Mark scheme

Human nutrition

Biology 0610 · Questions from Paper 3 and Paper 4

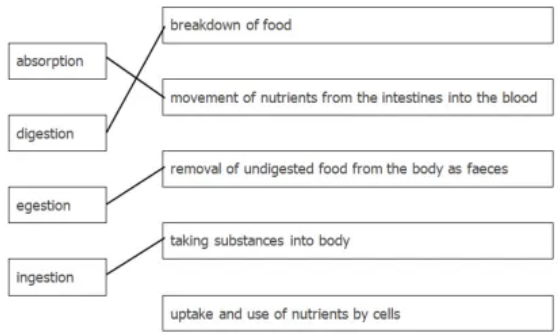
Total marks

114

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
11	12	12	12	8	10	11	12	12	14	**114**

Question 1 [11]

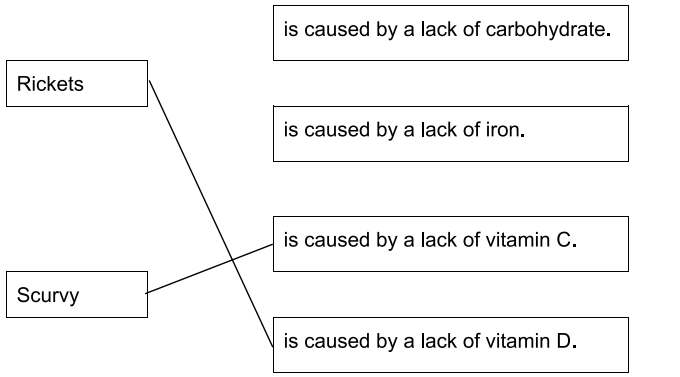
1(a)	**C** ; **C** ; **A** and **C** ;	**4**	either order
1(b)	colon ; rectum ; anus ;	**3**	
1(c)		**4**	**R** each additional line

Question 2 [12]

2(a)	breakdown of large molecules to small molecules ; insoluble to soluble (molecules) ;	**2**	
2(b)(i)	<table><tr><th>enzyme</th><th>substrate</th><th>products</th></tr><tr><td>amylase</td><td>starch ;</td><td>simple reducing sugars</td></tr><tr><td>lipase</td><td>fats and oils</td><td>fatty acids ; glycerol ;</td></tr><tr><td>protease</td><td>proteins</td><td>amino acids ;</td></tr></table>	**4**	
2(b)(ii)	*amylase:* pancreas / salivary gland ; *lipase:* pancreas ; *protease:* pancreas / stomach ;	**3**	
2(c)(i)	hydrochloric ;	**1**	
2(c)(ii)	killing (named), harmful microorganisms / pathogens (in food) ; providing, an acidic / correct / optimum, pH for enzymes ;	**2**	

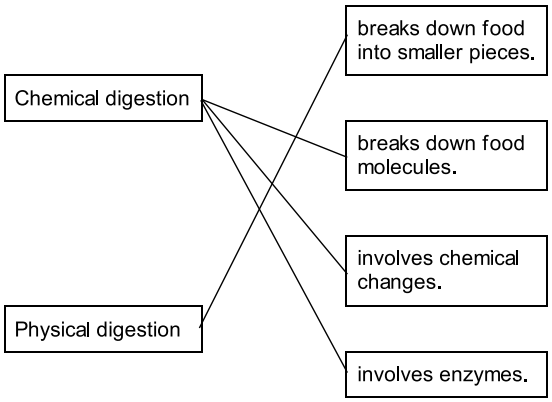
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Question 3 [12]

3(a)(i)	cheese ;	1	**R** each additional circle
3(a)(ii)	As age increases the recommended daily intake of calcium increases, then decreases and then increases again. ; The recommended daily intake of calcium doubles from ages 0–3 to ages 19–50. ;	2	3rd box and 4th box from top **R** each additional tick
3(a)(iii)	calcium is needed for (strong) bones / teeth ; (more) calcium is needed, when growing / for development / pregnancy / preventing rickets / prevents osteoporosis / maintaining bone density / AW ;	2	
3(b)	 ;;	2	one mark for each correct line **R** each additional line
3(c)(i)	(named) fruit / (named) vegetables / (named) nuts / (named) seeds / (named) wholegrain products ;	1	
3(c)(ii)	regular bowel movements / prevents constipation / bulking up, stools or faeces / correct ref. to peristalsis (described) / AVP ;	1	

3(d)(i)	**D** ;	1	
3(d)(ii)	**C** ; **E** ;	2	either order

Question 4 [12]

4(a)		4	**R** each additional line
4(b)	anus ;	1	
4(c)(i)	**Q** enamel ; **R** dentine ; **S** gum ;	3	
4(c)(ii)	nerves / neurones / nerve cell / receptors ; blood vessels ;	2	
4(c)(iii)	molar ; *any one from:* flat top / grinding surface / large surface ; multiple roots ;	2	

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Question 5 [8]

5	soluble ; stomach ; hydrochloric acid ; (named) microorganisms / pathogens ; pancreas / small intestine ; alkaline ; bile / bile salts ; emulsification ;	8	

Question 6 [10]

