Dialysis fluid contains zero waste products such as urea, excess water and mineral salts, hence creating a steep concentration gradient for waste products to diffuse out of the blood
- Tubing is narrow, long and coiled, which increases the surface area to volume ratio, increasing diffusion rate of substances between blood and fluid
- Dialysis fluid flows in opposite direction to blood, maintaining a concentration gradient for waste products to diffuse out of the tube

Q: Describe the mechanism of kidney dialysis.-

- Blood is drawn from a vein in the patient's arm and passed into a dialysis machine
- Blood flows through a partially permeable tubing, which is surrounded by dialysis fluid / dialysate
- *(same points as above question)*

Q: Describe and explain how increased sweating affects the composition of urine.-

- More water is lost from the body, causing blood water potential to decrease
- Hypothalamus is stimulated and detects the decrease in blood water potential
- Pituitary gland releases more anti-diuretic hormone (ADH) into the bloodstream
- Collecting duct walls become more permeable to water
- More water is reabsorbed into the bloodstream
- Smaller volume of urine is produced, urine becomes more concentrated / less dilute
- Blood water potential increases back to normal

Q: Suggest which part of the kidney has malfunctioned which results in trace amounts of blood and high levels of protein found in the urine.

- Basement membrane surrounding the glomerulus may have been destroyed / ruptured
- Unable to filter out large molecules such as proteins and blood cells, hence allowing them to be forced out of the glomerulus into the Bowman's capsule

Chapter 9: Homeostasis and Hormonal Control

Q: Define *homeostasis*.-

Homeostasis is the maintenance of a constant internal environment.

Q: Define *hormone*.-

- Chemical substance produced in very small quantities
- By an endocrine gland
- It is transported in the bloodstream
- to target organ(s) where it exerts its effects

Q: Explain, using a named example, what is meant by an endocrine gland.-

- An endocrine gland is a ductless gland which secretes hormones directly into the bloodstream.
- The pancreas is an endocrine gland which secretes insulin/glucagon into the bloodstream
- The pituitary gland is an endocrine gland which secretes ADH into the bloodstream

Q: Compare and contrast the regulation of body temperature during a hot day and during a cold day.-

Similarities:

- The hypothalamus is the receptor.
- Change in blood temperature is the stimulus.

Differences:

- On a hot day, the arterioles leading to the skin vasodilate, while on a cold day, the arterioles leading to the skin vasoconstrict.
- On a hot day, sweat glands become more active and secretion of sweat increases, while on a cold day, sweat glands become less active and secretion of sweat decreases.

- On a hot day, metabolic rate decreases and less heat is lost within the body, while on a cold day, metabolic rate increases and more heat is released within the body

Q: Describe the roles of insulin and glucagon in the body.-

When blood glucose concentration increases above norm,

- Islets of Langerhans in the pancreas secrete insulin into the bloodstream.
- Insulin stimulates the liver to convert excess glucose into glycogen for storage in liver and muscle cells.
- **Insulin increases permeability of muscle cells to glucose, causing the muscle cells to take in more glucose.*
- Blood glucose concentration decreases back to normal

*(*not in syllabus, extra points if you have brain space)*

When blood glucose level decreases below norm,

- Islets of Langerhans secrete glucagon into the bloodstream.
- Glucagon stimulates the liver and muscle cells to convert stored glycogen back into glucose which is then released into the bloodstream.
- Blood glucose concentration increases back to normal

[cross-topic question]

Q: Explain why hormonal responses are generally slower than reflex actions.-

- Hormones are carried via the bloodstream before reaching target organs to cause responses
- Hence speed of response depends on the rate of blood flow.
- Reflex actions which are triggered by nerve impulses that travel very quickly through neurons to reach the effectors to cause the reflex.
- Hence reflex actions are much faster than hormonal responses

[cross-topic question]

Q: Describe the differences between nervous control and endocrine control.-

Endocrine control	Nervous control
Uses hormones as signals	Uses nerve impulses as signals

Hormones transported by blood	Nerve impulses transmitted by neurones
Slow responses	Quick responses
Always involuntary	May be voluntary or involuntary
Causes responses in more than one target organs	Causes response in a localised region
Results in relatively longer-lasting responses	Results in short-lived responses

Chapter 10: Nervous System and The Eye

Q: Define 'reflex action'.-

It is an immediate and involuntary response to a specific stimulus without conscious control.

