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Examiners' Report / Principal Examiner Feedback

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IGCSE

IGCSE Biology (4325) Paper 2H

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General

This paper was taken by a much smaller number of candidates than in the summer. However, the examiners were once again impressed by the abilities of the candidates to apply their knowledge and understanding of biology to a wide range of situations. Most candidates attempted all of the questions and there was no evidence of candidates running out of time on the paper.

Questions 1-7 also appear on the foundation level paper.

Question 1 (a) required candidates to complete the list of characteristics of living things. Most were able to correctly identify reproduction and nutrition as the missing characteristics. Part (b) asked candidates to suggest why excretion is important. Almost all responses correctly suggested removal of toxic waste products of metabolism.

Question 2 (a) presented candidates with a photograph of a red blood cell. Almost all of the candidates were able to name haemoglobin as the red pigment that absorbs oxygen. Most could also explain how the biconcave shape increased the surface area for diffusion of oxygen. Part (b) asked candidates to draw and label a phagocyte. Marks were awarded for the correct shape of cell and for labelling cell membrane, correctly shaped nucleus and cytoplasm. Most candidates were also able to describe how a phagocyte helps to destroy pathogens.

Question 3 showed candidates a diagram of a section through the human thorax. Candidates had to identify the ribs, diaphragm and the spine from the diagram. Most could identify the ribs and the diaphragm but some could not correctly identify the spine. In part (b) the majority of candidates were able to describe the contraction and flattening of the diaphragm as a person breathes in. Part (c) gave candidates a diagram showing an alveolus of a normal person and an alveolus for a person with emphysema and asked candidates to suggest why a person with emphysema would find it difficult to walk upstairs. The best responses explained how the surface area of the alveoli are reduced in a person with emphysema and how this would reduce the availability of oxygen for respiration and energy release in the muscle cells.

Question 4 showed a diagram of a root hair cell. In (a) almost all responses correctly labelled the nucleus but in (b) some were unable to correctly label the cell membrane often pointing to the cell wall. Most could in (c) give osmosis as the mechanism of absorption of water and the better candidates could explain that energy is required to absorb mineral ions into the roots against a concentration gradient. Finally only the best candidates could give chlorophyll as a molecule made using magnesium and amino acids/ proteins etc. as a molecule made using nitrates.

Question 5 required candidates to name the ovary and oviduct from a diagram and then identify the part that releases progesterone. Most candidates were able to do this with only a few failing to earn credit. Part (b) also asked why it is important that progesterone is released during pregnancy and many correctly identified the role it plays in preventing breakdown of the uterus lining. Part (c) required candidates to identify the placenta and give two of its functions. Most gained credit for describing the provision of glucose or oxygen for the embryo and the removal of metabolic waste. Finally most candidates were able to state the number of chromosomes as 46, or 23 pairs, but a significant minority wrote 23.

Question 6 was about the carbon cycle. Part (a) asked candidates to name two molecules found in plants that contain carbon. Most were able to do this common answers being starch, glucose, cellulose and amino acids. They then had to give two ways that carbon in plants is released into the atmosphere. The great majority were able to name respiration but only a few could name decomposition or combustion as the second. Most could give two consequences of global warming but struggled to give a third. Part (b) required candidates to explain the consequences of releasing sulphur dioxide into the atmosphere. The best answers described how the gas dissolves in water to form acid rain which then falls to earth were it can harm plant and aquatic life.

Question 7 required a longer prose answer explaining how glasshouses increase crop yield for a named plant. Although most candidates were able to score well few named a crop and those that did often suggested rice or corn or crops not normally grown in a glasshouse. Most candidates gained credit for suggesting increased lighting, increased heat, increased carbon dioxide and regulating water supply and how this leads to a higher rate of photosynthesis.

Question 8 provided information on cloning wolves. In part (a) most were able to name at least two reasons for the decline in the number of wolves. The third reason proved more difficult with many candidates giving hunting for fur or hunting for sport as different reasons. We expected loss of habitat, shortage of food, predation and disease as possible answers. Part (b) required candidates to describe the process of production of a cloned embryo. The best candidates were able to describe how the nucleus of an adult cell from the parent would be fused with an enucleated egg cell and be allowed to divide by mitosis in a suitable culture solution. Candidates could generally give the role of a surrogate mother but struggled with the percentage calculation and often suggested that 1 or 2 or sometimes even 251 male wolves were involved in the production of Snuwolf and Snuwolfy.

