

Cambridge TECHNICALS LEVEL 3

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Unit 18

Microbiology

Model Assignment

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Please note:

You can use this assignment to provide evidence for summative assessment, which is when the learner has completed their learning for this unit and is ready to be assessed against the grading criteria.

You can use this assignment as it is, or you can modify it or write your own; we give more information in this document under Guidance for tutors.

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# Guidance for tutors on using this assignment

## General

OCR Cambridge Technical model assignments are available to download from our website: [www.ocr.org.uk](http://www.ocr.org.uk).

The purpose of this assignment is to provide a scenario and set of tasks that are typical of how scientists, technicians and other practitioners working in the field of microbiology would develop an understanding of the principles and apply these; to enable you to assess your learner against the requirements of the specified grading criteria. The scenario and its tasks are intended to give a work-relevant reason within the commercial use of microorganisms in food production and in medical microbiology for applying the skills, knowledge and understanding needed to achieve the unit.

This assignment will not instruct learners how to meet the highest grade. Whether learners achieve a pass, merit or distinction will depend on what evidence they produce.

You can modify the scenario we provide in this assignment to make it more relevant to your local or regional needs. Please refer to the information under 'Modifying the model assignment' later in this section.

You don't have to use this assignment. You can use it as a guide to help you to design your own assignment, and we provide an assignment checking service. You'll find more information on these matters in section 8 of the qualification handbook.

In the tasks, we'll refer to the format of evidence. Learners are **not** required to follow that format **unless** we tell them otherwise.

It's essential that the work every learner produces is their own. Please make sure you read through the information we give on authenticity in section 8 of the qualification handbook and make sure that your learners and any staff involved in assessment understand how important authenticity is.

**We provide this assignment to be used for summative assessment. You must not use it for practice or for formative assessment.**

## Before using this assignment to carry out assessment

Learners will need to take part in a planned learning programme that covers the knowledge, understanding and skills of the unit.

When your learners are ready to be assessed, they must be provided with a copy of the following sections of this assignment:

- General information for learners
- Assignment for learners
- Evidence Checklist

They may carry out preparation prior to undertaking the tasks and there is no time limit for this.

## When completing the assignment

You should use this assignment in conjunction with the unit specification and qualification handbook.

## Resources to complete the tasks

There are resource requirements for this assignment. Every learner will need access to the following resources:

Tasks for LO1 - Bacterial samples that can be identified in the laboratory – refer to Health and Safety regulations on the safe handling of bacteria in the laboratory. The choice of bacterial samples may be limited by the laboratory facilities available within the establishment that the assignment is undertaken.

Tasks for LO2 – If practical investigations are undertaken in the production of silage or energy – refer to Health and Safety regulations to maintain a safe working environment.

The tasks in this LO can be linked to the food product to be produced in LO3. If a food product such as wine is chosen to be produced, learners may focus on the use of GM in the development of vines that are resistant to pests and fungal disease.

Tasks for LO3 – A food product is produced by fermentation and tests carried out to define the optimum conditions of production. Fermentation equipment will be needed as well as test equipment.

The quality assurance tests in this LO may be linked to the tests carried out in the Product Testing Unit, this may require access to titration and chromatography equipment. If a food product such as wine is chosen then links to LO1 – the type of yeast needed to give a particular type of fermentation, including metabolic products and mouthfeel for the wine type and to Units 10 or 21 for product testing- the pH value needs to be measured as well as the finish of fermentation.

## Health and Safety and the use of resources

The scenario requires some practical work and collection of primary data using bacteria. It is the centre's responsibility to ensure the safety of all learners. Tutors are responsible for making their own Risk Assessments for the tasks prior to learners attempting the practical work, and for ensuring that appropriate Health and Safety procedures are carried out. However, tutors must not provide learners with these Risk Assessments. Learners, prior to undertaking practical investigations submit a Risk Assessment.

