



National
Qualifications

Physics

Assignment

General assessment information

This pack contains general assessment information for centres preparing candidates for the assignment Component of Higher Physics Course assessment.

It must be read in conjunction with the specific assessment task for this Component of Course assessment, which may only be downloaded from SQA's designated secure website by authorised personnel.

Valid from session 2014/15 and until further notice

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Introduction

This is the general assessment information for Higher Physics assignment.

This assignment is worth 20 marks out of the total of 120 marks available for this Course. The Course will be graded A-D.

Marks for all Course Components are added up to give a total Course assessment mark which is then used as the basis for grading decisions.

This is one of two Components of Course assessment. The other Component is a question paper.

The assessment task will be set and externally marked by SQA and conducted in centres under the conditions specified by SQA.

This document describes the general requirements for the assessment of the assignment Component for this Course. It gives general information and instructions for assessors.

It must be read in conjunction with the assessment task for this Component of Course assessment.

Equality and inclusion

This Course assessment has been designed to ensure that there are no unnecessary barriers to assessment. Assessments have been designed to promote equal opportunities while maintaining the integrity of the qualification.

For guidance on assessment arrangements for disabled candidates and/or those with additional support needs, please follow the link to the Assessment Arrangements web page: www.sqa.org.uk/sqa/14977.html

Guidance on inclusive approaches to delivery and assessment in this Course is provided in the *Course Support Notes*.

What this assessment covers

This assessment contributes 20% of the total marks for the Course.

The assessment will assess the skills, knowledge and understanding specified for the assignment in the Course Assessment Specification. These are:

- ◆ applying knowledge of physics to new situations
- ◆ selecting information from a variety of sources
- ◆ processing the information/data collected (using calculations and units, where appropriate)
- ◆ presenting information appropriately
- ◆ analysing the data/information collected/processed
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ evaluating experimental procedures/practical investigations
- ◆ communicating findings/information effectively

Assessment

Purpose

The purpose of this assessment is to generate evidence for the added value of this Course by means of an assignment.

Assessment overview

Assessment should take place when the candidates are ready to be assessed.

This assignment requires candidates to apply skills, knowledge and understanding to investigate a relevant topic in physics. The topic should draw on one or more of the key areas of the Course. The assessor must review the topic chosen to ensure that it is appropriate.

The assignment offers challenge by requiring skills, knowledge and understanding to be applied in a context that is one or more of the following:

- ◆ unfamiliar
- ◆ familiar but investigated in greater depth
- ◆ integrating a number of familiar contexts

The assessor has responsibility for ensuring that the topic to be investigated by the candidate is sufficiently demanding. Some examples of suitable investigations are provided in the *Higher Physics Course and Unit Support Notes*. None of these examples are mandatory: they are intended simply to illustrate the level of demand that is expected of an assignment at Higher. Assessors and candidates should choose relevant topical contexts appropriate to the learning and teaching, but it is the assessor's responsibility to ensure that the topic will allow the candidate to provide evidence of an appropriate standard to achieve the full range of marks available.

This assignment has two stages:

- ◆ a **research** stage
- ◆ a **communication** stage

The **research** stage involves gathering information/data from the internet, books, newspapers, journals, experiment/practical activity or any other appropriate source. Candidates must select, use and record their referenced sources. An appropriate experiment/practical activity must be used as one of the data sources. The Researching Physics Unit could be used as one of your experimental/practical investigation data sources. Any practical work undertaken will not be assessed.

Group work approaches are acceptable as part of the **research** stage when gathering information/data or undertaking an experiment/practical activity,

but assessors must ensure that candidates are able individually to meet the evidence requirements of this assessment.

