AQA GCSE Biology

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	fatty acids **and** glycerol		1	AO1 2.2.1
01.2	pancreas **or** small intestine		1	AO1 2.2.1
01.3	temperature		1	AO2 2.2.1
01.4	so they were both at the correct temperature / temperature being investigated		1	AO2 2.2.1
01.5	as temperature increased (until 35 °C), rate of reaction increased		1	AO3 2.2.1
01.6	any **two** from: • no substrate / lipid was broken down • lipase / enzyme denatured • structure changed so it could no longer bind to lipid / lipid could not fit in active site		2	AO3 AO2 2.2.1
02.1	enzymes have specifically shaped active sites substrate molecules are a complementary shape to this site enzymes can only bind with one type of substrate (to form an enzyme-substrate complex)		1 1 1	AO1 2.2.1
02.2	enzyme is not used up in reaction therefore can catalyse multiple substrate molecules	accept for 1 mark after substrate reacts, it is released so active site free for another substrate	1 1	AO1 2.2.1

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02.3	any **one** from: • building starch / glycogen / cellulose • building lipids from fatty acids • building proteins from amino acids • combining carbon dioxide and water to form glucose	accept other appropriate examples	1	AO1 2.2.1
2.4	increased temperature will cause body enzymes to denature which will prevent chemical reactions vital to life from occurring (efficiently) it could also damage / denature enzymes in viruses preventing virus from infecting person / causing further damage to body / reproducing		1 1 1 1	AO3 2.2.1
03.1	starch		1	AO1 2.2.1
03.2	any **two** from: • temperature • volume of starch solution • volume of amylase • concentration of starch solution • concentration of amylase		2	AO2 2.2.1

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03.3	any **three** from: • remove small samples from the reaction every 30 seconds / a set time • test samples with iodine • turns blue-black in presence of starch • iodine remains yellow-brown when no starch present, so the reaction is complete.		3	AO1 2.2.1
03.4	128		1	AO2 2.2.1 MS 1c, 2b, 2f
03.5	all points plotted correctly smooth curve of best fit through points	award 2 marks for all five points correct; 1 mark for three points correct	2 1	AO2 x3 AO3 x1 2.2.1 MS 4a 4c
03.6	pH 6.5	accept answer between pH 6.2 and 6.8	1	AO3 2.2.1 MS4a
04.1	proteins		1	AO1 2.2.1
04.2	amino acids make up proteins; so needed to form enzymes / hormones / antibodies / structural tissue	accept other sensible roles of amino acids	1 1	AO1 2.2.1

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04.3	2.2		1	AO2 MS4a 2.2.1
04.4	A – in the stomach optimum pH in area of high acidity B – in the small intestine optimum pH slightly above 7		1 1 1 1	AO2 2.2.1
04.5	many stains are food products enzymes break down insoluble molecules into soluble molecules which would be removed from clothing by detergent / water	accept any named source of staining credit named example, e.g. proteins to amino acids	1 1 1 1	AO2 2.2.1
04.6	(most) enzymes are denatured at 60 °C therefore, they are no longer able to bind to the food / stain (to break it down)	accept description of active site being changed	1 1	AO2 2.2.1
05	**Level 3:** All steps of the experiment are described correctly and in suitable detail. The writing is clear, coherent and logically organised.		6	AO2 AO3 4.2.2.1
	Level 2: Most steps of the experiment are described correctly, but the description may lack detail. The writing is mainly clear and coherent, but the order may not be logical.			

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Question	Answers	Extra information	Mark	AO / Specification reference
	Level 1: Some steps of the experiment are described correctly, but the description lacks detail. The writing lacks clarity and coherence. The order is not logical.			
	No relevant content.			

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Question	Answers	Extra information	Mark	AO / Specification reference
	Indicative content for method: • using the measuring cylinder, add a fixed volume (e.g. 5 cm^3) of starch solution to each test tube • using the pipette, alter pH of starch solutions by adding a fixed volume (e.g. 1 cm^3) of a different pH buffer solution to each tube • add one drop of iodine solution to each point on the spotting tile • using pipette, add a fixed volume (e.g. 1 cm^3) of carbohydrase solution to the first tube and stir / mix • start stopwatch. • using glass rod, remove a droplet of starch/carbohydrase mixture and add to the iodine solution • repeat this step every minute until iodine solution does not turn blue-black • record time value • repeat for all pH values being investigated **Safety precautions**: • wear goggles • ensure glassware is kept in centre of workspace • use test-tube rack to hold test tubes **Control variables**: • solutions at same temperature (check with thermometer) • use same volume of starch / carbohydrase / pH buffer in each tube • use same concentration of starch/carbohydrase/pH buffer in each tube			

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Question	Answers	Extra information	Mark	AO / Specification reference
06.1	break down proteins Into amino acids		1	AO1 4.2.2.1
06.2	water bath		1	AO3 4.2.2.1
06.3	40 °C		1	AO2 4.2.2.1
06.4	rate = $\frac{1}{\text{time}}$ = $\frac{1}{12}$ rate of reaction = 0.08(3) per min / min^{-1}	accept correct identification of 12 min as time	 1 1 1	AO1 AO2 4.2.2.1 MS 1c
06.5	**advantage**: enzyme speeds up digestion of egg white / protein so protein stains would be removed during clothes washing **disadvantage**: enzyme only (very) effective at limited range of temperatures so other stains may not be removed at the temperatures the enzyme works most effectively	accept other reasonable suggestions with relevant argument from the data accept enzyme less effective below 30 °C / above 50 °C	 1 1 1 1	AO3 4.2.2.1
07.1	speeds up a reaction without being used up		1 1	AO1 4.2.2.1

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07.2	burns brightly		1	AO2 4.2.2.1
07.3	concentration or pH of hydrogen peroxide / catalase		1	AO2 4.2.2.1
07.4	to identify anomalous results / to improve accuracy of data		1	AO2 4.2.2.1
07.5	5.0 cm	accept 3.9(3) for 1 mark (1.8 is an anomaly)	2	AO2 4.2.2.1 MS 1c, 2b, 2f
07.6	enzyme had been denatured / protein shape changed can no longer bind to hydrogen peroxide to break it down		1 1	AO2 4.2.2.1
07.7	repeat experiment at temperatures between 20 °C and 40 °C redraw graph using additional data to identify optimum temperature		1 1	AO3 4.2.2.1
08.1	proteins		1	AO2 4.2.2.1
08.2	pH 8		1	AO2 4.2.2.1

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08.3	any **three** from: • enzymes and substrate fit together (like a lock and key) • enzymes have a specific / unique active site • this is complimentary to / fits into the shape of the enzyme • they bind to form an enzyme-substrate complex and molecule is broken down		3	AO1 4.2.2.1
09.1	bell-shaped curve peak at +37 °C	accept peak in range +35 °C to +40 °C	1 1	AO2 4.2.2.1
09.2	bell curve with peak to the left of the human graph peak around 0 °C	Accept peak anywhere in range –20 °C to +10 °C	1 1	AO3 4.2.2.1
10.1	any **three** from: • the bonds in an enzyme / the forces in an enzyme • hold the enzyme / protein in its 3 dimensional shape • a change in pH affects the forces in the bonds leading to a change in the shape (of active site) • if pH change is too great the enzyme will no longer bond to the substrate		3	AO1 4.2.2.1
10.2	protease		1	AO1 4.2.2.1

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Question	Answers	Extra information	Mark	AO / Specification reference
10.3	any **four** from: • place milk samples in water baths at different temperatures • place first temperature sample in machine and measure proportion of light which passes through / is transmitted • add casein and measure time taken to reach selected % transmission, e.g. 50% • repeat for all temperature samples • plot graph of temperature against time – curve minimum point will show optimum temperature		4	AO2 4.2.2.1
10.4	systematic error all % transmission results would be lower than expected but optimum temperature would still be identified		1 1 1	AO3 4.2.2.1
11.1	single-celled organisms have a large surface area : volume ratio		1	AO1 1.3.1 2.2.2
11.2	any **four** from: • diaphragm contracts / flattens • intercostal muscles contract, pulling ribcage up and out • volume of chest cavity increases • pressure inside chest cavity decreases • external / atmospheric air pressure greater (causing air to move into the lungs)		4	AO1 2.2.2

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Question	Answers	Extra information	Mark	AO / Specification reference
11.3	spherical shape gives large surface area – maximise area for diffusion thin walls – shorter diffusion distance good blood supply – maintain large diffusion gradient		1 1 1	AO1 1.3.1 2.2.2
12.1	blood contains red blood cells, white blood cells and platelets blood contains more red blood cells than white blood cells or platelets white blood cells are larger than red blood cells / platelets are smaller than red blood cells	ignore reference to plasma	1 1 1	AO3 2.2.3
12.2	risk of disease transmission risk is low if correct procedures / safety precautions followed, e.g. working aseptically / wearing PPE / use of disinfectants		1 1 1	AO3 2.2.3
12.3	$\frac{0.008}{10}$ 1250×		1 1	AO2 1.1.5 MS2h
12.4	$\frac{0.008}{0.01}$ 1 any **two** from: • maximises time available for diffusion • shorter diffusion distance for gas exchange • maximises surface area of red blood cell exposed for diffusion		1 1 2	AO2 2.2.2

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13.1	organ		1	AO1 2.2.1
13.2	large surface area – maximises area for diffusion thin walls – shorter diffusion distance good blood supply – maintains large diffusion gradient		1 1 1	AO2 1.3.1 2.2.1
13.3	to transfer energy from respiration for the active uptake / transport of glucose	 accept other correctly named substance	1 1	AO1 2.2.1
13.4	mitosis any **three** from: • cell grows or increases in mass • number of sub-cellular structures increases • DNA replicates / doubles / is copied • DNA divides / nucleus divides into two • cytoplasm / cell membrane divides to form two cells		1 3	AO1 AO2 1.2.2
14.1	$\frac{0.40}{0.75} = 0.53$ 46.7% decrease	award 2 marks for correct answer with no working shown	1 1	AO2 4.1.3.3 MS 1c

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Question	Answers	Extra information	Mark	AO / Specification reference
14.2	any **six** from: • sugar is absorbed into small intestine by diffusion and active transport • a small amount of sugar will diffuse into the bloodstream • this continues until the concentration of sugar in the bloodstream and in the intestine are equal • active transport is required to move sugar against a concentration gradient to maximise body uptake • active transport requires energy • energy is provided through cell respiration • if rate of respiration is reduced, energy cannot be provided for active transport and hence rate of sugar absorption decreases		6	AO2 4.1.3.1 4.1.3.3

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