## Time

*You should plan on 15 to 21 hours for learners to complete this assignment.*

Learners must be allowed sufficient time to complete all the tasks. The amount of time may vary depending on the nature of the tasks and the ability of individual learners. To help with your planning, against each of the tasks we've given an indication of how long it should take.

Learners can produce evidence in several sessions.

## Format of evidence

Learners have to produce evidence that demonstrates how they have met the grading criteria. At the very least they must produce evidence that meets **all** of the pass criteria. Please make sure your learners realise that missing just one pass criterion means they will not pass the unit, even if they have successfully met the merit and distinction criteria.

We don't have specific requirements for the format of evidence in this assignment. We've said what format the evidence could take for each task. For example, if we say 'You could include a report on ...', the evidence doesn't have to follow any specific reporting conventions. You can modify the format of the evidence, but you must make sure the format doesn't prevent the learner from accessing the grading criteria.

For more guidance on generation and collection of evidence, please refer to the section 8 'Internal Assessment', in the qualification handbook.

## Group work

If you plan to ask learners to work in a team to complete work for assessment, you need to determine at which point in an assessment task learners can work together. You must be sure that each learner can produce evidence of their own contribution to each grading criterion. You can give constructive feedback to learners about working as a group and direct them on team working skills because evidence of team working skills is not required by the unit. See our information on authentication, including group work and feedback to learners, in section 8 of the qualification handbook.

If witness statements are used to support learners' evidence, you'll need to complete an individual statement for each learner.

## After completing the assignment

Once the learner has submitted their work to you to be assessed, you must judge or 'mark' the work against the grading criteria for the unit and identify one grade for the unit. For further information about assessment, please refer to section 8 of the qualification handbook.

Your assessment decisions must be quality assured across the cohort of learners in your centre who are being entered for the same unit. This must be done through an internal standardisation process. We give information on internal assessment and standardisation in the qualification handbook.

## Reworking the assignment

If you and the learner feel they've not performed at their best during the assessment, the learner can, at your discretion, improve their work and resubmit it to you for assessment. If a learner is working on improving their work before it is resubmitted, you and the learner must continue to make sure the work is the learner's own.

Any feedback you give to the learner must not direct them on how to improve their work. You can identify what area of the work could be improved but you cannot give the learner any details about how they could improve it. You must follow the guidelines given in section 8 of the qualification handbook under 'Authenticity of learner work'.

## Modifying the model assignment

The tasks in this assignment allow learners access to the full range of grades detailed in the grading criteria of this unit.

If you modify this assignment you must **not** change the grading criteria provided in the tasks for the learner or in the evidence checklist. These grading criteria are taken from the unit.

You can modify the scenario to suit your local or regional needs and the tasks may be contextualised to match any changes you have made to the scenario. If you supply your own drawings to support a different scenario, these must be sufficiently detailed for learners to complete the tasks.

You can modify the type of evidence and the format it takes, unless we expressly state that evidence must take a specific format.

You must also make sure that you avoid discrimination, bias and stereotyping and support equality and diversity. For more information, please see the section 'Designing your own assignments for internally assessed units' in section 8 of the qualification handbook.

**If modifications are made to the model assignment, whether to the scenario alone, or to both the scenario and individual tasks, it is your responsibility to make sure that all grading criteria can still be met and that learners can access the full range of grades.**

If you're using this model assignment and delivering the Foundation Diploma or Diploma you have an opportunity to secure meaningful employer involvement by working with an employer to modify it.

# General information for learners

Q ***What do I need to do to pass this assignment?***

A You need to produce evidence to meet the requirements of **all** the pass criteria for the unit this assignment relates to. If you miss just one pass criterion, you will not achieve this unit and will receive an unclassified result.

Q ***What do I need to do if I want to get a merit or distinction for this assignment?***

A For a merit, you need to produce evidence to meet the requirements of **all** the pass criteria for the unit this assignment relates to **and** you need to produce evidence to meet **all** the merit criteria.

For a distinction, in addition to the above, you also need to meet **all** the distinction criteria for this unit.

