



EXAMINERS' REPORTS

**LEVEL 3 CERTIFICATE IN
MEDICAL SCIENCE**

SUMMER 2017

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UNIT 1: HUMAN HEALTH AND DISEASE

Most candidates attempted all questions and it was apparent that all candidates had sufficient time to complete the paper. A number of candidates failed to express themselves clearly and responses lacked the use of appropriate terminology or specificity, this was a problem in both Welsh and English medium scripts.

The quality of written communication was again an issue for some candidates. They are reminded of the necessity for good English/ Welsh on the front of the examination paper. It was also clear that many candidates had difficulty with simple mathematical problems. It was refreshing to see that most candidates had appropriate equipment i.e. pencil and ruler for use with drawing the graph.

Section A **Pre-release Material**

Most centres had spent a considerable length of time preparing candidates for the pre-release section. These candidates scored high marks for Section A. There was a significant number of candidates, however, that had not thoroughly studied the pre-release and could not expand beyond the content of the article. The pre-release article was available for four weeks before the examination to allow preparation in advance. Questions were based both directly on the content of the article and wider knowledge taken from the specification.

- Q.1. Candidates had no problem in listing three effects that CKD may have on the health of an individual which were listed comprehensively in the pre-release article.
- Q.2. Most candidates had no trouble in naming two causes of CKD but explaining proved more difficult and where there was no reference to the kidney candidates failed to gain marks. It was anticipated that this question would be a straight forward use of the pre-release material, though many failed to do this successfully.
- Q.3. (a) (i) Most candidates correctly identified ultrafiltration as the means of filtration within the nephron.
- (ii) Most candidates could also successfully use the diagram to identify the structure(s) responsible for ultrafiltration. A small number of candidates, however, listed many different structures of the nephron including correct and incorrect structures. This resulted in no marks and candidates should be discouraged from adding more than the necessary responses as they will be penalised.
- (iii) Candidates clearly understood the processes within the nephron and were able to answer this question with no problem.

- (b) Very few candidates correctly answered this question regarding ADH and osmoregulation. This question was based entirely on work from the specification and should have posed no problem to candidates that had prepared well using the pre-release material. Candidates' answers were generally weak, lacked depth of knowledge and showed poor communication skills. ADH is tested at GCSE level and so had candidates learnt their work should have been answered reasonably well. Many candidates did not even attempt this question and seeing as the kidney had been the main focus of the pre-release article the answers were disappointing.
- Q.4. This question should have been a straight forward direct recall question for those that had studied well. The diagrams used were standard protein organisation diagrams and candidates should have been familiar with them. The question was answered poorly with many confused answers, again quality of written communication let candidates down and the majority of candidates failed to achieve more than a couple of marks here.
- Q.5. Candidates successfully analysed the data from the pre-release article and could calculate the numbers based on percentages found in the text. However, many failed to then add up percentages that they had found and so did not answer the question fully, this resulted in only one or in many cases no marks. Candidates need to further process answers in order to respond fully to the questions if they are to achieve the maximum marks.
- Q.6 (a)&(b) Candidates on the whole were able to identify trends in the data that was contained in the pre-release.
- Q.7. (a) The majority were able to describe numerous trends in the data between genders, many quoted figures which was good practice.
- (b) Valid reasonable suggestions were made by most candidates. Here they applied their knowledge well and most gained the mark.

Section B

- Q.8. (a) (i) Most candidates could name the motor neurone.
- (ii) Candidates struggled to state the function of the motor neurone with only the minority gaining this mark. They failed to give enough detail as to where it transfers the electrical message and from where.
- (b) The majority of candidates struggled to correctly describe the transmission of an action potential across a synapse. Many confused the synapse with the reflex arc, and those that had attempted the question lacked key biological terminology and phrasing in their responses. Some drew nice diagrams but because they had not been annotated, were not given credit.
- Q.9. (a) Most candidates correctly named the class of pathogen for HPV as virus yet there were a small number that stated a bacteria.

