

Assessment Schedule – 2010

Human Biology: Describe functioning of human circulatory, respiratory and excretory systems (90178)

Evidence Statement

Q	Achievement	Achievement with Merit	Achievement with Excellence
ONE	Sufficiency: <i>Achieves 2 of a, b or c.</i>	<i>Explains any TWO effects from b and c. (Two Bullet Points)</i>	<i>Discusses c.</i>
(a)	Diagram must show and label a narrow lumen enclosed in a thick, muscular / elastic wall.		
(b)	ONE CORRECT ANSWER Eg: <ul style="list-style-type: none"> • Artery has high blood pressure, vein has lower blood pressure. • Artery wall has thicker band of elastic tissue than vein. • Artery has a narrower lumen than vein. Any answers to do with valves are irrelevant to the question	<i>Explains why the two vessels have different blood pressure:</i> <i>Links blood pressure to size of lumen and thickness of wall in arteries & veins.</i> <i>Eg (or equivalent):</i> <ul style="list-style-type: none"> • (m) Artery has high blood pressure because each heart beat causes blood to surge through an artery (narrower lumen / smaller diameter). The artery wall with its thick band of elastic tissue can expand to cope with the blood surges. Whereas veins don't have to cope with blood surges. Their blood pressure is lower because their thinner walls and wider lumen let blood flow back to the heart steadily. 	
(c)	ONE CORRECT ANSWER Eg: <ul style="list-style-type: none"> • Reduced blood flow in coronary arteries. • (causes) Damaged heart / CHD / heart attack. • Increased blood pressure / hypertension. • Faster heart beat. • Build up of fatty / plaque / cholesterol deposits in the blood vessels of the heart. (Note: effects must be heart related as per question.)	<ul style="list-style-type: none"> • (m) Reduction in diameter / narrower vessel of arteries reduces the flow of blood and elevates blood pressure as the heart has to work harder to keep the blood flowing . This causes damage to heart / CHD. • (m) Build up of plaque or clot formation in coronary arteries can cause heart attack / death if coronary artery blocked. 	<i>Elaborates both ideas in Merit into a comprehensive answer.</i> Answer must discuss: i) Reduction in diameter / narrower vessel of arteries reduces the flow of blood and elevates blood pressure as the heart has to work harder to keep the blood flowing. This causes damage to heart / CHD. <i>plus</i> ii) narrowing / blocking of coronary / heart arteries by plaque / fatty deposits / cholesterol causing a heart attack / damage to muscle tissue in the heart leading to death of tissue due to lack of oxygen. Note: arteries must be clearly related to heart.
TWO	Sufficiency : <i>Describes TWO correctly out of a, b, c, d.</i>	<i>Explains any TWO out of b, c or d. Two (m)s = M</i>	<i>Discusses d.</i>

(a)	<p>ONE OF:</p> <ul style="list-style-type: none"> Moist lining of walls for gases / oxygen/ carbon dioxide to dissolve/ diffuse across. Exchange of O₂ / CO₂ is more efficient / improved / better etc <p><i>Allow "easier"</i></p>		
(b)	<p>ONE OF:</p> <ul style="list-style-type: none"> Thin walls. Rapid diffusion. Short distance for diffusion / gas exchange or similar <p><i>Allow "easier"</i></p>	<p><i>Links short distance to rapid diffusion</i></p> <ul style="list-style-type: none"> (m) Being only one cell thick makes the walls thin so providing a short diffusion pathway / short distance so the gases can move rapidly across the wall/ membrane from lungs (air) to capillaries (blood) and vice versa. <p><i>Not "easier" for Merit</i></p>	
(c)	<p>ONE OF:</p> <ul style="list-style-type: none"> Walls folded to increase surface area allows larger amounts of diffusion/ gas exchange. Allows more rapid / quicker / easier more efficient gas exchange (or named gases) <p>Do not accept "air"</p>	<p><i>Links increase surface area to rapid / increased rate of diffusion</i></p> <ul style="list-style-type: none"> (m) Folding of the walls increases their surface area (over a smooth surface). This allows diffusion of larger amounts / of the gases / more efficient transfer across the wall/ membrane (in a set time period). <p><i>Not "easier" for Merit</i></p>	
(d)	<p><i>Gives features of the capillary network. No link to increasing rate.</i></p> <p>TWO OF :</p> <ul style="list-style-type: none"> Large numbers of capillaries Capillaries thin walled / one cell thick Capillaries close to alveoli wall Continuous / Fast blood flow in capillaries for transport of gases. Capillaries have a large surface area 	<p><i>Answers relate the features to increasing rate of gas exchange / rapid diffusion / improving amount of exchange in a certain time</i></p> <p>TWO of: = (m)</p> <ul style="list-style-type: none"> Large numbers of capillaries surround each alveolus to allow large amounts of diffusion in set time period. Capillaries are thin walled to provide a short distance (short diffusion pathway) for rapid diffusion of the gases. Capillaries cover alveolus wall so in very close contact to give short diffusion pathway/ distance so diffusion is rapid. Continuous / Fast flow of blood in capillaries assists rapid diffusion as concentration gradient maximised. Capillaries have a large surface area which allows for large amounts of diffusion 	<p>Elaborates any TWO ideas from Merit into a comprehensive answer.</p> <p><i>This means the two merit statements</i></p> <p><i>PLUS relating feature to maintaining a high concentration gradient</i></p> <p><i>PLUS uses an example of O₂ or CO₂ passing into or out of the capillary network respectively</i></p>

