

- 1 (a) (A) ciliary (muscle/body);  
 (B) pupil + becomes smaller/constricts; (R) narrower  
 (R) controls amount of light entering  
 (A) less light enters eye (A) makes iris larger/width increases [2]

- (b)(i) (voluntary)  
 can be controlled (by will)/involves a decision or thought/not automatic;  
 (A) control by brain (R) conscious (R) knowingly  
 (antagonistic)  
 ref. to opposing/working against each other/one contracts while the other relaxes AW; [2]

- (ii) CHECK FOR ARROWS OR ANNOTATIONS ON FIG. 2.1  
 ref. to eye ball pulled to the right AW; (A) clockwise (R) up  
 (A) outwards/towards muscle C [1]

- (iii) ref. to contraction AW of muscle D + relaxation of muscle C;  
 D pulls on eyeball AW;  
 C is antagonistic to D; [max. 2]

- (c) 2 MARKS FOR CORRECT ORDER  
 1 MARK FOR TWO INCORRECT  
 cornea aqueous humour pupil lens vitreous humour; ; [2]

(d)

	type of light detected	distribution in the retina
rods	ref. to shades of grey/ dim light/black and white/low light intensity; (A) night/dark/white	ref. to spread over (retina); (A) more concentrated on margins (R) on sides unequal.
cones	ref. to colour/bright light/ high light intensity/day(light); (A) single named colour	ref. to in fovea/yellow spot;

[4]

.....  
**Total: 13]**  
 .....

- 2 (a) (i) pupil drawn in both diagrams + smaller in first diagram ;  
iris in both diagrams the same diameter ; [2]
- (ii) labels correct for:  
iris ;  
pupil ;  
sclera ; [3]
- (b) (pupils gets bigger)  
ref. to contraction + of radial muscles ;  
ref. to relaxation of circular muscles ; [2]
- (c) ref. to role of rods in detecting black and white images AW ;  
ref. to sensitivity even in low light intensities AW ;  
ref. to role of cones in detecting colour AW ;  
ref. to cones needing high light intensity to trigger them AW ; [max. 3]
- [max. 10]

Question	Answer			Mark	Additional Guidance																		
3 (a) (i)	<b>G</b> oesophagus/esophagus/gullet ; <b>H</b> diaphragm ; <b>M</b> large intestine /large bowel /colon ;			[3]	<b>R</b> intestine unqualified /rectum																		
(ii)	<table border="1" data-bbox="338 402 1261 1062"> <thead> <tr> <th data-bbox="338 402 660 500">function</th> <th data-bbox="660 402 985 500">name</th> <th data-bbox="985 402 1261 500">letter from Fig. 3.1</th> </tr> </thead> <tbody> <tr> <td data-bbox="338 500 660 633">conversion of glucose to glycogen</td> <td data-bbox="660 500 985 633">liver</td> <td data-bbox="985 500 1261 633"><b>P</b> ;</td> </tr> <tr> <td data-bbox="338 633 660 733">secretion of insulin and glucagon</td> <td data-bbox="660 633 985 733">pancreas</td> <td data-bbox="985 633 1261 733"><b>K</b></td> </tr> <tr> <td data-bbox="338 733 660 866">absorption of products of digestion</td> <td data-bbox="660 733 985 866">ileum /small intestine</td> <td data-bbox="985 733 1261 866"><b>L</b> ;</td> </tr> <tr> <td data-bbox="338 866 660 967">storage of bile</td> <td data-bbox="660 866 985 967">gall bladder</td> <td data-bbox="985 866 1261 967"><b>O</b> ;</td> </tr> <tr> <td data-bbox="338 967 660 1062">chemical digestion of protein in an acidic pH</td> <td data-bbox="660 967 985 1062">stomach</td> <td data-bbox="985 967 1261 1062"><b>J</b> ;</td> </tr> </tbody> </table>			function	name	letter from Fig. 3.1	conversion of glucose to glycogen	liver	<b>P</b> ;	secretion of insulin and glucagon	pancreas	<b>K</b>	absorption of products of digestion	ileum /small intestine	<b>L</b> ;	storage of bile	gall bladder	<b>O</b> ;	chemical digestion of protein in an acidic pH	stomach	<b>J</b> ;	[4]	ignore bile duct
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Question		Mark	Additional Guidance									
3 (b) (i)	emulsification / emulsifying (fat) / producing an emulsion ;	[1]	R 'emulsion' unqualified									
(ii)	increases surface area ; for action of, lipase / enzyme(s) ;	[2]	A speeds up, enzyme reaction / breakdown of fat / absorption of fat A makes it easier to absorb									
(c) (i)	<table border="1"> <thead> <tr> <th>hormone</th> <th>uptake by liver cells</th> <th>concentration of glucose in the blood</th> </tr> </thead> <tbody> <tr> <td>insulin</td> <td>inc</td> <td>decreases ;</td> </tr> <tr> <td>glucagon</td> <td>de</td> <td>increases / stays the same ;</td> </tr> </tbody> </table>	hormone	uptake by liver cells	concentration of glucose in the blood	insulin	inc	decreases ;	glucagon	de	increases / stays the same ;	[2]	one mark per correct row
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insulin	inc	decreases ;										
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(ii)	adrenaline ;	[1]	A epinephrine, cortisol, ACTH, growth hormone, somatostatin, thyroxine, GLP-1, GIP									
(d)	glucose concentration is kept, (near) constant / within narrow limits / AW ; any change (in concentration), is detected / acts as a stimulus ; correct ref to, glucose → glycogen / glycogen → glucose / increasing glucose concentration / decreasing glucose concentration ; <i>idea that it returns concentration to normal ;</i> <i>idea that release of correctly named hormone, stops / switches off ;</i> ref to <u>homeostasis</u> ;	max [3]	R hormones carrying out conversions directly									
		<b>[Total: 16]</b>										

Question	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)	<p>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</p> <p>2 <u>muscle</u> ;</p> <p>3 respire faster ; R breathes faster (as this is for MP1)</p> <p>4 <i>idea that</i> more, energy / ATP, released / needed ;</p> <p>5 <u>aerobic</u> respiration ;</p> <p>6 <i>idea that</i> requires more oxygen ; A ref to more <u>oxygenated</u> blood</p> <p>7 <i>idea that</i> remove more carbon dioxide ;</p> <p><i>change to breathing maintains</i></p> <p>8 pH of blood ;</p> <p>9 oxygen concentration ;</p> <p>10 carbon dioxide concentration ;</p> <p>11 prevents (much) <u>anaerobic</u> respiration occurring ;</p> <p>12 prevents build up of, lactic acid / lactate ; R removes</p> <p>13 prevents oxygen debt ; R repays</p> <p>14 AVP ; e.g. ref. to homeostasis, contraction of muscle</p>	[max 5]	<p>breathing rate, volume of air, ventilation rate e.g. breathe, fast / faster, deeper R heavier</p> <p>A more respiration <b>NOT</b> more glucose R 'energy produced'</p> <p>MP8 – MP10 must have idea of maintaining near constant</p> <p>MP11–13 R refs. to there being an oxygen debt and paying off oxygen debt as question is about <i>during</i> exercise not afterwards, other points especially MP1 to 7 can still be awarded if answer contains refs to oxygen debt unless answer says 'after exercise'</p>

Question	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>			