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## **EXAMINERS' REPORTS**

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**LEVEL 3 CERTIFICATE/DIPLOMA IN  
MEDICAL SCIENCE**

**SUMMER 2019**

Grade boundary information for this subject is available on the WJEC public website at:  
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### **Online Results Analysis**

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### **Annual Statistical Report**

The annual Statistical Report (issued in the second half of the Autumn Term) gives overall outcomes of all examinations administered by WJEC.

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## **MEDICAL SCIENCE**

### **Level 3 Certificate/Diploma**

**Summer 2019**

#### **UNIT 1**

#### **General Comments**

Unit 1 is the externally assessed examination unit for the Medical Science Certificate. It is worth 50% of the overall marks for 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 Easter 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.

Section B is 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 mathematical skills.

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 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 often incorrect.

#### **Comments on individual questions/sections**

##### **Section A - Pre-release Material**

Most centres had spent a considerable length of time preparing candidates for the pre-release section. These candidates scored very high marks for Section A. There was 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. The facility factor for section A was 59.8, with an attempt rate of 100 %.

- Q.1** Candidates had no problem in stating three possible causes of MS which were listed comprehensively throughout the pre-release article.

- Q.2** (a) The majority of candidates had no problem in drawing a motor neurone. However, they did struggle to label the structures listed and so lost marks for the labelling.
- (b) Again, drawing the direction of the impulse posed no problem for the majority of candidates.

Question 2 was purely recall from the specification and as it is stated clearly in the teacher guidance that candidates are expected to be able to draw and fully label a motor neurone it was encouraging to see that this work had been covered by centres during the delivery of unit 1.

- Q.3** Candidates could state two symptoms and their treatments for four marks. These were listed in the pre-release article.

- Q.4** (a) (i) The simple mathematical calculation caused problems for a large number of candidates where the incorrect figures were used. Candidates used figures for England only and did not calculate the percentage of English MS sufferers in the UK - this resulted in no marks being awarded. Some candidates struggled to round to the correct number of decimal places and this resulted in lost marks and in some cases, candidates did not include their workings and rounded up incorrectly, resulting in no marks. These simple mathematical calculations come up every year.
- (ii) Most candidates suggested correct reasons why Scotland may have more MS sufferers than England. This information was found in the pre-release and showed that candidates were very familiar with the text due to thorough preparation before-hand.
- (iii) The majority of candidates correctly realised that Scotland had a smaller population than England hence the higher percentage diagnosed but lower numbers compared with England.
- (b) (i) The graph question this year required candidates to plot a bar graph of the data found in the pre-release. This was a straight-forward bar graph. It was therefore, disappointing that the vast majority of candidates selected to draw a line graph. These line graphs could access 3 marks which included marks for the scale, axes and plots. The scales selected by some candidates were so obscure it meant that plotting the points was very difficult and resulted in the plotting mark being lost. Many candidates turned the graph paper to be landscape which was acceptable but meant again that the scales were modified and caused unnecessary errors with plotting.
- (ii) Calculating a ratio was new to this paper during this season, but was done well by a large number of candidates. It is worth remembering that these mathematical skills are expected in this specification for both unit 1 and unit 3 and can be included at any time along with any of the other mathematical skills listed.
- (c) Many candidates failed to gain the mark for two lifestyle improvements due to them not stating 'more exercise'. This is not the first time for this type question to appear in unit 1 and so candidates should be familiar with qualifying their answers.

- Q.5** (a) Data analysis is another skill that is tested annually. It was therefore disappointing when many candidates could only describe the trend and did not even attempt an explanation for the decrease in percentage numbers in employment. I suspect that many candidates did not read the question properly and so failed to gain the second mark here.
- (b) Most candidates could suggest a reason for the low numbers employed 30+ years after diagnosis.