- (b) (i) A large number of candidates failed to recognise point X as the 'booster/ reinfection by same pathogen'. This curve is the standard immunity curve that candidates should have recognised from their studies. It was clear that many had no idea what it was and this was reflected in the poor quality of answers.
- (ii) Almost all candidates struggled to describe and explain the differences between the primary and secondary response. Responses lacked detail and many candidates gave a good description of the trends but failed to explain, this resulted in no marks. Many candidates did gain a mark for correctly explaining the production of memory cells during the response in the correct context. This was encouraging.
- (iii) The process of antibody production was also answered poorly. Responses were weak and candidates tended to discuss antibodies with many key concepts missed. This question was also not attempted by a large number of candidates and proved a good discriminator question with only the very best candidates gaining marks.
- (c) (i) + (ii) Both of these questions were based on work studied in unit 2. Candidates had clearly understood the concepts of confidentiality, consent, ethics etc and were able to construct answers that were credit worthy. However, an unusually large number of candidates described 'animal testing and its cruelty' when discussing ethical issues with regards clinical trials. This clearly missed the point and many failed to link the work that they had done across the units to this question.

Q.10. This question was a standard biochemistry question and should have posed no problem to candidates that had learnt their work on biological molecules and those that had practised with previous questions from other courses.

- (a) (i) The majority of candidates could state hexose as the type of monosaccharide but there were still a considerable number of candidates that named the molecule as α - glucose which had already been given in the stem of the question.
- (ii) Most candidates failed to gain the mark here due to not mentioning maltose and water.
- (iii) Most candidates gained a mark for stating the glycosidic bond but failed to state 1-4 for the second mark. This specification equivalent with that of advanced level and therefore the quality of responses must also be of similar standard, candidates are encouraged to write as much detail as is necessary and to be specific with their answers to ensure the mark.
- (b) (i) It was the quality of communication that let many candidates down with this question. The failure to identify the carbon number resulted in no marks. Most understood that the OH group was above/ below depending on the glucose they were discussing but lacked specificity in their answers. Some drew on the diagram above and referred to this, which was credited as it showed clear understanding.

- (ii) The definition of an isomer was generally done well although again the lack of good science and poor level of communication meant that many lost this mark.
- (c) Answers to this question were poor on the whole. Many candidates described the use of starch in the liver as a storage polysaccharide, which of course was incorrect. The spelling of glycogen needed to be correct for this question as it is similar to glucagon and many did confuse the two.
- Q.11. (a) Diseases are a large part of section three of the specification and this question really tested their knowledge of a number of them. Most candidates were able to state the mode of infection for HIV but then could not describe its effect on the body- both parts were needed for one mark. In a similar way candidates often only managed to correctly state the type of pathogen, mode of infection or effect and as such did not gain many marks. It was clear that many candidates had not learnt this work well and struggled with the question.
- (b) (i) & (ii) These unintentionally became discriminator questions with very few candidates correctly stating both endocytosis and translation as the processes occurring at different stages.
- (iii) This protein synthesis question was answered very poorly. Candidates struggled to recognise this as a standard description of protein synthesis. Many could name key structures for example tRNA, mRNA and ribosomes but missed the connections between them that allow for proteins to be synthesised. Only a very few candidates could describe this process correctly and in enough detail that allowed them to access the marks.
- Q.12. (a) Most candidates correctly recognised the small intestine as the part of the digestive system affected by coeliac disease but many lost marks due to simply stating the 'intestine' which was too vague.
- (b) This question expected candidates to apply their knowledge of coeliac disease to describe its effect on the digestive system. The image was there to give candidates a clue as to what to think about. Many scored well on this question describing the merging of villi, reducing surface area. The standard of communication here was good.
- (c) The suggest question was answered well for one mark. Where candidates lost a mark was when suggesting why a person who suffers from coeliac disease would be tired, they didn't make the link between lethargy and lack of energy from food which was needed for the second mark.
- Q.13. (a) There were a plethora of different graphs drawn here. Many candidates produced line graphs or bar charts that had unsuitable scales and no labels which lost marks. Candidates are reminded that they should select scales that use at least 50% of the graph paper and that they should include values at the origin as well as label on the axes. The maximum that a line graph could achieve was two marks.