In the course of their assignment, candidates are required to:

- ◆ choose a relevant topic in physics (the assessor must review the appropriateness of the topic chosen)
- ◆ state appropriate aim(s)
- ◆ explain the underlying physics of the topic researched
- ◆ research the topic by selecting relevant data/information
- ◆ process and present relevant data/information
- ◆ consider experimental uncertainties
- ◆ analyse data/information
- ◆ state conclusions
- ◆ evaluate their investigation
- ◆ present the findings of the research in a report

The evidence for this assignment will consist of the report. Of the total of 20 marks available for the assignment, the marking instructions provide 16 marks for skills and 4 marks for knowledge and understanding. The table below shows how these marks are allocated to each of the criteria against which the evidence will be assessed.

Criteria	Mark allocation
Aim(s)	1
Applying knowledge and understanding of physics	4
Selecting information	2
Processing and presenting data/information	4
Uncertainties	1
Analysing data/information	2
Conclusion(s)	1
Evaluation	3
Presentation	2

Assessment conditions

Assessors must exercise their professional responsibility in ensuring that evidence submitted by a candidate is the candidate's own work.

Candidates should start the assignment at an appropriate point in the Course. This will normally be when they have started work on the Units in the Course and have sufficient knowledge and skills to undertake the assignment. It is recommended that no more than eight hours is spent on the whole assignment.

This assignment has two stages:

- ◆ a **research** stage
- ◆ a **communication** stage, during which the report is written

Candidates may access any appropriate resources during the research stage of this assignment.

During the communication stage of this assignment, candidates should have access to the following resources:

- ◆ Material collected by the candidate during the **research** stage. This may include, for example, statistical, graphical, numerical or experimental data; data/information from the internet; published articles or extracts; notes taken from a visit or talk; notes taken from a written or audio-visual source.

The assessor should check that the material used by the candidate in this communication stage conforms to the criteria above. It must not include a prepared report or elements of one.

Candidates may produce their report over a period of time. If the report is done over a number of sessions, then the assessor must retain the candidate's work between sessions. Following completion of the report there should be **no** re-drafting.

As a guide, evidence which meets the requirements of this Component of Course assessment should be 800-1500 words, excluding tables, charts and diagrams.

The requirements of the assignment should be made clear to candidates at the outset.

Reasonable assistance may be provided prior to the formal assessment process taking place. Reasonable assistance may be given on a generic basis to a class or group of candidates. The term 'reasonable assistance' is used to try to balance the need for support with the need to avoid giving too much assistance. If any candidates require more than what is deemed to be 'reasonable assistance', they may not be ready for assessment or it may be that they have been entered for the wrong level of qualification.

In the **research** stage, reasonable assistance may include:

- ◆ directing candidates to the Instructions for Candidates
- ◆ clarifying instructions/requirements of the task
- ◆ advising candidates on the choice of the topic or issue

In the **communication** stage, reasonable assistance may include:

- ◆ directing candidates to the Instructions for Candidates
- ◆ clarifying instructions/requirements of the task

At any stage, reasonable assistance does **not** include:

- ◆ providing model answers
- ◆ providing feedback on drafts

The **research** stage will be conducted under some supervision and control. This means that although candidates may carry out some research outwith the learning and teaching setting, assessors should put in place processes for monitoring progress and ensuring that the work is the candidate's own and that plagiarism has not taken place.

Assessors should put in place mechanisms to authenticate that the research is the candidate's own work. For example:

- ◆ regular checkpoint/progress meetings with candidates
- ◆ short spot-check personal interviews
- ◆ checklists which record activity/progress
- ◆ photographs, film or audio evidence
- ◆ checking candidate lab books/blogs

Group work approaches are acceptable as part of the **research** stage. However, there must be clear evidence for each candidate to show that the candidate has met the evidence requirements.

The **communication** stage will be conducted under a high degree of supervision. This means that:

- ◆ candidates must be in direct sight of the assessor (or other responsible person) during the period of the assessment
- ◆ candidates must not discuss their work with each other

Evidence to be gathered

The following candidate evidence is required for this assessment:

- ◆ a report

The report will be submitted to SQA, within a given timeframe, for marking. The same report cannot be submitted for more than one subject.

