WJEC (Wales) Biology GCSE Topic 1.3 Digestion and the Digestive System in Humans Questions by Topic - Mark Scheme

1.

Marking details	Marks Available
Indicative content: amylase digests/breaks down starch to glucose {pores/holes} in visking tubing/visking tubing is selectively permeable too small for starch molecules/particles to pass through/or ref to molecule size big enough to allow glucose molecules/ particles to diffuse through/or ref to molecule size water heated strongly/boiled with Benedict's reagent positive colour change (reference blue to green/orange/red) iodine solution added to water remains brown **5 – 6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1 – 2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit. **Question 1 Total**	6 **[6]**

2.

Question			Marking details	Marks Available
2	*(a)*		X - gall bladder; Y - stomach;	2
	(b)	(i)	Bile; Lipase; Glycerol;	3
		(ii)	carries bile (into small intestine)/bile {travels/passes/flows/ transported} through/bile flows through; NOT releases bile/this is the bile duct/connects gall bladder to intestine/carries bile to pancreas	1
			Question 2 total	**[6]**

3.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	Any one from: • (small enough) to be absorbed/ • to make food soluble/ • to pass {into the blood/ through the intestine wall};	ORA	To make them smaller	
(b)	i		1	the rate (of digestion) increases when {pH/ alkalinity} increases; it = rate of digestion	ORA At high pH it is faster		
	ii		2	bile emulsifies fat/ bile turns fat into {droplets/ globules}; bile creates greater surface area for {lipase/enzyme} to work on;	Bile breaks down fats into droplets	Bile breaks down fats	
Total Mark			4				

4.

Question		Marking details	Marks Available
(a)	(i)	Liver – arrow & name;	1
	(ii)	Gall bladder – arrow & name;	1
(b)	(i)	Bile breaks {down/ up} large {lipid/fat/oil} drop(let)s into small drop(let)s; Accept bile emulsifies lipid/fat/oil **NOT** large molecules into small molecules Ref to pH is neutral for increased/bigger/larger surface area for enzyme/lipase action;	2
	(ii)	All {lipid/ olive oil} digested/enzyme working flat out;	1
	(iii)	Glycerol;	1
		Question 4 Total	**[6]**

5.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(a)			small intestine/ Ileum/ duodenum	1			1		
	(b)			(5 x 14 =)70mm^2 or 0.7 cm^2		1		1	1	
	(c)			• Absorption/ absorb {nutrients/ digested food/ glucose/ soluble food/ amino acids} (1) NOT diffusion/ absorb food unqualified/ water • Digestion/ break down of {food molecules/ named molecules}/produces {digestive enzymes/ correct named enzyme} (1) NOT produces enzymes unqualified/ break down of food (unqualified)	2			2		
	(d)			Rich Blood supply / large surface area/ thin walls for absorption (1) Enzymes produced for digestion / contain glands which produce enzymes (1)		2		2		
	(e)	(i)		{Protein/gelatin/ jelly} {broken down/digested} (1) to amino acids (1) which are soluble/ can dissolve (1)			3	3		2
		(ii)		enzyme denatured(1) active site {destroyed/ changed shape} (1) No digestion of protein/ protein cannot fit/ enzyme substrate complex cannot be formed (1)			3	3		3
				Question total	**3**	**3**	**6**	**12**	**1**	**5**

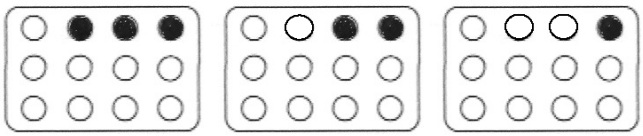
6.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(a)			amino acids (1) lipids (1) Ignore: Fats fatty acids and glycerol (either order) (1)	3			3		
	(b)			A = 3 B = 2 C = 4 D = 1 **all four correct** (1)		1		1		
	(c)	(i)		(as temperature increases) {the rate/it} {rises/ increases} (1) to optimum/until 35 °C (1) NOT 6a.u. then falls (1)		3		3		
		(ii)		(shape of the) active site {destroyed/ changed/ deformed/ damaged} (1) substrate cannot {bind/ fit/ join/ attach/ connect} (1)	2			2		
				Question total	**5**	**4**	**0**	**9**	**0**	**0**

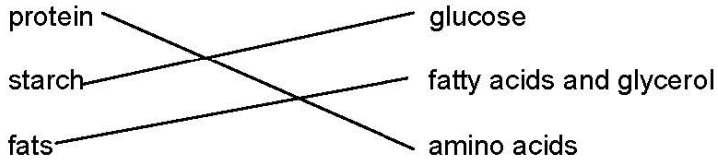
7.

