

2022 6093/1 Answers

Qn	Answers	Qn	Answers
1	D	21	B
2	B	22	B
3	D	23	A
4	B	24	C
5	C	25	D
6	B	26	B
7	C	27	D
8	D	28	D
9	A	29	B
10	D	30	A
11	B	31	B
12	B	32	B
13	C	33	D
14	D	34	C
15	D	35	C
16	D	36	A
17	A	37	D
18	C	38	B
19	A	39	A
20	D	40	A

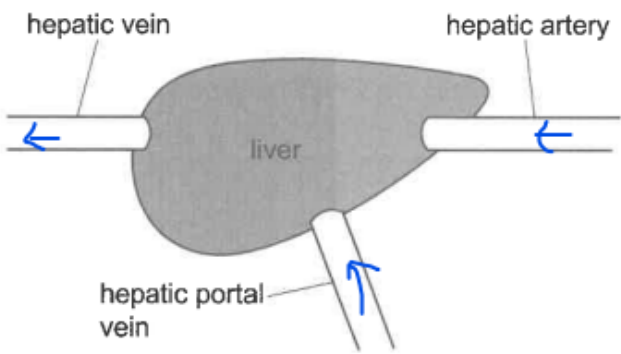
2022 6093/2 Answers

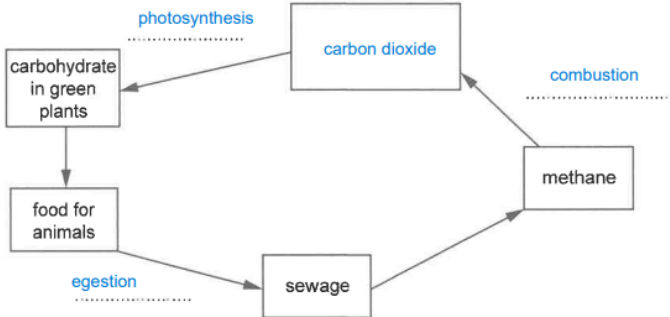
Section A

Qn	Answers	Remarks
1a	No nucleus + more space to carry haemoglobin to bind to oxygen; Biconcave shape + increase surface area to volume ratio + faster rate of diffusion of oxygen + in and out of the cell;	Candidates should link structure to its correct function. Students should state that haemoglobin bind to oxygen instead of transport oxygen. RBCs are also biconcave and not concave. Candidates should link lack of nucleus to providing more room for haemoglobin instead of just oxygen.
1bi	Decreased oxygen at cells or muscles + reduced ability to carry out aerobic respiration + less energy released at muscles for walking up stairs; Heart rate and breathing rate increase to get more oxygen and deliver oxygen to muscle cells; Anaerobic respiration + release more energy required; Produce lactic acid + build-up of lactic acid + muscle fatigue;	Candidates should describe how breathing or heart rate would be affected and/or describe tiredness. Less oxygen would be delivered to the muscles or cells for aerobic respiration. Response should also include the need for anaerobic respiration. Candidates should note that responses should be specific including stating the type of respiration e.g aerobic respiration instead of generalised description of less oxygen delivered to the 'body', or just referred to 'respiration' without specifying aerobic respiration. Cellular respiration is unclear if it refers to aerobic or anaerobic respiration.
ii	Pulmonary vein; Oxygen diffuse from alveolus to red blood cells + blood vessel from lungs + highest concentration of oxygen;	Candidates should take note, not to mistake pulmonary vein for pulmonary artery. Answers should be succinct with clear points to justify