## Section B

- Q.6** Facility factor 42.5, attempt rate 100%.
- (a) An easy 3 marks for candidates had they learnt their work by simply labelling the structures of the skin which is a requirement at GCSE. It was therefore, surprising the number of candidates that struggled with this question.
- (b) Another potentially easy 4 marks for candidates that had learnt their work but again, unfortunately, they were unable to recognise the hair and sweat gland and the majority struggled to state the function of each. Descriptions lacked clarity and detail. Candidates named the hair as the hair follicle which was incorrect and failed to give enough details on their functions to gain marks.
- (c) The majority of candidates failed to identify the leucocyte as the cell that produces pus. I think here, candidates failed to connect the two areas of the specification. ‘White blood cell’ was not accepted again this year as it does state clearly in the teacher guidance that candidates should use the correct biological terms for these cells at this level.
- Q.7** Facility factor 35.9, attempt rate 98.2%.
- (a) The question containing photomicrographs of the different organelles was designed to be accessible for all candidates. It was direct recall had candidates been exposed to these during lessons. Many candidates failed to recognise the rough endoplasmic reticulum, golgi body or mitochondria with candidates guessing incorrectly.
- (b) Candidates struggled to give a clear account of the plasma membrane structure and were not detailed or scientific enough in their answers. ‘Water loving/ hating’ was not sufficient for the marks and many candidates failed to give more of a response than this.
- Q.8** Facility factor 26.4, attempt rate 98.8%.
- (a) A simple comparison of DNA and RNA was needed for this question. The majority of candidates were able to achieve 1 mark here, but many failed to achieve many more. Common errors included spelling thymine as thyamine and not giving comparative statements.
- (b) (i) a large number of candidates failed to identify guanine for the first mark and then were unable to state that it has a double ring structure.

- (ii) Most candidates were able to identify that guanine and cytosine are joined by hydrogen bonds for 1 mark but failed to describe complementary base pairing for the second mark.
- (c) (i) Candidates struggled to label the amino acid binding site on the tRNA molecule but many were able to label the anticodon correctly.
- (ii) This question became an unintentional differentiator on this paper. Candidates were asked to describe the process of translation. This was done poorly by the majority of candidates with only a very small number of candidates achieving more than 3 marks. Candidates struggled to describe the process, and many did not know the function of tRNA. The lack of clarity in their responses made it difficult to award marks for many candidates and there was a lack of scientific language and detail which further restricted marks.

**Q.9** Facility factor 47.6, attempt rate 99.7%.

- (a) (i) This question had a variety of possible answers and candidates made good attempts at accessing the 3 available marks. Marks were sometimes lost in not giving comparative statements for both males and females.
- (ii) Most candidates could state that obesity would result in strain on the joints. The most common error here was when candidates were too generic with their response stating 'muscles' or 'bones' instead of joints.
- (b) (i) The synovial or hinge joint shouldn't have posed a problem to candidates but many got this wrong. These candidates failed to notice the prompts in the question and described the joint as a ball and socket joint.
- (ii) Most candidates scored at least one mark on this question, correctly identifying damage to the cartilage causing friction or rubbing, or the synovial membrane being inflamed. Many candidates could describe these correctly for two marks.
- (iii) Candidates were asked to give two treatment options here, many stated surgery which was correct. A large number gave a description of procedures that do not or could not take place so did not gain a mark. Steroids were only accepted if they were injections. A lack of specificity in answers here let some candidates down and led to them losing marks.

**Q.10** Facility factor 39.4, attempt rate 99.7%.

- (a) Another basic labelling question, done poorly by a larger number of candidates than expected. Common mistakes included labelling the bronchi as the trachea and the alveoli as the bronchioles. This work is studied at GCSE across all courses and should have posed no problems at all at this level.

- (b) The application style of this question meant many candidates struggled to gain marks. Many realised that the restriction of the airways would mean that there would be less air entering/leaving but did not connect this with increased breathing rate to compensate. Many scored 1 mark only.
- (c) This was a linked question from unit 3 so all candidates should have carried out some form of research so should have been able to list these ethical considerations with ease. However, the main answers given were confidentiality and consent which were correct but very few gave other references to the points that are found on the ethical evaluation questionnaire.

**Q.11** Facility factor 27.4, attempt rate 99.7%.

- (a) Another simple mathematical calculation that was poorly answered by the vast majority of candidates. Only a very small number of candidates scored any marks on this question. It was clear that the candidates struggled to locate the information within the question and used the incorrect figures to calculate the number of people prescribed medication for depression. Candidates calculated 74% of the 2000 that took part in the survey instead of reading the figures properly and calculating 74% of the 29% that sought help. This led to massive numbers being calculated by the candidates that were incorrect.
- (b) Candidates struggled to list risk factors for depression, instead they gave potential symptoms of depression instead.
- (c) Most candidates were able to give a reason for the cost being much higher than calculated, taking into consideration that people lost hours in work and many hadn't been diagnosed.
- (d)
  - (i) The majority of candidates failed to identify that all regions would suffer the same risk factors for depression such as workload, housing, cost of living etc. This resulted in very few marks being awarded for this question and the question became an unintentional differentiator.
  - (ii) This question posed no problem for candidates and many could identify methods for reducing depression.

