

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

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)	<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/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]	

