

MATHEMATICS

MTH-5079-1 — Conics II

**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 *Conics II*. 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, 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, deals with equations and graphs of circles, parabolas, ellipses and hyperbolas at a theoretical level.

Whether the aim is to enable students to solve practical problems or to orient them toward a career in science, 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 or a microcomputer in the classroom. This particular area is addressed throughout the different learning activities.

Consequences

During evaluation, particular attention should be paid to the accuracy of the graphs.

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 is permitted.

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

- **Circle**
 - Equation or inequality in standard and general form
 - Centre and radius
 - Line tangent to a circle
 - Domain and range of a relation defining a circle
- **Parabola**
 - Equation or inequality of a vertical or horizontal parabola in standard form
 - Vertex, focus, axis of symmetry and directrix of a parabola
 - Domain and range of a relation defining a parabola
- **Ellipse**
 - General equation or inequality of an ellipse centred at the origin
 - Vertices and foci of the ellipse
 - Domain and range of a relation defining an ellipse
- **Hyperbola**
 - General equation or inequality of a hyperbola centred at the origin
 - Asymptotes, vertices and foci of the hyperbola
 - Domain and range of a relation defining a hyperbola

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.

- **Structuring:** Being familiar with the fundamentals of mathematics, understanding some mathematical concepts, establishing cognitive relations.
Possible actions: associating, classifying, comparing, completing, describing, defining, contrasting, stating, enumerating, grouping, naming, ranking, organizing, recognizing, arranging, and so on
- **Mathematizing:** Interpreting a given situation using a mathematical model (arithmetical, algebraic or graphical).
Possible actions: formalizing, illustrating, representing, schematizing, symbolizing, translating, transposing, and so on
- **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

4. Table of Dimensions

CONCEPTS	CIRCLE	PARABOLA	ELLIPSE	HYPERBOLA
SKILLS	35%	25%	20%	20%
STRUCTURING 10%	1 Domain and range of the relation 10%			
MATHEMATIZING 30%	2 Equation or inequality in standard form based on a graph 30%			
OPERATING 60%	3 Graph 10%	6 Graph 10%	8 Graph 10%	9 Graph 10%
	4 General equation based on the centre and radius 10%	7 Standard equation based on the vertex and foci 5%		
	5 Equation of the tangent 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.

Dimension 1

Indicating, using interval or set-builder notation, the domain and range of at least two of the following relations given in graph form: a circle, a parabola, an ellipse centred at the origin, a hyperbola centred at the origin, or a region determined by one of the preceding conic sections; indicating the relations in graph form.

Dimension 2

Writing, in standard form, the equation or inequality corresponding to a graph of at least two of the following relations: a circle, a parabola, an ellipse centred at the origin, a hyperbola centred at the origin, or a region determined by one of the preceding conic sections.

Dimension 3

Graphing, in a Cartesian plane, the circle or region determined by a circle corresponding to an equation or inequality in general or standard form; indicating the coordinates of the centre of the circle; drawing one of the radii of the circle and indicating its length.

Dimension 4

Writing, in general form, the equation of a circle, given the coordinates of its centre (h, k) and the length of its radius (r) .

Indicating the coordinates of the centre and the length of the radius of a circle, given its equation in general form.

Dimension 5

Writing the equation of a line tangent to a circle, given the coordinates of the point of tangency (x_1, y_1) and the equation of the circle in standard form.

Dimension 6

Graphing, in a Cartesian plane, the parabola or region determined by a parabola corresponding to an equation or inequality given in standard form; indicating the coordinates of the focus and vertex of the parabola; drawing the axis of symmetry and the directrix of the parabola.

Dimension 7

Writing, in standard form, the equation of a horizontal or vertical parabola, given the coordinates of its vertex (h, k) and its focus (x_1, y_1) .

Dimension 8

Graphing, in a Cartesian plane, the ellipse centred at the origin or region determined by the ellipse centred at the origin corresponding to an equation or inequality in standard form; indicating the coordinates of the vertices and foci of the ellipse.

Dimension 9

Graphing, in a Cartesian plane, the hyperbola centred at the origin or region determined by the hyperbola centred at the origin corresponding to an equation or inequality given in standard form; indicating the coordinates of the vertices and foci of the hyperbola; drawing the asymptotes of the hyperbola.

6. Explanation of Content and Weighting

Given that the program focuses on helping the students learn how to use various mathematical tools, emphasis has been placed on the skills of mathematizing and operating.

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

STRUCTURING	10%
MATHEMATIZING	30%
OPERATING	60%

The themes have been weighted as follows:

CIRCLE	35%
PARABOLA	25%
ELLIPSE	20%
HYPERBOLA	20%

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.

7.3 Pass Mark

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