THREE	Sufficiency : <i>Describes TWO of part a, b or c.</i>	<i>Explains TWO ideas from b and c</i> OR <i>explains TWO ideas from c</i>	<i>Discusses c.</i>
(a)	<p>ONE OF:</p> <ul style="list-style-type: none"> • Removal of (toxic poisonous) wastes / urea produced by / from body (chemical reactions / metabolism). • Kidneys filtering blood to remove (toxic) wastes/ urea/ excess salts/ (excess) water..... • Removal of (toxic) CO₂ from lungs. <p>(Qu. does not specifically relate to kidneys)</p>		
(b)	<p><i>Idea of excess water removed from blood.... OR....into urine.....OR..... by kidneys..... OR.... into bladder</i></p> <p>ONE CORRECT STATEMENT</p> <p>Eg</p> <ul style="list-style-type: none"> • Kidney filters out excess water. • Excess / more water in bladder dilutes urine (colour). • More / excess water in Urine • Kidney only reabsorbed the water it needs. 	<p><i>Answer gives idea of regulating the amount of water in body / blood. Ie. answer must show understanding that because there is more water in the blood then less is reabsorbed (or similar).</i></p> <p>E.g:</p> <ul style="list-style-type: none"> • Kidney filters out the excess water from blood. Body / kidney only reabsorbs the water it needs. The rest/ excess water is stored in the bladder to produce a lot of dilute urine. <p>OR</p> <ul style="list-style-type: none"> • Blood has excess water (absorbed from gut). Pituitary Gland / brain monitors / measures this and decreases ADH production. Less filtrate water reabsorbed, more water makes up urine, urine more dilute. 	

