

Question	Expected Answers	Marks	Additional Guidance
<p><b>1 (d)</b></p> <p><b>1</b> <u>vasoconstriction</u>;</p> <p><b>2</b> (constriction / AW) of arterioles ; <b>A</b> arteries</p> <p><b>3</b> decrease in supply of blood to skin capillaries ;</p> <p><b>4</b> ref. to shunt vessels ;</p> <p><b>5</b> to increase supply of blood to <u>muscles</u> ;</p> <p><b>6</b> no / little sweat ;</p> <p><i>later as body temperature increases</i></p> <p><b>7</b> <u>vasodilation</u> ;</p> <p><b>8</b> (relaxation / AW) of arterioles ; <b>A</b> arteries</p> <p><b>9</b> increase in supply of blood to skin capillaries ;</p> <p><b>10</b> (causes) loss of heat ;</p> <p><b>11</b> by, conduction / convection / radiation ;</p> <p><b>12</b> increase in blood flow to sweat glands ;</p> <p><b>13</b> increase production of sweat ;</p> <p><b>14</b> loss of heat by evaporation ;</p>		<p>[max 5]</p>	<p><b>NB:</b> All marks should be qualified by reference to stage of the run</p> <p><b>R</b> constriction of capillaries / blood vessels / veins</p> <p><b>R</b> constriction of capillaries / blood vessels / veins</p>
<b>[Total:14]</b>			

Question	E	Answers	Marks	Additional Guidance
2	(a)	$C_6H_{12}O_6 + O_2 ;$ $\rightarrow CO_2 + H_2O ;$ $6O_2, 6CO_2, 6H_2O ;$	3	<i>marks for:</i>  correct formulae for glucose and oxygen correct formulae for carbon dioxide and water balancing the equation  <b>ignore</b> word equation
	(b)	1 temperature ; 2 mass of soda lime ; 3 volume of air in the syringe ; 4 volume / size, of syringe ; 5 mass of seeds ; 6 <i>idea of reading from same edge of droplet (each time) ;</i>	max 3	<b>A</b> amount  <b>A</b> 'number / size'
	(c)	(i) 1 moves to the right / towards seeds / syringe ; 2 seeds absorb oxygen ; 3 give out carbon dioxide, absorbed by soda lime ; 4 volume of, air / gas, decreases ; 5 pressure of, air / gas, decreases ;	max 3	
	(c)	(ii) 1 slows down / stops ; 2 rate of respiration decreased ; 3 oxygen being used up / AW ; 4 aerobic respiration slows / ref. to anaerobic respiration ;	max 2	<b>A</b> aerobic respiration stops <b>R</b> respiration (unqualified) stops
			<b>[Total: 11]</b>	

Question	E	Answers	Marks	Additional Guidance
3 (a)		release of energy, from, food / named food ; with oxygen ;	[2]	<b>A</b> word / chemical, equation (even if not balanced) for 1 mark <b>R</b> produce / create
(b)	1 2 3 4 5	external intercostal muscles contract ; ribcage raised ; <b>A</b> 'expands' volume of, thorax / chest / lungs, increases ; pressure of air decreases ; pressure of atmospheric air is greater than air in lungs ;	[max 4]	MPs 1 and 2 ignore diaphragm <b>A</b> space / size allow MPs 3–5 if in context of diaphragm
(c)	1 2 3 4	(external) intercostal muscles relax ; ribs, fall / move in and down ; <u>internal</u> intercostal muscles contract ; ref. to elasticity of lungs ;	[max 2]	<b>R</b> refs. to diaphragm
(d) (i)		70 ;	[1]	if answer not in Table 3.1 <b>A</b> elsewhere
(ii)	1 2 3 4 5 6 7 8 9 10 11 12 13	requires <u>more</u> oxygen ; oxygen debt ; lactic acid produced during exercise ; (as a result of) anaerobic respiration ; not enough oxygen supplied, to muscles (during running) ; lactic acid lowers pH of blood ; high concentration of carbon dioxide in blood ; from aerobic respiration ; (carbon dioxide) detected by, brain / receptors ; (carbon dioxide) stimulates high ventilation rate ; (carbon dioxide) increases depth of breathing ; lactic acid is, broken down / respired / converted to glucose ; ref. to homeostasis ;	[max 5]	<b>A</b> lactate for lactic acid throughout the answer  <b>A</b> 'need to remove carbon dioxide'
			<b>[Total: 14]</b>	

Question	E	Answers	Marks	Additional Guidance
4 (a)		$C_6H_{12}O_6$ ; $2C_3H_6O_3$ ;	[2]	I word equation I energy / ATP R if 2 is not included for $C_3H_6O_3$ R glucose if oxygen included on left of arrow R if water given on either side
(b)		2.0 / 2 ; 18 ; 36 ;	[3]	A <i>ecf</i> for volume of air per minute = multiple of first two figures in answer
(c)	1	descriptive comment on difference between Fig. 3.1 and 3.2 ; A data quote for any one of the results shown in Table 3.1	[max 5]	breathing rate, volume of air, ventilation rate e.g. breathe, fast / faster, deeper R heavier  A more respiration NOT more glucose R 'energy produced'  MP8 – MP10 must have idea of maintaining near constant  MP11–13 R refs. to there being an oxygen debt and paying off oxygen debt as question is about <i>during exercise</i> not afterwards, other points especially MP1 to 7 can still be awarded if answer contains refs to oxygen debt unless answer says 'after exercise'
	2	<u>muscle</u> ;		
	3	respires faster ; R breathes faster (as this is for MP1)		
	4	<i>idea that</i> more, energy / ATP, released / needed ;		
	5	<u>aerobic</u> respiration ;		
	6	<i>idea that</i> requires more oxygen ; A ref to more <u>oxygenated</u> blood		
	7	<i>idea that</i> remove more carbon dioxide ;  <i>change to breathing maintains</i>		
	8	pH of blood ;		
	9	oxygen concentration ;		
	10	carbon dioxide concentration ;		
	11	prevents (much) <u>anaerobic</u> respiration occurring ;		
	12	prevents build up of, lactic acid / lactate ; R removes		
	13	prevents oxygen debt ; R repays		
	14	AVP ; e.g. ref. to homeostasis, contraction of muscle		

Question	E Answers	Marks	Additional Guidance
4 (d)	<p><i>mark both parts together to max 5 – some points may be awarded in either section</i></p> <p><b>1</b> <u>more</u> / <u>faster</u> , respiration in muscles ; <i>pulse rate</i></p> <p><b>2</b> pulse rate increases ;  <b>3</b> <i>idea that</i> more / faster, blood transport to, muscles / lungs ;  <b>4</b> <i>idea that</i> muscle requires more oxygen ;  <b>5</b> remove, carbon dioxide from muscles ;  <b>6</b> remove, lactic acid / lactate, from muscles ;  <b>7</b> remove heat from muscles ;</p> <p><i>concentration of glucose</i></p> <p><b>8</b> concentration of blood glucose, increases / stays the same ;  <b>9</b> glucose required for, energy / respiration ;  <b>10</b> for muscle, activity / contraction / to work ;</p>	[max 5]	<p><b>A</b> heart pumps faster  <b>R</b> 'to body'</p> <p><b>I</b> – (strenuous) exercise</p>
<b>[Total: 15]</b>			