



Higher National Examination-based Graded Unit Specification

General Information

This Graded Unit has been validated as part of the HNC Data Analytics. Centres are required to develop the assessment instrument in accordance with this validated specification.

Graded Unit title: Data Analytics: Graded Unit 1 (SCQF level 7)

Graded Unit code: HH7X 34

Type of Examination: Closed-book

Publication date: January 2017

Source: Scottish Qualifications Authority

Version: 01

Graded Unit purpose

This Graded Unit is designed to provide evidence that the learner has achieved the following principal aims of the HNC Data Analytics:

- ◆ To develop study and research skills.
- ◆ To develop learners' knowledge and skills in mathematics, statistics and software development.
- ◆ To develop transferable skills demanded by employers and/or progression to Higher Education.
- ◆ To develop skills and knowledge to enable learners articulation to a second year Higher Education programme and/or progress to higher level within further education.
- ◆ To develop computational thinking.

Credit points and level

1 Higher National unit credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

Higher National Examination-based Graded Unit Specification: General Information (cont)

Recommended entry to the Graded Unit

It is recommended that the learner should have completed or be in the process of completing the following units relating to the above principal aims prior to undertaking this Graded Unit:

| | |
|---------|--|
| H173 34 | <i>Developing Software: Introduction</i> |
| H8W8 34 | <i>Big Data</i> |
| H7K1 34 | <i>Engineering Mathematics 2</i> |
| H8XT 33 | <i>Statistics for Science 1</i> |
| H175 34 | <i>Computer Systems Fundamentals</i> |

Core Skills

There are no Core Skills embedded in this Graded Unit specification.

Assessment Support Pack

The Assessment Support Pack for this unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable instrument of assessment. Centres wishing to develop their own assessments should refer to the Assessment Support Pack to ensure a comparable standard. Assessment Support Packs are available on SQA's secure website.

Equality and inclusion

This Graded Unit 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.

Further advice can be found on SQA's website:
www.sqa.org.uk/assessmentarrangements

Higher National Examination-based Graded Unit Specification: Designing the examination and assessing learners

Graded Unit title: Data Analytics: Graded Unit 1 (SCQF level 7)

Assessment

This Graded Unit will be assessed by the use of a *closed-book examination* developed by centres. The examination should provide the learner with the opportunity to produce evidence that demonstrates she/he has met the aims of this Graded Unit.

The assessment is an examination lasting three hours.

The examination should be designed to assess the learner's critical knowledge and understanding of the topics relating to the specific aims which this Graded Unit is designed to cover.

The examination will be marked out of **100**. Only whole marks should be used.

The questions and corresponding marks should be designed in accordance with the key topics (ie the critical knowledge and skills to be covered in the examination), level of demand (eg description, explanation, analysis, application) and relative mark allocation for each key topic outlined in the table below.

| Key topics | Level of demand | % mark allocation for each key topic |
|---|-----------------------------|--------------------------------------|
| Coding (including testing) and technical documentation. | Descriptions; explanations. | 20 |
| Concepts behind big data and its applications and implications. | Explanations; applications. | 20 |
| Components of a computer system, and number and logic systems. | Descriptions; explanations. | 20 |
| Statistical concepts including probability and probability distributions. | Descriptions; calculations. | 20 |
| Trigonometric and hyperbolic functions, and calculus (differentiation and integration). | Solutions. | 20 |
| Total marks for examination | | 100 |

These topics are taken from the knowledge and understanding contained within the following component units of this award.

H173 34 *Developing Software: Introduction*
H8W8 34 *Big Data*
H175 34 *Computer Systems Fundamentals*
H7K1 34 *Engineering Mathematics 2*
H8XT 33 *Statistics for Science 1*

The topics may be assessed using constructed response questions or a combination of constructed response and selected response questions. It is permissible (but not required) to offer learners a limited choice within the question paper.

Higher National Examination-based Graded Unit Specification: Designing the examination and assessing learners (cont)

Graded Unit title: Data Analytics: Graded Unit 1 (SCQF level 7)

At least 30% of the available marks must be awarded for questions that assess knowledge between topics.

A specific question paper may slightly alter the allocation of marks specified in the above table, while adhering to the general distribution.

Learners' responses must be assessed using a pre-prepared marking scheme. The marking scheme will be based on the above distribution of marks together with Grade Related Criteria (see later). Half marks should not be awarded for any question.

