



## Higher National examination-based graded unit specification

### General information

This graded unit has been validated as part of the HNC Nautical Science. Centres are required to develop the assessment instrument in accordance with this validated specification.

**Graded unit title:** Nautical Science: Graded Unit 1  
(SCQF level 7)

**Graded unit code:** HT0K 34

**Type of examination:** Examination

**Publication date:** July 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 Nautical Science:

- ◆ Enables learners to obtain a Certificate of Competency as a Deck Officer.
- ◆ Prepares learners for the responsibility of keeping a watch at sea and in port.
- ◆ Develops skills to enable learners to effectively navigate a vessel by traditional and modern means.
- ◆ Develops skills to enable learners to operate a vessel in a safe and effective manner.
- ◆ Develops skills to enable learners to work with others in a safe and effective manner.
- ◆ Develops skills to deal with emergency situations.
- ◆ Develops awareness of current maritime legislation.
- ◆ Prepares learners for the MCA written and oral examinations.

### Credit points and level

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

## Higher National examination-based graded unit specification: General information (cont)

**Graded unit title:** Nautical Science: Graded Unit 1  
(SCQF level 7)

### Recommended entry to the graded unit

It is recommended that the learner should have completed or is nearing completion of the following units relating to the above principle aims prior to undertaking this graded unit:

- ◆ *Ship Stability: An Introduction*
- ◆ *Bridge Watchkeeping*
- ◆ *Marine Cargo Operations*
- ◆ *Chart Work and Tides*
- ◆ *Celestial Navigation*
- ◆ *Navigational Mathematics and Science.*

The term open-book within the context of this assessment means the learner can use the supplied publications from the 'List of permitted publications'.

### Core Skills

There are no Core Skills embedded in this graded unit specification.

### Assessment support pack

There is no assessment support pack for this unit.

### 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](http://www.sqa.org.uk/assessmentarrangements)

## Higher National examination-based graded unit specification: Designing the examination and assessing learners

**Graded unit title:** Nautical Science: Graded Unit 1  
(SCQF level 7)

### Assessment

This graded unit will be assessed by the use of an *open-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
<b>Section A</b>		
Apply the principles of transverse and longitudinal stability to a typical ship loading problem	Perform stability calculations to ensure the vessel complies with intact stability requirements	20%
Loading, discharging and stowage of cargoes	Explain procedures and perform cargo calculations	20%
Duties of the Officer of the Watch in port	Identify and explain procedures to ensure the safety/security of the vessel when in port.	10%
<b>Section B</b>		
Duties of the Officer of the Watch at sea	Identify and explain procedures to ensure the safety/security of the vessel while at sea.	10%
Apply the principles of chart work and position fixing.	Fix the vessel's position using charted objects, determine the compass course to steer while counteracting/suffering the current and wind while passage planning.	10%
Knowledge of tides.	Explain tidal terminology and perform calculations involving times and heights of tides worldwide.	10%

## Higher National examination-based graded unit specification: Designing the examination and assessing learners

**Graded unit title:** Nautical Science: Graded Unit 1  
(SCQF level 7)

Key topics	Level of demand	% mark allocation for each key topic
Observation of celestial objects to find their true bearing and obtaining position line or Application of mathematics for navigation.	Perform calculations to find true bearing of any celestial object by amplitude/azimuth method and determine the errors of ship's compasses.  To calculate course and distance between two points on earth's surface using plane/Mercator/parallel sailing methods.	20%
<b>Total marks for examination</b>		<b>100</b>

### Conditions of assessment

The examination is *open-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 an examination paper consisting of a practical ship cargo operations, stability and navigation problem, and involving the learners solving problems covering the following HN Units:

- ◆ *Ship Stability: An Introduction*
- ◆ *Marine Cargo Operations*
- ◆ *Bridge Watch keepings*
- ◆ *Chart work and Tides*
- ◆ *Celestial Navigation*
- ◆ *Navigational Mathematics and Science*

Learners will require access to MCA approved data tables and approved formula sheets.

## Higher National examination-based graded unit specification: Designing the examination and assessing learners (cont)

**Graded unit title:** Nautical Science: Graded Unit 1  
(SCQF level 7)

### List of permitted publications

- ◆ *Nautical Tables*
- ◆ *MCA Approved Extracts from the Nautical Almanac*
- ◆ *MCA Approved Extracts from Admiralty Tide Tables*
- ◆ *Navigational Chart/Chartlets*
- ◆ *Weather Charts*
- ◆ *Compass Deviation Cards*
- ◆ *Radar Plotting Sheets*
- ◆ *Co-Tidal/Co-Range Diagrams*
- ◆ *Ships Manoeuvring Data Sheet*
- ◆ *MCA Approved Trim and Stability Data Sheets*
- ◆ *MCA Approved Formulae sheets*

The paper should be designed to thoroughly test the learner's ability to carry out the duties of Officer of the Watch during navigation and cargo operations of a vessel.

