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Report on the Examination

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General Comments

This paper produced a wide range of marks with students displaying good AO1 knowledge of a variety of the specification content. As always, students struggled with the more applied aspects of questions. Question 1 was about transcription and translation and was generally well answered. Question 2 contained aspects of experimental design and knowledge of colorimetry was weak. Question 3 revealed some confusion about microvilli as opposed to villi and students need to be reminded to read the question carefully before writing rote-learned sentences about the adaptations of villi in general. The first part of question 4 asked students to describe meiosis and was generally well answered. The second, more applied part of this question was poorly answered. Question 5 was centred around classification and the AO1 knowledge demonstrated by the majority of students was good. The application of this knowledge to the provided data was less well answered, with some students failing to gain marks due to an inability to express themselves clearly using appropriate scientific language. Question 6 started with a risk assessment of a dissection and was not well answered by the majority. Teachers should focus on teaching specific risk assessments relevant to each practical activity in order to avoid generalised answers like 'goggles' and 'gloves'. The second part of the question required students to analyse two sets of data and scored poorly, despite the mark scheme having 8 points available for 4 marks. Teachers would be advised to focus on the final four marking points for this question as they are fairly standard for scientific investigations of this nature and were rarely seen in student responses. Question 7 asked students to draw a tissue plan and produced a majority of very poor responses, mostly containing cell detail. The second part of this question asked students to analyse data containing standard deviations and produced a variety of responses. Question 8 was based on knowledge of behaviour and selection and provided a range of marks. Students who read the question carefully and applied their knowledge of directional selection to the specific investigation provided scored well. Question 9 proved an excellent discriminator. Well-prepared students displayed excellent AO1 knowledge of insect gas exchange and human ventilation and achieved high marks.

Question 1

01.1 Only 2% of the cohort managed to achieve 1 mark. There were lots of vague answers about sections of DNA coding for proteins.

01.2 Just over 25% of students scored 2 marks, with 58% scoring 0. Quite a few answers referred to mRNA being made in the nucleus of eukaryotes, but not in prokaryotes. There were some incorrect references to prokaryotes having single-stranded DNA. A pleasing number of students understood the fact that prokaryotic mRNA does not contain introns and, therefore, does not require splicing.

01.3 Only 2% scored the maximum 2 marks, with 30% scoring 1. Most students struggled with the idea of PNA binding to the DNA and therefore preventing mRNA synthesis, despite being told this

in the stem of the question. There were some worrying references to PNA interfering with helicase, so the DNA was still double-stranded, thereby making it impossible for PNA to bind.

01.4 This question was generally well answered with over 65% scoring at least 1 mark. A small proportion of students are still writing about energy being 'made' or 'produced', rather than released.

Question 2

02.1 Just over 40% of the entry scored 1 mark, with 14% not even attempting the question.

02.2 Only 20% of students managed to score 1 mark, with too many simply referring to the red colour produced from a positive Benedict's test and not linking this to transmission or absorbance in a colorimeter.

02.3 There were better answers on this simple variables question, with 43% of students gaining both marks. 35% achieved at least 1 mark. Students commonly failed to gain marks by referring to 'amount', which is not an acceptable alternative to volume at this level.

02.4 This question was generally well answered with 66% of students gaining maximum marks. The most common reason for not achieving any marks was incorrectly calculating the ratio of apple core to flesh. Some 2.5% of students did not attempt this question.

02.5 A relatively poorly answered question with 76% of students failing to gain any marks. Many students referred to the evaporation of water decreasing the water potential, as opposed to the hydrolysis of starch producing soluble maltose or glucose, which then decreased the water potential.

Question 3

03.1 This question was poorly answered with 72% of students failing to score any marks. The main reason for this was the lack of explanation for the description. Many students correctly stated that microvilli increase the surface area but did not link this to increased diffusion. There were too many references to the microvilli having 'thin walls' or being '1 cell thick', highlighting a basic misconception between villi and microvilli.

03.2 Students who attempted this question did relatively well, with almost 60% scoring at least 1 mark. Many students with an incorrect answer failed to show their working and potentially failed to gain a mark as a result. Too many students clearly used the π button on their calculator despite being told to use 3.14 in the stem of the question (although this was not actually penalised by the examiners). Almost 10% of students did not attempt this question.

03.3 Although only 8% of students scored maximum marks, almost 60% picked up at least 1 mark. Very few students accessed marking point (MP) 1, with most marks being awarded for MP 2 and

MP 3. Some students failed to gain a mark by referring to the 'active site' on the antibody or the protein.

Question 4

04.1 This question was generally well answered, with over 60% of students achieving at least 2 marks. Most students achieved MP 2 and MP 5. A common misconception was that the products of meiosis 1 are diploid. Too few students referred to the replication of DNA during interphase and so did not gain MP 1.

04.2 Almost 20% of students did not attempt this question, with only 10% achieving 2 marks. Those students who successfully understood that there would be 16 different arrangements often didn't go on to calculate the number in the sample of 300 and so only scored 1 mark.