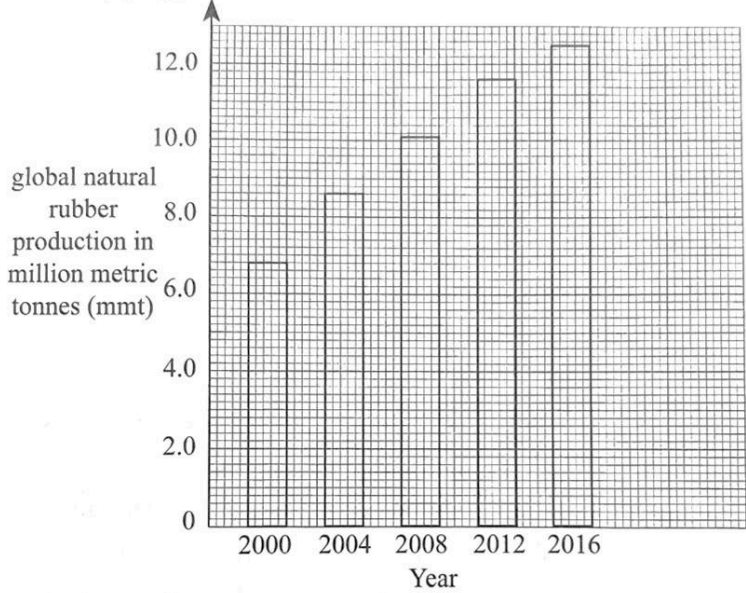
		their choice.
1c	Transported to lungs + gaseous exchange + excretion of carbon dioxide as waste product + during exhalation; White blood cells	Good answers for the reasons of transport of carbon dioxide should include the lungs, excretion, or exhalation.
2ai	Palisade mesophyll cell	Candidate should clearly state the type of cell instead of just leaf cell which had been mentioned in the question
2aii	Large central vacuole	
2aiii	mitochondrion/ribosome	Nucleus not acceptable as it is shown in the diagram
2b	Chloroplast would move towards light source + in the cell Light energy is required for photosynthesis + absorb by chlorophyll; Nearer the light source for maximum amount of light energy + convert light energy to chemical energy	Answers should show understanding of the need for light energy to be absorbed by chlorophyll for photosynthesis. Chloroplast would not migrate to the top of the leaf or epidermis but only within the cell, and would spread out so as not to overlap with each up.
2c	Water molecules + osmosis and Carbon dioxide + diffusion; Water molecules down a water potential gradient + carbon dioxide down a concentration gradient; Through the cell wall and cell membrane;	Answers should include how water molecules travelled from cell to cell by osmosis and that carbon dioxide moved by diffusion, and that movement was always 'down a concentration gradient'. Both water and carbon dioxide would need to cross the cell surface membrane and the cell wall. Candidates who described movement of water from its

		uptake in the roots, up the xylem to the leaf did not note the requirement of the question.
3a	Long; Pendulous;	Candidates should not give two correct answers in the first space and give further information in the second. Candidates should be careful not to give stigma features to stamens.
3bi	Carbon, oxygen and hydrogen	Nitrogen is not acceptable as it is not found in carbohydrates and fats
3bii	White flour has a more digestible carbohydrates at 80.1g and 76.3g than brown flour at 76.5g and 72.0g in 100g of flour; White flour has less indigestible carbohydrates than brown flour such as 2.4g as compared to 4.6g for rice flour and 2.7g as compared to 10.7g for wheat flour; White flour has lesser protein than brown flour such as 5.9g as compared to 7.2g for rice flour and 10.3g as compared to 13.2g for wheat flour; White flour has lesser fats than brown flour such as 1.4g as compared to 2.8g for rice flour and 1.0g as compared to 2.5g for wheat flour;	Candidates should clearly state the difference between named types of flour, instead relying on lists of quoted figures only. Comparative terms such as 'less' or 'more' should complement the use of figures to give others a better understanding of differences.
3biii	<u>Dissolve</u> a spatula of flour in 2cm³ of water in a test tube. Add 2cm³ of biuret solution and <u>shake to mix</u>. Observe colour change. If biuret solution changes from blue to violet solution, protein is present. If the biuret solution remains blue, protein is absent.	The test and <u>expected colour</u> for protein should be described.