- (b)
 - (i) The majority of candidates had no trouble calculating a mean for the data given.
 - (ii) Most candidates suggested valid reasons as to why the number of excess winter deaths had increased.
 - (iii) The majority of candidates did score well on this question, but many failed to achieve the mark due to poorly worded answers that lacked specificity.
 - (c) This question expected candidates to apply their knowledge of employment and health and most candidates achieved the first mark using the graph. Where they failed to gain the second mark was with explaining the effect of employment on health, e.g. 'certain occupations have a higher physical demand and therefore many cause a higher sickness record'.
- Q.14. (a)
 - (i) This question was a standard gas exchange question and should have posed no problem to candidates. It was therefore disappointing that some candidates did not score well here and could not state diffusion as the method of movement or give the direction of movement of oxygen and carbon dioxide. This was almost GCSE standard in content and as such should have been answered well.
 - (ii) Labelling the bronchi/ bronchioles proved problematic for a large number of candidates that labelled most of the respiratory system instead of the actual site affected by asthma.
 - (iii) This suggest question was answered well, candidates clearly understood the implications of lifestyle choices on asthma sufferers.
 - (iv) Almost all candidates could name a test that could be carried out to test lung function, although many missed the second mark due to a lack of detail in their responses.
- (b) A large number of candidates struggled to state the purpose of the ECG test, again lacking clarity in their answers. They also failed to describe the method of conducting the test and missed out key parts that were needed. There was also a small number of candidates that did not attempt this question. This was, again, linked to unit 2.

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UNIT 2: PHYSIOLOGICAL MEASUREMENT TECHNIQUES

General comments:

Twenty centres submitted work for this unit in this series. The quality of work submitted by the centres was in a number of cases of a very high standard and assessment by the majority of centres was in the main accurate and in agreement with the moderator's assessment. Administrative work was mostly correctly submitted, with mark records completed by the teacher and authentication sheets signed by the candidates.

Task 1

For this task candidates need to produce pre-test information for three different tests; one of these tests must be an ECG. A.C 1.1 should be covered in each piece of pre-test information, as each piece is marked out of a maximum of 6 marks for this A.C (18 marks in total for this A.C). It is important that for A.C 1.1 candidates do not just describe the physiological test, but explain the principles of how the test works. So for example with the peak flow test, candidates could explain about this test measuring airflow through the bronchi and thus the degree of obstruction. With blood pressure, candidates need to explain how the cuff inflates to cut off blood flow, then slowly releases, so that the sensor can accurately record when pressure returns, reference to systolic and diastolic pressure measurements should be made and how these relate to blood flow/pressure on blood vessels. In a number of instances high bands marks were awarded to candidates who did not explain the principles, these marks were moderated down.

Task 2

For this task candidates need to produce a plan (A.C 3.1). This plan should be detailed and cover things such as: identification of information to be collected, procedures that will be used, equipment needed, and the location and timing of the test; how/when patients will be informed of when they need to attend, what they should do/not do before the test; any other individuals that need to be contacted-e.g technician, and required facilities etc. Although the observation record can also support the achievement and marking of this A.C, it is important that candidates do produce a written plan themselves. Candidates need to perform a minimum of two tests on at least two patients (A.C 3.2). The two tests should test two different physiological systems, for example blood pressure test: cardiovascular system, and peak flow: respiratory system. Tests such as BMI do not test a specific system and are not listed in the content for this unit (A.C 3.2). Candidates should complete these tests as they would be completed within a clinical situation, i.e. blood pressure recorded three times, peak flow recorded three times. Candidates should be given ample opportunity to practise the carrying out of these tests and be provided with appropriate equipment to complete the tests.

