



# **NQ Verification 2015–16 Key Message Reports**

<b>Verification group name:</b>	<b>Physics</b>
<b>Levels</b>	<b>N4 – Advanced Higher</b>
<b>Date published:</b>	<b>October 2016</b>

**This Report combines all Verification Key Messages for the academic session 2015-2016.**



## NQ Verification 2015–16 Key Messages Round 1

01

### Section 1: Verification group information

Verification group name:	Physics
Verification event/visiting information	Event
Date published:	March 2016

#### National Courses/Units verified:

National 3, National 4, National 5, Higher and Advanced Higher Units

02

### Section 2: Comments on assessment

#### Assessment approaches

It is important that centres use the most up-to-date version of the Unit assessment support pack (UASP) for the Unit being assessed. They should also make sure they have candidate evidence that matches the Assessment Standards and that they follow the advice in the judging evidence table for the Unit.

For Outcome 1 it is important that centres select an assessment activity that is at the appropriate level for the Course being followed by the candidate. The structure of the report should follow that required within the UASP and should have a clear link to a key area at the level being studied.

To aid both internal and external verification it would be advantageous if centre staff clearly annotated the candidate scripts to highlight where an Assessment Standard is achieved.

Most centres used the most up-to-date Unit assessment support pack assessment instrument but a few used the previous version.

For Assessment Standard 2.1, when a centre is following the portfolio approach to assessment centres should note that the minimum that can be assessed in one go is a key area and the assessment of a key area should not be split.

Centres selected for verification in round 1 that were following the portfolio approach all followed this rule.

For all questions that involve a value to be given it is important that the accepted answer includes the unit where the quantity being stated has a unit associated with it. The only place this is not expected is where the value is written into a table where the heading has the unit.

All candidates should be given the opportunity to be assessed over all key areas within a Unit before a final decision on that Unit is made. If a candidate needs to be re-assessed for Assessment Standard 2.1 then there are two possible approaches to re-assessment. The candidate could be given another test covering all the key areas within a Unit and if they get 50% or more of the responses correct they would pass AS 2.1. Alternatively, the centre could analyse the candidate's performance in each key area in which they performed poorly in the first test, then re-assess the candidate on those key areas. If the candidate gains 50% or more of the responses correctly for the new test then they pass AS 2.1.

The Unit-by-Unit approach was followed by the majority of the centres selected for round 1 to assess Assessment Standards 2.1 and 2.2 at National 5, Higher and Advanced Higher (2.1 and 2.4 at National 3 and 4).

## **Assessment judgements**

Through the use of practical experimentation candidates are required to complete Outcome 1. This allows the candidate to demonstrate experimental/practical skills that cover all the Assessment Standards for this Outcome. This is usually achieved through a single assessment activity. If required, each Assessment Standard can be achieved individually to allow the candidate to achieve success in all six Assessment Standards.

It is important that the Assessment Standards for Outcome 1 are not split into smaller parts, especially Assessment Standard 1.1 which consists of six pieces of evidence (five at National 3) required from one plan for a single experimental procedure. If one piece is incorrect or missing the centre can allow the candidate to redraft the whole plan for AS 1.1 or design an alternative plan for another experiment.

It should be noted that all centres selected in this verification round that included an Outcome 1 report, carried out practical experiments that allowed all Assessment Standards to be assessed with the one activity.

A clear aim is required at the start of any experimental/practical investigation to allow the candidate to draw effective conclusions based on the stated aim.

When the candidate is planning an investigation the description should be clear enough to allow another person to carry out the experimental/practical procedure in the exact same way as the candidate. It is not necessary for the dependent

and independent variables to be explicitly stated as long as they are clear in the procedure.

For Assessment Standard 1.4 at National 4, National 5, Higher or Advanced Higher, or Assessment Standard 1.3 at National 3, candidates should be encouraged to draw a valid graph where the results/aim clearly demonstrate that this would be appropriate. This will give the candidates a second opportunity to demonstrate achievement of the Assessment Standard. It should be clear that to achieve the Assessment Standard the headings and units should be included and correct in order to achieve this AS. It is also important that, if appropriate, an origin is marked clearly on the graph as per the General Marking Instructions.

To aid feedback to the candidate and support both internal and external verification it is important that the assessors indicate clearly on the candidate script where each of the Assessment Standards is achieved.

For Assessment Standard 2.1 it is important that the candidate is awarded a pass when they achieve half the total of correct responses expected as per the marking guidance. It is also important that centres annotate any marking guidance used to show alternative answers accepted where appropriate. Where centres are using their own assessment or have adapted the UASP, it is important that an assessment grid is produced to show which key areas are being covered by each question to demonstrate the number of opportunities per key area the candidates are given. Where centres are devising their own assessments or making major adaptations to the UASPs these should be submitted for prior verification.