**Q.12** Facility factor 45.5, attempt rate 99.9%.

- (a) This table became a differentiator on this paper. As the main unit 2 link question it was answered very poorly by many candidates. It was clear that many had no knowledge of what the physiological tests were used for. It was clear from answers that some centres had revised this work and that others had not. It is worth remembering that all content needs to be covered from all units for this exam.
- (b)
  - (i) Candidates could state variables that need to be taken into consideration before taking blood pressure readings. This is probably due to candidates using this test during their project work for unit 2.

- (ii) Three marks were available here for correct descriptions and explanations of the given graph of blood pressure in different blood vessels. Most candidates scored at least one mark for basic descriptions of the graph which was encouraging. A small number of candidates could develop their answers and described the effect of friction and cross-sectional area on blood pressure. This was encouraging.

### **Summary of key points**

- There was an improvement again this year in the quality of answers in particular for section A and centres had clearly spent the time before the exam studying the pre-release article.
- 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, selecting appropriate graphs, plotting points accurately and calculating percentages.
- 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. Direct recall of themes that are part of GCSE specifications were also answered poorly which was disappointing.
- 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. It was found this year that responses to the Unit 2 questions were very poor and showed that some candidates had not covered this work during lessons.

## **MEDICAL SCIENCE**

### **Level 3 Certificate/Diploma**

**Summer 2019**

#### **UNIT 2**

#### **General Comments**

Forty-two centres submitted work for this unit in this series.

Largely the quality of work submitted by centres was of a good standard and most of the assessment decisions made by centres were valid and agreed with the moderator's decisions. Some centres had over-graded for some assessment criteria, awarding higher band marks where the candidate's work was at best middle band.

The administrative work was correctly submitted by most centres, with authentication sheets signed by the candidates. Most centres had correctly completed the mark record sheet; some centres had included detailed annotation on candidate's work which was helpful to the moderation team.

#### **Comments on individual questions/sections**

##### **Task 1**

Candidates need to produce pre-test information for three different tests; one of these tests must be an ECG.

AC1.1 must be demonstrated in each piece of pre-test patient information, as each piece is marked out of a maximum of 6 marks, so 18 marks in total for this AC. It is important that for AC1.1 candidates do not just describe the procedures for carrying out the physiological test but explain the principles of how the test works. For example, with peak flow test, candidates could explain about this test measuring airflow through the bronchi and thus the degree of obstruction and/or narrowing. 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. Explanations for blood pressure should include reference to systolic and diastolic measurements, and what these are in relation to the cardiac cycle in order for candidates to be awarded top band marks. Many candidates seemed confused about the principles of peak flow measurement, confusing it with lung volume.

Too many leaflets had small, illegible tables of normal vs abnormal values, which were not labelled/identified; these would be useless for patients; candidates only need summary data which they can then use for AC1.2.

##### **Task 2**

For this task candidates need to produce a plan (AC3.1). This plan should be detailed and cover points as indicated in the specification, 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 (this could be a copy of a patient notification form); any other individuals that need to be contacted - e.g. technician, facilities etc. Although the observation record can also support the achievement and assessment of this AC, it is essential that candidates produce a written plan themselves, which includes AC2.1 and 2.2 in some detail. Evidence of AC2.1 and 2.2 cannot come from the observation record alone.

Candidates need to perform a minimum of **two tests** on at least **two** patients. The two tests should test two different physiological systems, for example blood pressure test: cardiovascular system, peak flow: respiratory system. Tests such as BMI/breathing rate do not test a specific system and are not listed in the content for this unit (AC3.2). Pulse oximetry and blood pressure are a permitted combination of tests.

The expected clinical requirement is for blood pressure measurement to be repeated three times. This provides opportunities for data processing (AC4.1), through the calculation of a mean. Three readings also provide data for candidates to then discuss repeatability and outliers in their data, in their evaluations (AC4.3). There is no mean calculated for peak flow results; the highest reading is taken.

### **Task 3 and 4**

These two tasks are linked, but it is important to ensure that candidates cover all the required ACs. It is not necessary to give detailed analysis of results in the test results summary box on the pro-forma. Limitations of the tests they have performed must be covered (AC1.3). These limitations should not be specifically about the individuals tested, but about the actual test/method of testing/equipment etc. If only one blood pressure measurement is taken, then this is not a limitation, as three readings are expected for this measurement test.

For AC4.1 candidates should process data from the physiological measurement tests they performed and from the data with which they are provided (ECG trace). This requires correct calculations and use of significant figures, with units. With the ECG trace, candidates should label the components of the ECG (P, QRS and T) and undertake relevant analysis. They should also comment on the “repeatability” of the two traces provided. The ECG trace must be attached to the report; it is a result. If there is no ECG trace it is impossible to check whether candidates have been given an alternative trace as an example.

