

Gas exchange:

- 1) State 4 features of gas exchange surfaces which make them more efficient at diffusion? (4)
- 2) What is Fick's law and why is it important? (2)
- 3) Explain why unicellular organisms such as the amoeba do not require a specialised gas exchange surface? (2)
- 4) Explain the difference between gas exchange, ventilation and respiration? (3)
- 5) Why is the use of water as a respiratory medium a significant disadvantage compared to using air? (3)
- 6) What is the difference in gas exchange between bony and cartilaginous fish? (2)
- 7) Draw a simple labelled diagram of the fish gas exchange surface? (4)
- 8) What is counter-current flow and what are its advantages? Use a graph/diagram to help support your answer. (4)
- 9) What is the role of the operculum? (2)
- 10) Describe the ventilation mechanism which fish use to force water over the gill filaments? (4)
- 11) Why is it important to maintain a lower pressure in the opercular cavity than in the bucco-pharynx? (2)
- 12) What percentage of oxygen in the water are bony fish able to extract? (1)
- 13) What percentage of oxygen in the air are the human lungs able to extract? (1)
- 14) How many times less oxygen is there in the water compared to air? (1)
- 15) Describe the role of the spiracles, tracheae and tracheoles in insect gas exchange? (3)
- 16) What is the reason why insects have a rigid exoskeleton covered by a cuticle and air tubes lined with chitin? (2)
- 17) How do periods of flight and activity help insects to ventilate the tracheae? (2)
- 18) How does the gas exchange surface in insects restrict their size? (1)

- 19) Draw a labelled diagram of a leaf structure and using this, explain how the efficiency of gas exchange in plants is maximised? (4)
- 20) Describe the mechanism of stomatal opening and closing? (6)
- 21) State 2 adaptations of the guard cells? (2)
- 22) Which gas is overall released by the plant during the day and night and why? (2)
- 23) What is the reason why the stomata are located on the lower surface of leaves and why is the upper surface covered by a cuticle? (1)
- 24) Draw a labelled diagram of the human respiratory system? (5)
- 25) What is negative pressure breathing? (2)
- 26) What is the role of pleural fluid? (2)
- 27) What is surfactant and what is its role? (2)
- 28) Describe the changes which occur in normal inspiration and explain why it is an active process? (4)
- 29) Describe the changes which occur in normal expiration and explain why it is a passive process? (4)
- 30) What happens during forced expiration? (2)
- 31) Why are the external and internal intercostal muscles described as antagonistic? (1)
- 32) Using a labelled diagram of an alveolus with a surrounding blood capillary, explain how gas exchange takes place across the alveolar epithelium? (4)
- 33) What is the reason why the trachea, bronchi and bronchioles are supported by rings of cartilage? (2)
- 34) Why is human ventilation said to be tidal? (2)
- 35) Why are the bronchi and bronchioles lined by smooth muscle? (2)
- 36) What is a spirometer? (1)
- 37) What is the importance of the ventilation to perfusion ratio? (1)
- 38) What is the value of Total Lung Capacity for a healthy adult? (1)

- 39) Using a diagram, show and explain the following terms; (8)
- Tidal Volume
 - Vital Capacity
 - Inspiratory Capacity
 - Expiratory Reserve Volume
 - Inspiratory Reserve Volume
 - Residual Volume
 - Functional Residual Capacity
 - Total Lung Capacity
- 40) Why is it difficult to breathe at high altitudes? (2)
- 41) What is altitude sickness and give 3 symptoms? (2)
- 42) What is acclimatisation? (2) Which hormone increases due to this and why? (2)
- 43) How can the Gamow bag help with acute altitude sickness and high altitude training? (2)
- 44) Explain why advanced multicellular organisms need the following;
- A pigment in the blood (2)
 - An internal transport system (2)
 - A ventilation mechanism (2)
- 45) Birds, reptiles and humans have internal lungs. What are the advantages of this? (3)
- 46) Why is the gas exchange of reptiles such as lizards more efficient on land than that of amphibians such as frogs? (2)
- 47) Explain how gas exchange in birds is made more efficient by flying, movement of the ribs and having air sacs which function as bellows? (3)

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