# Answers to examination-style questions

| Answers | Marks | Examiner's tips |
|---|---|---|
| **1 (a)** *intercostal* muscle; | **1** | Allow reference to either external or internal muscle. |
| **(b) (i)** muscle contracts pulling ribs upwards and outwards;<br>volume of thorax increased;<br>pressure in thorax decreased below atmospheric pressure; | **3** | First mark not awarded if contraction is linked to internal intercostal muscles. The rib cage does not expand! |
| **(ii)** maintain/greater diffusion/ concentration gradient;<br>continuous *diffusion*/faster *diffusion*; | **2** | This question specifically refers to the **rate** of gaseous exchange so the second mark point is essential for a complete explanation. |
| **2 (a)** contraction of diaphragm muscles flattens diaphragm;<br>contraction of external intercostal muscles pulls ribs upwards and outwards;<br>volume of thorax increased;<br>pressure in thorax decreased below atmospheric pressure; | **4** | Ensure you refer to the ***muscles*** of the diaphragm and to the ***external*** intercostal muscles. |
| **(b) (i)** tidal volume increases steeply, then the increase slows down after 10 to 15 km $h^{-1}$; | **1** | Ensure you use the figures from the graph when describing where any change occurs. |
| **(ii)** breathing rate increases slowly then steeply after 10 to 15 km $h^{-1}$; | **1** | For 1 mark maximum, reference should be made to the speed at which the change occurs in both **(i)** and **(ii)**. |
| **(c)** 20 × 2.75 = 55 $dm^3$ $min^{-1}$; | **2** | Correct answer = 2 marks. Correct method (i.e. tidal volume × breathing rate) = 1 mark. It is always important to show your working in case you make a mistake. |
| **3 (a) (i)** 6 litres; | **1** | Volume taken in during one breath = 500 $cm^3$ × 12 (breaths per minute) = 6 $dm^3$. |
| **(ii)** increase amount of air breathed in/out per breath and increase in breathing rate; | **1** | Allow increase in depth of breathing for first idea. |
| **(b)** muscle of diaphragm contracts and flattens;<br>increases volume in thorax/lungs;<br>causes decrease in air pressure in lungs; | **3** | There is no need to refer to the intercostal muscles. The question only refers to the role of the diaphragm. |
| **(c)** increase in percentage of water vapour;<br>allow increase in percentage of carbon dioxide; | **1 max** | The volume of nitrogen is the same in inhaled and exhaled air. Its percentage decreases due to the greater volume of water in exhaled air. |

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| **(d) (i)** trachea, bronchus, bronchioles; | **1** | |
| **(ii)** large surface area;<br>linked to diffusion;<br>single epithelial layer;<br>short diffusion pathway; | **4** | Referring to moisture in the alveolus will not be credited. |
| **4 (a)** walls of alveoli broken down/fewer alveoli present;<br>smaller surface area for diffusion;<br>reduced elasticity;<br>ventilation restriction;<br>scar tissue formed; | **4** | You must be precise in your answers. For example you must refer to the surface **area** to gain the second mark point. |
| **(b)** smoking;<br>infection, e.g. bronchitis;<br>heredity;<br>inhalation of particles linked to pollution; | **2 max** | |
| **(c)** emphysema is not an allergic reaction, asthma is;<br>emphysema affects alveoli;<br>asthma affects bronchi/bronchioles;<br>asthma involves inflammation; | **3 max** | Ensure you specifically name the disease when describing each difference. |
| **5 (a)** droplets;<br>in the air; | **2** | References to coughing or sneezing should be linked to the release of droplets. |
| **(b)** any 2 from – persistent cough;<br>fatigue;<br>weight loss;<br>coughing up blood; | **2 max** | |
| **(c) (i)** any 2 from –<br>mutation/new strain (of bacterium);<br>immigration;<br>reduced vaccination;<br>increase in social deprivation; | **2** | One of the main factors has been the immigration of infected individuals. |
| **(ii)** 18.24/18.25%;<br>(8113 minus 6861 divided by 6861) × 100; | **2** | Correct answer = 2 marks. Correct method = 1 mark. |
| **6 (a)** shortness of breath;<br>chronic dry cough;<br>chest pain;<br>fatigue; | **2 max** | |

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| **(b)** reduces elasticity of the lungs;<br>reduces exhalation/ventilation;<br>epithelium thickened/scar tissue lining alveoli;<br>increases diffusion pathway;<br>reduced gaseous exchange; | **4 max** | You should describe the changes in the lung tissues and then explain how these affect the function of the lungs. |
| **(c)** **(i)** large number in sample;<br>equal number of males and females in each group;<br>similar age;<br>similar life style linked to other risks;<br>healthy/no medical problems; | **3 max** | These are the main factors scientists would look at. There are other factors which would be credited. |
| **(ii)** correlation indicates link between number of cigarettes smoked and incidence of emphysema;<br>does not show that smoking is the direct cause of emphysema; | **2** | Surveys often enable correlations to be established. Causal relationships require investigations to provide scientific evidence. |