Marking details	Marks available					
	AO1	AO2	AO3	Total	Maths	Prac
Indicative content: • bile emulsifies fat • from large {globules/droplets}/ into small {globules/droplets} • increasing the surface area • bile {increases pH/ neutralises pH/ makes it more alkaline/ makes it less acid/ creates optimum pH} • in the small intestine (must be linked to correct pH/ to lipase) • for lipase • which digests/hydrolyses/breaks down fat (must be linked to lipase) • into fatty acids • and glycerol **5-6 marks** At least seven points from indicative content *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.* **3-4 marks** At least four points from indicative content *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.*	6			6		
1-2 marks At least one point from indicative content *There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.* **0 marks** *No attempt made or no response worthy of credit.*						
Question 3 total	**6**	**0**	**0**	**6**	**0**	**0**

8.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	i		2	both substrate molecules having entered the enzyme; an attempt to make them connect;			
	ii		1	Lock and Key;		Enzyme substrate complex	
	iii		2	(Boiling) alters the shape of the {enzyme/active site}/ denatures enzyme; so the molecules do not fit into enzyme/ active site;			
(b)			3	1 mark for each correct row;;;  **NB only allow marks if some cavities shaded**			
Total Mark			8				

9.

Question		Marking details	Marks Available
(a)	(i)	 2/3 correct lines;; (1 correct = 1 mark)	2
	(ii)	For absorption/ pass through cell/ for getting into blood/ for use by cells/ pass through cell membrane;	1
	(iii)	{for /to release / to get} source of energy; NOT produce energy/ make energy	1
(b)	(i)	I F II G; }	1
	(ii)	C and E;	1
(c)		Benedicts (reagent); Protein;	2
		Question 9 Total	**[8]**

10.

Question			Marking details	Marks Available
10	*(a)*	(i)	arrow pointing to liver;	1
		(ii)	arrow pointing to gall bladder; (ends of arrows must touch or go into each organ)	1
	(b)	(i)	speeds up (digestion)/ allows more to be digested;	1
		(ii)	Break down large droplets of oil (into small droplets)/ emulsifies; NOT reference to molecules NOT reference to digestion increase surface area; Must be clear that it is in reference to oil droplets, especially if first mark is not given for lipase to work/for enzyme action; (cannot be given alone)	3
			Question 10 Total	**[6]**

11.

Question	Marking details	Marks Available
(a)	• Amylase digested/ broke down/hydrolysed; NOT turn/change	1
	• Starch to glucose;	1
	• which {diffused/ passed/ small enough to go} through the {visking tubing/membrane} (into the water); *	1
	*Only accessed if second marking point awarded	
(b)	Starch molecule too big to pass through {visking tubing/ membrane};	1
(c)	Blood/blood stream;	1
(d)	1 mark for each correct row	2

Substance tested for	Reagent used	Colour of reagent	Colour with positive result
Starch	Iodine	**Yellow-brown/ Orange/orange-brown/ yellow-orange NOT red/ yellow**	blue- black
Glucose	**Benedict's**	blue	**green/yellow/ orange/ /brown/brick red NOT red**

Question 11 Total **[7]**

12.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	As the (mean dry) mass of the tubers decrease the (mean dry) mass of the leaves and stems increase;			
	(ii)		1	6;			
(b)	(i)		1	Starch;			
	(ii)		2	Starch in the tuber is converted to glucose; {for energy/ as a source of energy/ for respiration/ transported to other parts of plant};			
	(iii)		2	(The leaves and stems are carrying out) photosynthesis; the {products/ named products}of which {increase the mass/ are used for growth};			
Total Mark			7				

13.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1 1	Light; Water **and** Oxygen;	sunlight		Sun/ solar
(b)	i		2	increase then {plateau/ levels off}; plateau occurs at 4%;	Range of 3-4%	Reference to figures from *y*-axis	
	ii		1 1	34 – 20; 14; (correct answer but no working shown = 2) (incorrect answer but correct readings = 1)			
(c)			2	Iodine (solution); {Yellow/Orange/Brown} to {blue-black / black};	Iodide		
Total Mark			8				