For AC4.2 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. Statements such as “the individual is healthy” are not linked to evidence or suitable at this level as detailed explanations.

For AC4.4 it is important that candidates use scientific and technical language appropriately and consistently in the report for the head of department (e.g. hypertension rather than high blood pressure) for top band.

### **Summary of key points**

- This was the third year in which candidates could submit work for this unit.
- It was pleasing to see that many centres had acted upon the comments made in previous moderator reports.
- Please ensure that the tests listed in the specification content for unit 2 are selected – those that are not specific to a particular organ system are not appropriate.
- Annotation by the centres is particularly helpful to the moderation process, enabling the moderator to see why assessment decisions have been made within a centre.
- Centres are reminded that exemplar work for this unit is available to view on the secure WJEC website.

## **MEDICAL SCIENCE**

### **Level 3 Certificate/Diploma**

**Summer 2019**

#### **UNIT 3**

#### **General Comments**

This was the third year in which candidates could submit work for this unit.

The quality of the work submitted was generally good and assessments by the centres were in the main accurate and in agreement with the moderators. It was pleasing to see that many centres had acted upon comments made in previous moderator reports.

Administrative work was generally correct, with authentication sheets signed by candidates. It would be helpful if there was more annotation on the candidates' work, in the appropriate place, to indicate why certain bands and marks were awarded for the individual assessment criteria.

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

When making a photocopy of the candidate's presentation, please ensure that any spreadsheets, tables, and graphs are large enough to be clearly readable. This is especially important when statistical calculations are embedded into the spreadsheet.

If candidates start to plan their work with clear and measurable independent and dependent variables it sets the tone for the rest of the investigation; making planning the questionnaire, gathering and evaluating data, and making conclusions more accessible.

#### **Comments on individual questions/sections**

##### **Task 1: Planning to carry out the investigation**

**AC1.1:** To achieve band 3 candidates are required to give clear descriptions of the variables along with how they will be measured or, for the extraneous variables, how they may be controlled, or their effect minimised. To quote 'attitudes' as the dependent variable is too vague. This leads to questionnaires which are too long; hence a large amount of data is collected which subsequently makes the analysis unnecessarily complex.

**AC1.2:** Whilst it is essential to quote the hypothesis for the investigation the marks are awarded for its justification. Candidates should consider why they have chosen to investigate this hypothesis and why the information produced might be valuable. Better candidates might refer to a research paper or newspaper article. There is no requirement to produce pages of secondary data. Many candidates lost marks here by only referring to a one-tailed or two-tailed hypothesis.

**AC1.3 and 1.4:** These were generally well answered by most candidates. There was some confusion between qualitative and quantitative data. The better responses referred to how the data might be analysed, for example, by giving examples of questions which will generate data for graph drawing or may be used for a named statistical test. You are directed to the websites mentioned in the Guidance for Teaching booklet for information on sampling techniques.

### **Task 2: Collecting information**

**AC2.1:** To award band 3 the plan needs to be detailed for it to be followed by a third party. For example, it is insufficient to say that the questionnaire will be handed out. How will it be handed out? A few candidates lost all the available marks here for not including a plan.

**AC2.2:** For many candidates this was an exercise in collecting as much data as possible about smoking and the questionnaires contained far too many irrelevant questions. Consequently, far too much data was generated which did not link to the hypothesis making analysis difficult. It also resulted in investigations which were far too lengthy.

**AC2.3:** The use of spreadsheets for the raw data was an issue here with some candidates producing multiple pages of numbers and words, often in a minuscule font size, which bore little resemblance to the questions asked. Candidates should be encouraged to collate their raw data and present it in suitably labelled tables. This will also contribute towards AC5.1.

### **Task 3: Analyse the data**

This is the task the candidates struggle with the most. Throughout this task there should be evidence that the candidates understand and apply the terms used in data analysis. If a statistical test is used then terms such as degree of freedom, probability, critical value, parametric should be used and explained in the correct context. Many candidates use the correct terminology but fail to explain it.

Candidates should explain why they have chosen a statistical test using terms such as nominal, categoric or ordinal to describe their data. Other terms might include correlation, statistical difference, trend and normal distribution. If necessary, the null hypothesis should be stated before carrying out the test. Note that the null hypothesis should contain the phrase ‘there is no significant difference between ...’

A well set out and analysed statistical 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 if candidates show the stages of the calculation of the statistical test it will help them to access marks for both AC4.1 and 4.2.

A list of terminology and mathematical notation can be found in the Guidance for Teaching booklet.