6(a)(i)	*any two from:* become soluble ; for absorption ; small enough, for diffusion / active transport ;	2	
6(a)(ii)	water ;	1	
6(b)	*any six from:* **1** protein → amino acids ; **2** ref to specificity ; **3** both enzymes are active between pH 3 and pH5 ; **A** at pH4 **4** **A** is pepsin ; **5** optimum pH at 2 ; **6** enzyme shows, no activity / is denatured, from pH 5 ; **7** (functions) in stomach ; **8** where HCl is present / in acid conditions ; **9** **B** is trypsin ; **10** optimum pH at 10 ; **11** enzyme shows, no activity / is denatured, from pH 3 ; **12** (functions) in small intestine / secreted from pancreas ; **13** bile neutralises (stomach) acid / in alkaline conditions ;	6	MP1 **A** breaks down proteins (to, polypeptides / peptides) MP13 **A** pancreatic juice neutralises stomach acid
6(c)	(membrane of) epithelium ;	1	

Question 7 [11]

7(a)	**1** Benedict's solution in A, remains blue / no colour change / negative result, as there is no, maltose / breakdown of starch ; **2** Benedict's solution in B, turns red / changes colour / positive result, in the presence of maltose ; **3** amylase breaks down starch ; **4** into maltose ; **5** (maltose) is a small / soluble, molecule ; **6** maltose is able to pass through the dialysis tubing ; **7** by diffusion ; **8** from an area of high concentration to low concentration / down a concentration gradient ;	6	
7(b)	pepsin / protein / amino acids / peptides lipase / fats / oils / lipids / fatty acid and glycerol trypsin / protein / amino acids / peptides maltase / maltose / glucose ;;;;	4	one mark for each correct row
7(c)	villi / microvilli ;	1	

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Question 8 [12]

8(a)	**A** substrate ; **B** active site ; **C** enzyme-substrate complex ; **D** product(s) ;	**4**	
8(b)	production of, small(er) / soluble / simple(r), molecules ; (small molecules can be) absorbed / ref. to absorption ; **ora** (moves through) cell membranes / wall of intestine / into blood / into cells ;	**2**	
8(c)	<table><tr><th>function</th><th>letter from Fig. 2.1</th><th>name of structure</th></tr><tr><td>site of starch digestion</td><td>**A** **J / E**</td><td>mouth / buccal cavity small intestine</td></tr><tr><td>reabsorption of water</td><td>**J / E** **H** **F**</td><td>small intestine colon / large intestine rectum</td></tr><tr><td>secretion of pepsin</td><td>**C**</td><td>stomach</td></tr><tr><td>site of maltose digestion</td><td>**J / E**</td><td>small intestine</td></tr><tr><td>secretion of bile</td><td>**K** **L**</td><td>liver gall bladder</td></tr><tr><td>storage of faeces</td><td>**F**</td><td>rectum</td></tr><tr><td>secretion of lipase and trypsin</td><td>**D**</td><td>pancreas</td></tr></table> ;;;;;;	**6**	*one mark per row* *the letter must agree with the name* *if more than one letter or name mark first one only* **A J/E** small intestine

Question 9 [12]

9(a)	<table><tr><th>number from Fig. 4.1</th><th>name of the organ</th><th>letter or letters of all the processes that occur in the organ</th></tr><tr><td>**1**</td><td>mouth</td><td>**I**, **C**, **M**</td></tr><tr><td>**2**</td><td>stomach</td><td>**C**, **M** (**A**)</td></tr><tr><td>**3**</td><td>duodenum</td><td>**A**, **C** (**M**)</td></tr><tr><td>**4**</td><td>ileum</td><td>**A**, **C**</td></tr><tr><td>**5**</td><td>colon</td><td>**A**</td></tr><tr><td>**6**</td><td>anus</td><td>**E**</td></tr></table> ;;;;;;	**6**	one mark for each correct row
9(b)	*any six from:* 1 **P** is a lacteal ; 2 (lacteals) absorb, fats / fatty acids / glycerol / (named) fat soluble vitamin ; 3 **T** / lymphatic vessel, returns lymph / fats, to blood / to circulatory system ; 4 **Q** / epithelial cell, **has** microvilli ; 5 (microvilli / villi) increase the surface area for absorption ; 6 **Q** is one cell thick for short diffusion distance / fast diffusion 7 **Q** is site of breakdown of maltose to glucose ; 8 glucose uptake by active transport ; 9 **R** / capillary, for absorption of, amino acids / glucose / salts / water / products of digestion / soluble nutrients ; 10 **R** has thin walls / **R** is one cell thick ; 11 blood flowing to maintain concentration gradient / AW ; 12 transports absorbed nutrients to, **S** / venule / vein ;	**6**	

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Question 10 [14]

10(a)	human / largest mammal, has the longest / bat has the shortest (small intestine); (small intestine of) rat and cat are very similar in length; comparative data, quote / calculation with units at least once; negative correlation between length and length relative to body mass;	**3**	**A** relative to body mass bat much larger than other three animals / smallest length relative to body mass is in humans
10(b)	movement into / out of / through, (epithelial) cells / villi; into, capillaries; across cell membranes; by active transport; through protein carriers; against a concentration gradient; using energy;	**3**	**I** walls **I** into blood
10(c)(i)	(insect-eating) bat;	**1**	
10(c)(ii)	ratios are higher in the duodenum; higher (inner) surface area (than ileum); data comparison (for any one animal); more villi; more microvilli;	**3**	
10(d)	emulsification; increased surface area of fat (globules); faster, digestion / break down (of fat by enzymes); by lipase / to fatty acids and glycerol; neutralises (stomach) acid / chyme; provides alkaline medium for, pancreatic enzymes / lipase; denatures, pepsin / stomach, enzymes; AVP;	**4**	**I** faster break down of fats unqualified
		Total: 14	

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