

-SQA-SCOTTISH QUALIFICATIONS AUTHORITY

**Hanover House
24 Douglas Street
GLASGOW G2 7NG**

NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- 0068662 **-Session-1986-87**
-Superclass- ZF

-Title- PRINCIPLES OF NAVIGATION 3

-DESCRIPTION-

Type and Purpose A specialist module which enables the student to extend the understanding of the principles of navigation acquired in module 08661.

Preferred Entry Level 08661 Principles of Navigation 2

Learning Outcomes

The student should:

1. apply Napier's Rules;
2. know the concepts underlying the observations of amplitudes;
3. identify pole star observations and use appropriate corrections;
4. know the properties and effects of the moon moving in its orbit;
5. know the concept and effects of twilight;
6. know and use the concepts of planetary motion;
7. know and use the concepts of satellite orbits;
8. know the properties of a free gyroscope.

Content/
Context

Corresponding to the Learning Outcomes:

1. Calculation of any part of PZX triangle given any two parts and either $L'P$, $L'Z$ or $L'Z = 90$ degrees or sides PX , PZ , or $XZ = 90$ degrees.
2. Derivation of amplitude formula, finding of the observed altitude of sun and moon when the altitude is zero. Effect of latitude on observations. Calculation of LAT and LMT, of theoretical and visible rising/setting of sun, use of Almanac to find time of rising or setting of sun and moon.
3. Explanation of correction to true altitude of polaris to obtain latitude and position line (i.e. a , a , a and subtracting 1 degree). Reason for updating of polaris tables in Almanac each year.
4. Phases of moon, (full, new, first and last quarters, waxing, waning, conjunction, opposition, quadrature lunation, age of moon, lunar day). Nodes, limits of declination, solar and lunar eclipses. Tide generating forces of moon and sun and connection between tides and moon (lunar day and semi diurnal tides, full and new moon and spring tides, quadrature and neap tides) (priming and lagging).
5. Causes of twilight, civil, nautical, astronomical twilight, times of civil and nautical twilight from the Nautical Almanac, the relationship between civil and nautical twilight and star sights. The effect of latitude on duration of twilight and conditions necessary for twilight all night, darkness for full 24 hours and daylight for full 24 hours.
6. Definition of superior conjunction, inferior conjunction, opposition and quadrature. Calculation of time of meridian passage for any navigational planet. Selection of appropriate planets for observations at twilight. Direct and retrograde motion. Uses of planet diagram in Nautical Almanac.
7. Kepler's Laws as applied to satellites, changes in satellites' orbits, principles of satellite navigation system on board ships.
8. Properties of a free gyroscope - three degrees of freedom, gyroscopic inertia, apparent motion, drift and tilt, when there is no apparent motion, precession, direction of precession for given torque, factors which govern rate of precession.

Suggested Learning and Teaching Approaches	<p>Active learning and teaching approaches should be used throughout.</p> <p>Films, videos, planetarium visits, diagrams and models should be used as extensively as possible.</p> <p>Films and video should be used to stimulate discussion, not simply to convey information.</p> <p>Group investigations and projects would be useful techniques to employ in this module.</p>
--	---

Assessment Procedures	<p>Learning outcomes 1 - 8 inclusive should be assessed as follows:</p> <ul style="list-style-type: none">(i) a series of short answer questions;(ii) a series of calculations using information and data obtained from relevant source documents;(iii) a series of sketches. <p>Satisfactory performance would be respectively:</p> <ul style="list-style-type: none">(i) a score of 70% or better depending on the difficulty of the test set;(ii) a score of 70% or better depending on the difficulty of the test set;(iii) production of clearly labelled sketches with appropriate proportions, application of correction factors, etc, with an oral description of each sketch. <p>Testing should take place no later than 2/3 of the way through the module to allow time for remediation and retesting.</p>
-----------------------	--