In the centres verified this year it was clear that all centres used the correct process of half the total number of opportunities to assess Assessment Standard 2.1 across all the key areas and not that of half the opportunities for each key area.

When the portfolio approach is used the achievement of 50% of the statements being made for Assessment Standard 2.1 still applies and should be checked at the end of the Unit when summing up of the successful responses is made and checked against the total number of opportunities given to make accurate statements.

For Assessment Standard 2.2 at National 5, Higher and Advanced Higher or Assessment Standard 2.4 at National 3 and National 4, it is important that each of the problem solving types associated with the level of study is achieved across the Course. The similar 50% achievement for each problem solving type is applied when the candidate is given an assessment.

In a number of centres the use of inaccurate rounding was given credit but it is important that the General Marking Principles that are applied to the final examination are also applied to the Unit assessments. Care should also be taken to accept the appropriate number of significant figures when dealing with any calculation, where the usual rule of between one fewer and up to two more in the final answer than the data with the fewest significant figures should be applied.

The use of a recording grid for this Assessment Standard would make it clear when a candidate has achieved that skill.

For Assessment Standard 2.2 and 2.3 at National 3 and National 4, it is important that the candidates include sufficient physics knowledge at the appropriate level of study.

It is vital that overall decisions made by the centre in respect of each Assessment Standard is clearly recorded and indicated on the candidate script. A good number of centres made it clear where candidates had achieved each Assessment Standard and where verification took place. However, for a few centres the final decision between assessor and internal verifier was not always clear.

03

## Section 3: General comments

It is clearly stated that at National 3, National 4, National 5 and Higher levels that the candidates can be involved in the same experiment/practical activity and so gain the same set of results. It is important that after this group activity each candidate individually writes up the Outcome 1 to allow them to individually evidence each of the Assessment Standards.

It should also be noted that candidates should be encouraged to redraft the final report where they have not passed particular Assessment Standards. The assessor should supply appropriate feedback to allow the candidate to focus on what is required, without giving model answers as prompts.

Some centres had amended the marking guidance to show alternative acceptable answers but these new instructions were not always applied consistently to the candidate sample supplied. It is important that accurate amended marking guidance is made and applied consistently across the whole cohort. Care should be taken not to add additional responses that are either incorrect, do not answer the question or are inappropriate to the level being tested. Where centres are in doubt as to what to accept, consulting the examination Marking Instructions, especially the new National Qualifications exam papers and Revised Higher or Advanced Higher past papers, will give additional guidance for similar questions.

Over the whole sample this year it was noted that the centre marking was more in line with national standards than in previous years.

When a centre is selected for external verification it should only submit one Unit for each level being verified, ie if National 4 and National 5 are being sent then one Unit for each candidate at National 4 and one for the candidates at National 5 should be submitted for verification. It is also important that the centres make it clear which Assessment Standard(s) are to be verified if they send in more evidence than required.



## NQ Verification 2015–16 Key Messages Round 2

01

### Section 1: Verification group information

Verification group name:	Physics
Verification event/visiting information	Event and visiting
Date published:	June 2016

#### National Courses/Units verified:

H25C 74	National 4	Added value unit
H4L1 76	Higher	Researching Physics
H7XG 77	Advanced Higher	Investigating Physics

02

### Section 2: Comments on assessment

#### Assessment approaches

For National 4 the evidence produced by the candidates should relate clearly to a key area from any of the other three units within the Physics course. Where a report is chosen as the communication format, the structure of the report supplied in the advice provided within the unit assessment support pack would be the suggested format that centres should follow. To achieve this unit it is important that the activities used are at the appropriate level for the course.

It is important that, where a candidate achieves an individual assessment standard within the evidence provided, the centre clearly identifies this on the candidate's evidence to aid both internal and external verification.

Assessment standard 1.1 requires the candidates to demonstrate an understanding of the physics involved at the appropriate level. They are also required to state the effect the selected issue has on society or the environment. This makes it important that the topic picked is linked to a key area and set at the National 4 level.

Assessment standard 1.2 is part of the research stage and the candidates have to select relevant data/information from at least two relevant sources. These sources can be either totally from the internet, books, journals or other relevant publication or a combination of these, they could also choose to use a practical experiment as one of the sources with the other coming from the list above. It is important that for any source the candidate lists the source in enough detail that would allow another person to find the same evidence quickly. If a book is used the title, author, ISBN and page numbers would be required or if they used an experiment the title and aim must be recorded.

