

MATHEMATICS

MTH-5078-1 — Functions

**DEFINITION OF THE DOMAIN FOR
SUMMATIVE EVALUATION**

SEPTEMBER 1997

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Direction de la formation générale des adultes
Service de l'évaluation des acquis

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1. Introduction

This definition of the domain for summative evaluation describes and classifies the essential and representative elements of the *Mathematics* program—specifically, for module *Functions*. It presents an overview of the program, but should by no means replace the program itself. The purpose of defining the domain is to ensure that all summative evaluation instruments are consistent with the overall program.

The organization of this definition of the domain is the same as that of those of other modules. The content of each section is, however, specific to this module.

The goal of the definition of the domain for summative evaluation is to permit the preparation of examinations that are valid from one version to another, from year to year and from one school board to another, taking into account the responsibilities shared by the ministère de l'Éducation and the school boards.

2. Program Orientations and Consequences for Summative Evaluation

Orientations

Consequences

The main purpose of the adult education secondary level *Mathematics* program is to help adults understand the mathematical concepts needed to solve problems related to everyday situations, expand their knowledge of mathematics and, ultimately, facilitate access to a future occupation. Consequently, in the program, mathematics is presented as a practical tool for solving common, real-life problems.

This module, however, is more concerned with the basic techniques for solving specific functions, which will be useful in higher education.

All the learning activities in the program emphasize the acquisition of a systematic work method.

The program places equal emphasis on mastering the use of a calculator to solve problems.

During evaluation, special attention should be paid to the accuracy of the curves and to the solution statements.

Evaluation should measure the adult's ability to follow the steps involved in solving a problem. It should also verify whether or not the student has mastered a work method.

The use of a calculator without graphic display is permitted.

3. Content of the Program for Purposes of Summative Evaluation**Concepts**

- Functions: linear, quadratic, absolute value, greatest integer, inverse variation, square root
- Graphs
- Inverse
- Composition of two functions

Skills

Each skill is defined within the context of a mathematics program. Given that the adult education *Mathematics* program corresponds to the mathematics programs in the youth sector, the skills involved are the same for students in both sectors.

- **Operating:** Performing a given operation or transformation.
Possible actions: calculating, constructing, breaking down, performing, estimating, evaluating, isolating, measuring, reconstructing, solving, drawing, transforming, verifying, and so on
- **Analyzing or Synthesizing:** Establishing a link between a problem and a given solution or solving a given problem.
Possible actions: concluding, deducing, deriving, explaining, extrapolating, inferring, justifying, proving, solving, transferring, and so on

4. Table of Dimensions

CONCEPTS	FUNCTIONS	INVERSE OF A FUNCTION	COMPOSITION OF TWO FUNCTIONS
SKILLS	60%	30%	10%
OPERATING 80%	1 Graphs of linear, quadratic or absolute value functions 20%	5 Inverse of a function whose elements are listed, or are defined by means of set-builder notation, a Cartesian graph or an arrow diagram 20%	7 The composition of two functions defined by means of set-builder notation with at least one image 10%
	2 Graphs of greatest integer, inverse variation or square root functions 30%		
ANALYZING OR SYNTHESIZING 20%	3 Relation: function or not? 5%	6 Inverse: function or not? 10%	
	4 Increasing or decreasing functions 5%		

Note: The numbers 1 to 7 identify the dimensions.

5. Observable Behaviours

Examination items should be formulated on the basis of the observable behaviours listed below. The requirements and restrictions specified in the objectives of the program must be observed.

Dimension 1

Graphing a linear, quadratic or absolute value function, indicating the slope, the x-intercept, the y-intercept, the zero(s), the vertex, the domain and the range, as the case may be.

Dimension 2

Graphing at least two of the following functions: greatest integer, inverse variation and square root, indicating the asymptote(s), the domain, the range of the function, as the case may be, and giving the image of at least five elements of the domain.

Dimension 3

Determining whether a given relation is a function. The elements of the relation are listed or are defined by means of set-builder notation, a Cartesian graph or an arrow diagram.

Dimension 4

Determining if a function is increasing or decreasing in a given interval.

Dimension 5

Finding the inverse of a function whose elements are listed, or are defined by means of set-builder notation, a Cartesian graph or an arrow diagram. The elements of the inverse must be listed, graphed or indicated by means of set-builder notation.

Functions

Definition of the Domain

Dimension 6

Determining whether the inverse of a function whose elements are listed, or are defined by means of set-builder notation or an arrow diagram is itself a function.

Dimension 7

Finding the composition of two functions defined by means of set-builder notation and giving the image of at least one element for the function $f \circ g$ or $f(g(x))$.

6. Explanation of Content and Weighting

Given the particular content of this module on the graphic representation of certain specific functions and the determination of the inverse of given functions, that is, on rather theoretical material, emphasis has been placed on the skill of operating.

Furthermore, an analysis and synthesis dimension has been added in order to determine the students' ability to establish relationships between the concepts.

The weighting of the skills listed below is based on the program itself and on the time normally required to master these skills.

OPERATING	80%
ANALYZING OR SYNTHESIZING	20%

Also, since this module deals specifically with the graphic representation of functions and problems related to the inverse of functions and to the composition of two functions, the concepts have been weighted as follows:

FUNCTIONS	60%
INVERSE OF A FUNCTION	30%
COMPOSITE OF TWO FUNCTIONS	10%

7. Description of the Examination**7.1 Type of Examination**

There will be a written examination consisting of items that will be scored subjectively (free-response or extended-response items). Some items may be scored objectively.

7.2 Characteristics of the Examination

- The examination must be taken in a single session lasting no more than two hours.
- The distribution of marks should be consistent with the percentages indicated in the table of dimensions.
- Students are permitted to use a calculator without graphic display.

7.3 Pass Mark

To pass the module, students must obtain 60 out of 100 on the examination.