There is no minimum mark for any specific topic or any section within the paper (if the paper is divided into sections). Grades will be derived from the overall mark for the entire question paper.

If learners are permitted a choice within the paper (or a section within the paper) then the marks awarded must be based on the learner's best answers (in terms of marks scored).

Conditions of assessment

The examination is **closed-book**.

The examination should be **unseen** and the assessment should be conducted in **controlled** and **invigilated** conditions.

At all times, the security, integrity and confidentiality of the examination must be ensured.

The assessment is based on a written examination lasting **three hours**.

No reference material should be allowed into the examination room. The examination should take place under closed-book conditions. However, calculators are permitted.

All examination question papers, scripts and rough working must be returned to the invigilator at the end of the examination. Where published SQA exemplars are used, these must be returned to, and retained by, the centre.

The examination should normally be sat in one sitting. However, it is permissible to alter this where local circumstances require alternative arrangements (perhaps to accommodate e-assessment).

Higher National Examination-based Graded Unit Specification: Designing the examination and assessing learners (cont)

Graded Unit title: Data Analytics: Graded Unit 1 (SCQF level 7)

Assessing and grading learners

Learners who meet the minimum Evidence Requirements will have their achievement graded as an A, B or C. The Grade Related Criteria to be used to judge learner performance for this Graded Unit is specified in the following table.

| Grade Related Criteria | |
|---|--|
| Grade A | Grade C |
| <p>Is a seamless, coherent piece of work or exam script which consistently:</p> <ul style="list-style-type: none"> ◆ interprets and understands the question in a way which demonstrates insight and clear understanding of the topic ◆ demonstrates a comprehensive analysis and reply in their answers ◆ provides responses which are logically structured and coherently expressed demonstrating consistent use of correct terminology ◆ provides responses which are clear and well-structured throughout with language and terminology used of a consistently high standard in terms of level, accuracy and technical content ◆ consolidates and integrates required knowledge and skills linking concepts and ideas and relating answers explicitly to the question ◆ convincingly argues and shows links between experience demonstrating comprehensive knowledge and understanding as well as analysing and evaluation skills ◆ provides evidence of possible alternative approaches and arguments as well as understanding of different interpretations | <p>Is a co-ordinated piece of work or exam script which:</p> <ul style="list-style-type: none"> ◆ interprets and understands the question in a way which enables the learner to meet basic criteria ◆ demonstrates limited analysis, evaluation and explanation of the question and other relevant information ◆ provides responses which are uneven and convey limited understanding although some relevant points are given ◆ provides responses which are satisfactorily structured with adequate use of terminology and language, although not always consistent in terms of level, accuracy and technical content ◆ consolidates and integrates required knowledge and skills but may lack continuity and consistency and fail to show clear links to concepts and ideas ◆ argues and justifies conclusions in an acceptable way but these conclusions may lack reasoned understanding, may not link well to discussions and may show limited knowledge ◆ is likely to show only one approach and limited understanding of different interpretations |

Higher National Examination-based Graded Unit Specification: Designing the examination and assessing learners (cont)

Graded Unit title: Data Analytics: Graded Unit 1 (SCQF level 7)

The marks achieved by the learner in the examination should be aggregated to arrive at an overall mark for the examination. Assessors will then assign an overall grade to the learner for this Graded Unit based on the following grade boundaries.

| | | |
|---|---|----------|
| A | = | 70%–100% |
| B | = | 60%–69% |
| C | = | 50%–59% |

These grade boundaries are fixed and should **not** be amended.

If a learner does not achieve a pass or wishes to upgrade, then this must be done using a substantially different examination. In these circumstances, the highest grade achieved should be awarded.

More information on reasonable assistance, remediation and re-assessment may be found in the SQA publication *Guidance for the Implementation of Graded Units in Higher National Certificates and Diplomas* (SQA, 2008, Publication code: CA4405).



Higher National Examination-based Graded Unit Support Notes

Graded Unit title: Data Analytics: Graded Unit 1 (SCQF level 7)

Guidance on approaches to delivery and assessment of this Graded Unit

The topics may be assessed using constructed response questions or a combination of constructed response and selected response questions. It is permissible (but not required) to offer learners a limited choice within the question paper.

At least 30% of the available marks must be awarded for questions that assess knowledge between topics.

