



EXAMINERS' REPORTS

LEVEL 3 CERTIFICATE/DIPLOMA IN MEDICAL SCIENCE

JANUARY 2022

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LEVEL 3 CERTIFICATE/DIPLOMA IN MEDICAL SCIENCE

Level 3

January 2022

UNIT 1 HUMAN HEALTH AND DISEASE

Introduction and General Comments

Unit 1 is the externally assessed examination unit for the Medical Science Certificate. It is worth 50% of the overall marks of the Medical Science Certificate. Candidates are provided with a pre-release article four weeks before the exam (this year this was extended to six weeks due to the date of the Christmas break) and they are able to work their way through this pre-release article during this time.

Section A of the exam paper has questions based around the pre-release article. These questions could ask for content directly found in the article, could ask candidates to apply their knowledge or could bring in another unit of work connected to that which is in the pre-release. The maximum mark for this section is up to 25.

Section B is up to 65 marks of questions based on the specification for unit 1 as well as 8-10 marks from both Unit 2 and Unit 3. There is, therefore, a synoptic element within Unit 1. The questions will test a range of skills including direct recall, analysis, evaluation and other mathematical skills.

Only a small number of candidates attempted all questions, and it was apparent that all candidates had sufficient time to complete the paper. Many 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 again this year.

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 again. It was refreshing to see that most candidates had appropriate equipment i.e. pencil and ruler for use with drawing the graph although the type of graph selected by candidates was again incorrect.

Section A - Pre-release Material

Facility factor 45.9, 100% attempt rate

Most centres had spent some time preparing candidates for the pre-release section. These candidates scored some high marks for Section A. There were a small 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 six 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 stating three possible causes of high blood pressure which were listed throughout the pre-release article.

- Q.2** The majority of candidates had no problem in explaining one way that a high-fat diet can lead to high blood pressure. Many failed to associate that obesity or being overweight would lead to the heart having to work harder.
- Q.3** Candidates struggled to correctly complete the table with adaptations and relative blood pressure of the different blood vessels. This is straight from the specification and should have been accessible to all. Those that had learned this did score well but a large number of candidates failed to attempt the question.
- Q.4** (a) The simple mathematical calculation caused problems for a large number of candidates, where the incorrect figures were used. Candidates failed to find the correct figure from the pre-release to use in this question even though it was clearly stated where this figure was to be found. It was also clear that many candidates did not know how to calculate a percentage which is a basic mathematical requirement.
- (b) Here, candidates struggled with the difference between million and billion, even with the prompt in the question. They were not confident with the use of the figures in standard form and failed to calculate the cost successfully. This style of question is not new for this paper, but many candidates clearly struggled.
- Q.5** (a) Data analysis is another skill that is tested annually. Many candidates were able to describe the trends in the data here, but only a few were able to explain this trend.
- (b) This question drew on content from Unit 3, and it was clear that many candidates were unsure what an extraneous variable was and did not know how it could affect the data. It is worth remembering that there will be between 8 – 10 marks of questions based on any aspect of unit 3 in every paper.
- Q.6.** The majority of candidates that attempted this question had no problem in suggesting a reason for the prevalence of coronary heart disease being less in England compared to Scotland. Candidates that didn't achieve this mark wrongly identified Scotland as having a higher population density than England.
- Q.7** (a) The theme of the pre-release should suggest this as a possible question. Unfortunately, it was clear that not every candidate had studied this and answers to this question varied considerably. Many failed to note the basic procedure e.g., sitting with feet flat on the floor, recording readings from screen and deflating the cuff and removing. Again, there will be 8- 10 marks of Unit 2 content in each exam and this should be studied and revised for unit 1.
- (b) (i) This question was answered well by many candidates, and they were able to state the blood pressure range with no problem. Those that failed to gain any marks for this question only gave one value instead of a range as stated in the question.

- (ii) Candidates generally had no problem stating one lifestyle choice that could help lower blood pressure. Answers that did not gain the mark were not specific enough e.g. eat a healthy diet instead of which food group(s) to cut back on, and exercise instead of exercise more.
- (c) Most candidates were able to gain one mark here with statements about the possible side effects of medication. Details were lacking and answers were not clearly expressed for many to gain the second mark. The need for good English/ Welsh proved essential here.