<p>3(c)</p>	<p><i>TWO <u>simple</u> statement relating to how or why. Ihow +1 why statement</i></p> <p>Eg: “How”</p> <ul style="list-style-type: none"> • Blood fluid/ plasma from glomerulus/ capillaries has substances leaking/ moving/ filtering into Bowman’s Capsule. • Useful nurients / Water reabsorbed back into blood <p>“why”</p> <ul style="list-style-type: none"> • To remove (toxic) wastes / urea / excess salts from blood. • Homeostasis/ to maintain a constant internal environment. • To control levels of substances in body/ blood. <p>not “cleans”</p>	<p>For M:- Explains TWO ideas from:- the “hows” of <u>filtration</u> or <u>reabsorption</u> or <u>why</u> it must happen.</p> <p><i>Ihow + 1 why OR 2 hows</i></p> <p>NOTE: 1 m from 3c plus m from 3b = M overall for this question</p> <ul style="list-style-type: none"> • Diameter of blood vessel leading into glomerulus is larger than the blood vessel leaving the glomerulus. This sets up a high pressure inside the glomerulus of each nephron which filters / forces smaller molecules / name substances (except proteins and blood cells – too large) to move into the Bowman’s capsule. • Nephron filters blood →filtrate. Most of the small molecules such as glucose / aminoacids / hormones / salt ions are reabsorbed into surrounding capillaries / blood (around the kidney tubule) by diffusion and active transport <p>OR:</p> <p>Much of the water is reabsorbed by <u>osmosis</u> / changes in ADH making tubule more permeable to water passing back into the blood. (idea of change in amount of ADH alters amount of water reabsorbed Change does not need to be specific)</p> <p><i>Answers explain the “why” of filtration or re-absorption:</i> <i>Ie: ONE of:</i></p> <ul style="list-style-type: none"> • Body’s cells/ muscles’ activities produce waste products which end up in blood. Nephrons filter the (toxic) wastes to help the body maintain the correct levels of substances / correct concentration of chemicals (in blood), • Nephron filters out the excess salts/ water / urea to avoid these substances increasing to toxic levels in blood. • Nephron controls the level of substances in blood, eg salts/ water/ glucose to help the blood have the correct levels as these substances are required by cells for living processes/ respiration to occur. Hence much of the filtrate is reabsorbed. because the essential substances are needed <p><i>(OR similar answer.)</i></p>	<p><i>Elaborates the THREE ideas in Merit:</i></p> <p>A comprehensive answer should show a clear link between how filtration and re-absorption occurs and why wastes or excess substances in blood need to be filtered.</p> <p>Note: “why” needs to show understanding of both removal of toxic chemicals and maintaining correct balance of chemicals in the blood plus a link to body / cells being able to function correctly.</p> <p>Eg:</p> <ul style="list-style-type: none"> • Body’s cells/ muscles’ activities produce waste products which end up in blood. Nephrons filter the (toxic) wastes to help the body maintain the correct levels of substances / correct concentration of chemicals (in blood), <u>so the body can continue to function correctly.</u> • Nephron filters out the excess salts/ water / urea to avoid these substances increasing to toxic levels in blood. If blood levels become toxic, <u>body cells/ tissues / organs stop functioning.</u> • Nephron controls the level of substances in blood, eg salts/ water/ glucose to help the blood have the correct levels as these substances are required by cells for living processes/ respiration to occur. Hence much of the filtrate is reabsorbed. because the essential substances are needed <u>by the body/ cells/ tissues to function.</u> <p><i>(OR similar answer.)</i></p>
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<p>FOUR</p>	<p><i>Describes TWO benefits</i> <i>One benefit must relate to</i> 1) Lungs 2) Arteries / Veins or Heart</p> <p><i>This allows the question to cover both Question 1 and 2 in terms of sufficiency for the standard as the question covers both the respiratory and circulatory systems</i></p> <p><i>Eg:</i></p> <ul style="list-style-type: none"> • increased lung capacity • increased (rate) of gas exchange • reduced breathing rate • heart muscle stronger / fitter • heart pumps more efficiently • reduced pulse (rate)/ lower resting pulse • reduced work load for heart • maintains diameter of lumen in vessels for blood flow / improved blood flow • less build up of plaque on walls of vessels • improved venal flow in legs • blood pressure maintained / less likely to increase. 	<p><i>Explains TWO benefits, eg:</i></p> <ul style="list-style-type: none"> • Increased lung capacity increases volume of air inhaled/ exhaled so increasing the amount of gases/ oxygen and carbon dioxide brought to the gas exchange surfaces/ alveoli which maximizes gas exchange. • Greater lung capacity reduces the rate/ amount of breathing required (per time period) so reduces the workload of breathing muscles/ heart. • Increasing rate of gas exchange allows for increase in respiration so greater efficiency of energy release to body. • Stronger heart muscle allows for greater work load/ heart tires less quickly/ increased ability to pump blood with each beat/ pumps more efficiently so improving blood flow. • Pulse reduced as heart muscle stronger so beats less times per minute to transport same volume of blood. • Maintains diameter of lumen of vessels allows for more efficient blood flow/ increased supply of blood/ materials to/ from organs/ cells. Workload on heart reduced/ BP reduced so heart healthier. • Less build up of plaque improves/ maintains blood flow to organs / cells and improves/ maintains BP. Workload on heart reduced so healthier / stronger. • Improved venal flow facilitates return of blood to heart/ reduces risk of blood clots / formation of varicose veins. • Reduced BP reduces workload of heart so heart is healthier/ stronger and pumps more efficiently. • Strengthening of diaphragm / intercostals muscles makes G / E more efficient / increase because air into lungs. 	<p><i>Discussion that links / benefits of regular exercise to changes in function / structure for lungs, circulation, and heart in terms / related to improved blood flow and gas exchange.</i></p> <p><i>Eg:</i> Over time regular exercise will lead to less build up of plaque in blood vessels which improves blood flow to organs and reduces BP. Workload on heart reduced so it is healthier and stronger. Pulse reduced as heart muscle stronger so beats less times per minute to transport same volume of blood. Increased lung capacity increases volume of air inhaled / exhaled so increasing the amount of gases / oxygen and carbon dioxide brought to the gas exchange surfaces a which maximizes gas exchange.</p> <p><i>NOTE: All answers to this question must relate to the BENEFITS of exercise NOT describe / explain / discuss what happens to the systems DURING exercise.</i></p>
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Judgement Statement

Achievement	Achievement with Merit	Achievement with Excellence
3 A	1 M + 1 A	1 E + 1 A