When a candidate is selected for verification it is important that the individual's log book is included as part of the evidence submitted to allow the selected data/evidence to be confirmed rather than requiring the candidate to include all raw data in a final 'write up'. This evidence allows assessment standard 1.3 to be checked where the candidate has to present the selected data from one source in an appropriate format that is different from that used for the raw data. This can only be assessed if the raw and process data are included to allow comparison to take place as to the accuracy of the processing to be checked.

Assessment standard 1.4 requires the candidate to use physics theory to explain what the chosen topic has had an impact on — the environment or society. The impact can be either positive or negative as decided by the candidate but must be backed up with relevant physics theory at the appropriate National 4 level.

Assessment standard 1.5 is the final communication phase for the added value unit where the candidate communicates the overall findings from the research phase. This communication stage must include a clear aim and an overall evaluation of the data included as this brings the research information and the manipulated information together. This information should be in an appropriate format that allows an overall assessment judgement to be made and agreed upon.

Most of the centres selected for round 2 used a standard scientific report with a small number using a conference style poster or printing out the PowerPoint slides from the presentation to convey the relevant information/findings. It is important that when a PowerPoint is used that the speaker notes are included and are clear enough to allow another person to follow them.

For the Researching Physics (Higher) unit, visiting verification was carried out.

For assessment standard 1.1, candidates are required to research a topic that has a link to any of the key areas within the other three units within the Higher Physics course. The candidate is required to record at least two sources for the data/information used in the topic to a standard that would allow the assessor and the verifier to find the information easily when they are checking its validity. If the candidates download or copy information from text it is important that this is converted into their own words as a way to demonstrate some understanding of what evidence the candidate feels is relevant to the research topic selected.

To achieve assessment standard 1.1 the candidate must include sufficient physics, at the appropriate level, to show a clear understanding of the topic. The guidance notes for the centres requires a 'statement' in the format of a few sentences but at Higher level this would usually be much more to allow a fuller explanation of the physics involved to be explained in enough detail to allow the candidate to show a clear understanding of the physics relevant to the topic selected. This could be from a number of paragraphs to a number of pages of notes.

Assessment standard 2.1 is where the candidates are required to design and carry out a practical investigation based on the topic of interest. At Higher level this can be carried out as a small group of candidates but the centre staff must check that everyone takes an active part in the design and collection of information from this stage of the Researching Physics unit, especially since candidates will be using this data in their assignment.

Assessment standard 2.2 is the completion of the practical work and again can be carried out as part of a small group with each candidate being actively involved in the collection of data and the correct recording, including headings and units, in an appropriate format.

The centres selected for visiting verification this year all used appropriate formats to allow the candidates to record their research and experimental findings.

Centres are reminded that the use of a template or pro forma is not permitted.

For the Investigating Physics (Advanced Higher) unit, visiting verification was carried out.

Centres are reminded that all work for the Investigating Physics unit is individual work and group work is not allowed. Candidates should be choosing, with guidance, the topic they are investigating and unless a centre has a large number of candidates, each candidate should be choosing a different topic. Where it is necessary for the same topic to be investigated by a small number of candidates owing to a large cohort, then the centre must ensure candidates do not collude in their work. This is particularly important since the work from the Investigating Physics unit will be used as the basis for the project.

Centres are also reminded that the use of a template or pro forma is not permitted.

For assessment standard 1.1, candidates must give a clear statement of the physics topic selected for the whole investigation. This could be in the form of a few sentences but must be followed by enough evidence to demonstrate that the candidate can demonstrate the use of physics terms and knowledge at an appropriate level suitable for Advanced Higher Physics. The knowledge to support the candidate in developing the investigation project should come from at least three sources and it is important that these are recorded in enough detail that would allow the assessor and verifier to retrieve the full evidence.

Assessment standard 1.2 is where the candidate must complete the practical investigation including a clear aim for the practical activity to be completed. This could be for one experimental procedure, where the procedure is lengthy and complex, or, more typically, for multiple procedures but it is important that this stage is a solo activity and no group work is allowed. The information supplied should be detailed enough, including measurements to be taken and any risks associated with the procedure, to allow another person to be able to carry out the practical/experimental stage.

Assessment standard 1.3 is the completion of the practical work and again must be carried out individually. The candidate must collect relevant data and record this in the most appropriate format; this should include repeated measurements, where appropriate, and calculated averages, along with all associated uncertainties.

All of the centres selected for visiting verification used an appropriate log book or 'daybook' to record the candidates' findings.

## **Assessment judgements**

It is clear from the centres selected this year for National 4 added value unit that the staff and candidates have a clearer understanding of the national standard as the evidence supplied was well presented with clear centre decisions evident for the candidates' work.