The examination should consist of two section as follows:

### Section A

This section should cover the content of the following units:

- ◆ *Ship Stability: An Introduction*
- ◆ *Marine Cargo Operations and Watchkeeping*

Learners should answer all questions in this section which should contribute a maximum mark of 50% of the overall total.

### Section B

This section should cover the content of the following units:

- ◆ *Bridge Watchkeeping*
- ◆ *Chart Work and Tides.*
- ◆ *Celestial Navigation*
- ◆ *Navigational Mathematics and Science*

Learners should attempt all questions in this section, which should contribute a maximum marks of 50% of the overall total.

The format of assessment is an open-book examination in which you will have access to MCA approved data and formulae sheet. Programmable calculators will not be permitted for use in the examination.

## Higher National examination-based graded unit specification: Designing the examination and assessing learners (cont)

**Graded unit title:** Nautical Science: 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"> <li>◆ Shows the learner can perform calculations to the required level of accuracy and is completely at ease with stability, cargo operation and navigation concepts</li> <li>◆ Provides evidence of the learner's ability to think critically about cargo operations and navigation in progress and demonstrates a full awareness of the safety considerations that should be considered</li> <li>◆ Demonstrates that the learner has a complete understanding of the legislation applicable to cargo related operations, and to safe navigation.</li> <li>◆ Demonstrates that the learners have a full understanding of the contents of Chapter 8 (Watchkeeping) Section of STCW 78 as amended</li> </ul>	<p>Is a co-ordinated piece of work or exam script which:</p> <ul style="list-style-type: none"> <li>◆ Shows the learner is competent to perform stability, cargo operation and navigation calculations</li> <li>◆ Provides evidence of the learner's ability to monitor and control cargo operations and navigate the vessel safely at an operational level</li> <li>◆ Demonstrates that the learner has an awareness of the legislation applicable to cargo related operations and to the safe navigation of the vessel.</li> <li>◆ Demonstrates that the learner has a working knowledge of the contents of Chapter 8 (Watchkeeping) Section of STCW 78 as amended</li> </ul>

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.

## **Higher National examination-based graded unit specification: Designing the examination and assessing learners (cont)**

**Graded unit title:** Nautical Science: Graded Unit 1  
(SCQF level 7)

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:** Nautical Science: Graded Unit 1  
(SCQF level 7)

### Guidance on approaches to delivery and assessment of this graded unit

The main aim and objective of this graded unit is to ensure that a learner can draw together the information gained from HN Units with respect to the safe navigation and operation of the vessel at a level appropriate for OOW Unlimited Certificate of Competency.

- ◆ The assessment should be set at the operational level as designated by the IMO Convention on Standards of Training and Certification for watch keepers (STCW 78 as amended).
- ◆ The format of assessment is an open-book examination in which the learner will have access to MCA approved data and formulae sheet. Programmable calculators will not be permitted for use in the examination.
- ◆ Questions will be structured so that they are, as far as possible, relevant to the actual responsibilities which the learner will take on in the role of the Officer of the Watch, whilst keeping a watch on bridge whilst navigating the vessel and on deck in port, when the vessel is working cargo.
- ◆ The learner may be required to interpret information presented in graphical format and will be asked to produce sketches which should be in correct proportion and clear.
- ◆ In case of calculations all working should be shown including the intermediate steps. Distance should be calculated to the nearest nautical mile and time to the nearest minute. Also the positions obtained by calculation should be given to the tenth of a minute of latitude and longitude.
- ◆ Where information given is in the form of extracts and chartlets, the learner is advised to analyse these carefully, as reference to the contents of the extracts, within his/her answer may be reflected in the final grade awarded.

### 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:** Nautical Science: Graded Unit 1  
(SCQF level 7)

This graded unit is designed to ensure that you can draw together the knowledge and skills across the range of HN Nautical Science units.

The format of the assessment is an open-book examination in which you will have access to MCA approved data and formulae sheets. Programmable calculators will not be permitted in the examination.

Questions will be structured so that they are, as far as possible, relevant to the actual responsibilities which you will take on in the role of the Officer of the Watch, whilst keeping a watch on bridge whilst navigating the vessel and on deck in port, when the vessel is working cargo.

You may be required to interpret information presented in graphical format and you will be asked to do plotting. Plotting should be clear and in the correct proportion with proper annotations. Suitable scale should be taken and mentioned along with the plot.

In the case of calculations all working should be shown and intermediate steps should be shown. Positions should be calculated to the nearest minutes, tides to be calculated to nearest centimetre, distance to be calculated to the nearest first decimal place and draughts should be calculated to the nearest millimetre.

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

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