



LEVEL 3 DIPLOMA

4463U50-1

2024–2025

MEDICAL SCIENCE

UNIT 5: Clinical Laboratory Techniques

Activity 1 – Use of Clinical Laboratory Techniques

Activity 2 – Selection of Clinical Laboratory Techniques and Data Analysis

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Activity 1

Cellulitis is a bacterial skin infection. It makes the skin painful, hot and swollen. Although it is easily treated with antibiotics, it can become serious if it is not treated quickly, particularly in diabetics.

Fluid samples from a patient infected with cellulitis have been sent to the laboratory for testing. The samples have been treated to give a relatively clear liquid.

You will carry out clinical laboratory tests on **one** set of three samples:

- Sample 1 needs to be tested for glucose.
- Sample 2 needs to be tested to determine the level of bacteria.
- Sample 3 needs to be tested for protein.

You will write a report recording the outcome of each of your tests.

You are required to plan, carry out and report the results of the tests.

Task 1: Plan your investigation

Plan to carry out appropriate clinical tests on the samples you are provided with. These should be the tests listed above.

Task 2: Carry out your investigation

Follow your plan from Task 1. Record your raw data and any modifications to your plan as you carry out your tests.

Task 3: Record results

Record all of your results. These should include the results from the tests you have done on each sample. You should also record any other relevant observations. Ensure that all data and calculations are recorded and explained clearly.

Task 4: Summary

Summarise your findings. Your summary should be in a **concise** format but show all relevant information.

(You are not required to suggest a diagnosis in your summary.)

LEARNER SUMMARY SHEET

Task Number	Evidence This is the evidence that will be produced.	Assessment Criteria You must make sure your work covers the following assessment criteria.	Controls This tells you the rules that your teacher must keep when you complete the tasks.
Task 1 Plan	Written plan	AC2.1	Time 60 minutes Resources Access to appropriate ICT software. Access to class notes NOT allowed. Supervision You will be supervised throughout. Collaboration Individual task Feedback You cannot be given feedback on the work you produce until it has been marked.
Task 2 Carry out	Raw data Observation record	AC2.2	Time 120 minutes (split as required) Resources Access to appropriate ICT software. Access to class notes NOT allowed. Supervision You will be supervised throughout. Collaboration Individual task Feedback You cannot be given feedback on the work you produce until it has been marked.
Task 3 Record results	Results and any calculations	AC2.3	Time 60 minutes Resources Access to appropriate ICT software. Access to class notes NOT allowed. Supervision You will be supervised throughout. Collaboration Individual task Feedback You cannot be given feedback on the work you produce until it has been marked.
Task 4 Summary	Written Summary	AC3.4	Time 30 minutes Resources Access to appropriate ICT software. Access to class notes NOT allowed. Supervision You will be supervised throughout. Collaboration Individual task Feedback You cannot be given feedback on the work you produce until it has been marked.

**WJEC Level 3
Diploma in Medical Science**

Observation Record

To be completed by assessor as part of the evidence for Task 2.

Unit 5: Clinical Laboratory Techniques

Candidate Name:			
Samples provided to this Candidate:			
Test 1 sample contained			
Test 2 sample contained			
Test 3 sample contained			
AC2.2 assess biological samples using clinical tests			
	✓ or ✗		
Please indicate that the following was done:	Test 1	Test 2	Test 3
Maintains tidy working area at all times			
Works safely (with or without prompting)			
Consistently works in accordance with risk assessment and laboratory requirements without reminding or prompting			
Correctly uses PPE without reminding or prompting			
Consistently uses equipment to obtain suitable results			
Data is within expected tolerance of instruments/procedures			
Any further comments:			
Mark /6			
Mark Awarded AC2.2 (out of 18)			
Assessor	Signature	Date	
.....			

Technical Guidance: Procedures

There should be different sets of samples for candidates to test (i.e. every candidate **should not** receive the same set). The supervisor will need to make it clear on the observation record which substances are in the set so that marking is reflective of this.

Candidates should be given **one** set of three samples that allows them to test for:

- glucose using Benedict's reagent
- bacterial growth by serial dilution (at least four dilutions) then growing bacterial samples on agar plates
- protein using Biuret solution.

