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; volume of thorax increased; 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; 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; contraction of external intercostal muscles pulls ribs upwards and outwards; volume of thorax increased; 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) $20 \times 2.75 = 55\ dm^3\ min^{-1}$;	**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; increases volume in thorax/lungs; 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; 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; linked to diffusion; single epithelial layer; short diffusion pathway;	**4**	Referring to moisture in the alveolus will not be credited.
4 (a) walls of alveoli broken down/fewer alveoli present; smaller surface area for diffusion; reduced elasticity; ventilation restriction; 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; infection, e.g. bronchitis; heredity; inhalation of particles linked to pollution;	**2 max**	
(c) emphysema is not an allergic reaction, asthma is; emphysema affects alveoli; asthma affects bronchi/bronchioles; asthma involves inflammation;	**3 max**	Ensure you specifically name the disease when describing each difference.
5 (a) droplets; in the air;	**2**	References to coughing or sneezing should be linked to the release of droplets.
(b) any 2 from – persistent cough; fatigue; weight loss; coughing up blood;	**2 max**	
(c) (i) any 2 from – mutation/new strain (of bacterium); immigration; reduced vaccination; increase in social deprivation;	**2**	One of the main factors has been the immigration of infected individuals.
(ii) 18.24/18.25%; (8113 minus 6861 divided by 6861) × 100;	**2**	Correct answer = 2 marks. Correct method = 1 mark.
6 (a) shortness of breath; chronic dry cough; chest pain; fatigue;	**2 max**	

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(b) reduces elasticity of the lungs; reduces exhalation/ventilation; epithelium thickened/scar tissue lining alveoli; increases diffusion pathway; 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; equal number of males and females in each group; similar age; similar life style linked to other risks; 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; 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.