14.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	carbohydrate/starch/bread/potato/rice/pasta;	any other source of carbohydrate /starch		
(b)			1 1	pancreas {secretes/ produces/ makes/ releases} insulin; which converts glucose into glycogen;			
(c)			1	blood glucose {rises/ increases} to high level/ slow fall in blood glucose levels/ blood glucose levels do not fall to {between 3.5 – 7.5 mmol/l/ normal};			
(d)			2	*1 mark for **first two columns** circled correctly* *1 mark for correct result (**linked to first column, even if process incorrect**)*			
Total Mark			6				

Chemical test used	*Process used*	*Result of test*
Biuret test	**Dip in urine sample**	**Brown (diastix) blue/purple (clinistix)**
Benedict's test	Mix with urine sample and heat gently	
Iodine test	Mix with urine sample and cool in refrigerator	
Diastix/ Clinistix	**Mix with urine sample and heat strongly**	**yellow/ green/ orange/ (brick) red (Benedicts)**

15.

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
	(a)		movement of {substances/ gas/ molecules/ particles} {down a concentration gradient/ or description of} NOT concentrations move from high to low/ ref to SPM	1			1		
	(b)	(i)	to remove any {glucose and protein/ solution}		1		1		1
		(ii)	*Benedict's* • (Benedict's reagent changed from blue to brick red indicating the) presence of glucose (1) • glucose must have {come from/diffused/ passed through} tubing (1) • must be {pores/holes} in Visking tubing big enough to allow glucose molecules to {pass/diffuse} through (1) *Biuret* • (Biuret test didn't change colour) indicating no protein present (1) • protein couldn't {come from /diffused from/ pass through} tubing (1) • because {pores/holes} in tubing are too small to allow protein molecules (1)	1 1	1 1	1 1	6		2
			Question total	**3**	**3**	**2**	**8**	**0**	**3**

16.

Question	Marking details	Marks Available
(a)	A oesophagus; B pancreas; C liver;	3
(b)	Carbohydrate/ starch; Lipase; glycerol;	3
(c)	Biuret solution (as specification);	1
	Question Total	**[7]**

17.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
17	(a)			It allows {smaller/ small} molecules to pass through	1			1		
	(b)	(i)		Diffusion (through the pores) Accept osmosis	1			1		
		(ii)		(Molecule) B (1) it can {pass/ fit through} through pores/ A is too big to fit through pores/ pores are too small for A to fit through(1)		2		2		
	(c)	(i)		Iodine is small (molecule) (1) (Diffuses) into visking tubing (1) (reacts with) starch which is present (to give blue black colour) (1)	1 1	1		3		2
		(ii)		Starch is a large (molecule) (1) Cannot {pass out (through the membrane)/ fit (through pores)} (1)		2		2		2
	(d)			Oxygen/glucose	1			1		
				Question 17 total	**5**	**5**	**0**	**10**	**0**	**4**

18.

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
	(a)		A Correct position for pancreas (1) line must touch pancreas accept arrow/line labelled A B Correct position for bile duct (1) line must touch bile duct accept arrow/line labelled B	2			2		
	(b)	(i)	{Amylase/ enzyme} has {digested/ broken down} the starch (1)		1		1		1
		(ii)	Tube E/ 2% amylase (1) contained the {greatest/ highest} {concentration/ percentage} of {amylase/ enzyme}/ contained the most concentrated {amylase/ enzyme}(1) NOT more amylase		1	1	2		2
		(iii)	• hole number 5 (1) • no starch free area / no digestion of starch/ no clear area/ all the starch is still there/ no starch removed(1) • because {amylase/ enzyme/ Tube C/ solution} had been {(heated to) 100°C/ boiled} (1) • which {denatures/destroys} {enzyme/amylase/ active site} (1)	1	1	1 1	4		2
	(c)		to act as a control/ to show that it is the {amylase/enzyme} that digests the starch NOT controlled variable	1			1		1
			Question total	**4**	**3**	**3**	**10**	**0**	**7**

19.

