

Cambridge TECHNICALS LEVEL 3

LABORATORY SKILLS

Cambridge
TECHNICALS
2016

Unit 8

Cell biology

Model Assignment

T/507/6155

Version 1 - February 2017

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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.

The purpose of this assignment is to provide a scenario and set of tasks that are typical of how scientists, technicians, educators and other practitioners working in the field of cell biology 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 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:

- Leading research in aspects of cell biology, such as cell signalling, mitosis checkpoints and stem cells
- For Task 2, you will need access to an oil immersion microscope, with magnification up to x1000, a range of microscopical stains, and a cell-counting device such as a haemocytometer. While the use of a Coulter Counter is optional, learners may be given the opportunity to see the machine in use on a workplace visit
- For Task 3, learners may prepare temporary or permanent slides of root tip squashes to observe the stages of mitosis. Appropriate plant tissue, a fixative and a DNA stain, along with an appropriate high power microscope, would be required.

Health and Safety and the use of resources

The scenario requires some practical work in microscopy. 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.

Time

You should plan for learners to have 20–25 hours 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 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 8: Cell biology

Scenario

The Institute for Cell Biology

The Institute for Cell Biology is an international organisation. It works with a range of scientists in various organisations, including research institutions, hospitals and health and biomedical companies. It also works with students in secondary schools and colleges. Working directly with government departments, the Institute often informs government policy in emerging areas of cell technologies.

Working as a scientist in The Institute for Cell Biology, your role is to develop a range of resources and other documents to disseminate information on cell biology and its applications to a number of different audiences.

Introduction to the tasks.

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

- learning materials on biological membranes, their roles within the cell, and the developing area of cell signalling, for secondary school or college students
- instructional materials on cell biology and microscope techniques for laboratory technicians
- webpages on cell division for a pharmaceutical company
- a report to the government, to help them develop policy, on the potential of stem cell technologies in medicine.

Evidence for these tasks can include:

- Video recordings
- Audio recordings
- Pictorial or animated sequences
- Models
- Presentations
- Written reports
- Presentations and notes
- Risk Assessments

The tasks

Task 1: Biological membranes and cell communication

(This task should take around 6 hours.)

Learning Outcome 1: Understand the functions of the plasma membrane and endomembrane systems

Your task:

Prepare a learning package for secondary school or college students as part of a course on cell biology.

The first part of the learning package must focus on biological membranes, how they are involved in the movement of substances into and out of the cell, and the role of endomembrane systems.

The second part must focus on cell signalling. Cell signalling is a rapidly evolving area of cell biology related to the way that cells communicate. The information in student textbooks is often limited, and quickly becomes out of date.

This section could be evidenced by illustrated written material, which could include a presentation. It could be enhanced by pictorial or animated sequences or models. This work could involve some group work to put together respective parts of the package/presentation.

Pass	Merit	Distinction
P1: Describe the functions of the plasma membrane	M1: Explain the dynamic nature of endomembrane systems in a eukaryotic cell	D1: Explain the role of cell signalling pathways
Evidence		
You must prepare a learning package on biological membranes and cell communication appropriate for secondary school learners.		
The first section of the learning package must focus on biological membranes. It must include:		
<ul style="list-style-type: none">• a description of the functions of plasma membrane in regulating movement into and out of cells• an explanation of the function and components of the endomembrane systems in cells, in particular, how the components interact and are dynamic and changing constantly, which is often misunderstood		
The second section must focus on cell signalling. It must include:		
<ul style="list-style-type: none">• an explanation of how different types of cell chemical and electrical signalling systems work in the human body, explaining their role in a healthy individual, and what could happen if the signalling becomes defective.		

Task 2: Cell biology and microscopy techniques

(This task should take around 7 hours.)

Learning Outcome 2: Be able to use cytological techniques

Your task:

As part of your role at The Institute of Cell Biology, you must prepare instructional materials on cell biology and microscope techniques for laboratory technicians.

The instructional materials must cover key techniques in cell biology:

- cell staining techniques
- techniques used to count cells.
- a technique to extend the limits of light microscopy.

Your evidence **must** demonstrate that you can **use** the range of techniques. You will carry out cell staining techniques, and use of a haemocytometer and oil immersion microscopy in the school or college lab, but may experience others, such as immunohistochemistry, use of a Coulter Counter, and use of confocal microscopy on a workplace visit.

You must include a witness statement for the techniques that you have used.

You could present your instructional materials through illustrated, electronic or written material, with or without an accompanying video. You could demonstrate these techniques in a particular, specified context.