Q: Describe the pathway of nerve impulses in a named reflex action.-

1. Withdrawing hand from hot object (spinal reflex)

- Heat stimulates skin receptors. Nerve impulse is generated.
- Nerve impulse is transmitted along sensory neurone in the arm
- Sensory neurone transmits nerve impulse to relay neurone in the spinal cord
- Relay neurone transmits nerve impulse to motor neurone
- Motor neurone transmits nerve impulse from spinal cord to the effector, the bicep muscles
- Effector muscles (bicep muscles) contract, resulting in withdrawal of hand from the hot object

2. Pupil reflex (cranial reflex)

- Light rays stimulate photoreceptors in the retina. Nerve impulse is generated.
- Nerve impulse is transmitted along sensory neurone in the optic nerve
- Sensory neurone transmits nerve impulse to relay neurone in the brain
- Relay neurone transmits nerve impulse to motor neurone
- Motor neurone transmits nerve impulse from brain to the effector, the iris
- Iris constricts or dilates to control the amount of light entering the eyes

Q: Compare a voluntary action and a reflex action. -

Similarities:

- Both require the transmission of nerve impulses.
- Both require motor neurons and effector to bring about an action.
- Both are controlled by the central nervous system.

Differences:

- Voluntary action can be controlled by will whereas reflex action cannot be controlled by will
- Voluntary action does not always involve the receptor and sensory neurone whereas reflex action involves the receptor and the sensory neurone
- For voluntary action, nerve impulse is generated by the brain, while for reflex action, nerve impulse is generated by the receptor

Q: Describe how antagonistic pairs of muscle bring about the decrease in the amount of light entering the eye in a brightly lit environment:

- Circular muscles of the iris contract
- Radial muscles of the iris relax
- The pupil constricts to reduce the amount of light entering the eye.

Q: Describe how antagonistic pairs of muscle bring about the increase in the amount of light entering the eye in a dim environment :

- Circular muscles of the iris relax
- Radial muscles of the iris contract
- The pupil dilates to increase the amount of light entering the eye.

Q: Describe how a focused image is produced on the retina of the eye for a near object-

(Remember: Thick **N**oodles (**N**ear), Thin **F**ries (**F**ar))

- Ciliary muscles contract, relaxing their pull on suspensory ligaments
- Suspensory ligaments slacken
- Lens becomes thicker and more convex
- Light rays from the near object are sharply focused on the retina.
- Photoreceptors are stimulated.

Q: Describe how a focused image is produced on the retina of the eye for a far object-

- Ciliary muscles relax, pulling on the suspensory ligaments
- Suspensory ligaments become taut

- Lens becomes thinner and less convex
- Light rays from the far object are sharply focused on the retina.
- Photoreceptors are stimulated.

Q: Suggest why the changes that occur in the eye to form a clear image are controlled by the nervous system instead of a hormone.-

- Nervous system faster than hormones
- Nerve impulses almost instant
- Through neurones / nerve cells
- Allows eye to quickly change focus between near and distant objects
- Hormones are chemical
- Carried by blood, hence slower process for hormones

[cross-topic question]

Q: Explain why hormonal responses are generally slower than reflex actions.

- Hormones are carried via the bloodstream before reaching target organs to cause responses
- Hence speed of response depends on the rate of blood flow.
- Reflex actions which are triggered by nerve impulses that travel very quickly through neurons to reach the effectors to cause the reflex.
- Hence reflex actions are much faster than hormonal responses

[cross-topic question]

Q: Describe the differences between nervous control and endocrine control.

Endocrine control	Nervous control
Uses hormones as signals	Uses nerve impulses as signals
Hormones transported by blood	Nerve impulses transmitted by neurones
Slow responses	Quick responses
Always involuntary	May be voluntary or involuntary
Causes responses in more than one	Causes response in a localised region

target organs	
Results in relatively longer-lasting responses	Results in short-lived responses

[cross-topic question]

Q: Describe one example of how antagonistic muscles work in the body and explain the importance of this action to the body.-

1. Iris muscles

- The circular and radial muscles are a pair of antagonistic muscles in the iris that respond to changes in light intensity.
- In bright light, the circular muscles contract and radial muscles relax, causing the pupil to constrict.
- In dim light, the circular muscles relax and radial muscles contract, causing the pupil to dilate.
- This reflex action controls the amount of light that enters the eye to prevent damage to the retina.