Section B

Q.8 Facility factor 38.0, 100% attempt rate.

- (a) Only a very few candidates correctly identified a correct tissue group that would have abundant mitochondria and the reason they would be found there. Candidates completely missed the link between the specification and this question, they struggled to apply their knowledge here.
- (b) Many candidates failed to articulate an answer here with very long-winded explanations. Those that did score a mark here were concise and clear in their answers which was refreshing.
- (c) Most candidates had no trouble in stating two ethical considerations before using the technology described. This question was linked to Unit 2, which candidates were clearly confident in answering.
- (d)
 - (i) Calculating a mean is a skill that key stage 3 students would have no problem demonstrating. Candidates should have breezed through this mark but unfortunately even though the calculations were correct for many, they were unable to round up correctly and lost the mark. It was a shame that candidates rounded 38.67 to 38.6, which resulted in no mark. For future series it would be beneficial to candidates if centres went over these basic skills so as to ensure candidates do not make these mistakes again.
 - (ii) There is a graph question on every paper, this is nothing new. However, yet again the quality of graphs produced was disappointing. Candidates incorrectly drew a line graph. This resulted in the maximum mark that these candidates could achieve being 2- the axes and scale marks. Others lost marks due to incomplete labelling of the axes and with selecting the incorrect scale. Candidates are reminded that they need to give a value at the origin, this does not need to be 0. When a value was missing the candidate lost the correct scale mark immediately.
 - (iii) The majority of candidates suggested a viable reason for low birth numbers in women 40-44.
- (e)
 - (i) Few candidates could identify the bond between the terminal phosphate and middle phosphate as being where the most energy released during the hydrolysis of the molecule.

- (ii) Few candidates could name ADP as the new molecule.
- (iii) Only a very small number of candidates were able to explain the term 'universal energy currency'.
- (iv) Again, only a very small number of candidates were able to give a structural difference between a nucleotide of RNA and ATP. A number of candidates lost this mark as they failed to give a comparative statement and it was clear that very few candidates had revised this work on ATP.

Q.9 Facility factor 29.8, 100% attempt rate.

- (a) Many candidates scored well on this question and could identify the component of blood from the blood smear and description.
- (b) The majority of candidates failed to state two systems used to identify a person's blood group. This was directly from the specification and even though it is only a small part of the specification centres are reminded that any part can be examined.
- (c) Many candidates correctly identified erythrocytes here. 'Red blood cells' was not accepted as it is clear in the specification that candidates should use the correct biological terminology for these cells.
- (e) Candidates struggled to identify a nutrient deficiency condition; these are clearly named in the specification. Other correct examples would have been accepted also.

Q.10 Facility factor 32.6, 97.4% attempt rate.

- (a) A simple statement here would have been enough for one mark but many candidates were unable to state the function of the reflex arc.
- (b) Labelling the different neurones was completed relatively well, it was clear however, that candidates either knew this or they didn't with many either gaining 3 marks or 0.
- (c) The events that occur at the reflex arc is nothing new, but many candidates struggled here. Those that were able to describe the events scored well and there were 7 available marking points for the events with an additional mark for the correct order.

Incorrect statements regarding where the sensory neurone passed the message to, and not stating the effector resulted in very few marks for some.

- (d) (i) Many candidates had no problem in naming the neurotransmitter or an example of one.
- (ii) Candidates struggled with the role of the calcium ions. Only a very few marks were awarded for this question. Many candidates confused calcium ions with sodium ions.

Q.11 Facility factor 24.2, 98.3% attempt rate.

- (a)** Only a handful of candidates could correctly name protozoan as the pathogen that causes toxoplasmosis.
- (b)** Most candidates scored one mark here for the effect of toxoplasmosis but it was clear that they were confusing the condition with tape worms and many were stating weight loss which is incorrect.
- (c)**
 - (i)** The method of transmission was answered poorly here. Candidates need to clearly state that tapeworm is transmitted in foods that are contaminated with tapeworm eggs or words to that effect. Simply stating 'from under-cooked pork' is incorrect because unless that pork is infected or contaminated with tapeworm eggs the person won't get a tapeworm. The effects were answered well with many scoring 2 marks here.
 - (ii)** Reduction of tapeworm was not a problem for most candidates but they should be careful to refer to good food hygiene not just washing hands without context.