For assessment standard 1.1, most candidates had included enough detail in the identification of the area of physics selected in the communication phase to allow this to be verified. A small number of centres still failed to include the candidate's log book to allow this to be confirmed.

Most candidates selected topics clearly linked to the National 4 course key areas but a number included photocopies of National 5 assignments as evidence of attainment.

For assessment standard 1.2, the evidence supplied demonstrated that candidates were supplying full details for each reference used. This allowed the verification process to be seamless where any information required to be checked. As with assessment standard 1.1 some centres require to send in the candidate log book to allow the verifier to confirm the centre decision in relation to the appropriateness and relevance of the data selected.

Assessment standard 1.3 requires some of the raw data from the research phase to be presented in a different format to that of the original source. This can only be verified if the raw data is available to compare the new format against. In physics it is usual that a graph will be used, where appropriate, and that the type of graph best fits the evidence supplied, ie a line graph rather than a bar graph where the variables in the raw data are continuous.

Where data is selected, the candidates should be encouraged to display this in an appropriate table with clear headings and units for all columns. The averages should be calculated to allow a graph to be drawn.

For all assessment standards the centre should clearly identify the location of the evidence used to make the centre's judgement as this would aid not only internal verification but also the external verification process. Where a disagreement is identified between the assessor and the verifier it is important that the final decision is clearly highlighted.

For visiting verification of Researching Physics (Higher) centres supplied mostly interim evidence.

Assessment standard 1.1 requires the candidates to make a clear statement at the beginning of the research stage as to the topic being selected. This must include enough physics knowledge at Higher level to show a clear understanding of the topic selected. With most centres the underlying physics was clearly available for this assessment standard, where it was supplied for verification, but the overall statement was not included.

The statement at Higher level must have enough physics to demonstrate a clear understanding of the topic being investigated so will be a few paragraphs to a few pages in length. It should not be just a few sentences.

Assessment standard 2.1 demonstrated that most centres used small groups to design the practical/experimental setup. The assessment was enhanced with clear evidence of individual involvement in this stage of the unit with some changes to the design made in line with centre apparatus availability.

Assessment standard 2.2 was not fully completed by most candidates, as the table of results should be in the most appropriate format and averages calculated. Most candidates produced clear tables for the results but missed out the headings and units for each column used.

For visiting verification of Investigating Physics (Advanced Higher) centres supplied mostly interim evidence.

For assessment standard 1.1, all the candidates selected made a clear statement as to the topic being investigated. Most candidates had selected a number of experiments to carry out in support of the topic selected but the level of theory investigated was below that required for the unit at Advanced Higher level.

With assessment standard 1.2, most candidates had selected the appropriate experimental procedure(s) to support the investigation but most were in the same format as that viewed from books or the internet. It is a requirement that this should be in a format that would allow anyone with similar knowledge to carry out the practical work with no additional support.

Assessment standard 1.3 was not fully completed by most of the candidates as they had the table for the results but not calculated averages or listed the sources

of uncertainty in the experimental procedure. The tables had clear headings and units supplied by all candidates.

03

## Section 3: General comments

As it is appropriate to use an outcome 1 report from one of the other three units as a source of data for the National 4 added value unit this could reduce the assessment burden. If this is selected the candidate must supply the title and aim of the experiment as one of the sources, along with the raw data selected.

It is appropriate to ask the candidates to redraft responses given to help them cover the requirements of the unit in one go. If this is carried out then the centre must make sure they do not supply too much support to lead the candidates into only one possible answer but can give enough support to help focus the final submission.

For example, if the candidate had a table of results with missing units in the headings the centre staff could ask them to check the tables for their data. Giving the candidate advice on what unit they should include is inappropriate.

It is important that the level of support given to the candidates does not go above that demonstrated in the unit assessment support pack. Some centres have devised log books that cover the required level but a few supplied suggested answers to some of the areas required for achievement of the assessment standard, which was inappropriate.

For the Researching Physics unit (Higher, for session 2016–17 onwards centres will be able to use the evidence of candidates achieving the unit as evidence of outcome 1 in the other units, without the need to match evidence.

For the Investigating Physics unit (Advanced Higher) centres can use the evidence of candidates achieving the unit as evidence of outcome 1 for the other units, without the need to match evidence.

It is also important that centres have an effective internal verification process that allows the standards applied to be the same, not just within one teaching group but across teaching groups. Most centres have developed a clear internal verification process that is applied across the other three units but not always with the Researching Physics or the Investigating Physics units.

When evidence is sent into SQA for a centre selected for verification it is important that the centre includes verified evidence for some candidates to demonstrate the effective use of the centre policy. Centres are required to include a copy of the policy so it is important to allow this to be checked.