**AC4.1:** A statistical test, such as Chi Square or Mann-Whitney should be carried out correctly to achieve Band 3. The Chi square test was used inappropriately by many candidates. Standard deviation can only be used to analyse data which shows a normal distribution. Some candidates attempted to use standard deviation on Likert questions. This is meaningless.

**AC4.2:** The best answers here are where the conclusions are clearly and logically linked to the evidence and to the null hypothesis. Candidates who do not carry out a statistical test can still make detailed and appropriate conclusions. Conclusions need to link back to the original hypothesis.

**AC4.3:** This 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.

**AC4.4:** There was more evidence this year of candidates using mathematical notation correctly. A mark for using significant figures correctly can only be awarded where there is clear evidence of a calculation having been carried out.

#### **Task 4: Prepare a presentation**

**AC5.1:** This requires candidates to present their data visually and suitable 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 2.3 and 4.4) and graphs need to be fully labelled. Many graphs generated using excel spreadsheets did not have labelled axes.

#### **Summary of key points**

- A list of terminology and mathematical notation can be found in the Guidance for Teaching booklet.
- A plan must be included to credit AC2.1.
- Candidates should be encouraged to focus on the quality of their questionnaires – they should focus on relevant questions only.
- Centres are reminded that exemplar work for this unit is available to view on the secure WJEC website.

## **MEDICAL SCIENCE**

### **Level 3 Diploma**

**Summer 2019**

#### **UNIT 4**

##### **General Comments**

Unit 4 is an internally assessed unit that is worth 50% of the second year marks. It is split into three tasks. Each task allows candidates to communicate in different ways that are appropriate for their audience.

Candidates are expected to complete two presentations to hospital staff about the administration and effects of medication in task one. Task two expects candidates to produce information for patients about four different medicines and task three is information about cancer, causes of cancer and treatments.

39 centres submitted work for unit 4 in this series.

Many of these submissions were from new centres and the quality of this work varied, as too did the quality of assessment. Clear and detailed annotation would have aided the moderators for many of these new centres.

Centres that have previously entered work, produced consistently good work and most of these centres accurately applied the marking guidance and provided helpful annotation on the work. A minority of these centres are still over-generous when applying the marking guidance.

Most centres submitted the correct administrative documentation and all centres included authentication sheets signed by the candidates. The mark record sheets were correctly completed by the majority of centres although a small number of centres failed to add up the marks correctly and there were a number of clerical errors found by the moderation team.

In some instances, the number of marks awarded to candidates for certain ACs were higher than the maximum mark that could have been awarded, this also led to more clerical errors.

Centres are advised to refer to exemplar work on the WJEC secure website especially for task 2 as the leaflets have been presented in a straight forward and effective way that allow candidates to access all marking criteria.

Any work seen to have been copied or plagiarised will be brought down to Band 1 as this shows that candidates do not have a level of understanding of the work which would allow them to access any further marks. Candidates should be reminded that work should not be copied from any resources and that all work submitted should be original.

## Comments on individual questions/sections

### Task 1

The quality of presentations was very high with many candidates scoring almost maximum marks for this task. Observation records were completed well by the majority of centres although a small number of centres are still not including a copy of the presentation material, the speaker notes from the candidates or in some cases a reflective account of the candidates' contribution to team work. These are all necessary for Task 1. The omission of the reflective account (AC4.3) results in candidates losing any marks for AC4.3 although centres were still awarding marks for this AC.

For future submissions centres must include the following documents along with a completed observation record: **a copy of the presentation material, the candidate's speaker notes (if applicable) and a reflective account from each candidate outlining their contribution to team work.**

### Task 2

It was clear that many centres struggled with completing this task. The quality of work here was varied. Centres that have previously submitted work seemed to have grasped what is needed to be able to award the top band marks but new centres were over-generous when marking.

In some instances, the pamphlets had been presented and arranged in such a way that candidates were unable to access all mark bands, yet these candidates had still been awarded top band.

For this assessment it is important that all four of the pamphlets show evidence of each of the ACs for the task. Some centres confused what was needed and produced only three leaflets which automatically restricts candidates. Many of the assessors were overly-generous especially with the following ACs;

- **AC2.2** - candidates need to explain how medicines affect body systems, in many cases the body system was not named. This restricts marks for the candidate as simply stating an organ or area of the body is not sufficient.
- **AC2.4** - it is possible for candidates to explain how many medicines, not just antibiotics, may lose their effectiveness and this would be expected when awarding band 3.
- **AC2.5** - many candidates gave a list of the medications that interact with the named medicine, this is not sufficient for band 2 or 3 marks. Candidates should **explain** how these medications interact with the named medicine.
- **AC2.7** - a simple list of side effects is not sufficient here, yet many centres were awarding high marks for these. Candidates need to **explain** how the adverse reaction to the medication has occurred within the body and should give examples.