Q.12 Facility factor 32.4, 100% attempt rate.

- (a)** This should have been a straightforward 4 marks for all candidates. It was clear, however, that some candidates had no idea what an EEG looked like and were unable to name the organ that it assessed. However, the majority of candidates correctly identified the ECG and knew that this was used to assess the heart.
- (b)**
 - (i) + (ii)** Again, as a Unit 2-linked question, it was expected that candidates would be able to label vital capacity and tidal volume. Unfortunately, yet again this was not the case with very few gaining any marks for these two parts.
 - (iii)** Here candidates were expected to do a simple subtraction calculation but again their mathematical skills let them down and very few scored any marks here.
 - (iv)** Most candidates correctly stated that an asthma sufferer would have reduced tidal volume or vital capacity and scored the mark here.

Q.13 Facility factor 23.8, 94.7% attempt rate.

- (a)** This question was a real discriminator. Very few candidates were able to gain many, if any, marks here. Most candidates were unable to state the roles of key processes during protein synthesis with only the very best candidates scoring high marks here.

- (b) Most candidates were able to describe one difference between competitive and non-competitive inhibition, however they failed to gain the second mark because the phrasing of their answers meant that they were not giving a comparative statement on each line, instead giving one feature of competitive on one line then the opposite point for non-competitive on the other. This resulted in just one mark.
- (c) Many candidates scored well here. They were able to identify the factors with ease and gave some good, detailed descriptions which allowed them to access high marks. Where candidates lost marks here was in their phrasing and lack of specific detail for the factor stated.
- (d) Only a few candidates were able to correctly name the lock and key model/ induced fit hypothesis here. Many confused this with 'enzyme- substrate complex' or did not answer at all.

Summary

It was clear this series that centres that had spent some time working through the pre-release had scored well in section A.

Mathematical skills were a problem again this year and centres should be sure to cover this aspect of the course with candidates before the exam, in particular selecting appropriate graphs, plotting points accurately, calculating percentages and rounding up/down.

The quality of written response and use of subject-specific language was poor this year for a large number of candidates which resulted in many marks being lost.

Although the content seems to be vast there is more than enough time within the year for centres to cover all aspects of the work for this unit. Centres should refer to the teacher guidance for the level of detail that should be taught. Centres should also remember to revise work carried out in Unit 2 and 3 as these could be tested within this examination. Responses to the Unit 2 questions were very poor and showed that some candidates had not covered this work during lessons.

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UNIT 2 PHYSIOLOGICAL MEASUREMENT TECHNIQUES

There were too few candidates entered to comment on.

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UNIT 3 MEDICAL RESEARCH METHODS

There were too few candidates entered to comment on.

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UNIT 4 MEDICINES AND TREATMENT OF DISEASE

There were too few candidates entered to comment on.

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UNIT 5 CLINICAL LABORATORY TECHNIQUES

There were no entries for this unit.

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UNIT 6 MEDICAL CASE STUDY

Introduction

This was the first time this unit has been examined since the postponement of examinations due to the Covid-19 pandemic. It was pleasing to see that most of the candidates attempted all the questions. The questions in this paper are based on a pre-release which is made available four weeks before the examination.

The pre-release / resource folder contains information about three medical conditions. In this examination the medical conditions were epilepsy, bowel cancer and cellulitis. Candidates are expected to study and research the information presented in the resource folder prior to the examination.

A case study and some additional materials about each medical condition were also included in the examination.

Questions 1-4 Case Study 1: Epilepsy

Facility factor (FF): 32.8, attempt rate 100%.

Q.1 This question related to the nervous system and how a synapse between two neurons works. The candidates needed to recall the role of the sensory and motor neuron in part (a). In part (b) the candidates needed to use the diagram to describe the processes that lead to neurotransmitter release at the synapse. It was evident from many of the answers to part (b) that candidates had a weak understanding of the processes at the synapse.

(a) Most of the candidates were able to gain some marks in this first question by describing the role of the sensory or motor neuron.

(b) Only a few candidates gained marks full marks here. Very few candidates were able to fully describe the process despite the prompts on the diagram.

Q.2 In part (a) nearly all candidates could gain some marks when describing the principles of an EEG.

