

MATHEMATICS

MTH-5077-1 — Equations and Inequalities III

**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 *Equations and Inequalities III*. 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**

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 and expand their knowledge of mathematics. 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 solving of equations, inequalities and systems of equations and inequalities, that is, with various techniques necessary to solve problems in everyday life.

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.

Consequences

During evaluation, special attention should be paid to the presentation of solution sets that are graphed or indicated using interval or set-builder notation.

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**

- Inequalities or systems of inequalities of the first or second degree in one variable
- Equations of the first or second degree in one variable

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 SKILLS	INEQUALITIES OR SYSTEMS OF INEQUALITIES OF THE FIRST OR SECOND DEGREE IN ONE VARIABLE 75%	EQUATIONS OF THE FIRST OR SECOND DEGREE IN ONE VARIABLE 25%
OPERATING 90%	1 Inequality of the first degree (general form) 10%	
	2 Inequality of the second degree (product of factors) 10%	
	3 System of inequalities of the first degree (general form) 10%	
	4 System of inequalities of the second degree (product of factors) 10%	
	5 Absolute value inequality of the first degree 20%	7 Absolute value equation of the first degree 10%
	6 Inequality of the second degree (general form) 10%	8 Equation of the second degree (general form) 10%
ANALYZING OR SYNTHESIZING 10%	9 Graphs 5%	

Note: The numbers 1 to 9 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.

Since the content of the module emphasizes the different ways of presenting solution sets, evaluation must focus on these different presentations: graphs, interval notation, set-builder notation.

Dimension 1

Solving an inequality of the first degree that can be converted to one of the following forms:
 $ax + b < 0$, $ax + b > 0$, $ax + b \leq 0$ or $ax + b \geq 0$.

The solution set must be graphed or indicated using interval or set-builder notation.

Dimension 2

Solving an inequality of the second degree written as a product of factors:

$(ax + b)(cx + d) < 0$, $(ax + b)(cx + d) > 0$, $(ax + b)(cx + d) \leq 0$ or

$(ax + b)(cx + d) \geq 0$.

The solution set must be graphed or indicated using interval or set-builder notation.

Dimension 3

Solving a system of inequalities of the first degree whose inequalities can be converted to one of the following forms:

$ax + b < 0$, $ax + b > 0$, $ax + b \leq 0$ or $ax + b \geq 0$.

The solution set must be graphed or indicated using interval or set-builder notation.

Dimension 4

Solving a system of inequalities of the second degree whose inequalities are written as a product of factors:

$(ax + b)(cx + d) < 0$, $(ax + b)(cx + d) > 0$, $(ax + b)(cx + d) \leq 0$ or

$(ax + b)(cx + d) \geq 0$.

The solution set must be graphed or indicated using interval or set-builder notation.

Dimension 5

Solving an absolute value inequality of the first degree in one of the following forms:

$k | ax + b | < c$, $k | ax + b | > c$, $k | ax + b | \geq c$ or $k | ax + b | \leq c$.

The solution set must be graphed or indicated using interval or set-builder notation.

Dimension 6

Solving an inequality of the second degree in one of the following forms:

$ax^2 + bx + c < 0$, $ax^2 + bx + c > 0$, $ax^2 + bx + c \leq 0$ or $ax^2 + bx + c \geq 0$.

The solution set must be graphed or indicated using interval or set-builder notation.

Dimension 7

Solving an absolute value equation of the first degree in the following form:

$k | ax + b | = c$.

The solution set must be graphed or indicated using interval or set-builder notation.

Dimension 8

Solving an equation of the second degree in the following form:

$ax^2 + bx + c = 0$.

The solution set must be graphed or indicated using interval or set-builder notation.

Dimension 9

Matching a graph of a solution set with the corresponding equation or inequality of the first or second degree.

6. Explanation of Content and Weighting

Given the particular content of this module on the solving of equations, inequalities and systems of equations and inequalities, that is, on rather theoretical material, emphasis has been placed on the skill of operating. Emphasis should also be placed on the steps involved in solving a problem.

Finally, 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	90%
ANALYZING OR SYNTHESIZING	10%

The module deals specifically with problems related to inequalities, since equations were dealt with in detail in Equations and Inequalities I and II.

INEQUALITIES IN ONE VARIABLE	75%
EQUATIONS IN ONE VARIABLE	25%

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 at the end of the module, 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.