Pass	Merit	Distinction
P2: Demonstrate the use of microscopical and differential staining techniques		D2: Demonstrate the use of a technique used to extend the limits of light microscopy
P3: Demonstrate the use of an appropriate cell counting technique		
Evidence		
<p>You must prepare an illustrated instructional materials pack for laboratory technicians, in which you:</p> <ul style="list-style-type: none"> • demonstrate the use of microscopical and differential staining techniques and describe the use of techniques such as immunohistochemistry • demonstrate the use of a cell counting technique. This should include the use of a haemocytometer, e.g. for counting yeast or blood cells. You should also include a description of how to use of the Coulter Counter. • demonstrate a technique that can be used to extend the limits of light microscopy. This should include the use of oil immersion techniques or a description of confocal microscopy. 		

Task 3: Dividing cells

(This task should take around 5 hours.)

Learning Outcome 3: Understand the cell cycle and the importance of mitosis

Your task:

A pharmaceutical company has commissioned you to develop a series of webpages.

The company manufactures an anticancer drug first extracted from a rainforest plant. The drug works by preventing cancer cells from dividing.

The webpages are intended to give the public information on:

- the process of cell division and the cell cycle in normal cells
- the checkpoints in mitosis and mechanisms that halt the process of mitosis if it is not proceeding properly – when these occur naturally, and how anti-cancer drugs can work by stopping the cell division of cancer cells.

Your evidence can be a series of webpages. The webpages/report could include illustrations, photographs and video and/or other evidence. The development of these webpages could take the form of group work,

Pass	Merit	Distinction
P4: Describe the cell cycle, stages of mitosis and cytokinesis	M2: Explain the importance of mitosis	D3: Assess the importance of mechanisms that arrest cell division
Evidence		
You must prepare a series of webpages that must include: <ul style="list-style-type: none">• a description of the cell cycle in a healthy human, to include the stages of mitosis and cytokinesis, and an explanation of why mitosis is important in the growth, development and repair of an individual• a description of the mechanisms that halt the process of mitosis if it is not proceeding properly, and an assessment of the importance of these in arresting cell division, in the natural cell cycle and in clinical techniques.		

Task 4: Stem cells

(This task should take around 6 hours.)

Learning Outcome 4: Understand the process and significance of differentiation.

Learning Outcome 5: Understand the potential of stem cells in medical therapies

Your task:

Our understanding of stem cells, the role they play in differentiation, and possible stem cell therapies, have developed in recent years. New techniques are being developed that have made, are making, and will make stem cell therapies possible.

You must produce a report that will be used to inform government policy on the development of stem cells therapies.

The report must begin by setting out the scientific background to stem cells, i.e. describing the process of cellular differentiation and how genes are involved in this process.

The next part of the report should describe the use, and potential use of stem cells in medicine. You must also explain the techniques used in the collection and culture of stem cells and how they are then used in stem cell therapies.

Your evidence could be an electronic report or appropriately detailed presentation. This could incorporate illustrations, data, and video and/or audio evidence.

Pass	Merit	Distinction
P5 Describe the process of differentiation in the embryo in producing specialised cells	M3: Explain the role of gene expression in differentiation	
P6: Describe the uses of stem cells in medicine	M4: Explain the laboratory techniques used in stem cell therapy	
Evidence		
You must prepare a report designed to inform government policy on stem cell therapy, which must include: <ul style="list-style-type: none">• setting out the scientific background to stem cells, including a description of cellular differentiation and how genes are involved in the process• a description of the uses of stem cells in medicine, highlighting scientific, ethical and social issues associated with their use in research and clinical studies• an explanation of the techniques used in the collection, culture and use of stem cells in therapies.		

Evidence Checklist

OCR Level 3 Cambridge Technicals in Laboratory Skills

Unit 8: Cell Biology

LEARNER NAME:

For PASS have you: (as a minimum you have to show you can meet every pass criterion to complete the unit)	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
P1: Described the functions of the plasma membrane?	
P2: Demonstrated the use of microscopical and differential staining techniques?	
P3: Demonstrated the use of an appropriate cell counting technique?	
P4: Described the cell cycle, stages of mitosis and cytokinesis?	
P5 Described the process of differentiation in the embryo in producing specialised cells?	
P6: Described the uses of stem cells in medicine?	

For Merit have you:	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
M1: Explained the dynamic nature of endomembrane systems in a eukaryotic cell?	
M2: Explained the importance of mitosis?	
M3: Explained the role of gene expression in differentiation?	
M4: Explained the laboratory techniques used in stem cell therapy?	

For Distinction have you:	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
D1: Explained the role of cell signalling pathways?	
D2: Demonstrated the use of a technique used to extend the limits of light microscopy?	
D3: Assessed the importance of mechanisms that arrest cell division?	

To find out more

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