In part (b) only a few candidates could describe an artifact often seen on an EEG and then suggest a reason to reduce or remove it.

In part (c) most candidates were able to gain some marks by comparing the EEG traces, but only a few managed to correctly refer to the differences in the frequency and amplitude of the traces and gain all 3 marks.

Q.3 This question focusses on the AED drug, sodium valproate, which was mentioned in the pre-release and how it worked.

In part (a) only a few candidates could recognise group X. However, in part (b) most candidates could correctly describe the effect of sodium valproate on an epileptic patient.

In part (c) the candidates needed to use figure 2 to answer the question. Many candidates gained all the marks here and were able to correctly calculate the minimum initial daily dose from the information in figure 2.

In part (d) only a few candidates gave a correct suggestion on why sodium valproate is given as two equally divided doses despite reference in the stem of the question relating to its half-life.

Q.4 In part (a) most of the candidates were able to describe at least one trend shown in figure 1. It is important to note here that data needed to be used to gain the marks.

In part (b), very few candidates were able select the relevant data from the stem of the question and then correctly calculate the number of patients suffering from epilepsy in Wales.

Questions 5-10 Case Study 2: Bowel Cancer

Facility factor (FF): 17.9, attempt rate 100%.

Q.5 In part (a), very few candidates could fully describe the role of helicase and DNA polymerase to gain full marks. Many candidates gained one or two marks for partial or incomplete descriptions.

The same was true in part (b). Most candidates gained some marks here again for partial or incomplete descriptions.

Q.6 Nearly all candidates could correctly state the term to describe changes in DNA. However, in part (b) only a few candidates could describe the role of proto-oncogenes and tumour suppressor genes in cancer.

Q.7 Most candidates could correctly describe three pieces of evidence provided by a biopsy sample.

In part (b) most candidates gained some marks in explaining the processes in the preparation of slides. Very few gained full marks here.

Q.8 This question focusses on the drugs mentioned in the pre-release and their use in treating cancer of the bowel. Disappointingly only some candidates gained the mark.

Q.9 Figure 3 was needed to answer this question. Most candidates failed to state that the incidence of bowel cancer is greatest in Western Europe - the first marking point. Marks gained in the question were usually from a correct reason why the rates were different.

Q10 Figure 4 was needed to answer this question. Most of the candidates gained at least one mark here for recognising the difference in cancer rates and gender. Again, to fully answer the question, data from the graph must be used in the answers and not generic statements.

Questions 11-14 Case Study 3: Cellulitis

Facility factor (FF): 51.4, attempt rate 100%.

Q.11 Most candidates could correctly identify two natural barriers (other than skin) and describe how each barrier reduced the risk of infection by pathogens.

Q.12 In part (a) most candidates could state one method that is used to sterilise equipment by microbiologists.

(b) Most candidates gained the two marks available for correctly explaining why aseptic techniques are important when dealing with infectious pathogens, recognising both the risks to the environment and the operator or microbiologist.

Q.13 Part (a) of the question focusses on the drugs mentioned in the pre-release and how they work on the bacteria that cause cellulitis. How these antibiotics work is quite different and only a few candidates could describe this despite them being named in the pre-release.

In part (b) the candidates needed to use figure 5 to answer the question. This question is an extended answer-type question. It was pleasing to see many candidates gain the maximum marks in this question. To answer this question the candidates needed to describe the trends shown in figure 5 and then discuss some of the advantages and disadvantages of administering antibiotics both intravenously and orally.

Q14 Figure 6 was needed to answer this question.

In part (a) most candidates recognised that the decrease in MRSA rates was due to the introduction of the national prevention control measures. However, many failed to explain this further.

In part (b) only a few candidates gained full marks. Most candidates did not explain the medical problems caused by MRSA in patients.

Summary

The use of the pre-release prior to sitting this examination is very important. Centres and candidates who perform best in this examination have read the pre-release and researched information about each case study. Candidates should be encouraged to understand and research the following:

- the prevalence and symptoms of a disease
- the causes, and the processes used in diagnosis, which are named in the pre-release
- any treatments named in the pre-release
- how drugs named in the pre-release act on a pathogen, or on a patient, to relieve symptoms.



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245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk