

Mark Scheme

Combined Science GCSE

Key Concepts in Biology Test

(Levels 4-9)

	Answer	Marks
1. (a)	Structure X: nucleus Structure Y: cell membrane	(2)
1. (b)	A nucleus	(1)

(Total for Question 1 = 3 marks)

	Answer	Marks
2.	Mark two answers from: (must be given as pairs to award marks) Structure: tail Function: provides mobility/movement, so it can swim to egg Structure: enzymes (in head) Function: digests egg membrane for fertilisation Structure: nucleus Function: contains half chromosomes/genetic information, to be passed on/inherited by offspring	(4)

(Total for Question 2 = 4 marks)

	Answer	Marks
3. (a)	early microscope B → A → C modern microscope	(2)
3. (b)	size of image = 46mm (+/-) 1mm $46/1200 = 0.038 \text{ mm}$ (×1000 to convert units) = 38µm 1 mark for correct calculation, 1 mark for correct conversion of units	(2)
3. (b) (ii)	• Increased magnification and resolution • Can see cells in more detail/clearer • Images of cells appear larger • Living cells can be viewed using light microscopes	(4)

(Total for Question 3 = 8 marks)

	Answer	Marks
4. (a)	C denature	(1)
4. (b)	• 'Lock and key' model • Substrate and active sites are a specific shape • Substrate is complimentary to active site • Products released as they no longer fit the active site	(4)

(Total for Question 4 = 5 marks)

	Answer	Marks
5. (a)	• Use of an enzyme (does not need to be named) • Use of a range of pH substances, with numerical values given • Named control factors: (max 2 marks) • Temperature • Type of enzyme • Amount/volume of enzyme • Amount/volume of pH solution • Type/shape of container (beaker or conical flask) • Description of how to control factors • Named independent variable as the pH of the substance • Named the dependent variable as the amount of product produced • Description of how to collect/measure the product e.g. gas syringe, mass.	(6)
5. (b)	Line graph (reject bar chart)	(1)
5. (c)	Accept two answers from: • Repeated the investigation • Used a great range of pH solution • Compared her data with another person's • Used secondary results, e.g. internet	(2)
5. (d)	• Enzymes becomes denatured if not at optimum pH • Active site changes shape • Substrate cannot fit active site any longer • Rate of reaction reduced if enzyme is denatured	(3)

(Total for Question 5 = 12 marks)

	Answer	Marks
6. (a)	B 110g	(1)
6. (b)	The reaction is slowing down/finishing.	(1)
6. (c)	$= 130 \div 30$ $= 4.33$ Allow answers between 4.15 and 4.50 1 mark for correct working only 2 marks for correct answer	(2)

(Total for Question 6 = 4 marks)

	Answer	Marks								
7. (a)	B enzyme	(1)								
7. (b)	<table><tr><th>Small units</th><th>Nutrient</th></tr><tr><td>Sugars</td><td>Carbohydrate</td></tr><tr><td>Amino acids</td><td>Proteins</td></tr><tr><td>Fatty acids and glycerol</td><td>Lipids</td></tr></table>	Small units	Nutrient	Sugars	Carbohydrate	Amino acids	Proteins	Fatty acids and glycerol	Lipids	(3)
Small units	Nutrient									
Sugars	Carbohydrate									
Amino acids	Proteins									
Fatty acids and glycerol	Lipids									

(Total for Question 7 = 4 marks)

Question	Answer	Marks																				
8. (a)	An arrow is drawn to indicate movement into the cell.	(1)																				
8. (b)	More substance outside the cell. Substances move down a concentration gradient/from an area of high concentration to low concentration.	(2)																				
8. (c)	C The movement of water from a high concentration to a low concentration, through a partially permeable membrane.	(1)																				
8. (d)	<table><tr><td></td><td>Diffusion</td><td>Osmosis</td><td>Active Transport</td></tr><tr><td>Substances move down a concentration gradient</td><td>✓</td><td>✓</td><td>✗</td></tr><tr><td>Substance move against a concentration gradient</td><td>✗</td><td>✗</td><td>✓</td></tr><tr><td>Energy is required</td><td>✗</td><td>✗</td><td>✓</td></tr><tr><td>Dissolved solutes are moved</td><td>✓</td><td>✗</td><td>✓</td></tr></table>		Diffusion	Osmosis	Active Transport	Substances move down a concentration gradient	✓	✓	✗	Substance move against a concentration gradient	✗	✗	✓	Energy is required	✗	✗	✓	Dissolved solutes are moved	✓	✗	✓	(4)
	Diffusion	Osmosis	Active Transport																			
Substances move down a concentration gradient	✓	✓	✗																			
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Energy is required	✗	✗	✓																			
Dissolved solutes are moved	✓	✗	✓																			
8. (e)	Final mass – start mass = 47.2 – 61.3 = -14.1 (Change in mass ÷ start mass) × 100 = -23.00% 2 marks for correct answer 1 mark for correct method if answer incorrect	(2)																				

(Total for Question 8 = 10 marks)

TOTAL FOR PAPER = 50 MARKS