General Marking Instructions

In line with SQA's normal practice, the following general marking instructions are addressed to the marker. They will also be helpful for those preparing candidates for Course assessment.

Evidence will be submitted to SQA for external marking.

All marking will be quality assured by SQA.

General Marking Principles for Higher Physics assignment

This information is provided to help you understand the general principles you must apply when marking candidate responses to this assignment. These principles must be read in conjunction with the detailed marking instructions, which identify the key features required in candidate responses.

- (a) Marks for each candidate response must always be assigned in line with these General Marking Principles and the Detailed Marking Instructions for this assessment.
- (b) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.

Detailed Marking Instructions for Higher Physics assignment

Read the whole report before assigning any marks. Credit should be given for appropriate information wherever it is given in the report.

Criteria	Expected response	Max mark	Additional guidance	Notes
Aim(s)	States appropriate aim(s)	1	The aim(s) must be clearly stated and appropriate to the investigation undertaken.	<p>The aim must describe clearly what is to be investigated, eg ‘to investigate how the amount an optical fibre is bent affects the transmission of light through the fibre’.</p> <p>Acceptable versions of an aim could be: ‘to compare the energy of an earthquake with the maximum amplitude of the seismic waves’ NOT: ‘the effectiveness of sun cream’.</p> <p>The aim must be stated separately from the title.</p> <p>The word ‘aim’ does not need to be stated.</p>
Apply knowledge and understanding of physics	Explains the topic, using the underlying physics	4	<p>4 marks should be awarded to a candidate who has:</p> <ul style="list-style-type: none"> ♦ provided correct explanations of the topic researched using physics terms/ideas which are at a depth appropriate to Higher Physics (this does not mean the answer has to be ‘excellent’ or ‘complete’) 	<p>Ideally the underlying physics would be within one section within the report; however Markers should be aware that candidates may include the underlying physics throughout the report.</p> <p>If any of the candidate’s explanation of the underlying physics has been given credit in any other section then that piece of</p>

		<p>The response might include the use of physics concepts and principles: eg momentum and impulse, internal resistance, refraction, as well as related formulae and calculations.</p> <p>3 marks should be awarded to a candidate who has:</p> <ul style="list-style-type: none"> ◆ provided mostly correct explanations of the topic researched using physics terms/ideas which are at a depth appropriate to Higher Physics <p>2 marks should be awarded to a candidate who has:</p> <ul style="list-style-type: none"> ◆ provided some correct explanations of the topic researched using physics terms/ideas which are at a depth appropriate to Higher Physics <p>1 mark should be awarded to a candidate who has:</p> <ul style="list-style-type: none"> ◆ provided only one correct explanation of the topic researched, using physics terms/ideas which are at a depth appropriate to Higher Physics <p>0 marks: The candidate fails to meet the minimum standards required for 1 mark.</p>	<p>information should not be considered when awarding marks for the underlying physics.</p> <p>If the underlying physics has been copied verbatim from a reference or website then the candidate is not demonstrating understanding and should be awarded 0 marks.</p> <p>Information which is quoted from references in this section and then explained or expanded upon by the candidate is acceptable.</p>
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Select information	Selects sufficient relevant data/information for inclusion in the report	2	<p>2 marks: The data/information selected by the candidate for presentation/processing/analysis is both relevant and sufficient.</p> <p>1 mark: The data/information selected by the candidate for presentation/processing/analysis is relevant but insufficient.</p> <p>0 marks: The data/information selected by the candidate for presentation/processing/analysis is neither relevant nor</p>	<p>This means that the raw data/information MUST be included in the report. This could take the form of photocopies of pages from journals, books, print-outs of appropriate sections of webpages, tables of data from experiments conducted by the candidate, etc.</p> <p>Web links, book and journal references are not sufficient on their own.</p> <p>There must be relevant data from a minimum of two sources, which relate to the aim.</p> <p>For Physics, one of these sources must be data from practical work in which the candidate has taken an active part.</p> <p>For the data/information to be sufficient there should be enough data/information which could allow the candidate to draw a conclusion that relates to the aim.</p> <p>There must be relevant data from one source, which relates to the aim.</p>
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			<p>sufficient.</p> <p>This could include raw data from experiments/practical activities, extracted tables, graphs, diagrams and text. It might include, for example, statistical, graphical, numerical or experimental data; data/information from the internet; published articles or extracts; notes taken from a visit or talk; notes taken from a written or audio-visual source.</p>	
Process and present data/information	Data/information is processed and presented	4	<p>Processing can include, for example: performing calculations, summarising referenced text – although the marks are awarded for processing, it must be clear where the raw or extracted data/information came from.</p> <p>Presenting processed data/information can include, for example, appropriate formats from: summary, graph, table or chart (one must be graph, table or chart). In each case, sufficient detail should be included to convey the data/information. In all cases the candidate must clearly reference the source of the original data.</p>	<p>The raw data/information must be included in the report in order for marks to be awarded for processing and presenting.</p> <p>To access these marks there must be evidence of both processing and presenting. If either processing or presenting is not included then no marks can be awarded for this section.</p> <p>There is no requirement for candidates to present data/information in different formats. However, one of the chosen formats must be a graph, table or chart; otherwise no marks can be awarded in this section.</p> <p>For plotting of graphs and charts allow $\pm\frac{1}{2}$ box tolerance.</p>