There was a lack of clear annotation for this task especially as many of the candidates had not included evidence of all ACs on each leaflet and assessors had still awarded marks. It would be beneficial for moderation in future series if each leaflet was annotated with appropriate comments drawing attention to where the AC has been awarded. This way, when marking it is clear that all necessary information has been included on each leaflet so that application of the marking bands is easier.

For a small number of centres there was no justification of the method used when presenting Task 2, AC4.2. This must be present for candidates to be awarded any marks for this AC. Again, there is no mark awarded if the candidate does not include this in the work, yet centres were still awarding high marks with no evidence.

### Task 3

The majority of centres presented acceptable work for task 3 and this was assessed appropriately using the marking guidance. In a small number of centres the assessors were overly-generous for low quality work.

For **AC3.1** candidates were awarded band 3 marks for work that did not contain all necessary information describing the term cancer. As this AC is only worth 4 marks it is important that all aspects of the work are included. Any omissions should then lead to a decrease in the mark awarded.

Generally **AC3.2** was completed and assessed well with candidates explaining the genetic basis of cancer clearly and this work was assessed in accordance with the marking guidance.

**AC3.3** allows candidates to access high marks for descriptions of possible cancer treatments. This was, again, done well by the majority. It is worth noting here that for candidates to access band 3 marks they do need to include information about all treatment options included in the teacher guidance. These should be described to a sufficient level of detail for the band 3 marks and again any omissions should result in a decrease of marks awarded.

Many centres struggled with **AC3.4** as candidates must include an assessment of the potential impact of new treatments for cancer not a simple description. Many assessors awarded marks for descriptions of the treatments with no assessments of their impacts - this is incorrect and if candidates have not made an assessment they cannot access these marks.

### Summary of key points

- In summary, task one was of a high standard with most centres providing the correct documentation and applying the marking guidance correctly.
- Task two varied greatly across centres and therefore many centres, in particular new centres, should read their specific reports for areas to improve. Marking tended to be over-generous and a lack of annotation was found for a large number of centres.
- Task three tended to be done well with most centres understanding the brief here.
- Please refer to centre specific reports and to the details stated above for further AC-specific information.

## **MEDICAL SCIENCE**

### **Level 3 Diploma**

**Summer 2019**

### **UNIT 5**

#### **General Comments**

This unit is externally assessed by an assignment provided by WJEC annually in September of each academic year. It is downloadable from the WJEC secure website and was this year based around faecal sample testing and linked to bowel cancer.

There was a significant increase in centres submitting work for this unit in this series. The work submitted by the majority of centres was good, although candidates from a few centres had not completed all the tasks. The mark scheme for this unit can be found in the specification and it may be worth sharing this with candidates before they begin the assignment, as some had not included all the required information.

#### **Comments on individual questions/sections**

##### **Activity 1 - Use of Clinical Laboratory Techniques.**

The tasks in this activity are linked with the candidates being expected to plan and carry out the investigation, collecting results which they then summarise in a separate report. Most candidates were able to gain marks in all assessment criteria. A.C 2.1 required candidates to plan three tests, it was expected that for the highest marks they would:

- say what each test was for
- write a brief, but accurate method which would work (e.g. not streak testing, as colony numbers had to be calculated)
- state the expected results.

It is not necessary that candidates test multiple sets of samples, the brief requires them to test only one set.

The observation record, provided for the assessor to complete, must include the mark for the tests. This had not been done by all centres, meaning marks could not be awarded as there was no evidence to show some aspects of A.C 2.2.

When recording the data for A.C 2.3 marks were lost due to a lack of explanation of what they needed to do in the calculation, poor use of precision, standard form and units. This was reflected in the facility factor of 59.9 for this AC.

A.C 3.4 was assessed here. The task required a brief summary and candidates should not attempt to diagnose the patient. Not complying with these instructions and doing additional practicals, lost some candidates marks. Nevertheless, this AC had the highest facility factor in the assessment – 95.8.

Word processing the work is not essential, it also sometimes leads to marks lost due to inaccuracy of e.g. spelling and standard form. It is definitely not useful for the candidates to hand write and then word process their work, as was seen from several centres. The quantity of work produced must have made it very difficult to complete within the time allowed (4.5 hours).

### **Activity 2 - Clinical testing.**

The tasks here were more discrete. The first task often lost candidates marks, with the second being done well by the majority.