Q ***What help will I get?***

A Your tutor will support you when completing this assignment and will make sure that you know what resources or facilities you need and are allowed to use. We've given your tutor information about how much support they can give you.

Q ***What if I don't understand something?***

A It's your responsibility to read the assignment carefully and make sure you understand what you need to do and what you should hand in. If you are not sure, check with your tutor.

Q ***I've been told I must not plagiarise. What does this mean?***

A Plagiarism is when you take someone else's work and pass this off as your own, or if you fail to acknowledge sources properly. This includes information taken from the internet.

It's not just about presenting a whole copied assignment as your own; you will also be plagiarising if you use the ideas or words of others without acknowledgement, and this is why it's important to reference your work correctly (see Q&A below for more information on referencing).

Plagiarism has serious consequences; you could lose the grade for this unit or you may not be allowed to achieve the whole qualification.

Always remember that the work you produce must be your own work. You will be asked to sign a declaration to say that it is.

Q ***What is referencing and where can I find out more information about it?***

A Referencing is the process of acknowledging the work of others. If you use someone else's words and ideas in your assignment, you must acknowledge it, and this is done through referencing.

You should think about why you want to use and reference other people's work. If you need to show your own knowledge or understanding about an aspect of subject content in your assignment, then just quoting and referencing someone else's work will not show that **you** know or understand it. Make sure it's clear in your work how you are using the material you have referenced **to inform** your thoughts, ideas or conclusions.

You can find more information about how to reference in the [The OCR Guide to Referencing](http://www.ocr.org.uk/i-want-to/skills-guides/) available on our website: <http://www.ocr.org.uk/i-want-to/skills-guides/>.

**Q Can I work in a group?**

A Yes. However, if you work in a group at any stage, you must still produce work that shows your individual contribution. Your tutor can advise you how to do this.

**Q Does my work for each task need to be in a particular format?**

A You can present your work in a variety of ways – it can be handwritten, word-processed, on video or in digital media. What you choose should be appropriate to the task(s) and your tutor can advise you. There may be times when you need proof that you have completed the work yourself: for example, if you do something during work placement that you want to use as evidence, the tutor might ask the employer to provide a witness statement.

Make sure you check the wording in each task carefully. For each task, we'll tell you if your evidence has to be in a specific format:

- If we say use the word '**must**', for example 'You must produce a report' or 'Your evidence/work must include a diagram', then you must produce the work in the stated format.
- If we use the word '**could**', for example 'You could include sketches of your ideas' or 'You could do this by annotating your diagram', this means that you are not required to follow the format we have given, but you must make sure that the work you do produce allows you to demonstrate the requirements of the grading criteria.

If you are unsure about what evidence you need, please ask your tutor.

**Q Can I ask my tutor for feedback on my work?**

A Yes, but they can't give you detailed feedback.

We have given your tutor instructions on what kind of feedback they can give you. For example, they are **not** allowed to tell you exactly what to do to make your work better, but they **can** remind you about what they've taught you and you can use this additional learning to try and improve your work independently. They can say what they've noticed might be wrong with your work, for example if your work is descriptive where an evaluation is required, but your tutor can't tell you specifically what you need to do to change it from a description to an evaluation – you will need to work out what you need to do and then do it for yourself.

**Q When I have finished, what do I need to do?**

A If you have included the personal details (such as name, address or date of birth) of someone other than yourself in your work, this must be blanked out (anonymised) – your tutor will tell you how to do this. You don't need to do this for information contained in references.

You can complete the evidence checklist to show your tutor where they can find the evidence for each grading criterion in your work. You should make sure your work is labelled, titled and in the correct order for assessing.

Hand in the work that you've completed for each task to your tutor. They might ask to see your draft work, so please keep your draft work in a safe place.

**Q How will my work be assessed?**

A Your work will be marked by someone in your centre who has been authorised to do so. They will use the information in the grading criteria to decide which grade your work meets. The grading criteria are detailed in each unit and are also given in the tasks within this assignment. Please ask your tutor if you are unsure what the grading criteria are for this assignment.