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
(a)	(i)		Y		1		1		
	(ii)		maintain optimum pH (1) for (digestive) enzymes (1)	2			2		
	(iii)		Any one (x1) from: temperature/ volume/mass of food/ volume of enzymes/ concentration of enzymes/ time the food is in the gut			1	1		
	(iv)		{Fats/ lipids/ oils} {digested/ broken down} to fatty acids and glycerol	1			1		
(b)			protease (1) proteins {digested/ broken down} to amino acids (1)			2	2		
(c)			Any two **(x1)** from: 1. artificial gut gives reproducible results/ 2. easier to control [qualified -variables of artificial gut]/ 3. some factors cannot be controlled in a human/ check repeatability (1) 4. human trials are costly/ resource intensive/OWTTE (1) 5. human trials can be ethically disputable/ ethical issues/ / there are risks to humans/ OWTTE /ORA (1) 6. no need to find volunteers (1)		2		2		
			Question 19 Total	**3**	**3**	**3**	**9**	**0**	**0**

20.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	i		1	pancreas;			pancrease
	ii		1	liver;			
	iii		1	in the blood(stream);	blood vessels/ veins/ arteries/ capillaries		in blood cells
(b)			1	C;	1,2 and 3		
(c)			1	glucose;	sugar		blood sugar
(d)			2	{regular / description of regular} exercise/ exercise often; eat less {carbohydrate/starch/ sugar/ fat};			more exercise/ keep fit eat less food/ control the quantity of fat/ eat no fat
Total Mark			7				

21.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	Oesophagus;	gullet		
	(ii)		2	Drawing shows Bolus further down than in A; Wall of oesophagus constricted close to and above Bolus; (Pinch must be just above the bolus)			
	(iii)		2	Peristalsis ; (Muscles) contract;		relax	(muscles) tighten/ shorten/ squeeze
(b)	(i)		1	Gall bladder;			
	(ii)		2	Any 2 (x1) from: • Acts on fats/OWTTE; • Emulsifies/breaks down {droplets/ globules}; • To increase surface area (for enzyme to act); • neutralisation of acid/ is alkaline; digest fat to smaller molecules = 1 mark			Emulsifies Molecules
Total Mark			8				

22.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	Peristalsis;	phonetic spelling		
(b)	i		2	(Mass of food remaining undigested) increases until pH5; {levels off/ plateaus} at pH5; It increases until pH 5 where it levels off (2 marks)			
	ii		1	3;			
	iii		2	Stomach; Protein;			
Total Mark			6				

23.

Question			Marking details	Marks Available
	(a)	(i)	Peristalsis;	1
		(ii)	Muscles contract; and push/force the food along; 2nd mark is linked to 1st mark	2
	(b)		• Washing-up liquid emulsifies the milk fat/ OWTTE; • Increasing the surface area for the action of enzymes/ lipase; • enzyme digests (milk) fat into fatty acids (and glycerol) which {lower pH/ more acidic}; 2nd mark linked to 1st mark, 3rd mark is independent	3
			Question 23 Total	**[6]**

24.

Question	Marking details	Marks Available
(a)	peristalsis;	1
(b)	Muscles in the wall of the oesophagus contract;	2
	And {push/ force} the food (on to the next section);	
	Question Total	**[3]**

25.

Question		Marking details	Marks Available
(a)	(i)	Peristalsis;	1
	(ii)	B;	1
(b)			3

Food	Enzyme	Digested food
Starch/ carbohydrate;	carbohydrase	glucose
fat	**Lipase;**	fatty acids and **Glycerol;**

(c)	Absorbs water;	1
	Question 25 Total	**[6]**

26.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(a)			small intestine	1			1		
	(b)	(i)		✓ (1) ×× (1) (✓)✓ (1)		3		3		3
		(ii)		starch (molecule) {too big/ larger} and the glucose (molecule) {smaller/ small} (enough)/ starch is larger than glucose (1) to fit through {holes/ pores} in tubing (1) 2nd point linked to 1st	2			2		
				Question total	**3**	**3**	**0**	**6**	**0**	**3**

27.

Marking details	Marks Available
Indicative content: amylase digests/breaks down starch to glucose {pores/holes} in visking tubing/visking tubing is selectively permeable too small for starch molecules/particles to pass through/or ref to molecule size big enough to allow glucose molecules/ particles to diffuse through/or ref to molecule size water heated strongly/boiled with Benedict's reagent positive colour change (reference blue to green/orange/red) iodine solution added to water remains brown **5 – 6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1 – 2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit. **Question 27 Total**	6 **[6]**