2. Oesophagus / Intestines

- The circular and longitudinal muscles of the oesophagus/gut are a pair of antagonistic muscles.
- The circular muscles constrict the lumen while the longitudinal muscles dilate the lumen.
- They work together to produce rhythmic, wave-like contractions in the wall of the alimentary canal.
- This is important to enable the food to be pushed along the gut.

3. Intercostal muscles of the ribs

- The external and internal intercostal muscles of the ribs are a pair of antagonistic muscles
- During inhalation, the internal intercostal muscles relax while the external intercostal muscles contract.
- During exhalation, the external intercostal muscles relax while the internal intercostal muscles contract.

- The action of the muscles allows the person to breathe in and out, and for air to enter and exit the lungs

Chapter 11: Infectious Diseases in Humans

Q: Define *vaccine*.-

- A vaccine contains an agent that resembles a pathogen
- It stimulates white blood cells to quickly produce antibodies when the pathogen invades

Q: Define *antibiotic*.-

- Drugs that kill or inhibit growth of bacteria, but not viruses

Q: Describe differences between bacteria and viruses.-

Bacteria	Virus
Has an outer cell wall	Surrounded by a protein coat
Contains DNA as the genetic material	Contains either DNA or RNA as the genetic material
Cell membrane is present	Cell membrane is absent
Cytoplasm is present	Cytoplasm is absent
Ribosomes are present	Ribosomes are absent

Q: Describe how influenza may be transmitted and how to reduce its transmission.

How it is transmitted:

- Influenza can travel through droplets expelled from an infected person when they cough or sneeze and enter another person's respiratory tract.
- It can spread when someone touches a surface contaminated with the virus, and then touches their mouth, nose or eyes.

Ways to reduce influenza transmission:

- Get annual influenza vaccination
- Avoid close contact with infected people
- Cover mouth and nose when coughing or sneezing to prevent droplets from reaching others
- Wear surgical mask to prevent droplets from reaching others
- Wash hands with soap and water to kill viruses present on hands.

Q: Explain why antibiotics are not used to treat *[named virus]*.

- Antibiotics work by weakening and breaking up the cell wall and cell membrane respectively
- They also prevent ribosomes from making proteins and enzymes
- Since *[named virus]* is caused by a virus which has no cell wall, cell membrane or ribosomes, antibiotics will not be effective

Q: Explain how getting a chickenpox vaccination prevents that person from contracting chickenpox in the future. (*applies to any other viruses*) -

- The vaccine contains an agent that resembles the chickenpox virus
- This stimulates white blood cells to produce antibodies
- The white blood cells remain in the bloodstream for a long time
- In the future, when the chickenpox virus enters the bloodstream, the white blood cells will recognize the virus and quickly produce antibodies to destroy the virus, preventing infection

Q: Explain why it is recommended to finish the entire course of antibiotics. -

- Some bacterial cells are less sensitive to the antibiotics and are not easily killed
- If a course of antibiotics is not completed, the less sensitive bacteria may survive and reproduce
- They multiply, resulting in a strain of antibiotic-resistant bacteria
- Finishing the entire course of antibiotics ensures that all the bacteria are killed

Chapter 12. Nutrition and transport in flowering plants

Q: Describe the process of photosynthesis -

When chlorophyll in chloroplast absorbs light, light energy is converted into chemical energy. The chemical energy is then used for photolysis, splitting water molecules into H^+ ions and oxygen is produced as a waste product. The chemical energy is also used to reduce carbon dioxide into glucose.

Q: Compare the functions of phloem and xylem -

	Phloem	Xylem
Differences	Transport sucrose and amino acids	Transport water and mineral ions
	Bidirectional	Single direction
Similarity	Both contains specialised cells	
	Both found in vascular bundle	

Q: Describe the opening of stomata during the day -

During the day , the leaf is exposed to sunlight , photosynthesis occurs, producing energy . Energy is used for active transport of potassium ions from neighbouring cells to cytoplasm of guard cells . Water potential of guard cells decreases , resulting in water molecules from neighbouring cells travelling into guard cells through the partially permeable membrane via osmosis . Water potential of guard cells increases , guard cells become turgid . Due to the difference in thickness of the cell wall , a pair of guard cells bow apart from each other , opening the stomata.