Task 1 required candidates to produce a table of information which needed to be concise. Marks were lost from A.C 3.4 when the instructions were not followed.

The information needed to relate to the principals of the three tests. Many candidates wrote about what the patient would be required to do rather than how the test actually works. Details of what the candidates should have been taught is described in the specification and within the teacher guidance for A.C 1.1. The facility factor of 55.4 reflected that some candidates found this AC difficult.

Very few candidates had included detailed information for A.C 1.2 on the factors which would affect each of the three tests and this was a place where many candidates lost marks, with only one or two giving an accurate, detailed and coherent explanation showing detailed reasoning of the factors that affect each of these clinical tests. They cannot just include a generic paragraph, but should explain why each factor limits the results of the required tests. These points are reflected in the fact that AC1.2 had the lowest facility factor in the assessment at 45.1.

Task 2 was an analysis of results the candidates had been given using the normative values supplied. The graph required for A.C 3.1 needed to have suitable scales and be accurately drawn and labelled. Hand drawn graphs tended to achieve the highest marks and tended to be significantly better than anything produced electronically.

In order for the graph to be constructed, means needed to be calculated for A.C 3.2. Most candidates did manage these calculations, but many failed to explain what they needed to do. The mark scheme requires calculations to be clearly and logically presented using consistent, accurate significant figures, many candidates losing marks for these aspects.

The marks for A.C 3.3 tended to be good with most candidates able to analyse the marks for all information provided. Again, there needs to be no diagnosis and the information should be brief.

Within A.C 3.4 it is important the candidate “uses an appropriate structure”. In order that candidates do not lose marks here it would be helpful if tasks were not divided (e.g. task 1 plan right at the beginning but results at the end or ELISA described in several places throughout the work).

## **Summary of key points**

- Overall, the majority of centres submitted work of a pleasing standard and many teachers are giving students the skills to access the highest marks.
- Some work was annotated by teachers which is unnecessary here as the work is marked by WJEC.
- There were also scripts which contained aspects which were very similar and it should be noted that this work should be done individually not as part of a group.
- Some candidates had done huge amount of unrequired work and referenced this research. This is a waste of their time as they should have been taught all that they need to know to complete these tasks and having to complete this additional work in the time allowed must impact the quality of the requested work.
- Most centres correctly submitted the required administrative work, however folders and poly-pockets are unnecessary.
- The work should not amount to more than a few sheets, so stapling each candidate's work together would be sufficient.
- It should be noted that is essential that an authentication sheet signed by the candidate and the mark record sheet is attached to the candidates' work.

## **MEDICAL SCIENCE**

### **Level 3 Diploma**

**Summer 2019**

### **UNIT 6**

#### **General Comments**

This was the second year that this unit has been examined and 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 Stomach ulcers, Duchenne Muscular Dystrophy and Hypothyroidism. Candidates are expected to study and research the information presented in the resource folder.

Additional materials about each medical condition are also included in the examination.

#### **Comments on individual questions/sections**

##### **Questions 1-4 – Case Study 1 – Stomach Ulcers**

Facility factor (FF): 55.5, attempt rate 100%

**Q.1** This question related to protein digestion and how the endopeptidases pepsin and trypsin work. The candidates needed to use information in a given graph showing the effect of pH on these enzymes. It was evident from many of the answers to part (b) that candidates had a weak understanding of these types of enzymes.

- (a) Nearly all the candidates were able to gain all 4 marks in this first question by describing the effect of pH on these enzymes. Identifying the optimum pH for each and stating their relative locations in the digestive system.
- (b) For part (i) only a few candidates gained marks here. Very few candidates were able to describe the action of endopeptidases and exopeptidases on a polypeptide. Only a handful of candidates were able to correctly suggest why digestion of the polypeptide was more efficient if exposed to endopeptidases before being exposed to exopeptidases.

**Q.2** Figure 1 was needed to answer this question.

- (a) In part (a) nearly all candidates could describe at least one of the trends shown by the graph – the prevalence of *H. pylori* infection increases with age or there is a greater prevalence in India compared to the UK.
- (b) In part (b) most candidates could suggest a reason for the trend. The most common reason was related to food hygiene standards. Less candidates could give suitable reasons for the age-related trend.