It is essential that de-ionised water rather than tap water is used to make the samples.

Sets of samples should contain the following:

Sample 1: either glucose or no glucose.

Sample 2: bacteria – for example, from stale milk or other suitable culture (different amounts of bacteria would further diversify the sets).

Sample 3: either protein or no protein, for example, from casein (or other suitable solution).

Inability to count colonies will still be a valid result for candidates to analyse. Candidates should, however, demonstrate an understanding of how calculations should be carried out.

There is no requirement to test more samples/markers than indicated.

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Activity 2: Clinical testing

Clinical tests to confirm that a patient has cellulitis include:

- enzyme-linked immunosorbent assay (ELISA) to measure levels of C-reactive protein (CRP)
- analysis of blood components using haematology
- turbidimetry to identify levels of bacteria in solution.

CRP is a non-specific marker of inflammation. As cellulitis causes inflammation, higher levels of CRP can be used to suggest the severity and spread of the infection.

Table 2.1 – Interpretation of CRP levels

Level of CRP (mg/dm ³)	Implication
< 3	Normal level, seen in most adults
3–9	Minor elevation, suggests infection is localised
10–99	Moderate elevation, suggests infection has led to systemic inflammation
100–499	Marked elevation, suggests infection may lead to complications such as DVT
> 500	Severe elevation, suggests infection has led to sepsis

Table 2.2 – Reference ranges for some common haematology tests

Test	Adult male	Adult female
glucose (fasting) (mmol dm ⁻³)	4.5–6.1	4.5–6.1
sodium ions (mmol dm ⁻³)	133–147	133–147
potassium ions (mmol dm ⁻³)	3.5–5.0	3.5–5.0
calcium ions (mmol dm ⁻³)	1.15–1.29	1.15–1.29
haemoglobin (g dm ⁻³)	140–180	115–160
erythrocyte count ($\times 10^{12}$ dm ⁻³)	4.5–6.5	3.8–5.8
leucocyte count ($\times 10^9$ dm ⁻³)	4–11	4–11
thrombocyte count ($\times 10^9$ dm ⁻³)	150–400	150–400

YOU WILL NEED TO USE THE DATA PROVIDED ON THIS PAGE TO HELP YOU TO ANALYSE THE RESULTS GIVEN ON THE NEXT PAGE.

Tests have been done on samples from a 68-year-old male patient with cellulitis. The results are shown below.

ELISA to measure levels of CRP shows the patient sample to have a level of 350 mg/dm^3 .

Table 2.3 – Haematology test results

Test	Result
glucose sodium ions potassium ions calcium ions	5.3 mmol dm^{-3} 143 mmol dm^{-3} 4.3 mmol dm^{-3} $1.19 \text{ mmol dm}^{-3}$
erythrocyte count leucocyte count thrombocyte count	$4.6 \times 10^{12} \text{ dm}^{-3}$ $5.9 \times 10^{10} \text{ dm}^{-3}$ $5.8 \times 10^{11} \text{ dm}^{-3}$

Table 2.4 – Turbidimetry results

Level of infection (au)	Relative particulate units		
	Trial 1	Trial 2	Trial 3
0	7.9	8.2	8.1
2	8.8	8.7	8.9
4	12.3	11.5	12.2
6	28.1	28.4	27.8
8	58.3	57.5	58.2
10	99.7	99.7	99.8
sample (unknown)	85.3	84.9	85.3

Task 1: Testing information

Produce an information sheet about cellulitis diagnosis that could be given to patients.

The information should describe the method, purpose and limitations of the clinical laboratory techniques carried out, including:

- enzyme-linked immunosorbent assay (ELISA)
- analysis of blood components using haematology
- turbidimetry.

Do not include details of how the samples are taken from the body.

Task 2: Analysis of results

Test results are given on page 9. Write a concise report for the GP who will interpret the data.

You are not required to suggest a diagnosis in your analysis.