# Assignment for learners

## Unit 18: Microbiology

### Scenario

#### Microbiology quality control

Working as a Microbiology Quality Control Technician for a large bio-manufacturing company you are responsible for quality assurance of both manufactured products and the environment in which operators work. Microbial contaminants can enter a bio-manufacturing production process from both the environment and materials, and impact on the product outcomes as well as the operatives. Microbiology Quality Control Technicians must understand, monitor and prevent these impurities.

Your job role could include evaluating supply materials, the production process and the finished product as well as monitoring environmental factors to ensure compliance to common Good Manufacturing Practices. This will require you to calibrate and maintain microbiology laboratory equipment; compile and analyse data for documentation; and prepare related reports.

#### Introduction to the tasks.

In these tasks you will be required to demonstrate your knowledge and understanding of the principles and applications of microbiology. This will be through the development of:

- Learning materials on microbiology for secondary school or college students.
- Instructional materials on Health and Safety when dealing with microbes.
- Quality control of the use of microbes in the food industry and the agricultural industry.
- Practical application in the identification of microbes and the production of a food.

Evidence for these tasks can include:

- Video recordings
- Audio recordings
- Presentations
- Written reports
- Presentations and notes
- Diagrams/photographs
- Risk Assessments.

Before starting the assessment assignment you must have available the Unit Specification so you are aware of the necessary content coverage.

# The tasks

## Task 1: Microorganisms

(This task should take between 4 and 6 hours.)

Learning Outcome 1: Be able to classify and identify microorganisms

It is necessary to collect primary data to maintain quality assurance. It will be necessary to collect primary data accurately and safely using the appropriate technique.

Your task is to:

Prepare learning resources for support microbiology workers so they can identify microorganisms and classify bacteria, so that they can collect primary data when carrying out quality control.

The learning resource could be in two parts:

**Part 1** A series of labelled photographs/diagrams of the main groups of microorganisms. Labels need to also point out the major distinguishing features that identify the organisms.

**Part 2** A video recording/PowerPoint /photograph series of you demonstrating how to apply identification techniques with a summary (audio/written) of the reliability of the techniques as well as the appropriate Health and Safety action.

The reliability will not only rely on the skill of the user but on the calibration and maintenance of the equipment such as microscopes

Pass	Merit	Distinction
P1: Identify the main groups of microorganisms	M1: Use techniques to identify microorganisms	D1: Evaluate the use of techniques used to identify microorganisms
<b>Tasks/Evidence</b>		
<p>You must prepare learning resources for support microbiology workers so they can collect primary data for quality control.</p> <p>The learning resources must include:</p> <ul style="list-style-type: none"> <li>• labelled images defining groups of microorganisms</li> <li>• labelled images classifying bacteria</li> <li>• presentations demonstrating bacterial identification techniques</li> <li>• summary evaluation of the bacterial identification techniques, including: reliability, maintenance.</li> </ul>		

## Task 2: Microbiology in the farming environment

(This task should take between 2 and 4 hours.)

LO2: Understand the use of microorganisms in agriculture

Green issues are of great concern to the public and for the public to make informed decisions they require facts. Two main concerns are the possible impact on the environment of microorganisms and genetically modified crops. The bio-manufacturing company wants to give the public the relevant information and to show the benefits of microbiology so that the public will support further development.

Your task is to:

Prepare two sets of information packs that explain:

- How microorganisms are used in sustainable agricultural practice.
- The impact of genetically-modified (GM) crops.

Pass	Merit	Distinction
P2: Describe the use of microorganisms in sustainable agriculture		
P3: Describe how GM crops are produced	M2: Describe the advantages of GM crops	D2: Evaluate the consequences of the introduction of GM crops
<b>Tasks/Evidence</b>		
<p>You must prepare public awareness packs that demonstrate the impact of microorganisms and GM crops on the agricultural environment, stressing the benefits of their use.</p> <p>Pack 1: Must include how microorganisms are used in sustainable agricultural practice.</p> <p>Pack 2: Must include an evaluation of the development of GM crops, and their benefits as well as any possible consequences.</p>		

### Task 3: Food

(This task should take between 5 and 6 hours.)

