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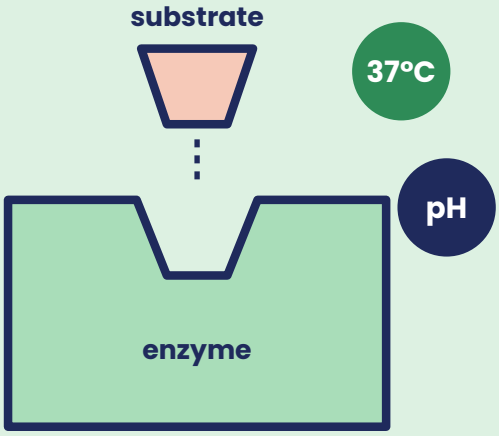
Year 10–11 • GCSE & IGCSE Biology

Enzymes



Mark Scheme – Teacher Copy

Answers, marking points and guidance for the Enzymes worksheet.

Active site | Digestion | Temperature | pH | Data | Uses

KEY IDEAS IN THIS WORKSHEET

YEAR 10–11

Name: _____ Class: _____

Date set: _____ Date due: _____

What's inside

Section A	Enzyme basics	**21 marks**
Section B	Factors affecting enzymes	**10 marks**
Section C	Interpreting data	**9 marks**
Section D	Applications and calculation	**9 marks**

Marking notes

- (1) = one mark for each marking point.
- / separates alternative answers.
- Allow error carried forward in calculations.
- Accept any correct, clearly expressed alternative.

Total marks

49

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Enzymes Worksheet – Mark Scheme

Total: 49 marks. (1) = one mark. Accept any scientifically correct alternative wording.

Section A – Enzyme basics

Q	Answer	Mark	Guidance
1	(a) catalysts; (b) protein; (c) active site; (d) substrate; (e) specific; (f) denatured	6	1 mark each
2	the active site has a specific shape (1); only a substrate with a complementary shape fits into it (1); to form an enzyme–substrate complex, and then the reaction happens (1)	3	
3	amylase: starch; maltose (or sugars); salivary glands and pancreas. Protease: proteins; amino acids; stomach, pancreas and small intestine. Lipase: lipids (fats and oils); fatty acids and glycerol; pancreas and small intestine.	12	1 mark for each correct box (12 boxes); accept maltose then glucose
	Section A total	**21**	

Section B – Factors affecting enzymes

Q	Answer	Mark	Guidance
4	molecules gain kinetic energy and move faster (1); more frequent collisions between enzyme and substrate (1); more successful collisions so the rate increases (1)	3	
5	the bonds holding the enzyme's shape break (1); the active site changes shape (1); the substrate no longer fits so the enzyme is denatured (1)	3	
6	each enzyme has its own optimum pH (1); that suits where it works: the stomach is acidic and the small intestine is alkaline (1)	2	
7	the pH affects the bonds that hold the enzyme in shape (1); so the active site changes shape and the enzyme is denatured (1)	2	
	Section B total	**10**	

Section C – Interpreting data

Q	Answer	Mark	Guidance
8(a)	40 °C	1	
8(b)	1000 ÷ 100 (1); = 10 (units per second) (1)	2	
8(c)	amylase is denatured (1); because the high temperature changes the shape of the active site (1)	2	
8(d)	test more temperatures between 30 °C and 50 °C (e.g. 35, 40, 45 °C)	1	
8(e)	any two: volume / concentration of starch; volume / concentration of amylase; pH; time between tests	2	
8(f)	a drop of the mixture no longer turns blue-black with iodine (stays orange-brown)	1	
	Section C total	**9**	

Section D – Applications and calculation

Q	Answer	Mark	Guidance
9	advantage: removes protein and fat stains at lower temperatures, saving energy (1); disadvantage: enzymes are denatured at high temperatures / can cause allergic reactions (1)	2	
10	lactase breaks lactose into glucose and galactose (1); lactose-intolerant people cannot make enough lactase (1); so the sugars can be absorbed without causing symptoms (1)	3	
11	all active sites are occupied / enzyme concentration is the limiting factor (1); so more substrate does not increase the rate (1)	2	
12	(14 – 8) ÷ 8 × 100 (1); = 75% (1)	2	
	Section D total	**9**	

Worksheet total: 49