Q: Describe how root pressure is created-

Water potential of the root hair cell is lower than the surrounding as root hair cells are concentrated with sugar and mineral ions . Water molecules from the soil will enter the root hair cells through the partially permeable membrane via osmosis . The water potential of the root hair cell increases , and water molecules travel to neighbouring cells via osmosis . The water molecules will then travel to the xylem vessels. At the stem , the influx of water creates pressure inside the xylem , pushing water up the plant's vascular system .

Q: Describe capillary action -

The tendency of water to move upwards inside very narrow tubes. This is due to the cohesion force between water molecules and the surface of xylem vessels . The

cohesion force between water molecules also helps water molecules to pull on each other up the stem , giving rise to transpiration pull .

Q: Describe the process of transpiration -

Water molecules will travel out the spongy mesophyll cells via osmosis, forming a thin film of moisture . During the day , when stomata opens , the water molecules in thin film of moisture will evaporate . Water vapour particles will accumulate in the air space , and then diffuse through the stomata and into the surrounding .

A: Describe the process of transpiration pull -

When water is lost through transpiration , water molecules move out of the spongy mesophyll cell ,via osmosis , in replacement of the lost water vapour . Water potential of spongy mesophyll cells decreases , causing chain flow of water molecules from neighbouring cells to travel to spongy mesophyll cells , and water molecules from xylem vessels to those neighbouring cells . This decreases water potential of xylem vessels which creates a suction force , pulling water up the xylem vessel .

Q: State the advantages and disadvantages of wilting -

Advantages	Disadvantages
Guard cells becomes flaccid which closes stomata → reduces water loss	Reduce rate of photosynthesis due to reduce of : - Water intake - CO₂ intake - Sunlight absorption
Reduce surface area exposed to sunlight → reduces further water loss	

Explain why the rate of transpiration is faster at higher temperatures . -

At higher temperatures , water molecules on the thin film of moisture gain heat faster and evaporate into water vapour particles at a faster rate .This increases water vapour concentration gradient between the intercellular air space and the atmosphere. Moreover , at higher temperatures , water vapour particles gain more kinetic energy , water vapour particles move faster , thereby diffusing out the stomata at a faster rate .

Q: Define rate limiting factor -

A factor that directly affects the rate of a chemical reaction if its supply is increased .

Q: Describe how phloem and xylem adapt to their function . -

Phloem	Xylem
Sieve tube with pores→ reduce resistance to phloem sap flow	Dead , lack protoplasm , hollow → reduce water flow resistance
Companion cells contains nucleus → control activities of sieve tube elements (eg. sucrose)	Lack cross walls → reduce resistance of water flow
Companion cells contains many mitochondria → provide energy for active transport for loading sugar into sieve tubes	Lignin (mechanically strong) → provides the stem mechanical support

Chapter 13 . Organism and their environment

Q: Define Consumers [1]-

Organisms that obtain energy and nutrients by feeding on other organisms. They are unable to make food themselves .

Q: Define Producers [1]-

Organisms that are able to make their own food .

Q: Define Decomposers [1]-

Break down dead organisms , faeces and excretory products for energy .

Q: Define “ *food chain*”[1]-

A series of organisms , beginning with the producers , through which energy and nutrients are transferred.

Q: Define trophic level . [1]-

The position of an organism in the food chain .

Q: suggest 2 ways in which energy may be lost between trophic levels . [2]-

Aerobic Respiration and excretion and egestion.

Q: Explain why there are usually very few predators of tertiary consumers . [2]-

Since 90 percent of the energy is lost between each trophic level , there is only a small group of tertiary consumers which provide energy for even less predators .

Q: Define the term carbon sink . [1]-

An area which stores carbon in it .

Q: Suggest why oceans are considered carbon sinks . [1]-

As when dead organisms decompose , carbon is stored under the ocean as fossil fuels .

Q: Suggest how bioaccumulation takes place. [4]-

When chemical waste is deposited into the ocean , the small microorganisms consume the toxics , which is indigestible . The small microorganisms are unable to excrete the toxics, thus the toxics is stored in their body , and the concentration of it increases in their body

Q: Suggest and explain what might happen to the number of small fishes in if fish-eating birds die . [4]-

When fish eating birds die , the large fishes will have less predators . They are able to survive , reproduce and increase in population . The increase in large fishes will lead to more small fishes being eaten , and if it is faster than their reproduction rate , small fishes' population will decline and go extinct .

