

# Enzymes and Digestion 3 MS

## QUESTION 1

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	lipase	allow phonetic spelling allow lipidase	1
b)i)	fall then rise owtte eg down then up  minimum / least / fastest / best / optimum at 39-41(oC)	allow faster then slower ignore explanations allow it falls to 40(oC) if no other marks gained, 'falls to an optimum' gains 1 mark	1  1
b)ii)	(yes)  any two from: ✗ less heat / energy / electricity / power required / used / wasted ✗ conserves fuel supplies or less fuel used ✗ less pollution from power stations owtte	there is no mark for circling 'yes' maximum 1 mark if No is circled  ignore lower temperature  accept less global warming or  less CO2 / carbon emissions / greenhouse gases or less SO2 / acid rain NB only direct effects less pollution only is not enough	2
c)	any two from: ✗ enzyme / lipase ✗ destroyed / denatured ✗ reference to (specific) shape changed	max 1 mark for reference to cell accept any named enzyme allow damaged / broken down not 'killed' ignore detergent / it	2
Total marks			7

## QUESTION 2

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	4		1
a)ii)	any one from: ✗ largest area of / most digestion (of lipid)	allow agar / jelly / mixture broken down / digested do not allow digestion of bacteria / lipase ignore digestion by bacteria	1

	✗ largest clear area		
b)	any two from: ✗ effect of pH / pH described ✗ effect of temperature ✗ effect on different types of lipid / fat ✗ cost or allergic reactions or effect on skin / fabrics / or environment or interaction with other chemicals in powder or shelf life		2
c)	enzymes / named enzyme denatured / destroyed	allow active site(of enzyme) altered	1
Total marks			5

### QUESTION 3

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <p><b>Large food molecule</b></p> <div style="border: 1px solid black; padding: 2px; width: 60px; margin: 5px;">starch</div> <div style="border: 1px solid black; padding: 2px; width: 60px; margin: 5px;">fat</div> <div style="border: 1px solid black; padding: 2px; width: 60px; margin: 5px;">protein</div> </div> <div style="text-align: center;"> <p><b>Enzyme</b></p> <div style="border: 1px solid black; padding: 2px; width: 80px; margin: 5px;">amylase</div> <div style="border: 1px solid black; padding: 2px; width: 80px; margin: 5px;">protease</div> <div style="border: 1px solid black; padding: 2px; width: 80px; margin: 5px;">lipase</div> <div style="border: 1px solid black; padding: 2px; width: 80px; margin: 5px;">isomerase</div> </div> </div>	all three correct = 3 marks two correct = 2 marks one correct = 1 mark extra line from a large food molecule cancels the mark	3
a)ii)	sugars fatty acids and glycerol amino acids	must be in this order	1 1 1
b)	liver		1
Total marks			7

### QUESTION 4

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	stomach is acidic / has low pH	allow any pH below 7 ignore stomach is not alkaline	1
	lactase works best / well in alkali / high pH / neutral / non-acidic conditions	allow any pH of 7 and above accept works slowly in acid conditions allow figures from table with a comparison ignore reference to temperature	1

b)	any three from ⊖ (below 45(°C)) increase in temperature increases rate / speed of reaction ⊖ reference to molecules moving faster / colliding faster / harder / more collisions ⊖ optimum / best at 45(°C) ⊖ high temps / above 45(°C) (rate slows due to) denaturation of enzyme / lactase	allow value(s) in range 41 – 49 allow synonyms of denaturation but not killed denaturation at high and low temperature does not gain this mark ignore body temperature ignore references to time / pH	3
c)	any two from ⊖ acid neutralised or conditions made neutral / alkali ⊖ (allow) emulsification / greater surface area of fat / lipid  ⊖ enzymes (in small intestine) work (more effectively / better)	accept bile is alkaline  allow description of emulsification eg fat is broken down / broken up into droplets allow better for enzymes	2
Total marks			7

### QUESTION 5

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	carbohydrase	extra ring drawn cancels the mark	1
a)ii)	fructose is sweeter than glucose so can be used in smaller amounts	extra box ticked cancels the mark	1
b)i)	(enzymes) work at low temperatures (enzymes) can be re-used / used many times	ignore references to specific temperatures ignore correct answers which are unrelated to the information	1 1
b)ii)	any two from: •workers have to use face masks when working with enzymes •(enzymes) work in a narrow range of pH values •(enzymes) are easily broken down by high temperature •(enzymes) are expensive (to buy)	it is not necessary for the complete statement to be written out in each case ignore effects on the body ignore correct answers which are unrelated to the information. ignore reference to specific pHs ignore reference to specific temperatures	2
Total marks			6

### QUESTION 6

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	any one from: <ul style="list-style-type: none"> <li>• (same) volume / amount / 1 cm<sup>3</sup> lipase</li> <li>• (same) volume / amount / 5 cm<sup>3</sup> lipid</li> <li>• mixed after 3 minutes / same time before mixing</li> </ul>	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 <ul style="list-style-type: none"> <li>• decrease in time or faster (breakdown)</li> <li>• then increase in time or then slower (breakdown)</li> <li>• fastest / least time / optimum at 35°C</li> </ul>	ignore explanations	2
d)	any two from: <ul style="list-style-type: none"> <li>• test more regularly eg test every minute</li> <li>• test at smaller temperature intervals</li> <li>• test between 50 (o C) and 95 (o C)</li> <li>• repeat at same temperatures or repeat the investigation or compare results with others</li> </ul>	ignore 'test at more temperatures' unqualified any interval < 5min any value < 15°C 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