-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

Hanover House
24 Douglas Street
GLASGOW G2 7NQ

NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number-	7180321	**-Session-1991-92**
-Superclass-	RB	

-Title-   **CORE MATHEMATICS 3**

-DESCRIPTION-

Purpose

This module allows for further practice in numerical skills, geometry and algebra and introduces elementary trigonometry.

The module is broadly comparable to Standard Grade Mathematics at 3 or 4.

The use of mathematical investigations allows the development of skills in practical situations. "A Guide to Mathematical Investigations: SQA 1991" provides guidance on investigations.

The Appendix gives further guidance on mathematics modules in general and contains a grid showing the relationship between modules.

Preferred
Entry Level

7180311 Core Mathematics 2
or Standard Grade Mathematics at 5
or '0' Grade Arithmetic
or an equivalent level of experience.

Outcomes

The student should:

1.   perform calculations;

2.   use graphical relationships;

3.   perform basic algebraic operations;

4.   solve right angled triangles;

5.   carry out a mathematical investigation.

Assessment
Procedures

Acceptable performance in the module will be satisfactory achievement of all the Performance Criteria specified for each Outcome.

The following abbreviations are used below:

PC   Performance Criteria
IA   Instrument of Assessment

Note: The Outcomes and PCs are mandatory and cannot be altered. The IA may be altered by arrangement with SQA. (Where a range of performance is indicated, this should be regarded as an extension of the PCs and is therefore mandatory).

OUTCOME 1   **PERFORM CALCULATIONS**

PCs

(a)   Rounding of numbers is correct to a given number of (i) significant figures and (ii) decimal places.
(b)   Interpretation of a number expressed in scientific notation/standard form is correct.
(c)   Use of percentages is correct.
(d)   Calculation of ratio and proportion is correct.
(e)   Calculation of perimeters and areas of circles is correct.

IA   Calculation Exercise

Topics should be assessed on the number of occasions indicated:

(a)	significant figures	3
	decimal places	3
(b)	scientific notation/	
	standard form	4
(c)	percentages	3
(d)	ratio	2
	proportion	2
(e)	perimeters	2
	areas	2

One question may cover more than one topic.

Satisfactory achievement of the Outcome will be demonstrated by the student producing 4 correct responses for (a) with at least 2 correct responses for each of significant figures and decimal places, 2 correct responses for (c) and 3 correct responses for each of (b), (d) and (e).

OUTCOME 2　　　　**USE GRAPHICAL RELATIONSHIPS**

PCs
- (a) Plotting of points using rectangular coordinates in each of the four quadrants is correct.
- (b) Reading of points in each of the four quadrants and on each axis is correct.
- (c) Drawing of a straight line given its equation in the form $y = ax + b$ or $x = c$ is correct.
- (d) Determination of the equation of a straight line in the form $y = ax + b$ or $x = c$ from its graph is correct.

IA　Graphical and Calculation Exercise

Topics should be assessed on the number of occasions indicated:

(a)	plot six points	1
(b)	read six points	1
(c)	draw straight lines, one positive gradient, one negative gradient and one horizontal or vertical.	3
(d)	equation of straight lines, one positive gradient, one negative gradient and one horizontal or vertical.	3

One question may cover more than one topic.

Satisfactory achievement of the Outcome will be demonstrated by the student producing the correct response for (a) and (b) and 3 correct responses for each of (c) and (d).

OUTCOME 3　　　　**PERFORM BASIC ALGEBRAIC OPERATIONS**

PCs
- (a) Evaluation of formulae is correct.
- (b) Manipulation of algebraic expressions, including use of brackets and indices, is correct.
- (c) Algebraic solution of linear equations is correct.
- (d) Factorising using common factors is correct.

IA　Calculation Exercise

Topics should be assessed on the number of occasions indicated:

(a)	evaluation	3
(b)	manipulation	4
(c)	algebraic solution	3
(d)	factorisation	3

One question may cover more than one topic.

3

Satisfactory achievement of the Outcome will be demonstrated by the student producing 2 correct responses for each of (a), (c) and (d) and 3 correct responses for (b).

OUTCOME 4   SOLVE RIGHT ANGLED TRIANGLES

PCs   (a)   Use of the Theorem of Pythagoras is correct.
             (b)   Use of trigonometric ratios in right angled triangles is correct.

             IA   Calculation Exercise

             Topics should be assessed on the number of occasions indicated:

(a)	(i)	calculation of the hypotenuse given the other 2 sides	2
(a)	(ii)	calculation of one side given the hypotenuse and another side	2
(b)	(i)	calculation of an angle given 2 sides	1
(b)	(ii)	calculation of the opposite side given an angle and one other side	1
(b)	(iii)	calculation of the adjacent side given an angle and one other side	1
(b)	(iv)	calculation of the hypotenuse given an angle and one other side	1

Satisfactory achievement of the Outcome will be demonstrated by the student producing 3 correct responses for (a) and (b).

OUTCOME 5   CARRY OUT A MATHEMATICAL INVESTIGATION

PCs   (a)   Identification of key factors of the investigation is correct.
             (b)   Identification of strategies is appropriate to the situation.
             (c)   Implementation of appropriate strategies is correct.
             (d)   Drawing of conclusions is appropriate to the investigation.
             (e)   Communication of findings is clear.

IA   Project

The student should present evidence which shows the structure of the investigation and processes carried out during the investigation.