Q: Suggest how bioamplification takes place . [5]-

When mercury is disposed of into the water , the small microorganisms consume them . The small microorganisms are unable to digest and excrete the mercury and concentration of mercury increases in their body . The organisms higher up in the food chain will consume many of these small organisms and concentration of mercury amplifies up the food chain . When it reaches the top consumers , they may experience toxic effects due to the high concentration of mercury .

Q: Suggest the reasons for conservation . [2]-

To combat climate change , forests and oceans are large carbon sinks .
Forests prevent soil erosion and landslides .

Q: Suggest some ways forests and Coral reefs can be conserved . [2]-

Educate the people to treat waste responsibly and not dispose of it into nature , to control pollution. Designate sites as reserves and manage them well .

Chapter 14. Molecular Genetics

Q: Name the four bases in a nucleotide sequence .[2]-

Cytosine , guanine , adenine , thymine

Q: Describe the structure of DNA . [6]-

Formation : Many nucleotides covalently bond to form a strand of polynucleotide . Two strands of antiparallel polynucleotide twist , forming a double helix with sugar-phosphate backbone , thus DNA is formed .

Definition : All of the above + Bases of the two polynucleotide strands are covalently bonded by hydrogen bonds with adenine complementary to thymine and cytosine complementary with guanine .

Q: Define genes . [1]-

Unit of inheritance and a sequence of nucleotides as part of a chromosome that codes for one polypeptide .

Q: Discuss 2 social implications of genetic engineering . [2]-

Biological warfare and allergic reactions

Q: Describe how a human gene can be inserted into bacteria to produce insulin . [6]-

DNA fragments from human pancreas are excreted , a restriction enzyme is used to cut out a small section of the gene . With the same restriction enzyme ,a section of a plasmid of the bacteria is cut out , and the gene is sealed into the plasmid using ligase . Using heat and electrical shock , the recombinant plasmid is transformed into bacterium . Lastly , the transgenic bacteria are grown in the fermenters for mass production of insulin .

Q: Explain how a transgenic organism can be produced . [5]-

When a gene is identified , it is cut out using the restriction enzyme and polymerase is used to increase the number of copies . The same restriction enzyme is used to cut off plasmid of the recipient organism . Ligase is used to seal the gene into the plasmid . With the application of heat and electrical shock , the recombinant plasmid is transformed into a vector , and inserted into the organism .

Q: Define alleles . [1]-

Different forms of a gene .

Q: Explain how it is possible for different organisms to contain different enzymes . [3]-

Since DNA contains alleles which can have different sequences of bases due to mutation , the amino acid sequence can be different leading to protein coded for being different , thus producing different enzymes .

Chapter 18 - Inheritance

Q: Compare continuous and discontinuous variation. [3]-

Continuous variation is affected by many genes , while discontinuous variation is affected by a gene . Continuous variation is a range of different phenotypes , while discontinuous variation involves categorised phenotypes , which are distinct from each other .

Q: Explain codominant alleles with an example . [4]-

Codominant alleles means that in the body , 2 different alleles are able to express their phenotype . For example , in the human blood group there are I^A , I^O , I^B alleles , I^A and I^B being dominant and I^O being recessive . When an offspring inherits I^A and I^B from its parents , both alleles are able to express their phenotype , therefore the person will have blood type AB .

Q: Suggest the reasons as to why mutations occur.[2]-

Chemical mutagens (tar) and ionising radiation (uv light)

Q: Name and explain an example of chromosome mutation. [3]-

Mutation is the sudden change in the number of chromosomes . For example , when an egg ends up with two copies of chromosome 21 , the offspring will have down syndrome .

Q: Explain why mutation to bases of genes can be beneficial . [3]-

Sickle-cell anaemia occurs when there is a change in the base of DNA of a gene controlling the production of haemoglobin . This causes haemoglobin to clump together resulting in sickle shape . People who are heterozygous for this mutation are more resistant to malaria .

Q: Explain why the observed ratio differs from expected . [1]-

The sample size is too small

Q: Explain why some families have only female children . [2]-

The outcome of an offspring is independent of each other , causing the observed ratio to be by chance . Thus , it is completely possible for some families to have only female children.

Chapter 15 . Modes of reproduction .

Q: Describe the Advantages and Disadvantages of Sexual reproduction . [3]-

Advantages :

- offspring may inherit beneficial traits from parents .
- Also , there is genetic variation in the offspring which helps them better adapt to changes in the environment .