04.3 This question was very poorly answered. Less than 10% of students achieved the mark. It was common to see double chromosomes, or just a single chromosome in the cell. Those who did draw four single chromosomes often shaded them incorrectly.

04.4 Only 36% of students achieved the mark despite the diagram showing diploid cells on either side of the arrow labelled A.

Question 5

05.1 Just over 40% of students achieved 1 mark, with only 5% achieving 2. A common error was writing about groups within groups but failing to mention the lack of overlap.

05.2 72% of students achieved the mark.

05.3 This was generally well understood. 75% of students achieved the mark for drawing an oval in the correct position on Figure 4.

05.4 This question was poorly answered, with only 2% of students achieving full marks. A total of 64% of students did achieve at least 1 mark, generally for MP 2, by correctly identifying that the Indian rhinoceros and Javan rhinoceros were the most closely related species. Relatively few students understood that the 2% difference with the Indian rhinoceros was due to variation within a species. A relatively large number of students made comments about the black and white rhinos being closely related to each other, something which could not be determined from this investigation.

05.5 This question was generally well answered, with over 76% of students achieving at least one mark, often for MP 1. There were too many vague references to comparing the horns between rhinos for MP 2.

Question 6

06.1 This was a poorly answered question with only 10% of students achieving 2 marks. There were far too many standard practical references to wearing goggles, gloves or washing of hands. Risk assessments need to be specific to the practical activity undertaken.

06.2 Around 20% of students achieved the maximum 2 marks, with 35% picking up at least 1 mark. A surprising number of students seemed unable to read the graph scales accurately or calculate the heart rate given the time of 1 heartbeat. 10% of students did not attempt this question.

06.3 This question was poorly answered. Less than 2% of students achieved the maximum 4 marks. Just over 50% of students managed to achieve 1 mark, mostly for MP 1, by stating that treatment 2 is more effective. The fact that both treatments reduce blood pressure was normally correctly observed, but very few linked this to the idea that patients were still at a higher-than-normal risk. MP 5-8 were rarely accessed and, if statistics were mentioned, the idea of significance was often missing. The information in the stem about treating a 'large number of patients' was largely ignored, so MP 8 was rarely awarded.

Question 7

07.1 The quality of drawings produced in answering this question was extremely poor. Only 7% of students managed to achieve 3 marks, with the majority drawing individual cells despite being explicitly told not to do so in the stem of the question. The idea of tissue plans clearly needs more emphasis in practical sessions.

07.2 This was another very low scoring question, with less than 2% of students scoring the maximum 4 marks. However, almost 64% of students did manage to achieve at least 1 mark, usually for pointing out the SD overlap/non-overlap. MP 2-4 required the idea of a significant difference and whether it affected shelf life. There were too many vague references to temperature/hours of daylight and increased transpiration rates despite a very clear set of results being provided in Table 4.

07.3 This question elicited some good answers with over 30% of students achieving at least 2 marks. However, there were some very vague references to 'putting the plant in water' or 'leaving it outside'. There were some confusing references to 'increasing the light to allow more photosynthesis'.

Question 8

08.1 This question was generally well answered with 50% of students correctly referring to mating/courtship behaviour. Some students made reference to the stones affecting swimming behaviour or making the fish happier/more playful/less aggressive.

08.2 Over 66% of students managed to achieve at least one mark for this question, mostly for correctly identifying the idea of repeating the investigation without brightly coloured stones. For MP 2, students needed to identify the change in variable (stones) with no effect on fish behaviour. Some students misinterpreted the information and referred to the effect on the number of spots on the fish rather than their behaviour, despite this being clearly stated in the stem of the question.

08.3 Less than 4% of students managed to achieve 4 marks for this question, but over 50% did achieve at least 1 mark, usually awarded for MP 3 or MP 4. There were a lot of answers referring to natural selection followed by a vague description of favourable alleles being passed on without identifying the nature of the allele. There was a number of confusing answers based around genetic bottlenecks and the founder effect.

Question 9

09.1 The majority of students showed some knowledge of the structure of the insect tracheal system with over 50% achieving at least 2 marks. There were some lengthy answers that detailed the benefits of abdominal pumping and water at the ends of the tracheoles, despite this not being a feature of the 'structure of the insect gas exchange system' as required by the wording of the question. Students often failed to achieve MP 2 because they omitted the word 'diffusion', although there were some pleasing references to the features involved in reducing water loss with MP 6-8 awarded more frequently.

09.2 This question was generally well answered with 20% of students achieving the maximum 5 marks, and over 60% achieving at least 2 marks. Marks were commonly not awarded for failure to link the contraction/relaxation of the diaphragm with the change in its position, and the same for the contraction/relaxation of the correct intercostal muscles with the change in position of the ribcage. Students with a secure knowledge of the topic gave well organised answers in a logical sequence.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.