Question 9 (a) asked candidates to label the cornea from a diagram of the eye and most got this correct. Part (b) asked about the genotype of a person whose cornea would not go cloudy and most also got this correct. Part (c) required the candidates to explain why a transplanted cornea might be rejected. Only the very best candidates earned full credit for explaining how the transplanted cornea contains antigens which have a genetic difference to the host tissue so the host white blood cells would secrete antibodies that would attack the cornea. Candidates were then asked to explain the term 'immunosuppressive' (drugs) and too many merely restated that these would suppress the immune system. The answer we wanted was that these would stop or slow down the rejection of the cornea. Many candidates were able to calculate 95% or 950 successful transplants.

Question 10 presented students with a graph showing the results of an experiment to look at the effect of increasing temperature on rate of photosynthesis at low and high light intensity. Most could describe the effect of increasing temperature on rate at low light intensity. Some could explain that the lack of any effect was due to light being a limiting factor. Most were also able to describe the effect of increasing temperature on rate at high light intensity. The best candidates could also explain the effect in terms of kinetic energy, carbon dioxide or chlorophyll as limiting factors and enzymes denaturing at high temperatures. Most candidates could name at least one factor that should have been kept constant in the experiment.

Question 11 (a) gave candidates a simple food chain and asked them to say how many trophic levels were present and give the term for the fish in the chain. They were also given data in part (b) about energy transfer and most could give two reasons for the energy loss between the microscopic animals and the insects. Many candidates could use the formula provided to correctly calculate the energy transfer. The best candidates were also able to examine the data and explain that since fish took in 500 kJ per m^2 from all sources but could only obtain 300 kJ per m^2 from the insects they must eat other organisms.

Question 12 described how the bark of trees can be used to treat prostrate cancer. Most candidates were able to correctly explain the meaning of endangered with only a few suggesting that it means extinct. Very few were able to concisely explain why removing the phloem would kill a tree. The best candidates explained how the phloem transports sucrose around the plant so that it can be used by other cells for respiration. Part (b) on micropropagation was not answered well with few candidates correctly suggesting why sterile cotton wool is used to enable oxygen and carbon dioxide to enter for respiration and photosynthesis. Most were able to suggest a suitable energy source in the agar and give two reasons why micropropagation is an effective method.

Question 13 required candidates to calculate the surface area to volume ratio of a rectangle. Only a small number of the best candidates were able to carry out this simple mathematical exercise. However most candidates could explain why chip A gained mass, then explain the differences between the other conditions due to water potential of the solutions, temperature of the solutions and differences in surface area to volume ratio.

Question 14 asked candidates to fill in the missing word on a passage about genetic modification of bacteria to produce insulin. Performance varied widely between candidates with many gaining 4 or 5 marks while some gaining 0 or 1.

Question 15 (a) gave students data on the mass and oxygen consumption of a range of shrews. Almost all candidates were able to describe how the oxygen consumption decreased with increasing mass. The better students could explain this by referring to greater heat loss from smaller shrews as they have a larger surface area to volume ratio so will need to respire faster. Again only a few of the best candidates could correctly calculate the volume of oxygen used in one day by the largest shrew. In part (b) most could give a change that would take place in the skin of a shrew as it moves to a cold area. Some candidates confused vasoconstriction with vasodilation. In part (c) most could name the sensory neurone and synapse and almost all could correctly show the direction of an impulse on the motor neurone.

Question 16 was also a longer pose question. Candidates were asked to use their knowledge of natural selection to explain why few albino giraffes are found in the wild. The best candidates were able to explain how the albino animals are poorly adapted due to lack of camouflage so are easily seen by predators. Thus, they are unlikely to survive to reproduce and therefore the allele for albinism will reduce in the population.

BIOLOGY 4325, GRADE BOUNDARIES

Option 1: with Written Alternative to Coursework (Paper 3)

	A*	A	B	C	D	E	F	G
Foundation Tier				58	46	34	23	12
Higher Tier	78	67	56	45	34	28		

Option 2: with Coursework (Paper 04)

	A*	A	B	C	D	E	F	G
Foundation Tier				N/A	N/A	N/A	N/A	N/A
Higher Tier	83	72	61	50	39	33		

No candidates at foundation tier entered coursework so there are no grade boundaries for this category.

Note: Grade boundaries may vary from year to year and from subject to subject, depending on the demand of the question paper.

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