

Cambridge TECHNICALS LEVEL 3

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# LABORATORY SKILLS

## Unit 6

### Control of hazards in the laboratory

### 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 allows the learner to understand the relevant legal requirements and recognize many of the common safety and health hazards associated with running a research laboratory, so by maintaining a safe work environment.*

*As this unit also links to many other units within the qualification and you can apply skills in the context of the practicals you will carry out elsewhere in other units.*

*Do remember that when assessing and moderating the evidence for this unit that it is easily located and logically presented.*

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** – Relevant regulations (COSHH, RIDDOR) hazard cards, hazard symbols, CLEAPPS procedures (focusing on biological, chemical and physical hazards)

<http://www.hse.gov.uk/biosafety/law.htm> This document introduces legislation, relevant to biological laboratories and a link to the Control of Substances Hazardous to Health (COSHH) Regulations (2002)

<http://www.hse.gov.uk/pubns/infection.pdf> is a document produced by the Advisory Committee on Dangerous Pathogens (ACDP) which explores many issues relating to transmission of disease and offers much straightforward guidance on reducing the risks.

<http://www.hse.gov.uk/pubns/misc208.pdf> explains the classification of biological agents into 4 groups

<http://www.hse.gov.uk/riddor/> An area of the HSE website with links to many aspects relating to the Reporting of Incidents, Diseases and Dangerous Occurrences Regulations (RIDDOR) (2013)

<http://www.hse.gov.uk/chemical-classification/labelling-packaging/hazard-symbols-hazard-pictograms.htm> Hazard pictograms

<http://www.hse.gov.uk/biosafety/gmo/gmo-regulations-email.htm> Contains biohazard sign

<http://www.microbiologyonline.org.uk/about-microbiology/introducing-microbes/> - Microbiology Society – information about bacteria and viruses

**Tasks for LO2** – Relevant regulations (COSHH, RIDDOR) hazard cards, hazard symbols, CLEAPPS procedures, a selection of risk assessment forms used in a variety of laboratories, examples of risk assessments for procedures involving group 2 biological agents

<http://www.hse.gov.uk/pubns/clinical-laboratories.pdf> - Safe working and the prevention of infection in clinical laboratories and similar facilities – This book contains sections on legislation, health and safety management, categorization of biological agents, containment levels, buildings and operation, standard operating procedures and safe working practices, equipment, labeling and transportation of specimens, cleaning, decontamination and waste disposal, health surveillance and immunization, incidents and accidents, measuring, auditing and reviewing performance

<http://www.hse.gov.uk/biosafety/biologagents.pdf> Biological agents: Managing the risks in laboratories and healthcare premises – has sections on legislation, health and safety management, working in healthcare, working in the laboratory, useful appendices

<http://www.hse.gov.uk/pubns/hsc13.pdf> - HSE guide to the structure of UK Health and Safety Legislation

<http://www.hse.gov.uk/coshh/> HSE links to useful information and guidance about the COSHH Regulations (2002)

<http://www.hse.gov.uk/pubns/indg453.pdf> - guidance leaflet explaining RIDDOR (2013)

## Tasks for LO3 – Designs of a variety of laboratories

*The Workplace (Health, Safety and Welfare Regulations) (1992) Approved Code of Practice*  
<http://www.hse.gov.uk/pubns/priced/l24.pdf>

*CLEAPSS G14 Designing and Planning Laboratories*

<http://www.hse.gov.uk/pubns/priced/microbiologyiac.pdf> *ACDP/HSE - The Management, Design and Operation of Microbiological Containment Laboratories – useful advice about laboratory design in general and microbiological laboratories in particular in addition to management topics and health and safety legislation*

<http://www.hse.gov.uk/pubns/clinical-laboratories.pdf> - *Safe working and the prevention of infection in clinical laboratories and similar facilities – This book contains sections on legislation, health and safety management, categorization of biological agents, containment levels, buildings and operation, standard operating procedures and safe working practices, equipment, labeling and transportation of specimens, cleaning, decontamination and waste disposal, health surveillance and immunization, incidents and accidents, measuring, auditing and reviewing performance*

## Health and Safety and the use of resources

The scenario requires some practical work and collection of primary data. 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 120hours 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.**

# 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* 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 6: Hazards in the Laboratory

### Scenario

You are a newly qualified technician who has recently completed a period of extensive training in a university bio-laboratory

Because you have recent experience of being new to the department, the research centre's health and safety manager wants you to produce health and safety induction materials that will provide a useful introduction for both new staff and for undergraduate and postgraduate students. These will cover:

- laboratory hazards
- reproduction and transmission of bacteria and viruses
- risk assessment
- standard laboratory procedures and safe working practices
- the importance of health and safety legislation
- good laboratory design
- management of a safe laboratory.

