

Cambridge **TECHNICALS LEVEL 3**

# ***SPORT AND PHYSICAL ACTIVITY***

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**2016**

**Unit 10**

**Biomechanics and movement  
analysis**

**Model assignment**

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# Contents

<b>Guidance for tutors on using this assignment</b> .....	<b>3</b>
General.....	3
Before using this assignment to carry out assessment .....	3
When completing the assignment.....	4
Resources to complete the tasks .....	4
Time.....	4
Format of evidence .....	4
Group work .....	4
After completing the assignment.....	5
Reworking the assignment .....	5
Modifying the model assignment.....	5
<b>General information for learners</b> .....	<b>6</b>
<b>Assignment for learners</b> .....	<b>8</b>
Scenario.....	8
The tasks .....	9
Task 1: The Application Process - Create a presentation covering movement in sport and physical activity .....	9
Task 2: The initial interview - Presentation on forces in sport and physical activity.....	10
Task 3: Final selection task - Analysis of a sporting movement .....	11
Task 4: Trainee Induction task - Movement Analysis Improvement plan.....	12
<b>Evidence Checklist</b> .....	<b>13</b>

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 will give the students an understanding of biomechanics and the use of biomechanics in sporting analysis to improve performance. Elite sport is often won by hundredths of seconds and 'marginal gains', is a well known phrase amongst elite sport. The use of biomechanics can allow athletes to gain better times, techniques and overall improve their performance. 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:

For task 1 and 2 there are no specific resources that you need to make available to learners when they are taking this assignment. Although access to IT facilities will be needed.

For task 3 and 4, it would be advantageous for learners to be able to access video recording equipment and/or movement analysis software.

## Health and Safety and the use of resources

The scenario suggests that learners will analyse performance across a range of sport; therefore sports and activity sessions led by the learners must be supervised by a responsible adult.

## 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

This assignment has not been written to include 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 will 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's 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 10: Biomechanics and movement analysis

### Scenario

## Biomechanics in Sport

Biomechanics is a key part of success in elite sport and has been crucial in the development of both athletes and equipment to enable performance at an elite level.

Biomechanics in Sport (BiS) are a company who work with elite athletes providing them with analysis of mechanics of their sporting actions.

The following are some examples of the areas where BiS offer athletes support:

- The identification of the optimal technique for enhancing sports performance
- The analysis of sport and exercise equipment e.g. racquets and their optimum length for performance
- The impact of motion and forces on sporting performance.

They have recently been given funding to employ a trainee. You have decided to apply for this position and will be asked to complete a number of tasks in order to be shortlisted for interviews taking place later in the month.

### Introduction to the tasks;

In these tasks you will be asked to demonstrate your knowledge and understanding of movement in relation to complex sporting techniques, how motion and force can affect sporting performance, and analysis of specific sporting movements including how to improve their execution.

Evidence for these tasks can include:

- Video recordings
- Presentations
- Observation records
- Written reports
- Presentations and notes
- Witness statements
- Results analysis forms and graphs
- Feedback to individual and team performers

# The tasks

## **Task 1: The Application Process - Create a presentation covering movement in sport and physical activity**

(This task should take between 3 and 4 hours)

Learning Outcome 1: *Understand movement in relation to sport and physical activity*, is assessed in this task.

Your task:

As part of the application process you have been asked to prepare a presentation to demonstrate your understanding of the planes and axes of movement in different sporting activities. Your potential new employer will want to be sure that you understand how the human body moves in sport and physical activity, and have asked for you to explain the movements on each plane using at least two examples from complex sporting actions in the presentation.

In order to mark yourself out as a strong candidate, you should be able to provide information about how different sporting actions could gain a mechanical advantage, the classification of different types of levers in human anatomy and how they produce movement in a different range of sporting activities.

<b>Pass</b>	<b>Merit</b>	<b>Distinction</b>
P1*: Describe the planes and axes of movement used in different sporting activities	M1: Define mechanical advantage with reference to levers and their use in sport and physical activity	D1: Classify the different types of levers and give examples of how they produce movement in different sporting activities.
P2*: Explain movements on each plane using examples from different sporting activities		
<b>Evidence</b>		
Evidence could be in the form of a PowerPoint presentation or a video recording of a series of sporting movements analysed, with a written up presentation notes.		

## **Task 2: The initial interview - Presentation on forces in sport and physical activity**

(This task should take between 6 and 8 hours)

Learning Outcome 2: *Understand motion and force in relation to sport and physical activity*, is assessed in this task.

Your task:

Following from the success of your initial piece of work, you have been shortlisted for interview to gain a traineeship with Biomechanics in Sport.