Learning Outcome 3: Be able to use microbiology in food production

The consumer is becoming more health conscious and realises diet is a major fact in their health. The bio-manufacturing company wishes to launch a new product but first they want to raise public awareness of the use of microorganisms in food before producing the product.

Your task is to:

- Produce a public awareness advert of the use of microorganisms in food products.
- Produce a microbiological food product under optimum conditions and record the quality control in the development of a fermented food product.

Pass	Merit	Distinction
P4: Describe the use of microbes in food production	M3: Explain the optimum conditions for growth of microorganisms during a fermentation process	
P5: Produce a microbiological food product under optimum conditions	M4: Describe the biochemical processes involved in the production of a food from microorganisms	
<b>Tasks/Evidence</b>		
<p>You must produce a public awareness advert of the use of microorganisms in food products. You must include the relevant biochemistry for the various food industries.</p> <p>You must produce a microbiological food product with the scientific log book of its production.</p> <p>The log book must have a record of:</p> <ul style="list-style-type: none"> <li>• how the food was produced</li> <li>• an explanation of the optimum conditions of production.</li> </ul>		

## Task 4: Antimicrobials

(This task should take between 2 and 4 hours.)

Learning Outcome 4: Understand the action of antimicrobials on microorganisms

Microbes are becoming resistant to antibiotic treatments. The bio-manufacturing company wish to make the public aware of their role in the fight against harmful microbes and that the overuse of antibiotics will result in the inability to control a number of diseases. The company believes if the public know about antibiotics and their affects then they will use them sensibly.

Your task is to:

As a Microbiology Quality Control Technician, help develop a public awareness campaign in the use of antibiotics.

Information may be in the form of video/audio presentations as well as image and text presentations.

Pass	Merit	Distinction
P6: Identify the types of antimicrobial used in medicine		
P7: Describe the mode of action of antibiotics		
P8: Describe the mechanism of antimicrobial resistance (AMR)	M5: Describe current and projected trends in AMR	D3: Evaluate measures to prevent future consequences of AMR
<b>Tasks/Evidence</b>		
<p>You must produce resources for a public awareness campaign.</p> <p>You must include in your awareness information:</p> <ul style="list-style-type: none"> <li>• types of antimicrobial used in medicine and how they work</li> <li>• implications of antimicrobial resistance (AMR)</li> <li>• an evaluation of the development of new antibiotics and other therapies.</li> </ul>		

# Evidence Checklist

## Unit 18: Microbiology

LEARNER NAME:

For PASS have you:	Completed (✓)	Ref/Page no(s)/DVD timings, etc.
P1: Identified the main groups of microorganisms?		
P2: Described the use of microorganisms in sustainable agriculture?		
P3: Described how GM crops are produced?		
P4: Described the use of microbes in food production?		
P5: Produced a microbiological food product under optimum conditions?		
P6: Identified the types of antimicrobial used in medicine?		
P7: Described the mode of action of antibiotics?		
P8: Described the mechanism of antimicrobial resistance (AMR)?		

For Merit have you:	Completed (✓)	Ref/Page no(s)/DVD timings, etc.
M1: Used techniques to identify microorganisms?		
M2: Described the advantages of GM crops?		
M3: Explained the optimum conditions for growth of microorganisms during a fermentation process?		
M4: Described the biochemical processes involved in the production of a food from microorganisms?		
M5: Described current and projected trends in AMR?		

For Distinction have you:	Completed (✓)	Ref/Page no(s)/DVD timings, etc.
D1: Evaluated the use of techniques used to identify microorganisms?		
D2: Evaluated the consequences of the introduction of GM crops?		
D3: Evaluated measures to prevent future consequences of AMR?		

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