3c	Rate of absorption of nutrients such as glucose, amino acids, fatty acids and glycerol would be reduced + the surface area to volume ratio of the surface of absorption is reduced; Lesser glucose absorption of glucose and amino acids through blood stream + fatty acids and glycerol through lacteals; Nutrients would be lost and egested without absorption;	Candidates should state that absorption would be reduced as the surface area for absorption was reduced. Stronger responses should include further detail, such as stating specific nutrients that would be absorbed (into the bloodstream or lacteals) or egested without absorption.
4ai	 The diagram shows a central liver organ. To its left, a hepatic vein and a hepatic artery enter the liver. Below the liver, a hepatic portal vein enters. Blue arrows on each vessel point towards the liver, indicating the direction of blood flow.	Candidates should note that blood in the hepatic portal vein flowing towards the liver
4aii	Hepatic vein	
4bi	Fair comparison due to differences in population sizes, total number of cases might not be an accurate representation of the proportion of people with liver disease in the two areas	Candidates should focus on identifying that the population sizes could be different.
4bii	Number of cases in A is much higher than cases in B + in the first 40 year in A, cases increase from 38 cases per 100 000 in 1960 to 64 cases per 100 000 in 1980 whereas in B, cases increases from 6 cases per 100 000 men in 1960 to 14 cases per 100 000 in 1980; From 1980 to 2000, number of cases in A start to decrease to 38 cases per 100 000 + number of cases in B continue to increase to 27 cases per 100 000	Comparisons should be supported with data including the figures 'per 100 000' and not attempt to manipulate the figures (e.g. 500 000 cases in B in 1960).
4biii	People are more aware about dangers of alcohol consumption through outreach/educational campaigns;	Some candidates mistakenly gave a reason for alcohol consumption increasing and a few mentioned reasons why

	Law to restrict hours of sales of alcohol;	people gave up smoking.
4biv	Increase reaction time/ slower reaction time; Increase risk of gastric ulcer; Reduced self-control; Frequent intake may lead to addiction; Slow down brain functions;	'Decreased reaction time' is not the same as 'slower reaction time'
4ci	Where the effects of hormones are exerted for specific reactions to take place	Answer should relate between target organ and hormones
4cii	Glucagon stimulates the conversion of glycogen to glucose by liver cells and muscle cells; When blood glucose concentration is lower than normal;	Common misconception includes glucagon directly converting the glycogen to glucose rather than stimulating the conversion
5a	temperature/ pH	
5b		Process converting food into sewage is NOT decomposition.
5c	DNA is a double helix structure composing of different sequence of nucleotides + segments of nucleotides + codon + contain code for amino acids + protein synthesis + transcription and translation; Different microorganisms + different combinations of nucleotides sequence; Codes for different amino acids + different polypeptides + different protein + + different enzymes; Since enzymes are protein in nature	Candidates should note the context of the question and write what they understood about DNA structure and provide description for protein synthesis.

Section B

Qn	Answer	Remarks												
6(a)(i)	 global natural rubber production in million metric tonnes (mmt) <table><thead><tr><th>Year</th><th>Production (mmt)</th></tr></thead><tbody><tr><td>2000</td><td>6.8</td></tr><tr><td>2004</td><td>8.5</td></tr><tr><td>2008</td><td>10.0</td></tr><tr><td>2012</td><td>11.5</td></tr><tr><td>2016</td><td>12.5</td></tr></tbody></table>	Year	Production (mmt)	2000	6.8	2004	8.5	2008	10.0	2012	11.5	2016	12.5	
Year	Production (mmt)													
2000	6.8													
2004	8.5													
2008	10.0													
2012	11.5													
2016	12.5													
(ii)	$(12.5 - 6.8)/6.8 \times 100 = 83.8\%$	Show working												
(b)	Replacing natural tropical rainforests will lead to a decrease in plant and animal biodiversity. It will also cause an unbalanced ecosystem, as plants and animals are removed and thus causing a change in the food chains/webs. Animals who depend on the plants that are removed may die due to a lack of food source and this may cause other organisms that depend on these animals to also lose their food source. The loss of biodiversity also results in the reduction is the natural and large gene pool which reduces the chances of survival of plants and animals in the rainforest. All these effects may cause extinction of plant and animal species.													
(c)	Phloem	Ensure accurate spelling												

