Enzyme and Digestion 4 MS

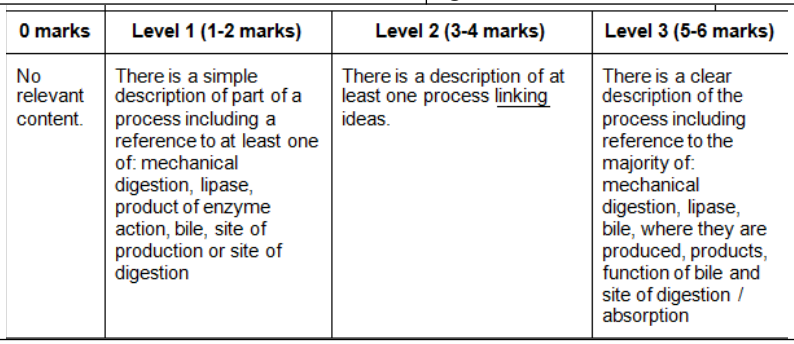
QUESTION 1

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	any one from: • (same) volume / amount / 1 cm 3 lipase • (same) volume / amount / 5 cm 3 lipid • mixed after 3 minutes / same time before mixing	ignore reference to recording results every 5 minutes or concentrations of lipid / lipase allow amount of solution allow keep same volumes in the test tubes do not accept temperature	1
b)	so that the lipase and the lipid reached the right temperature		1
c)	any two from • decrease in time or faster (breakdown) • then increase in time or then slower (breakdown) • fastest / least time / optimum at 35℃	ignore explanations	2
d)	any two from: •test more regularly eg test every minute •test at smaller temperature intervals •test between 50 (o C) and 95 (o C) •repeat at same temperatures or repeat the investigation or compare results with others	ignore 'test at more temperatures' unqualified any interval < 5min any value <15℃ allow test more temperatures in the range any value in range, eg test at 70 allow do it again	2
e)i)	(lipase / it) denatured / destroyed / changed shape	allow damaged / deformed do not accept killed ignore broken (down)	1
e)ii)	fatty acids and glycerol		1
Total marks			8

QUESTION 2

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	A		1
a)ii)	hydrochloric (acid) / HCl		1
a)iii)	alkali / suitable named example	accept sodium hydrogen carbonate / sodium bicarbonate / milk of magnesia / other brand names allow bile (salts) ignore antacid	1
b)	amylase breaks down starch (broken down) into sugars / glucose digestion of starch in the mouth (also) starch broken down in small intestine amylase produced in salivary glands / small intestine / pancreas		1 1 1 1 1 1
c)	small intestine	allow ileum / duodenum do not accept large intestine	1
Total marks			9

QUESTION 3

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	8.6	accept value in range 8.5 to 8.7	1
a)ii)	hydrochloric acid / HCl		1
a)iii)	X	accept HCL accept hydrogen chloride ignore hcl / etc.	1
b)			6

examples of biological points made in the response:
- mechanical breakdown in mouth / stomach
- fats ☾ fatty acids and / or glycerol
- by lipase

	• (produced by) pancreas • and small intestine • fat digestion occurs in small intestine • bile • produced by liver • neutralises acid from stomach • produces alkaline conditions in intestine • refs. to increased surface area related to emulsification or chewing • products are small molecules / water-soluble • products absorbed by small intestine		
Total marks			9

QUESTION 4

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	any two from: •product not contaminated with enzyme or is pure • enzyme can be reused •continuous flow process possible • enzyme more stable / can be used at higher temperature	allow enzyme not wasted / less enzyme is needed allow enzyme lasts longer ignore refs. to cost / cheaper	2
b)	maximum fructose production / maximum enzyme activity or increase in flow rate does not increase production higher rate leaves some glucose unchanged	accept optimum / best allow glucose not wasted / extra glucose wastes money	1 1
c)	less (fructose) needed (for same sweetness) (less fructose) ➪ less fattening / fewer 'calories'	ignore fructose is sweeter unqualified ignore refs. to cost / cheaper	1 1
Total marks			6

QUESTION 5

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	amino acid(s)	accept peptide(s) do not allow polypeptide(s)	1
a)ii)	protease		1
b)i)	2		1
b)ii)	repeat	do not allow other enzyme /	1

	using smaller pH intervals between pH1 and pH3	substrate allow smaller intervals on both sides of / around pH2 allow smaller intervals on both sides of / around answer to (b)(i)	1
b)iii)	enzyme / pepsin denatured / shape changed enzyme / pepsin no longer fits (substrate)	do not allow enzyme killed allow enzyme 'destroyed' allow enzyme / pepsin does not work	1 1
c)	hydrochloric (acid)	allow phonetic spelling accept HCl allow HCL ignore hcl do not allow incorrect formula – e.g. H2Cl / HCl2	1
Total marks			8

QUESTION 6

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	a catalyst		1
a)ii)	lower temperatures		1
a)iii)	sugar		1
b)	The enzyme can easily be used again The fructose does not have any enzyme in it		1 1
Total marks			5

QUESTION 7

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	glycerol		1
a)ii)	pancreas / small intestine	accept duodenum / ileum ignore intestine unqualified	1
b)	any two from: • type of milk • volume / amount of milk • vol. bile equals vol. water • volume of lipase • concentration of lipase • temperature	ignore time interval ignore solution unqualified do not allow pH ignore starting pH ignore volume / amount of bile / water	2

		ignore concentration of bile accept amount of lipase if neither volume nor concentration given	
c)i)	fatty acid (production)		1
c)ii)	faster reaction / digestion (with bile) or pH decreases faster (with bile) or takes less time (with bile) or steeper fall / line (with bile)	allow use of data ignore easier	1
c)iii)	all fat / milk digested or same amount of fatty acids present or (lower pH) denatures the enzyme / lipase	allow all reactants used up ignore reference to neutralisation allow enzyme won't work at low pH do not allow enzyme killed	1
Total marks			7