			<p>4 marks should be awarded to a candidate who has processed and presented all data/information correctly and appropriately.</p> <p>3 marks should be awarded to a candidate who has processed all data/information correctly and appropriately and presented</p>	<p>For calculations: a suitable presentation format would be a clearly set-out worked example.</p> <p>When using graphing packages, all major and minor gridlines should be included. Points should be visible but not excessively large. Lines or curves of best fit should be used.</p> <p>The presentation format should be appropriate to the data/information.</p> <p>To attain 4 marks, all processing and presenting must be correct, eg all appropriate labels, units, headings must be included, calculations must be correct (with units), all points must be plotted within tolerance, appropriate line(s) of best fit must be drawn.</p> <p>Any mistakes would mean that the candidate can achieve a maximum of 3 marks.</p> <p>Lack of references or cross referencing directly associated with each piece of raw/presented data/information would mean that the candidate can only achieve a maximum of 3 marks.</p> <p>3 marks: 'most' means more than 50%.</p>
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			<p>most data/information correctly and appropriately or who has processed most data/information correctly and appropriately and presented all data/information correctly and appropriately.</p> <p>2 marks should be awarded to a candidate who has processed and presented some of the data/information correctly and appropriately.</p> <p>1 mark should be awarded to a candidate who has processed and presented little data/information correctly and appropriately.</p> <p>0 marks: The candidate fails to meet the minimum standards required for 1 mark.</p>	<p>2 marks: 'some' means 25-50%.</p> <p>1 mark: 'little' means less than 25%.</p>
Uncertainties	Reading and random uncertainties	1	<p>1 mark should be awarded to a candidate who includes appropriate readings and random uncertainties in their experimental work.</p> <p>0 marks: The candidate fails to meet the minimum standards required for 1 mark.</p>	<p>Reading uncertainties should be included for all measurements made (if the reading uncertainty is the same for all measurements a statement to this effect is satisfactory, eg 'the reading uncertainty in each distance is ± 0.0005 m').</p> <p>If repeated readings are taken then a random uncertainty in each set of readings should be calculated and included. A sample calculation should be included to show how the random uncertainty was calculated.</p>