7(a)	The afferent arteriole has a larger lumen than the efferent arteriole, thus more blood enters than leaves the glomerulus. This results in a high hydrostatic pressure which forces small molecules out of the bloodstream and into the Bowman's capsule by ultrafiltration. The basement membrane around the blood capillaries in the glomerulus are partially permeable. This allows only small molecules, such as glucose, amino acids, water and urea to diffuse out of the blood and into the Bowman's capsule to form the filtrate. Larger substances such as plasma proteins and blood cells are unable to pass through and remain in the bloodstream. The walls of the Bowman's capsule are one cell thick, which allow for faster diffusion of substances out of the blood to form the filtrate in the Bowman's capsule.	It is important to mention the molecules that are not able to pass through during ultrafiltration. It would be incorrect to refer to the wall of the Bowman's capsule as a cell wall or state that the <i>cells</i> are one cell thick.
(b)	1. Red blood cells would be present in the urine 2. White blood cells/ plasma proteins would be present in the urine	Specific components of blood should be mentioned. Increased presence of other molecules such as water or glucose were incorrect as these should already be removed from the blood during ultrafiltration and reabsorbed during selective reabsorption.

(c)(i)	Homeostasis is the maintenance of a constant internal environment through negative feedback. Negative feedback is a type of regulation in biological systems in which the any deviation from the reference point triggers corrective mechanisms that serve to eliminate that deviation by exerting an opposite direction to the initial change.	References to negative feedback and corrective mechanisms should be mentioned.
(ii)	Osmoregulation which is the regulation and maintenance of the water potential of the blood plasma by ADH.	It is incorrect to describe osmoregulation as the maintenance of water potential of cells/body.

8E(a)(i)	In the smoker, the walls of the alveoli have broken down, resulting in larger and fewer alveoli with a smaller surface area compared to a non smoker who has smaller alveoli. The walls of the alveoli in the smoker have holes compared to the non smoker that does not, thus further reducing the surface area.	References to the 'walls' of the alveoli should be stated, not just alveoli. Good answers state visible observations such as the size of the alveoli and the holes in the walls and make reference to surface area. Non observable descriptions such as elasticity and inflammation should not be stated.
(ii)	The larger alveoli with holes in the walls in the smoker reduces the surface area to volume ratio for the exchange of gases by diffusion. Less oxygen will diffuse into the blood/ red blood cells and be transported to the cells. Thus there is less oxygen available thus a lower rate of aerobic respiration at the cells resulting in less energy released. The person may feel tired due to lesser energy released. He may also suffer from muscle fatigue due to the increased production of lactic acid due to anaerobic respiration that occurs due to insufficient oxygen. His heart rate and breathing rate may increase to absorb and transport more oxygen to the cells quickly.	Students should be clear to state that less oxygen is transported by the blood to cells for aerobic respiration. Weak answers generalise the transport of oxygen as in the body, without being specific.

(b)	The person may have weight gain and suffer from obesity. Increased fats in the diet may cause fatty deposits on the walls of the coronary arteries. This will reduce the size of the lumen and may result in the formation of a clot in the coronary artery. Oxygenated blood will not be transport to the heart muscle cell below the clot. The cells will be unable to respire and release energy, thus causing the cells to die. This may lead to a heart attack/ coronary heart disease.	Formation of the fatty deposits on the inner walls of the coronary artery must be clear. The impact on the person's health should be stated.
8O(a)	The lens is responsible for focusing by refracting light onto the retina to form a clear image. For distant objects, the light rays are parallel. Thus the lens becomes thinner/less convex, refracting the light less to form a clear image. For near objects, the light rays are divergent. Thus the lens becomes thicker/ more convex, refracting light more to form a clear image.	The ability of the lens to change thickness should be clearly described.
(b)(i)	The nuclear cataract blocks the light from passing through the lens, thus preventing it from reaching the retina. This would cause a blurred image to be formed. The image would also be dimmer as less light rays can reach the retina.	It is important to mention that the light rays do not reach the retina.
(ii)	The study showed that 43% of diabetics formed cataracts but only 16% of non-diabetics formed cataracts. This shows that there is a higher risk (2.7 times more likely) for a person to form cataracts if he has diabetes. The limitations of the study would be that the sample sizes for the diabetic group and non-diabetic group are not equal; there are significantly more non-diabetics in the study compared to diabetics.	Student should quote data in the form of percentages instead of raw numbers. Suggestions for improvement are not required.