LEARNER SUMMARY SHEET

Task Number	Evidence This is the evidence that will be produced.	Assessment Criteria You must make sure your work covers the following assessment criteria.	Controls This tells you the rules that your teacher must keep, when you complete the tasks.
Task 1 Choice of techniques	Explanation of techniques	AC1.1, AC1.2, AC3.4	Time 60 minutes Resources Access to appropriate ICT software. Access to class notes NOT allowed. Supervision You will be supervised throughout. Collaboration Individual task Feedback You cannot be given feedback on the work you produce until it has been marked.
Task 2 Analysis of data	Report	AC3.1, AC3.2, AC3.3	Time 30 minutes Resources Access to appropriate ICT software. Access to class notes NOT allowed. Table of reference ranges for some common blood tests should be supplied. Supervision You will be supervised throughout. Collaboration Individual task Feedback You cannot be given feedback on the work you produce until it has been marked.

Managing the assessment

Time

6 hours

The time suggested for each task, as set out in the Learner Summary Sheets, takes account of the contribution of the task to the overall assessment requirements. There can be no changes to the total time available for controlled assessment, as set out in this assignment. Centres can, however, amend the suggested time available for each task.

Resources

Candidates must have access to the Learner Brief, Learner Summary Sheets, list of reference ranges for some common blood tests and any necessary equipment.

Collaboration

Group work is not allowed for the assessment.

Supervision

Candidates must be supervised by an assessor whilst completing the activities. Centres must have systems in place to ensure candidates cannot access evidence they have been developing outside of supervised activities.

Authentication

Supervision is in place to ensure the authenticity of evidence produced for summative assessment. Assessors should not provide input or guidance to candidates during the controlled assessment time. This includes providing formative feedback on the evidence being produced. Assessors can provide guidance on the requirements of the task and remind candidates of the performance bands and how they can be interpreted.

Candidates can review and redraft evidence independently within the time controls for the assessment. Candidates must sign a declaration to confirm that all evidence submitted for assessment is their own work and that any sources used have been acknowledged.

Assessors must sign a declaration to confirm that evidence submitted was completed under the controlled conditions set out in the assignments.

Marking

This assessment will be marked by WJEC. The work must be submitted for marking in the summer of the academic year in which the assessment is set. The date for submission of external assessment can be found in the WJEC Examination Timetable published for each academic year on the WJEC website.

WJEC will use the performance bands found in unit 5 of the specification.

Accepted changes

Activity one

No changes are permitted to this activity.

Activity two

No changes are permitted to this activity.

WJEC Level 3 Diploma in Medical Science AUTHENTICATION SHEET

UNIT 5: Clinical Laboratory Techniques

Centre Name: **Centre Number:**

Candidate Name: **Candidate Number:**

Notice to Candidates: The work you submit for assessment must be your own. If you copy from someone else, allow another candidate to copy from you, or if you cheat in any other way, you may be disqualified from at least the subject concerned.

Declaration: I have read and understood the Information for candidates. I have produced the attached work without assistance other than that which is acceptable under the scheme of assessment. I have clearly referenced any sources and any AI tools used in the work. I understand that false declaration is a form of malpractice.

Candidate Signature: **Date:** / /20.....

I confirm that:

1. the candidate's work was conducted under the conditions laid out by the specification
2. I have authenticated the candidate's work and am satisfied that to the best of my knowledge the work produced is solely that of the candidate. The candidate has clearly referenced any sources and any AI tools used in the work. I understand that false declaration is a form of malpractice.

Assessor Signature: **Name (printed):** **Date:** / /20.....

WJEC Level 3 Diploma in Medical Science
EXTERNAL ASSESSMENT: ASSESSMENT GRID (EXAMINER ONLY)

UNIT 5: Clinical Laboratory Techniques

Centre Name:

Centre No:

Candidate Name:

Candidate No:

Assessment criteria	Evidence	Total / Max	Unit mark		
AC2.1	Activity 1	/9			
AC2.2	Activity 1	/18			
AC2.3	Activity 1	/4			
AC1.1	Activity 2	/18			
AC1.2	Activity 2	/7			
AC3.1	Activity 2	/6			
AC3.2	Activity 2	/6			
AC3.3	Activity 2	/6			
AC3.4	Activity 1 and 2	/6	Activity 1	Activity 2	Mean
TOTAL			/80		