Task 3 and 4

These two tasks are linked, but it is important to ensure that candidates do cover all the required A.Cs, this includes describing possible limitations of the tests they have performed (A.C 1.3). Candidates should process data from the physiological measurement tests they performed and from the data with which they are provided (ECG trace). For A.C 4.1 candidates need to process data from the tests they have completed on patients A and B. For blood pressure candidates need to show they have taken a mean reading from three, for peak flow candidates should show they have taken the highest reading. With the provided ECG trace candidates should label the components of the ECG (P, QRS and T) and calculate heart rate. They should also comment on the “repeatability of the two traces provided (A.C 1.3). A number of candidates failed to complete this data processing correctly or completely.

For A.C. 4.2 Candidates need to provide conclusions which are detailed and are clearly linked to the evidence, this includes comparisons to expected norms and patient history. Candidates need to link their findings to expected physiology and possible pathology. For A.C 4.4 it is important that candidates use scientific and technical language in the proforma for the head of department (e.g. hypertension rather than high blood pressure).

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UNIT 3: MEDICAL SCIENCE RESEARCH METHODS

General Comments

Eighteen centres submitted work for this unit in this series.

The quality of the work submitted was good and assessments by the centres were in the main accurate and in agreement with the moderators. Candidates had obviously been prepared carefully for the unit.

Administrative work was generally correct, with authentication sheets signed by the candidates. However, centres should check that marks from candidate work are transferred correctly to the Mark Record Sheet and that the marks are totalled correctly to avoid clerical errors.

If centres are changing the task for the model assignment it is highly recommended that they contact WJEC to ensure that candidates are able to generate the evidence required to meet the assessment criteria.

When making a photocopy of the candidate's presentation, please ensure that any tables and graphs are large enough to be clearly readable.

Task 1: Planning to carry out the investigation

AC1.1: To achieve Band 3 candidates are required to give a clear description of the independent and dependent variables with reference to a minimum of three controlled or extraneous variables along with a description of how to minimise the effect of the controlled/extraneous variables.

AC1.2: In order to justify the hypothesis, candidates need to state their hypothesis, making reference to their dependent and independent variable. Justification should link to the focus question and might contain reference to, for example, a newspaper or television article. There is no need to produce pages of secondary data.

AC1.2: This requires candidates to justify their sampling technique. There is no need to justify why other techniques are rejected.

AC1.3: A good answer here should refer to the design of the questionnaire, e.g. use of open v closed questions, single v multiple responses, collection of quantitative v qualitative data. There should be reference as to how the data will be analysed, for example, which questions generate data for drawing graphs or for using a named statistical test.

Task 2: Collecting information

AC2.1: Evidence of the plan to collect information is required.

AC2.3: The sample size should be sufficient for the method of data analysis. Candidates should present their raw data in a table format (link to AC5.1).

Task 3: Analyse the data

Candidates should explain why they have selected a particular statistical method to analyse their data (AC3.2). If necessary, the null hypothesis should be stated before carrying out the test. A well set out and analysed test will meet many of the assessment criteria including AC3.1, AC4.2 and AC4.4. It is acceptable to analyse the data by using an excel spread sheet but the sheet should be formatted correctly to ensure all the data is to the same number of decimal places.

Note that the null hypothesis should contain the phrase ‘there is no significant difference between ...’

Candidates who do not carry out a statistical test can still make detailed and appropriate conclusions from the data they have collected. (AC4.2)

AC4.3 requires candidates to evaluate their data and/or their procedures. Reference could be made here to the number of people in the sample, bias, reliability of the data collected along with any possible improvements.

Task 4: Prepare a presentation

AC5.1 requires candidates to present their data visually and in a suitable format for an audience of scientists and non-scientists. Any scientific terminology needs to be explained (link to AC 3.1). All tables and graphs need to be correctly set out. Tables need to have clear column headings (link to AC 4.4) and graphs need to be fully labelled.



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