- Q.3** This question focusses on the drugs mentioned in the pre-release and how they work.  
Most candidates gained all the marks here and were able to describe how PPI's and antacids reduce the symptoms of indigestion.
- Q.4** Most of the candidates showed that they had used the pre-release well and had used the information given to prompt further thinking prior to the examination. Figure 2 was also needed to answer part (c).
- (a)** Many candidates managed to correctly state the role of a sedative and a local anaesthetic. However, several candidates incorrectly stated that a sedative and/or a local anaesthetic put the patient to sleep.
  - (b)** Nearly all the candidates gained marks describing how a gastroscopy is performed, most gaining all 4 marks.
  - (c)** Using figure 3, most candidates suggested the correct local anaesthetic and explained their choice correctly.  
In part (iii) candidates needed to use information from the case study (Harold) and information from the table to calculate the maximum dose required. A number of candidates did not refer to the case study to calculate Harold's weight and did not gain any marks.

### Questions 5-9 – Case Study 2 – Duchenne muscular dystrophy

Facility factor (FF): 28.0, attempt rate 100%

- Q.5** **(a)** Most candidates could state what was meant by the term 'sex linked'.
- (b)** Many candidates gained some marks here. If the candidate used the stem of the question to correctly identify the genotypes of the parents and complete the Punnett square then 3 marks were available. An error carried forward (ecf) was often applied to the Punnett square if the genotypes were incorrect, but the cross and probability statement were correct.
- Q.6** Only a few candidates gave a good account of the process of PCR. Many gave a poor account and confused this technique with an ELISA or RIA. Credit was given for stating the main purpose of PCR in genetic testing.
- Q.7** Figure 4 (a normal ECG trace) was given as an aid to candidates.
- (a)** Only a few candidates could explain the differences between a normal ECG and a patient with DMD despite the reference to conduction in the given example. It would be expected that candidates could describe the electrical conduction within an ECG and identify abnormalities against a normal trace. Candidates usually gained marks explaining the term tachycardia.
  - (b)** This question related to the structure of the heart and not its function. Only some candidates were able to describe the effects on the structure of the heart.
- Q.8** This question focusses on the drugs mentioned in the pre-release and their use in treating a DMD patient. Nearly all candidates gained at least one mark here, usually for recognizing that both of these drugs reduce blood pressure.

- Q.9** Information from the case study and Figure 3 was needed to answer this question. Many candidates gained all the marks available here. They correctly determined the correct stage (stage 5) and gave correct explanations. Some credit was also given if the candidate chose stage 4 as long as the explanations for their decision were correct.

### Questions 10-13 – Case Study 3 – Hypothyroidism

Facility factor (FF): 43.6, attempt rate 100%

- Q.10** Most candidates gained some marks by describing the term auto-immune, usually for recognising that it was an abnormal immune response.
- Q.11** (a) Most candidates gained at least one mark for explaining why tyrosine is classed as an amino acid, usually recognising the carboxyl or amine group. No credit was given for stating it had an amino group.
- (b) Nearly all candidates could correctly suggest that iodine is part of the diet.
- (c) Most candidates understood the process of RIA and correctly placed the steps in the correct order and gained all the marks. In part (ii) many candidates could give a correct additional advantage of RIA and a risk of using this technique.
- Q.12** Figure 5 was needed to answer this question. This question also related to work in unit 3 of the course.
- (a) Most candidates were awarded the one mark for stating the null hypothesis. The null hypothesis must state that there is no significant difference... In part (ii) the candidates had to use the information in the stem and the table to determine the probability and compare this to the  $\chi^2$  value given. Most candidates gained one mark for rejecting the hypothesis but many did not give a correct reason.
- (b) Many candidates gained most of the marks available for correctly comparing the information in figure 5. Most recognized that the prevalence was greater in females and that it increased with age. The last marking point relating to the prevalence in females increasing at a faster rate was often missed.
- Q.13** Figure 6 was needed to answer this question. This question also related to information in the case study.
- (a) Many candidates could calculate the total number of packs required in one year however many failed to realise that they needed the two different packs of 150 $\mu\text{g}$  and 100 $\mu\text{g}$  which have a different cost per pack. There were several correct ways to calculate the cost, by pack or by tablet, all were given credit.
- (b) Most candidates gained only one mark here. Usually the candidates were able to recognise that it takes time to visit a pharmacy/GP so going less often saves time. Saving money was only accepted if was qualified, e.g. less travel costs or GP time. In part (ii) many candidates recognized the NHS prefers short prescription times so that they can monitor non-adherence.

- (c)** This part of the question focusses on the drugs mentioned in the pre-release, how they work and the side-effects of these drugs. Some of the candidates could explain these side effects very well and showed that they had used the pre-release effectively. In part (ii) most candidates could state the primary use of the drug lithium and could state a correct side effect, of which there are many.

### **Summary of key points**

- 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 cause and the processes used in diagnosis a disease, named treatments and how named drugs act on a patient.



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