Respiration

Mark Scheme 1

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Respiration
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 1

Time Allowed: **51 minutes**

Score: **/42**

Percentage: **/100**

Question		Mark	Additional Guidance
1 (a) (i)	4.4 ($cm^3 kg^{-1} min^{-1}$) ;	[1]	
(ii)	increase and decrease (after a lag) ; rapid / sudden / immediate / sharp / dramatic / AW, increase ; remains constant / reaches a plateau / flat lines / AW ; more gradual decrease ; returns to, resting / original / AW / 4.4 ($cm^3 kg^{-1} min^{-1}$) ; any data quote with time and oxygen uptake with units for both	max [4]	e.g. maximum uptake is 18 $cm^3 kg^{-1} min^{-1}$ between 8 and 13 minutes
(iii)	increase in <u>muscle</u> contraction / <u>muscles</u> contract more or faster ; increase in demand for, energy / ATP ; increase in (rate of) <u>respiration</u> ; ref to <u>aerobic respiration</u> ; heart beats faster / faster pulse rate ; increase in, depth / rate, of breathing ; *idea that* body / muscles, needs more oxygen ; prevents / reduces, anaerobic respiration / build-up of lactic acid ; AVP ; e.g. release of adrenaline / uptake reaches maximum possible / ref to maximum lung capacity	max [4]	**R** 'produce / create / make, energy' **A** high rate of <u>respiration</u> **A** correct balanced equation
(b) (i)	$\frac{170}{100} \times 100 =$; 170 ;;	max [2]	
(ii)	(during faster exercise) more energy needed when running faster / there is a faster rate of respiration ; oxygen not supplied fast enough (from lung / heart) ; <u>anaerobic respiration</u> occurred during exercise ; lactic acid is produced ; cannot be broken down in muscle ; (so) diffuses / passes, from muscle into blood ;	max [3]	**A ora**
		[Total: 14]	

2 **(a)**	increased blood flow *or* heart, pumps / beats, faster ; more, oxygen / glucose (for muscles) / carbon dioxide removed ; more energy released by respiration ; for muscle contraction ;	max [2]	**ignore** increased, pulse rate / heart rate **R** 'energy produced' / 'energy created'
(b)	increase in, time / exercise intensity / effort, increase in lactic acid concentration ; increase is, steady / proportional ; after exercise lactic acid concentration continues to increase ; after exercise / near end of exercise, concentration levels off / AW ; appropriate use of data ;	max [3]	units must be used at least once
(c) (i)	the release of a relatively small amount of energy ; by the breakdown of glucose ; in the absence of oxygen / without oxygen ;	max [2]	**R** 'produce / AW, energy' **ignore** 'use' unqualified **ignore** air / fermentation unqualified
(ii)	(by) diffusion ;	[1]	
(iii)	(blood) plasma ;	[1	
(d)	*in trained cyclists* lower <u>anaerobic</u> respiration / more <u>aerobic</u> respiration ; less lactic acid produced (during exercise) ; because more oxygen supplied to muscles ; less <u>oxygen debt</u> ; less oxygen required, to oxidise / breakdown, lactic acid ; (breakdown) to glucose / carbon dioxide and water ; quicker, removal / breakdown, of lactic acid ; appropriate comparative data quote with units ;	max [4]	
		[Total: 13]	

3 **(a)**		(chemical) <u>reactions</u> that breakdown, (named) nutrient(s) **;** to, release / transfer, energy **;** inside cells **;**	max [2]	**R** produces / creates / AW, energy
(b)		biceps contracts **;** pulls on forearm / radius **;** ref to the tendon **;** bends / flexes, the arm **;** triceps relaxes **;**	max [3]	
(c) **(i)**		increase in muscle contraction **;** increase in demand for, energy / ATP **;** increase in rate of respiration **;** <u>aerobic</u> respiration **;** heart beats faster / breathes faster *or* breathes deeper **;**	max [4]	*For MP1, 2 and 3 'more' / increase must be given at least once*
(ii)		line decreases immediately at 20 min **;** line reaches 0.2 $dm^3 min^{-1}$ at 30 min **;**	[2]	
(iii)	**1** **2** **3** **4** **5** **6** **7** **8**	<u>oxygen debt</u> **;** (during exercise) oxygen not supplied fast enough (from lung / heart) **;** to muscles **;** <u>anaerobic</u> respiration occurred during exercise **;** lactic acid produced **;** builds up in muscle / not carried away fast enough in blood **;** extra oxygen required after exercise **;** lactic acid is, broken down / respired / oxidised / converted to glucose **;**	max [4]	