12. Respiration

12.3 Anaerobic respiration

Paper 3 and 4

Marking Scheme

Q1.

(a)(i)	carbon dioxide ;	1	
(a)(ii)	respiration ;	1	**A** fermentation
(b)	biofuels / AVP ;	1	

Q2.

(a)	*'Anaerobic respiration in yeast' linked to:* breaks down nutrient molecules. ; is a chemical reaction. ; releases less energy than aerobic respiration. ;	3	**R** each additional line
(b)	*any two from:* bread (making) ; ethanol / alcohol ; biofuels ;	2	
(c)	0.02 (cm^3 per s) ;;	2	MP1 correct calculation to any number of decimal places MP2 correct rounding to two decimal places ecf from incorrect MP1

Q3.

(a)	breaks down ; oxygen ; less ; molecule ; lactic acid ;	5	
(b)	alcohol / ethanol ; carbon dioxide ;	2	either order

Q4.

(a)	lactic acid / lactate ;	1	
(b)(i)	2754 (kJ) ;	1	
(b)(ii)	glucose + oxygen ; → carbon dioxide + water ;	2	
(c)(i)	**A** ; **F** ; **G** ; **C** ;	4	MP2 and MP3 can be in either order
(c)(ii)	carbon dioxide ;	1	
(c)(iii)	bread-making / AVP ;	1	

Q5.

(a)(i)	7.4 (g) ; 300 (minutes) ;	**2**	
(a)(ii)	mass decreases / no carbon dioxide is produced ; enzymes inactive / yeast killed or destroyed ;	**2**	
(a)(iii)	alcohol / ethanol ;	**1**	

Q6.

(a)	a chemical reaction in a cell ✓ breaks down nutrient molecules ✓ coordinates and regulates body functions does **not** use oxygen ✓ affects reaction times and self-control produces alcohol and carbon dioxide in yeast ✓ uses carbon dioxide uses oxygen ;;;;	**4**	one mark for each correct tick. **R** each additional tick
(b)	lactic acid ;	**1**	

Q7.

(a)(i)	maltose ;	**1**
(a)(ii)	32 (cm^3) ;	**1**
(b)	increased (volume of carbon dioxide) ;	**1**
(c)	*any two from:* bread-making ; making, alcohol / ethanol ; biofuels ; AVP ;;	**2**

(d)	*similarities:* both release energy ; both require glucose ; both produce carbon dioxide ; *differences:* **ora** throughout anaerobic respiration does not requires oxygen ; anaerobic respiration releases less energy (per glucose molecule) ; anaerobic respiration in yeast produces ethanol ; aerobic respiration in humans produces water ;	**4**
(e)	glucose ; → lactic acid ;	**2**

Q8.

(a)	both use glucose ; both occur in cells ; aerobic respiration uses oxygen ; **ora** aerobic respiration releases <u>more</u> energy (than anaerobic respiration) ; **ora** anaerobic respiration produces lactic acid ; **ora** aerobic respiration produces carbon dioxide ; **ora**	**4**	

(c)	*Alcohol linked to:* can be addictive (box 2) ; increases reaction times (box 5) ; is a depressant (box 6) ;	**3**	
(d)	liver / brain / pancreas / heart / stomach ;	**1**	

Q9.

(e)(i)	glucose → lactic acid ;	**1**	
(e)(ii)	releases more energy ;	**1**	

Q10.

(d)	bread / baking / making dough rise ; brewing / producing alcohol ; biofuels production / use of alcohol as a fuel ; AVP ;	**2**	

Q11.

(a)(i)	3 ; 1 **and** 3 ;	**2**	
(a)(ii)	$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$;;	**2**	MP1 correct formulae MP2 correct balancing (of correct formulae)
(a)(iii)	amylase ; maltase ;	**2**	either order

(b)(i)	muscle ;	**1**	

(b)(ii)	*any two from:* continuation of deeper breathing / faster breathing / AW ; continuation of fast heart rate / AW ; *idea of* delivering oxygen for the breakdown of lactic acid / delivering lactic acid to the liver to be broken down ;	**2**	
(b)(iii)	liver ;	**1**	

Q12.

(a)	*gap1:* 7.07 (to) *gap 2:* 6.55 ; (enough) *gap 3:* oxygen / oxygenated blood *gap 4:* (an) oxygen (debt) ; *gap 5:* any time between 31 and 32 (minutes) ; *gap 6:* blood(stream) / (blood) plasma ; *gap 7:* liver ; *gap 8:* heart / pulse ;	**6**	
(b)(i)	$(C_6H_{12}O_6) \rightarrow 2C_2H_5OH + 2CO_2$;;	**2**	MP1 for formulae MP2 for balancing
(b)(ii)	cell wall / (large) vacuole / plasmid(s) ;	**1**	

Q13.

(a)(i)	$C_6H_{12}O_6$; $\longrightarrow 2C_2H_5OH + 2CO_2$;	**2**	

Q14.

(b)(i)	flour / starch / sugar / glucose / sucrose / carbohydrate ;	1	
(b)(ii)	respiration ;	1	
(b)(iii)	carbon dioxide ;	1	

Q15.

(c)	demand for, energy / oxygen, increases ; (rate of) respiration increases ; limited supply of oxygen to muscle (tissue) ; *idea that* heart / pulse / breathing, rate not increased enough ; muscles respire anaerobically ; lactic acid is produced ;	3	
(d)	horses continue to breathe, at high rate / deeper ; continue with a high, heart / pulse, rate ; to provide, enough / AW, oxygen (to 'pay-off' the debt) ; lactic acid, moves / diffuses / AW, (from muscle) into blood ; lactic acid transported to the liver ; (in the liver) lactic acid is, broken down / oxidised / respired (aerobically) ;	4	