This Graded Unit specification permits various examination formats and types of question. Possible question paper designs include:

- 1 fixed number of questions requiring constructed responses (no choice).
- 2 fixed number of questions requiring constructed responses (with choice).
- 3 dividing the question paper into two sections: one for selected response questions and one for constructed response questions.
- 4 dividing the question paper into various sections based on topics (including combined topics).

An example of Design 1 would be: 10 questions, each worth 10 marks, requiring essay-type responses; all questions must be attempted. At least three questions must be integrative.

An example of Design 2 would be: 12 questions, each worth 10 marks, requiring essay-type responses; ten questions must be attempted. The integrative elements could either be distributed across all questions or separated into a separate section.

An example of Design 3 would be: a question paper comprising two sections. Section 1 would consist of 30 multiple-choice questions, each worth one mark. Section 2 would consist of seven extended response questions, each worth 10 marks, requiring essay-type responses; all questions must be attempted; at least three questions must be integrative.

An example of Design 4 would be: a question paper consisting of extended response questions divided into three sections. Section 1 would consist of questions relating to computing (computer systems, programming and data analytics). Section 2 would consist of questions relating to mathematics and statistics. Section 3 would consist of integrative questions. The marks distribution could be: Section 1 — 40 marks; Section 2 — 30 marks; and Section 3 — 30 marks.

Higher National Examination-based Graded Unit Support Notes (cont)

Graded Unit title: Data Analytics: Graded Unit 1 (SCQF level 7)

If a question paper permits choice and learners attempt more questions than required, assessors should mark all of the questions attempted and base the total score on the learner's highest marks.

The actual questions produced should cover the critical knowledge and skills specified in the five key topics to provide direct evidence of attainment or to allow attainment.

It is suggested that centres deliver the five underpinning Units prior to the delivery of this Unit. This would provide the knowledge and skills for the examination. A suggested approach would be to revise the knowledge contained within the mandatory Units prior to the examination. It would be beneficial to teach learners examination and study techniques and provide sample questions under examination conditions.

Sufficient time must be available for remediation and re-assessment. The centre should plan to have the first sitting of the examination of the Unit completed, marked and internally verified prior to any scheduled central verification event.

All examinations should take place under invigilated conditions. The examination question paper must be returned to the invigilator at the end of the exam. No materials or scrap paper should be removed from the examination room.

Should a centre wish to develop their own Instrument of Assessment they are strongly advised to have the assessment prior verified.

All learner scripts should include the learner name, date of assessment.

Where published SQA exemplars are used, then these must be returned to and retained by the invigilator.

All examination should be **unseen**. This range of questions should sample the full range of subject content. Where a reassessment is required a different sample must be selected.

Opportunities for developing Core and other essential skills

There are no Core Skills embedded in this Graded Unit specification.

History of changes to Graded Unit

| Version | Description of change | Date |
|---------|-----------------------|------|
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General information for learners

Graded Unit title: Data Analytics: Graded Unit 1 (SCQF level 7)

The Graded Unit is designed to assess your knowledge and understanding of key facts and concepts relating to data analytics.

The unit is graded. The grading is based on your mark for the assessment as follows:

| | |
|---------|---------|
| Grade A | 70–100% |
| Grade B | 60–69% |
| Grade C | 50–59%. |

Your mark will be based on your performance in an **examination**. The exam will last for **three hours** and will be sat under **controlled conditions**. No reference material is permitted during the exam. You may use a calculator.

The precise nature of the exam is not fixed but it will include a number of questions that require a written response. It may consist of multiple-choice questions and/or essay-type questions.

The questions will be based on the following topics.

- 1 Coding (including testing) and technical documentation.
- 2 Concepts behind big data and its applications and implications.
- 3 Components of a computer system, and number and logic systems.
- 4 Statistical concepts including probability and probability distributions.
- 5 Trigonometric and hyperbolic functions, and differentiation and integration.

These topics will be based on the following units, which you should have completed before sitting the examination.

| | |
|---------|--|
| H173 34 | <i>Developing Software: Introduction</i> |
| H8W8 34 | <i>Big Data</i> |
| H7K1 34 | <i>Engineering Mathematics 2</i> |
| H8XT 33 | <i>Statistics for Science 1</i> |
| H175 34 | <i>Computer Systems Fundamentals</i> |

Some of the questions will require you to combine your knowledge of these topics.