PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 1: KEY CONCEPTS IN BIOLOGY (PACK 1)

SCORE	PERCENTAGE
/59	%

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Mark Scheme

Q1.

	Answer	Acceptable answers	Mark
	An explanation including **two** of the following points: • ref to specific shape (1)		**(2)**

	• to bind to substrate / form enzyme substrate complex (1) • for reaction to take place / catalysed(1) • joining together {substrates / molecules} / break down {substrates / molecules} (1) • ref to lock and key mechanism / hypothesis (1)		

Q2.

Question number	Answer	Mark
(i)	all the starch has been converted into glucose / all the starch has reacted with the amylase / all the starch is digested (1)	(1) AO3 2a

Question number	Answer	Mark
(ii)	Any two from: • pH of the solution (1) • concentration of amylase (1) • concentration of starch (1) • amount of mixing (1) • size of the tube used (1) • time interval must be the same (1)	(2) AO2 2

Question number	Answer	Additional guidance	Mark
(iii)	it is a control/to check that starch doesn't breakdown into glucose without amylase (1)	ignore control variable ignore allow results to be compared	(1) AO2 2

Q3.

Question number	Answer	Mark
(i)	A they have membrane-bound organelles **The only correct answer is A** **B** *is not correct because they have a nucleus* ***C*** *is not correct because they do not have a cell wall* ***D*** *is not correct because this is not a specific feature of eukaryotic cells*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(ii)	genetic analysis / based on {DNA/genetics} / DNA of Archaea more similar to eukaryotes (1)	accept more knowledge because of better microscopes	**(1)** **AO1 1**

Q4.

Question Number	Answer	Mark
(i)	C the volume of milk and the concentration of chymosin **The only correct answer is C** ***A*** *is not correct because time is being measured* ***B*** *is not correct because the temperature is being changed* ***D*** *is not correct because the temperature is being changed*	**(1)** **AO2 2**

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation linking **two** from: • 40°C is the {optimum / closer to the optimum} / there is a faster **rate of reaction** (1) • because as temperature increases (kinetic) energy increases (1) • more chance of collision (between the chymosin and the milk protein) (1) • more enzyme-substrate complexes are formed (1)	accept the enzyme works faster	**(2)** **AO2 1**

Question Number	Answer	Additional Guidance	Mark
(iii)	An explanation linking: • time taken would be longer / the milk would not curdle (1) • because the enzyme is denatured / the active site has changed shape (1)	accept slow rate of reaction / a time greater than 75 seconds	**(2)** **AO2 1**

Question Number	Answer	Additional Guidance	Mark
(iv)	Any **one** from: • it is a control (1) • to confirm that the milk doesn't curdle at that temperature without chymosin (1) • allows for a comparison with the results (1)	accept to see the effect of not adding chymosin	**(1)** **AO2 2**

Question Number	Answer	Additional Guidance	Mark
(v)	Any **two** from: • use a smaller interval between the temperatures (1) • measure temperatures between the range of 35°C and 45°C (1) • controlling a variable not identified in the method (1) • keep the tubes at the required temperature after adding chymosin by using a water bath (1) • repeat the test at each temperature (1)	ignore a wider range of temperatures accept e.g. volume of milk / type of milk / enzyme concentration accept use a water bath to control temperature accept calculate a mean / identify anomalies	**(2)** **AO3b**

Q5.