Satisfactory performance will be achievement of all the Performance Criteria.

The following sections of the descriptor are offered as guidance.
They are not mandatory.

CONTENT/CONTEXT

1. Round 6.2146m to 3 decimal places (nearest mm), 0.00352 kg to 2 significant figures. Rounding of calculator display to an appropriate number of digits. Scientific notation. Interpret 3.2×10^5 as 320000 and 2.1 E-4 as 0.00021. 10^6 is 1 000 000. Interpretation of calculator display.

   Simple interest over part of a year e.g bank rate at 10.2% for four months. Express one quantity as a percentage of another eg. find percentage profit given cost price and selling price.

   Exchange rates, time and speed for a fixed journey. Mortar mix 1:4 (cement to sand).

2. Points such as (3,2) (-2,5) (4,-1) (-3,-2) (-3,0) (0,4). Lines such as $y = 2x + 5$, $y = 3 - x$. Interpret relationships qualitatively using graphs including linear relationships (eg. speed, distance) and non-linear relationships (eg. resale value of a car over a period of time).
   C = 1OU + 900, C is cost of electricity, U is number of units used.

3. Evaluating formulae, using units as appropriate, such as
   $P = I^2R$; $s = ut + \frac{1}{2}ft^2$;

   $$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}; \quad d = \sqrt{\quad} \; (x^2 + y^2);$$

   $$V = \frac{4}{3}p\,r^3.$$

   Algebraic expressions such as: 3(2a + 5b);
   2x - (x + 3y); $5a - a^2 + 2a$; 3b(b + 2);
   (a + 2b)(a + b).

   Linear equations such as 2x + 3 = 9,
   5x + 3 = 10; 7y - 2 = 8;
   3x - 5 = 11 + x; 2(x + 3) = 14.

   Common factorisations such as: 5x - 10;
   $3b^2 + b$; $6a^2 + 2a$; ax + bx.

4. Calculations in context including the calculation of the length of the hypotenuse or another side. Use of the converse to show that an angle is a right angle.

   Trig ratios: sin, cos, tan; height of a tree, holes in metal plates, surveying.

5. The document "A Guide to Mathematical Investigations: SQA 1991" provides detailed information concerning, and exemplars of, investigations. The investigation should involve the content of other outcomes.

SUGGESTED LEARNING AND TEACHING APPROACHES

The module descriptor lists discrete outcomes, but the learning and teaching approaches adopted may change the order or integrate the outcomes as appropriate. Several approaches are possible depending on the availability of resources, experience of tutors and the type of student group. This may involve individualised learning, group work and class work. Multi media approaches should be encouraged where possible: text, practical activities, simulations, computer programs, videos etc. Problem solving should be encouraged throughout the module as part of the learning and teaching process, within the investigations, and as part of the assessment process. Likewise the investigation of mathematical ideas should be encouraged throughout the module. Diagnostic and formative assessment may be used where appropriate. The summative assessment may form an integral part of the whole learning/teaching process or may consist of separate tests.

The student should be encouraged to keep a log book/workfile. This should form a complete record of the student's work throughout the module. The workfile could contain the student's notes, class handouts, completed worksheets, exercises, assignments, projects, investigations, log of computer activities and a summary of the important details for later revision purposes.

The sensible use of appropriate technologies (numeric/ scientific/graphics/programmable calculators or computers etc.) should be encouraged. Due account should be taken of estimation, rounding and errors introduced into calculations.

Investigations should allow for divergent mathematical thinking. They may allow for comparisons and contain open ended or closed problems. Situations may occur where no solution is obtainable. The acquisition of mathematical skills may occur within the investigation. A typical investigation used for the purposes of summative assessment may take 2 to 3 hours.

APPENDIX

FRAMEWORK OF THE MATHEMATICS MODULES 91/92

The module grid summarises the complete structure of the mathematics modules and some of their relationships.

Progression through the grid is to the right.

When considering the suitability of a module, it is important to consider it in relation to others in the grid and not just in isolation.

The first module, Using Numbers in Everyday Situations, relates to the most elementary number concepts and skills.

The modules Using Basic Number Skills, Using Arithmetic Skills, Dealing With Basic Measurements, Dealing With Money, Using Measurement Skills Within Everyday Activities and Small Scale Planning, Estimating and Costing were developed for the BBC Basic Skills Numeracy project.

The modules Core Maths 2, 3 and 4 relate approximately to work done in Standard Grade Mathematics. They are appropriate as National Certificate modules because they allow for consolidation of mathematical skills and they provide students with a second opportunity to create a base from which they can develop their mathematical knowledge and skills.

The modules Business Numeracy, Construction Numeracy 1 and 2, Engineering Numeracy and Laboratory Numeracy have a vocational bias and cater for the mathematical needs of students on craft, operator, clerical or YTS courses.

Craft Technology 1 and 2 are designed to consolidate the mathematical skills at craft level.

The remaining modules meet the needs of students requiring further mathematics in support of their other studies.

Modules Analysis/Algebra 1, Analysis/Algebra 2, Calculus 1(A) and Calculus 1(B) relate approximately to work done in Higher Grade mathematics, but alternative groupings are possible for students continuing or intending to continue, with college or university studies in, for example, business studies or engineering.

Specialist modules such as Business Statistics, Boolean Algebra, Numerical Methods, Operational Research and Spherical Trigonometry are available.