Disadvantages:

- Two parents are required
- Fusion of gametes required
- Method is usually slower than asexual reproduction

Q: Describe the differences between asexual and sexual reproduction . [3]-

Asexual reproduction does not require the fusion of gametes , while sexual reproduction requires the fusion of male and female gametes to form a zygote .

Asexual reproduction requires only one parent while sexual reproduction requires both parents .

Asexual reproduction produces offspring that are genetically identical to the parents , while sexual reproduction produces offspring that are genetically dissimilar to the parents .

Asexual reproduction usually is a faster method of producing offspring as compared to sexual reproduction .

Q: Describe the process of mitosis and its importance . [3]-

Mitosis is a type of cell division giving rise to genetically identical cells in which the chromosome number is maintained .

Mitosis is important in allowing for asexual reproduction to occur .

Moreover , new cells must be produced via mitosis for multicellular organisms to grow. Additionally , new cells are produced by mitosis to replace cells that are dead or damaged.

Q: Describe the process of meiosis and its importance. [3]-

Meiosis is a type of cell division that gives rise to genetically dissimilar cells in which the chromosome number is halved due to the separation of homologous chromosomes .

Meiosis is important in producing haploid gametes . As during meiosis , each pair of homologous chromosomes in the parent nucleus separate to form daughter cells .

Moreover , meiosis is also important in producing gametes that are genetically dissimilar . With greater genetic variation , the species are more likely to survive and adapt to changes in their environment .

Q: Describe how haploid and diploid are formed . [3]-

Haploids are formed during meiosis in reproductive organs , where each pair of homologous chromosomes in the parent nucleus separates . Diploids are formed during fertilisation , when a male and female gamete fuses .

Chapter 16. Reproduction in Plants

Q: Describe the function of petals in insect-pollinated flowers . [2]-

The petals are brightly coloured to attract insects for pollination , provide a platform for insects to land and also to have lines that guide insects to the base of the petals to obtain nectar .

Q: Define *pollination* [1]-

Pollination is the transfer of pollen grain from the anther to the stigma .

Q: Describe Self-pollination and the advantages of self pollination . [4]-

Self pollination is the transfer of pollen grains from the anther to the stigma of the same flower or of a different flower on the same plant .

- Self pollination only requires one plant .
- Do not depend on external factors such as wind or insects for pollination .
- Also , it increases the chances of beneficial traits from the parent being passed on to the offspring .
- Since the anther and stigma are from the same flower and are close by , chances of pollination is higher as compared to cross pollination .
- Less energy and pollen is wasted in self pollination as compared to cross pollination .

Q: Describe Self-pollination and the disadvantages of self pollination . [4]-

Self pollination is the transfer of pollen grains from the anther to the stigma of the same flower or of a different flower on the same plant .

- Self pollination causes offspring to have lesser genetic variation as compared to crossed pollination , and thus are less well-adapted to the changes in the environment .
- Continued self pollination will cause offspring to be weaker and less resistant to diseases .

Q: Describe Cross-pollination and the advantages of Cross pollination.[4]-

Cross pollination is the transfer of pollen grain from the anther to the stigma of a different plant of the same species .

- This increases genetic variation of offsprings , allowing them to be more well-adapted and increases survival chances when there are changes in the environment . Since any change in the environment is less likely to destroy all the varieties in a species .
- The offspring may inherit beneficial qualities from both parents .
- More viable seeds , which are capable of surviving longer before germination are produced .

Q: Describe Cross-pollination and the disadvantages of Cross pollination.[4]

Cross pollination is the transfer of pollen grain from the anther to the stigma of a different plant of the same species .

- Two plants are required
- Depends on external factor such as wind and insect for pollination
- Less likely for pollination to occur
- More energy and pollen are wasted

Q: Describe the differences between the anther and filament of wind-pollinated and insect-pollinated flowers . [2]-

Stamens of an insect-pollinated flower are usually not pendulous and protruding out of the flower , while stamens of a wind-pollinated flower have pendulous filaments and protruding anthers .

Q: Describe the differences between the stigma of wind-pollinated and insect-pollinated flowers . [2]-

The stigma of an insect-pollinated flower is short and does not protrude out of the flower, while the stigma of a wind-pollinated flower is large, feathery and protrudes out of the flower to provide a large surface area to trap pollen.