It may be appropriate for you to deliver aspects of your induction materials as presentations.

### Introduction to the tasks.

In these tasks you will need to show that you understand the hazards that are likely to be encountered in the bio-lab as well as showing that you know and understand the principles of risk assessment and risk minimisation. This will be through the development of:

- instructional materials describing hazardous agents that may be encountered and organisms that can potentially cause disease in the laboratory
- instructional materials for safe working practices in the laboratory when working with bio- hazardous substances
- risk assessments underpinned by relevant legislation
- laboratory designs which allow for control of disease in laboratories.

Evidence for these tasks can include:

- video recordings
- audio recordings
- presentations
- written reports
- presentations and notes
- diagrams/photographs
- risk assessments
- presentational display material.

**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: Hazards in the laboratory

(This task should take between 4 and 5 hours.)

Learning Outcome 1: Understand the types of hazard that may be encountered in a laboratory

Some safety information is displayed in the pathology laboratories as wall displays. This includes a Health and Safety Executive (HSE) Poster, "Health and Safety Law". Beside the poster are displayed GHS Hazard pictograms so that everyone using the laboratories is familiar with them. However, these cover very broad categories of hazard.

The health and safety manager has asked you to produce a guide to hazards which includes more detail.

Your task is to:

Produce a guide to laboratory hazards with an appendix about how viruses and bacteria grow and are spread.

Pass	Merit	Distinction
P1: Describe the types of hazard agents that are found in a laboratory situation	M1: Explain how disease causing organisms reproduce and are transmitted	D1:
<b>Tasks/Evidence</b>		
<p>Produce a guide to hazards in the pathology laboratories in the form of a leaflet.</p> <p>The guide should comprise of a general section covering the different types of hazards. For each type of hazard, biological, chemical and physical, include a paragraph in which you define the type of hazard, and give specific examples.</p> <p>Briefly describe the effect of each hazard on human health.</p> <p>You need to include examples of carcinogens, mutagens and teratogens.</p> <p>Include a detailed section on organisms which cause disease. Describe and illustrate specific examples of each of a virus and a bacterial organism. For each of the organisms include detail on:</p> <ul style="list-style-type: none"> <li>• the structure of the organism</li> <li>• the organism's method of reproduction</li> <li>• an explanation of the function of the organism in causing disease</li> <li>• an explanation of the optimal conditions for survival and reproduction of the organism.</li> </ul>		

## Task 2: Risk Assessment

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

LO2: Be able to use health and safety procedures to minimise the risk presented by hazards in a laboratory

As a trainee technician you followed standard procedures which had been risk assessed and optimised to be as safe as possible. You are required to explain the process of risk assessment to new staff and students.

Many procedures and practices in the microbiology laboratory involve steps which help to prevent the spread of disease. You will explore how use of procedures and practices is promoted by legislation.

Your task is to:

Produce and explain a risk assessment for a school/college microbiology procedure.

Explain how procedures and practices used in a microbiology laboratory prevent the spread of disease.

Describe how, by carrying out risk assessments, an organisation is complying with legislation and describe how, as a result, the COSHH Regulations and RIDDOR and other relevant health and safety legislation may have an influence on procedures and practices.

Evaluate how effective legislation is in promoting safe working practices and evaluate the consequences of adopting poor procedures and practices.

Pass	Merit	Distinction
P2: Carry out risk assessments for a laboratory procedure	M2: Describe how health and safety legislation influences procedures and practices	D1: Evaluate the effectiveness of current legislation in safe working practices in the control of diseases
P3: Explain the procedures and practices required to effectively prevent diseases from spreading in a laboratory		D2: Evaluate the potential impact of poor procedures and practices on individuals and the environment

### Tasks/Evidence

You should produce a document, in which you explain how to carry out a risk assessment based on carrying out a risk assessment for a microbiology laboratory, e.g. producing a streak plate or carrying out serial dilutions of a solution of a bacterial culture. The document should summarise the outcome of the risk assessment and explain the risk assessment process and the decisions that you have made in relation to the process, showing how the control measures work to prevent diseases from spreading in the laboratory.