Question number	Answer	Additional guidance	Mark
(i)	**Measurement** 65 (mm) / 6.5 cm (1) **Conversion** 65 mm = 65 000 µm (1) or 6.5 cm x 10 000 = 65 000 µm (1) **Division** 65 000 ÷ 50 000 (1) 1.3 (µm)	 accept 63 mm – 66 mm ecf from incorrect measurement 0.0013 x 1000 (1) ecf from incorrect conversion accept 6.5 ÷ 50 000 (1) 65 ÷ 50 000 (1) correct answer on answer line with no working 3 marks accept 1.26/1.28/1.32 (µm) for 3 marks	**(3)** AO1(2)

Question number	Answer	Additional guidance	Mark
(ii)	An answer including three of the following: • no nucleus /chromosomal DNA (1) • cell wall (1) • flagellum (1) • presence of ribosomes (1) • no membrane bound organelles / no mitochondria (1)	List rule applies: reject nucleus reject mitochondria accept DNA is in the cytoplasm accept: pilli (1) slime {coat / capsule / layer}(1) ignore: cell membrane / cytoplasm / chloroplast	**(3)** **exp** AO1 (1)

Q6.

Question Number	Answer	Additional Guidance	Mark
	measurement 45 (mm) / 4.5 **cm** (1) calculation (45 ÷ 700) = 0.0643 (1) conversion into standard form and millimetres 6.43×10^{-2} / 6.4×10^{-2}	award full marks for the correct answer with no workings allow 44-46 (mm) allow ecf for incorrect measurement allow ecf for incorrect substitution accept answer to any number of decimal places	**(3)** **AO1 1**

Q7.

Question number	Answer	Additional Guidance	Mark
(i)	$2.0 \times 10^8 - 1.6 \times 10^7$ / 200 000 000 – 16 000 000 /184 000 000 (1) 1.84×10^8 / 1.8×10^8	award full marks for correct answer **accept 18.4×10^7 or 18×10^7 for 1 mark**	**(2)** AO2(1)

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking: • (myelination) speeds up impulses (1) • insulates the {axon/neurone} (1) • motor neurones transmit information from the CNS / motor neurones transmit information to effectors / neurones in the brain connect to other neurones in the brain (1) • (motor neurones) transmit information over a greater distance (than neurones in the brain) (1)	accept signals/messages for impulses accept brain/spinal cord/relay neurone for CNS accept muscles/ glands for effectors accept idea that motor neurones can be part of a reflex so need quick impulses (1)	**(3)** AO2(1)

Q8.

Question number	Answer	Additional guidance	Mark
	5 (mm) (1) 5 000 000 nm(1) 5 000 000 ÷ 250 = 20 000 OR 5 (mm) (1) 0.00025 mm (1) 5 ÷ 0.00025 = 20 000	accept 4 and 6 (mm) accept 4 and 6 (mm) accept 5 ÷ 250 = 0.02 (2) 4 ÷ 250 = 0.016 (2) 6 ÷ 250 = 0.024 (2) accept numbers in standard form award full marks for 20 000 without working	**(3)**

Q9.

Question number	Answer	Additional Guidance	Mark
	division 0.0062 ÷ 2 / 6.2 ÷ 2 (1) **OR** unit conversion 0.0031 x 1000 / 0.0062 x 1000 (1) 3.1 (picograms)	award full marks for correct answer with no working accept 6.2/ 0.0031 for 1 mark with no working	**(2)** AO2(1)

Q10.

Question number	Answer	Mark
(i)	2:1	(1)

Question number	Answer	Mark
(ii)	0.05	(1)

Question number	Answer	Mark
(iii)	(as the size of the cube increases) the rate of diffusion remains the same / the size of the cubes does not affect diffusion rate	(1)

Question number	Answer	Mark
(iv)	An explanation that combines identification – amplification of knowledge (2 mark): • from an area where it is high concentration to an area of low concentration / down a concentration gradient (1) • because the jelly/agar/cube is **permeable** (1)	(2)

Q11.