As part of the interview they would like you to create a presentation to show your understanding of how forces and motion are related to sport and physical activity. They would like you to show your knowledge and understanding of the key terms relating to motion, and apply your understanding of forces to a range of examples from sport and physical activity. They also require you to explain the importance of Newton's Laws of Motion are key in how sporting actions take place

The interview panel expect that strong candidates for the role should be able to apply their knowledge of forces to a range of sporting examples, use free body diagrams to show the forces acting on a performer, and explain factors that can affect stability.

<b>Pass</b>	<b>Merit</b>	<b>Distinction</b>
P3: Define momentum, inertia, mass, weight, force, stability	M2: Apply understanding of forces to a range of examples from sport and physical activity	D2: Explain stability, factors which affect it and how it can be applied to performance in sport and physical activity
P4: Explain Newton's Laws of Motion in relation to sport	M3: Draw and label a free-body diagram to show the forces acting on a performer or object in a sport or physical activity	
P5: Describe the forces which can affect sporting performance		
<b>Evidence</b>		
Evidence could be achieved through written evidence, presentations, video evidence and pictures.		
For M3 this may include screen shots if a computer programme has been used to generate the free body diagram.		

### **Task 3: Final selection task - Analysis of a sporting movement**

(This task should take between 4 and 5 hours)

Learning Outcome 3: *Be able to analyse movement in sport and physical activity*, is assessed in this task.

You have made it to the final round of selection and you have one more task to complete before BioS make their final decision, on who to appoint.

Your task:

BioS have asked for you to carry out an analysis of a sporting movement of your choice; this movement must be a complex movement (i.e. golf swing, tennis serve, somersault). The analysis should include the different phases of the movement: preparatory, execution and recovery phase and use an appropriate movement analysis method. You should also include information linked to task 1 and 2 to prove to BioS you can apply your knowledge to a sporting action.

An assessment of the suitability of different methods of movement analysis would help to make you stand out in the selection task.

<b>Pass</b>	<b>Merit</b>	<b>Distinction</b>
P6*: Analyse a specific sporting movement using appropriate method(s)	M4: Assess the suitability of different methods of movement analysis in relation to sport and physical activity	
<b>Evidence</b>		
Evidence could be achieved through a written plan, a presentation or video presentation.		
The analysis can be in the form of:		
<ul style="list-style-type: none"><li>• Against technical models</li><li>• Through peer/coach observation</li><li>• Slow motion video</li><li>• Software/apps</li></ul>		

## **Task 4: Trainee Induction task - Movement Analysis Improvement plan**

(This task should take between 6 and 8 hours)

Learning Outcome 4: *Be able to use movement analysis to improve performance in sport and physical activity*, is assessed in this task.

Your task:

BioS were impressed with your movement analysis and have employed you as a trainee.

As part of their initial induction they would like you to plan how to improve the movement you analysed in task 3. You should identify the areas that need improving and create a plan for use by the athlete on how they could improve.

They have asked that, if possible, you to evaluate the effectiveness of your improvement plan, looking at your initial analysis and the final movement after your improvement plan to evaluate how successful the improvement plan was.

<b>Pass</b>	<b>Merit</b>	<b>Distinction</b>
P7*: Plan for improvement in a specific sporting movement, based on movement analysis	M5: Evaluate the effectiveness of the plan for improvement in a specific sporting movement	
<b>Evidence</b>		
The improvement plan could be a written report, training plan, video evidence of feedback to a client or a PowerPoint presentation.		

# Evidence Checklist

## OCR Level 3 Cambridge Technicals in Sport and Physical Activity

### Unit 10: Biomechanics and movement analysis

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 planes and axes of movement used in different sporting activities	
P2: Explained movements on each plane using examples from different sporting activities	
P3: Defined momentum, inertia, mass, weight, force, stability	
P4: Explained Newton's Laws of Motion in relation to sport	
P5: Described the forces which can affect sporting performance	
P6: Analysed a specific sporting movement using appropriate method(s)	
P7: Planned for improvement in a specific sporting movement, based on movement analysis	

For Merit have you:	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
M1: Defined mechanical advantage with reference to levers and their use in sport and physical activity	
M2: Applied understanding of forces to a range of examples from sport and physical activity	
M3: Drawn and label a free-body diagram to show the forces acting on a performer or object in a sport or physical activity	
M4: Assessed the suitability of different methods of movement analysis in relation to sport and physical activity	
M5: Evaluated the effectiveness of the plan for improvement in a specific sporting movement	

For Distinction have you:	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
D1: Classified the different types of levers and give examples of how they produce movement in different sporting activities.	
D2: Explained stability, factors which affect it and how it can be applied to performance in sport and physical activity	

To find out more

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