



# T Level Technical Qualification in Science

Occupational specialism assessment (OSA)

## Laboratory Sciences

Assignment 2 - Part A

Mark scheme

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### Mark scheme

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Part A

## Contents

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## Task 1(a)

### Task 1(a): assessor observation checklist

Criteria	Assessor check	Marks awarded	Essential criteria (all essential criteria must be awarded to pass)
Student fixes bacterial sample onto microscope slide.		1	Yes
Uses the equipment correctly and Gram staining reagents to stain the bacterial samples.		1	Yes
Uses a microscope to observe the samples.		1	Yes
Correct PPE is selected and worn.		1	Yes
Repeats measurement more than 5 times.		1	
Performed scientific techniques effectively: <ul style="list-style-type: none"> <li>• measuring</li> <li>• observing</li> <li>• use the equipment correctly (manual dexterity)</li> </ul>		1 mark for completing techniques effectively and 1 mark for completing techniques accurately. (maximum 6 marks)	<b>Guidance</b> Assessor must check the accuracy of recorded measurements and observations on at least 2 occasions.
Total awarded		11 marks	

**Task 1(a): following the SOP for Gram staining of bacteria**

Band	Mark	Descriptor
4	10-12	The student has demonstrated autonomy and judgement in following the multi-step standard operating procedure (SOP), carrying out <b>all instructions in full</b> and carrying out the task logically and in a <b>time-efficient</b> manner to produce <b>accurate</b> results.
3	7–9	The student has followed the multi-step standard operating procedure (SOP), carrying out <b>most</b> instructions in full, with only <b>occasional minor omissions or errors</b> , for example, adding too much sample to the slides resulting in a suboptimal fixation.
2	4–6	The student has followed the multi-step standard operating procedure (SOP) to produce results, but in <b>some areas attention to detail is lacking</b> . Carried out all major steps in the correct order, although there may be <b>some errors or omissions</b> within some of the steps, for example, poor heat fixing of slides.
1	1–3	The student has followed parts of the multi-step standard operating procedure (SOP) correctly to produce results, carrying out <b>most of the major steps</b> , but <b>may omit a key step</b> and complete some of the steps in the wrong order, compromising the validity of results. Minor PPE errors.
0	0	No creditworthy material as described in bands 4 to 1.

**Indicative content**

- correct heat fixing of the samples onto the microscope slides
- correct use of the staining reagents in order to stain and destain samples
- correct use of the microscope to examine samples
- measurements are taken and recorded
- a substantial number of repetitions is required to establish a mean

**Content mapping:**

K1.1 How health, safety and environmental practices are applied when performing scientific techniques:

- safely performing the procedure
- completing the procedure
- safely disposing of materials, in line with COSHH: biohazards (for example, microorganism cultures)

K1.47 When scientific and mathematical skills may be applied when completing scientific tasks:

- measuring
- manual dexterity
- observing
- analysing

K1.52 When it is appropriate to use the following laboratory techniques:

- differential staining to identify microorganisms

K1.63 The principles of producing reliable and verifiable results:

- recording in a clear and unambiguous way, such as the use of tables, indelible ink, not using sticky notes or loose papers and ensuring that writing is legible
- using appropriate units, notation, and correct number of significant figures

K1.67 The purpose and importance of SOPs within the laboratory environment

S1.68 Work safely in a laboratory when performing specific scientific techniques

S1.69 Comply with relevant health and safety legislation and regulations, including COSHH and biosafety containment levels, when handling and disposing of solids, liquids, and gases relevant for the scientific technique being performed

S1.71 Use appropriate PPE when performing scientific tasks (for example, suitable eye protection and gloves)

S1.75 Apply a range of science and mathematical skills when performing practical scientific techniques

S1.78 Use the following practical scientific techniques to analyse environments and identify microorganisms within biological environments:

- differential staining techniques

## Task 1(b)

### Task 1(b): identification of bacterial species

Band	Mark	Descriptor
4	10-12	The student has recorded their observations <b>clearly and in full</b> , including the Gram status of the bacteria and their morphology. These recordings have allowed them to make a <b>clear, reasoned, and supported suggestion</b> as to the bacteria they believe is the source of the infection.
3	7-9	The student has recorded their observations <b>clearly</b> , identifying enough elements required to be able to identify the Gram status of the bacteria correctly, a <b>reasoned suggestion</b> has been made to identify the likely bacteria based on its morphology though some elements may be missing from either the recording or explanation that would enable the student to fully support their conclusion.
2	4-6	The student has <b>recorded</b> their observations, though some of these observations may be <b>unclear or lack detail</b> (e.g. poor description of morphology or colours of the staining). The student is able to use their observations to make a <b>clear judgement</b> on the Gram status of the bacteria in the sample but their attempt at further identifying the species may be <b>unclear, lack detail, or be unsupported by their observations</b> .
1	1-3	The student has made <b>some attempt at recording</b> their observations, though these recordings may be <b>brief or lack the required detail</b> to be confidently used to identify the Gram status and species of bacteria. An <b>attempt at identifying</b> the Gram status of the bacteria <b>is made</b> but this attempt may be <b>unclear, lack detail, or be unsupported</b> by their observations. No attempt at further identification of the likely species has been made.
0	0	No creditworthy material as described in bands 4 to 1.

#### Indicative content

- results are recorded in an appropriate manner
- identification of the species present in the sample attempted using both the Gram status of the bacteria and the morphology of the bacteria/colonies (taken from literature)
- the Gram status of the provided samples is correctly identified as Gram-positive, and the morphology is correctly described and linked to the correct bacterial species

**Content mapping:**

S1.81 Use appropriate international system of units (SI) and be able to work with a range of appropriate scales when conducting scientific tasks

S1.84 Select appropriate equipment to complete practical scientific techniques:

- light microscope
- heating apparatus

S1.85 Demonstrate practical technical competence in the use of equipment:

- taking accurate measurements
- correctly manipulating the equipment
- using equipment safely and for the intended purpose

S1.87 Produce data from scientific techniques, which are reliable and verifiable, by:

- recording data and records in a clear and unambiguous way:
  - organising ideas logically and coherently
- critically reviewing data obtained and repeating investigations where appropriate

## Performance outcome (PO) grid

Task	PO1	PO2	PO3	Total
1(a)	23	0	0	23
1(b)	12	0	0	12
<b>Total marks</b>	35	0	0	35
<b>% weighting</b>	100	0	0	100



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## Change History Record

Version	Description of change	Approval	Date of issue
v1.0	Additional sample material		01 September 2023
v1.1	Sample added as watermark	November 2023	20 November 2023