Question Number	Answer	Additional guidance	Mark
(i)	(2 x 5.0 x 2.0) + (2 x 5.0 x 2.0) + (2 x 2.0 x 2.0) or 20 + 20 + 8 (1) 48.0	allow full marks for correct final answer accept 48	(2) AO 1 1

Question Number	Answer	Additional guidance	Mark
(ii)	• chip B has greater surface area (1) • therefore **more** water {absorbed / moved into the potato chip} (1)	accept chip B is bigger / has more cells	(2) AO 3 2a AO 3 2b

Question Number	Answer	Additional guidance	Mark
(iii)	An explanation that links the following: • (cells) lose water / become plasmolysed (1) followed by • (water moves out) by osmosis (1) • from a high concentration of water molecules (in the potato) to a low concentration of water molecules (in the solution) / through the partially permeable membrane (to the salt solution) (1)	accept get smaller/shrink/lose mass accept from low solute concentration to a high solute concentration accept from high to low water potential	(3) AO 1 1

Q12.

Question number	Answer	Mark
(i)	Substitution 1.84 – 2.15 = -0.31 (1) change in mass Evaluation -0.31 ÷ 2.15 = -0.144 (1) Correct decimal places -0.144 x 100 = -14.41 (%) (correct to 2 dec place)	(3)

Question number	Answer	Additional guidance	Mark
(ii)	An explanation that combines application of knowledge (1 marks) and reasoning/justification – application of understanding: (2 mark) • chip 2 has gained mass but chip 5 has lost mass (1) • because chip 2 was immersed in a solution where the sucrose concentration outside the chip was lower than the sucrose concentration inside the chip (1) • so water osmosed into the chip causing it to become turgid / so chip water osmosed out of chip 5 and it became plasmolysed (1)	Accept reverse argument for chip 5	(3)

Q13.

	Answer	Acceptable answers	Mark
(a)(i)	Any **two** of the following points: (yeast cell) • has a nucleus (1) • does not have a flagellum (1) • does not have a plasmid (1) (bacterial cell) • has chromosomal DNA / circular DNA (1) • has a capsule (1) • has a slime coat (1) • does not have mitochondria (1)	Accept: has a vacuole accept: named bacterial feature e.g pilli, small ribosome, if not labelled in yeast cell	**(2)**
(a)(ii)	does not have chloroplasts/chlorophyll	cannot photosynthesise	**(1)**
(b)(i)	7×10^9 (-) 5×10^{10} **(1)** =(-)4.3×10^{10} or (-)43×10^9	two marks for correct bald answer accept 43 000 000 000 allow one mark for correct subtraction from wrongly selected numbers	**(2)**

		only accept the numbers in the table with a correct minus calculation	
(b)(ii)	A description including any **two** of the following points: • involved in defence against disease / part of immune system (1) • phagocytosis (1) • antibody / antitoxin production (1)	accept: (fight pathogen / harmful microorganism / named microorganism) accept: engulf / ingest / surround /digest cells reject: make antigens ignore: refs to role of red blood cells or platelets	**(2)**
(b)(iii)	tired / lack of energy / lethargy / short of breath	anaemia /fainting / less oxygen / increased anaerobic respiration reject: references to asthman	**(1)**

Q14.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	nucleus (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	**C** In DNA, the bases A - T are complementary		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)	A definition including two of the following: • a sperm fuses with egg / penetrates the egg (1) • nuclei/genetic information fuses /combines (1) • reference to haploid gametes /gametes have 23 chromosomes (1) • reference to cell made being diploid / has 23 pairs of chromosomes / zygote formed (1)	Ignore sperm meets egg	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(i)	A description that includes the following: • (aerobic) respiration / using glucose / using oxygen (1) • energy released (for movement / swimming / metabolism)(1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(ii)	An explanation including **two** of the following: • a change in a base/base sequence/order of bases / a change in mRNA (1) • named change e.g. addition/deletion (1) • reference to change in an amino acid / order of amino acids (1)	Accept codon, triplet, genetic code for base. substitution/deletion/other named gene mutation.	**(2)**

Q15.

	Answer	**Acceptable answers**	**Mark**
	to supply / contain (a large amount of) nutrients / energy (for the zygote / embryo)	food /named nutrient Ignore references to foetus Reject baby	**(1)**