Comparative document

(Version 2.0 April 2014 compared with Version 3.0 June 2014)

Physics: Particles and Waves (Higher) Unit

SCQF: level 6 (6 SCQF credit points)

Unit code: H4L0 76

The purpose of this document is to give a quick, visual guide to any amendments or clarifications made during the revision process.

Unit outline

The general aim of this Unit is to develop skills of scientific inquiry, investigation, analytical thinking, and independent working, along with knowledge and understanding of particles and waves. Learners will apply these skills when considering the applications of particles and waves on our lives~~, as well as the implications on society/the environment.~~. This can be done by using a variety of approaches, including investigation and problem solving.

The Unit covers the key areas of:
The standard model, Forces on charged particles, Nuclear reactions, Wave particle duality, Interference and diffraction, Refraction of light and Spectra.

Learners will research issues, apply scientific skills and communicate information related to their findings, which will develop skills of scientific literacy.

Learners who complete this Unit will be able to:

1 Apply skills of scientific inquiry and draw on knowledge and understanding of the key areas of this Unit, to carry out an experiment/practical investigation
2 Draw on knowledge, and understanding of the key areas of this Unit and apply scientific skills

This Unit is a mandatory Unit of the Higher Physics Course and is also available as a free-standing Unit. The Unit Specification should be read in conjunction with the *Unit Support Notes*, which provide advice and guidance on delivery, assessment approaches and development of skills for learning, skills for life and skills for work. Exemplification of the standards in this Unit is given in Unit Assessment Support.

The *Course Assessment Specification* for the Higher Physics Course gives further mandatory information on Course coverage for learners taking this Unit as part of the Higher Physics Course.

Recommended entry

Entry to this Unit is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by one or more of the following or equivalent qualifications and/or experience:

- National 5 Physics Course or relevant component Units

Equality and inclusion

This Unit Specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. For further information, please refer to the *Unit Support Notes.*

Standards

Outcomes and assessment standards

Outcome 1

The learner will:

1 Apply skills of scientific inquiry and draw on knowledge and understanding of the key areas of this Unit to carry out an experiment/practical investigation by:

1.1 Planning an experiment/practical investigation
1.2 Following procedures safely
1.3 Making and recording observations/measurements correctly
1.4 Presenting results in an appropriate format
1.5 Drawing valid conclusions
1.6 Evaluating experimental procedures

Outcome 2

The learner will:

2 Draw on knowledge and understanding of the key areas of this Unit and apply scientific skills by:

2.1 Making accurate statements
~~2.2 Describing an application~~
~~2.3 Describing a physics issue in terms of the effect on the environment/society~~
~~2.4~~2.2 Solving problems

Evidence Requirements for the Unit

Assessors should use their professional judgement, subject knowledge and experience, and understanding of their learners, to determine the most appropriate ways to generate evidence and the conditions and contexts in which they are used.

Evidence can be drawn from a variety of sources and presented in a variety of formats. Evidence may be presented for individual Outcomes or gathered for the Unit as a whole, by combining assessment holistically in a single activity. If the latter approach is used, it must be clear how the evidence covers each Outcome.

Transfer of evidence: Since the Outcomes and Assessment Standards are the same for the Our Dynamic Universe, Particles and Waves and Electricity Units of the Course, the Units differing only by context, evidence for Outcome 1 and Assessment ~~Standards~~Standard 2.2~~, 2.3 and 2.4~~ for this Unit in this Course can be used as evidence of the achievement of
Outcome 1 and Assessment ~~Standards~~Standard 2.2~~, 2.3 and 2.4~~ in the Electricity and Our Dynamic Universe Units of this Course.

The key areas covered in this Unit are:

Particles
- the standard model
- forces on charged particles
- nuclear reactions

Waves
- wave particle duality
- interference and diffraction
- refraction of light
- spectra

The table below describes the evidence for the Assessment Standards which require exemplification.

Assessment Standard	**Evidence Requirements**
Planning an experiment/practical investigation	The plan should include: ♦ a clear statement of the aim ♦ a hypothesis ♦ a dependent and independent variable ♦ variables to be kept constant ♦ measurements/observations to be made ♦ the equipment/materials ♦ a clear and detailed description of how the experiment/practical investigation should be carried out, including safety considerations
Making and recording observations/measurements correctly	Repeated measurements where appropriate
Presenting results in an appropriate format	One format from: table, line graph, chart, key, diagram, summaries or extended text or other appropriate formats
Drawing valid conclusions	Include reference to the aim
Evaluating experimental procedures	Suggest improvement(s) with justification
Making accurate statements	At least half of the responses should be correct across the key areas for the set of questions provided
~~Describing a physics issue in terms of the effect on the environment/society~~	~~The description should include the physics of the issue~~
Solving problems	One of each: ♦ make predictions ♦ select information ♦ process information including calculations as appropriate ♦ analyse information

Exemplification of assessment is provided in Unit assessment support packs. Advice and guidance on possible approaches to assessment is provided in the *Unit Support Notes.*

Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this Unit. The skills that learners will be expected to improve on and develop through the Unit are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the Unit where there are appropriate opportunities.

1 Literacy

1.2 Writing

2 Numeracy

2.1 Number processes
2.2 Money, time and measurement
2.3 Information handling

5 Thinking skills

5.3 Applying
5.4 Analysing and evaluating
5.5 Creating

Amplification of these is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work.* The level of these skills should be at the same SCQF level of the Unit and be consistent with the SCQF level descriptor. Further information on building in skills for learning, skills for life and skills for work is given in the *Unit Support Notes.*

Administrative information

Published: ~~April~~June 2014 (version ~~2~~3.0)

Superclass: RC

History of changes to National Unit Specification

Version	Description of change	Authorised by	Date
2.0	Page 1 – the description of key areas under 'Unit outline' has been revised to give more information Page 3 – in Outcome 1.3, the word 'accurately' has been replaced by 'correctly'. Pages 3-4 – the Evidence requirements have been rewritten to better explain what is required; information has been added on Transfer of Evidence	Qualifications Development Manager	April 2014
3.0	Assessment Standards 2.2 & 2.3 removed	Qualifications Development Manager	June 2014

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Note: readers are advised to check SQA's website: www.sqa.org.uk to ensure they are using the most up-to-date version of the Unit Specification.