<table>
<tr><th>Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>1 (a)</td><td>
<table>
<tr><th>function</th><th>letter</th><th>name</th></tr>
<tr><td>structure that makes sounds</td><td>A</td><td>larynx</td></tr>
<tr><td>bone that provides protection for the lungs</td><td>E</td><td>rib ;</td></tr>
<tr><td>airway that allows passage of air only into the right lung</td><td>J</td><td>bronchus ;</td></tr>
<tr><td>airway that allows passage of air into both lungs</td><td>B</td><td>trachea ;</td></tr>
<tr><td>contracts to increase the volume of the thorax</td><td>F/G</td><td>(F) diaphragm / (G) external intercostal muscle ;</td></tr>
<tr><td>muscle that contracts to lower the ribcage</td><td>K</td><td>internal intercostal muscles ;</td></tr>
<tr><td>site of gas exchange</td><td>M</td><td>alveoli ;</td></tr>
</table>
</td><td>[6]</td><td></td></tr>
<tr><td>(b)</td><td>keeps, airways / trachea / bronchi, open ;
allows (free flow of) air into (the lungs) ;
allows flexibility / can breathe even when, bent / swallowing / AW ;
AVP ;</td><td>[max 2]</td><td>I protection</td></tr>
<tr><td>(c) (i)</td><td>(aerobic) respiration ;</td><td>[1]</td><td>R anaerobic respiration</td></tr>
<tr><td>(ii)</td><td>rate (of breathing) increases ;</td><td>[1]</td><td>R it increase
A it’s faster / deeper</td></tr>
</table>

Question			Mark	Guidance
1	(iii)	stimulus (is CO_2) ; **A** acidic / pH, of blood decreases ; (CO_2 / pH) detected by the brain ; by a receptor ; ref to (named) neurone in context ; brain sends impulses to, (intercostal) muscles / diaphragm / effectors ; (intercostal) muscles / diaphragm / effectors, contract more (frequently) ; negative feedback / homeostasis ; reflex / automatic / involuntary ;	[max 3]	
			[Total: 13]	

Question	Expected Answers		Marks	Additional Guidance
2 **(a) (i)**	bronchus / bronchiole(s) **;**		[1]	
(ii)	**1** **2** **3** **4**	goblet cells, release / produce, mucus **;** mucus traps, dirt / particles / pathogens **;** cilia, beat / AW **;** to move, fluid / AW, up / out (of airway) **;**	max [3]	**R** 'cilia trap dirt'
(b) (i)	**1** **2** **3** **4**	diffusion **;** across (cell / permeable) membranes **;** high concentration to low concentration (of O_2) / down concentration gradient **;** moist lining / AW / O_2 is dissolved **;**	max [3]	
(b) (ii)	**1** **2** **3** **4** **5** **6** **7** **8**	<u>external</u> intercostal muscles contract **;** <u>internal</u> intercostal muscles relax **;** lifts ribs, upwards / outwards **;** diaphragm contracts **;** diaphragm, flattens / drops **;** volume of, thorax / lungs / chest, increases **;** pressure in, thorax / lungs / chest, decreases **;** air flows in down a pressure gradient **;**	max [4]	**A** ribcage expands
(iii)	carbon dioxide **;** water <u>vapour</u> **;**		max [1]	

Question		Expected Answers	Marks	Additional Guidance
2 **(c)**	**1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11**	tar / carcinogens **;** carcinogenic / can cause, lung cancer **;** sticks to / blocks / damages, (named) air passages / alveoli / cilia **;** (trigger) production of, more / excess, mucus **;** (smoke) particles **;** trigger white blood cells **;** irritant / causes asthma / prone to infection **;** phagocytosis described **;** carbon monoxide **;** combines with haemoglobin (permanently) **;** reduced oxygen transport (of blood) **;**	max [4]	*component must be linked to correct effect*
			[Total: 16]	

3 **(a (i)**	*award two marks if the answer is correct – 12* *if there is no answer or it is incorrect, award one mark for correct working* 6 s – 1s = 5 seconds for 1 breath ; 60 / 5 = 12 (breaths per minute) ;	max [2]	Alternative: 4 s – 9 s = 5 s for 1 breath Allow 10 s for 2 breaths for working mark.
(ii)	slower breathing rate before match ; **ora** deeper breathing during match ; **ora** during the match breaths are different from each other ; **ora** pressure (in lungs) increases during the match ;	max [3]	
(b)	external intercostal muscles contract ; internal intercostal muscles relax ; lifts ribs, upwards / outwards ; diaphragm contracts ; diaphragm, flattens / drops ; volume of, thorax / lungs / chest, increases ; pressure in, thorax / lungs / chest, decreases ; air flows in down a pressure gradient / description ;	max [4]	Note: internal and external must be stated
(c) (i)	(CO_2) is metabolic / AW, waste ; (CO_2) is toxic ;	max [1]	**ignore** – from body (in question stem)
(ii)	(blood) plasma ;	[1]	
(iii)	pH decreases / becomes acidic ;	[1]	
(d)	more, (aerobic) respiration ; steeper concentration gradient ;	[2]	**A** description of gradient.
		[Total: 14]	

4 **(a)**	diaphragm <u>contracts</u> and, lowers / flattens / AW; rib cage rises / moves, upwards / outwards; external intercostal muscles <u>contract</u>;	**max 3**	**A** increases in volume / expands
(b)	pH decreases; increased rate of aerobic respiration; more carbon dioxide (into blood plasma); forms (carbonic) acid; anaerobic respiration occurs (during strenuous exercise); lactic acid produced;	**max 3**	idea of <u>more</u> needs to be apparent at least once for **MP2** and **MP3** **A** carbon dioxide is acidic
		[Total: 6]	