Write an informational leaflet, explaining how using particular procedures and practices would prevent the spread of disease in the laboratory in a hospital or research laboratory. (Consider all the procedures and the practices used in connection with the work that is carried out with micro-organisms in your school/college laboratory, including preparative work and waste disposal.)

The final section of the informational leaflet should provide a comprehensive justification for following good procedures and practices. You should describe to what extent having good laboratory procedures and practices helps laboratories to comply with health and safety

legislation.

Evaluate what may happen to the health of individual laboratory workers, the laboratory and its wider surroundings and other employees if laboratory practice were poor.

Illustrate your evaluation with examples of what may happen in the best case/worst case scenarios.

Evaluate how effective health and safety legislation on safe working practices is in controlling diseases in the laboratory. Include a description of the sort of evidence that you need to carry out this evaluation and an analysis of the extent to which this information is available.

### Task 3: Laboratory Design

(This task should take between 6 and 7 hours.)

Learning Outcome 3: Be able to design a safe functioning laboratory to manage the risk presented by hazards

You have considered laboratory hazards, risk assessment and the resulting safe working practices. The design of a laboratory can also have a positive effect on health and safety.

You will produce a guide to laboratory design, using a design of your own for a given scenario, provided by your tutor, to highlight the features of good laboratory design. You will explain the features of the design which are likely to control the spread of disease.

Your task is to:

Produce a laboratory design which minimises the risks posed by the hazards in the laboratory with an explanation of how the design of the laboratory controls the spread of disease.

You should consider legislation and guidance relating to workplace design in general and laboratory design in particular.

You should then analyse the contributions of procedures and legislation to the control of diseases in the laboratory.

Pass	Merit	Distinction
P4: Produce a design specification to control risks posed by hazards in a laboratory	M3: Explain how the design of a laboratory can control the spread of disease in a laboratory	D3: Analyse how procedures and legislation affects the control of diseases in a laboratory
<b>Tasks/Evidence</b>		
<p>You must produce a laboratory design on graph paper (with as much drawn to scale as possible – estimating the footprint of the pieces of equipment).</p> <p>You should include in your design: work bench facilities, storage, waste disposal, air management and health and safety requirements and other aspects of the teaching content, relevant to the scenario provided by your tutor.</p> <p>You must write a report, explaining how your laboratory design minimizes the spread of disease, referring to best practice information where possible</p> <p>In developing a laboratory design which controls risks from hazards and the spread of disease in laboratories, you will have carried out research on the management, design and operation of microbiological containment laboratories and clinical laboratories. You will have become familiar with additional procedures and practices used in working biological laboratories. Prepare a PowerPoint presentation with accompanying notes which provides an analysis of how this wider range of procedures and practices affects the control of diseases in a microbiological laboratory. Explain the advantages of following particular procedures and practices and the consequences of not following those procedures/practices. Explain to what extent legislation determines whether the diseases are controlled. Justify your conclusions (For example, consider whether the diseases in the laboratory would be controlled if no legislation were in place.)</p>		

# Evidence Checklist

## OCR Level 3 Cambridge Technicals in Laboratory Skills

### Unit: 6 Control of hazards in the laboratory

LEARNER NAME:

<b>For PASS have you: (as a minimum you have to show you can meet every pass criterion to complete the unit)</b>	<b>Where can your tutor find the evidence? Give page no(s)/digital timings, etc.</b>
P1: Described the types of hazard agents that are found in a laboratory situation?	
P2: Carried out risk assessments for a laboratory procedure?	
P3: Explained the procedures and practices required to effectively prevent diseases from spreading in a laboratory?	
P4: Produced a design specification to control risks posed by hazards in a laboratory?	

<b>For Merit have you:</b>	<b>Where can your tutor find the evidence? Give page no(s)/digital timings, etc.</b>
M1: Explained how disease causing organisms reproduce and are transmitted?	
M2: Described how health and safety legislation influences procedures and practices?	
M3: Explained how the design of a laboratory can control the spread of disease in a laboratory?	

<b>For Distinction have you:</b>	<b>Where can your tutor find the evidence? Give page no(s)/digital timings, etc.</b>
D1: Evaluated the effectiveness of current legislation in safe working practices in the control of diseases?	
D2: Evaluated the potential impact of poor procedures and practices on individuals and the environment?	
D3: Analysed how procedures and legislation affects the control of diseases in a laboratory?	

To find out more

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