<p>Analyse data/information</p>	<p>Data/information is analysed</p>	<p>2</p>	<p>Analysis will include interpreting data/information included in the report (which may/may not have been processed by the candidate) to identify relationships. This may include further calculations.</p> <p>2 marks for correctly analysing the data/information.</p> <p>1 mark for some correct analysis of the data/information.</p> <p>0 marks: The candidate fails to meet the minimum standards required for 1 mark.</p>	<p>Candidates may use either raw data/information (eg graphs or tables from the internet, journals) that they have included, or their processed data/information or a combination of both.</p> <p>Analysis may include comparisons, patterns and trends, discussion of results, eg the calculation of a constant, the relationship between variables, what graphs show.</p> <p>2 marks for correctly analysing data/information from at least two sets of data/information.</p> <p>1 mark for either correctly analysing one set of data or correctly analysing part of the data from at least two sets of data/information – the candidate could correctly identify the trend in a set of data but fail to compare this to another set of data or using their data to correctly calculate a constant but making no comparison to the accepted value from a literature/internet source.</p>
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Conclusion(s)	States valid conclusion(s)	1	<p>1 mark for stating a conclusion that relate(s) to the aim(s) and is supported by evidence from the candidate's research.</p> <p>0 marks: The candidate fails to meet the minimum standards required for 1 mark.</p>	<p>If no aim has been stated then the mark cannot be awarded.</p> <p>Although the conclusion may relate to the aim, it must be supported by information in their report, otherwise the conclusion mark cannot be awarded.</p> <p>If the candidate states multiple aims then the conclusion must relate to all aims given (unless the candidate stated that the aim was modified to narrow the focus).</p>
Evaluation	Evaluation of the investigation	3	<p>For marks to be awarded for evaluation, candidates must make judgements based on criteria. The criteria, upon which judgements of the investigation are made, may include the following (not an exhaustive list):</p> <ul style="list-style-type: none"> ◆ robustness of findings ◆ validity of sources ◆ reliability of data/information ◆ evaluation of (experimental) procedure <p>1 mark for each valid, evaluative comment based on relevant criteria, to a maximum of 3 marks.</p> <p>0 marks: The candidate has not met the standards described for 1 mark.</p>	<p>Each comment must be supported by appropriate justification, for example:</p> <p>Robustness – findings are supported by other reputable sources.</p> <p>Validity of sources – explanation of why a source might be considered to be biased/unbiased, key variables controlled.</p> <p>Reliability of data/information – from a scientific journal, sample size, repeated results.</p> <p>Evaluation of procedures – when experimental data is analysed using a graph and a straight line is established passing close to, but not through, the origin, consideration could be given to systematic</p>

				uncertainties. Consideration could be given to the equipment used to make measurements, eg ‘a more precise balance could be used to measure mass’ followed by some justification (not ‘a better balance could be used’).
Presentation	Appropriate presentation References	2	<p>Maximum of 2 marks for the presentation of the report.</p> <p>1 mark for each of:</p> <ul style="list-style-type: none"> ◆ appropriate title and structure ◆ the references to at least two sources used in the report are given in sufficient detail to allow them to be retrieved by a third party – if one of the sources is an experiment/practical activity, then the title and the aim should be recorded 	<p>The third person, passive voice is the preferred style for report writing, but this is not a requirement.</p> <p>Although references may appear within the body of the report they must also appear at the end of the report.</p> <p>The structure of the report does not need to follow the structure listed in the Marking Instructions or Candidates’ Guide.</p> <p>If one of the sources is an experiment/practical activity, then only the title of the experiment/practical and aim are required as raw data has been dealt with elsewhere.</p> <p>References of websites must be complete URL addresses – www.bbc.co.uk is not acceptable.</p> <p>References of text books must include title, author, page number and either ISBN number or version/edition number.</p>

				References of journals must include title, author, volume and page number. At least two references must be given correctly to access this mark.
		20		

Administrative information

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History of changes

Version	Description of change	Authorised by	Date
1.1	'What this assessment covers' section and 'Assessment overview' section – list of skills, knowledge and understanding assessed in the assignment amended for clarification. Detailed Marking Instructions amended to include a column of additional notes.	Qualifications Manager	September 2014

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