Q: Describe the differences between pollen grains of wind-pollinated and insect-pollinated flowers. [2]-

Pollen grains of a wind pollinated flower are usually smooth and light so that they are able to be blown away by the wind, while pollen grains of an insect pollinated flower are spiky and rough so that they are able to cling onto bodies of insects.

Q: Describe the role of pollen grain on the stigma of a female plant during fertilisation. [5]-

Pollen grains carry male gametes. After pollination, the pollen grains germinate in contact with the stigma, due to sugary fluid secreted by the stigma. The pollen tube grows out of the pollen grain, and secrete enzymes which digest surrounding tissues of the stigma and style. The pollen tube grows down the style into the ovary. When it enters the ovule through the micropyle, the tip of the pollen tube absorbs sap and bursts, releasing male gametes. The nucleus of male gametes then fuses with the nucleus of the ovum to form a zygote.

Chapter 17 Reproduction in Humans.

Q: Describe the sequence of events that occur after a human egg cell is fertilised which enable it to develop and survive in the uterus. [5]-

After fertilisation, the zygote divides by mitosis, forming an embryo which implants onto the wall of the uterus lining. Placenta is formed, allowing nutrients to diffuse into the fetus and waste to diffuse out of the fetus. The placenta also

produces progesterone to maintain the uterine lining The umbilical cord formed , allowing diffusion of Oxygen into the foetus and diffusion of carbon dioxide away from the foetus . The amniotic fluid provides protection and support for the foetus .

Q: Describe what happens to the fertilised egg in its early development .[4]-

After fertilisation , the zygote divides by mitosis to form an embryo . The peristaltic movement of cilia and oviduct will sweep the embryo into the uterus . In which the embryo will float freely for about two days before implantation occurs , as it is embedded onto the wall of the uterus .

Q: Suggest a role for the cilia .[1]-

To sweep the embryo to the uterus

Q: Describe the process of fertilisation and outline the early development of the embryo . [6]-

During fertilisation , the acrosome of the sperm breaks down parts of the egg membrane. Only the nucleus of one sperm will enter and fuse with the nucleus of the egg , forming a zygote .As soon as one sperm enters the egg , the cell membrane of the egg changes so that no other sperms can enter . After fertilisation , the zygote divides by mitosis , forming an embryo . Peristaltic movement of the cilia and oviduct will sweep the embryo towards the uterus , where the embryo will float freely for about 2 days before implantation occurs , as it is embedded onto the wall of the uterus .

Q: Describe the function of the placenta during pregnancy . [2]-

- Allows exchange of nutrients and metabolic waste products such as urea
- Allows antibodies to diffuse into the fetus blood
- Produces progesterone to maintain the uterine lining

Q: List the functions of the amniotic sac and its fluid . [2]-

- Provide cushion to protect against physical shock
- Allows for movement , to promote muscle development
- Provide lubrication during birth

Q: Describe the role of Oestrogen and Progesterone .[2]-

Oestrogen repairs and thickens uterine lining , and also maintains uterine lining .

High levels of oestrogen causes ovulation .

Progesterone maintains uterine lining and prevents further ovulation .

Q: Describe the concentration of Oestrogen and Progesterone during the menstrual cycle . [4]-

From day 6 to 10 , the ovary secretes oestrogen , increasing concentration of oestrogen . At day 14 , the level of oestrogen peaked , causing ovulation . During the fertile period (day 11-15) the ovary secrete progesterone to prevent further ovulation , hence concentration of progesterone increases and concentration of oestrogen decreases . If no fertilisation occurs , then concentration of progesterone will also decrease .

Q: Describe the function of the umbilical cord .[3]-

The umbilical cord contains one umbilical vein , which transports oxygenated blood and food from the placenta to the foetus , and also two umbilical arteries , which transport deoxygenated blood and waste away from the foetus to the placenta .

Q: Describe how HIV can be transmitted . [2]-

Sexual intercourse , pregnancy and sharing of hypodermic needle

Q: Describe the ways of preventing HIV . [2]-

Wear a condom , stick to one sex partner and do not abuse drugs .

Q: List down external factors that can affect the length of a menstrual cycle . [2]-

Illness , stress , depression , unbalanced diet and malnutrition .

Q: Describe two functions of the ovaries in a healthy young woman who is not pregnant . [3]-

Ovary produces eggs , releasing oestrogen to repair uterine lining and high levels to trigger ovulation . Ovary produces progesterone to prevent further ovulation and help with the growth and maintenance of the uterine lining .