

MATHEMATICS

MTH-3002-3 Geometry II

**DEFINITION OF THE DOMAIN FOR
SUMMATIVE EVALUATION**

FEBRUARY 1995

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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, and, more specifically, of the module entitled *Geometry II*. As such, it gives 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 Definition of the Domain for Summative Evaluation for each module in this program is organized in a similar manner; however, the content of this definition of domain is specific to the module entitled *Geometry II*.

The goal of the Definition of the Domain for Summative Evaluation is to prepare 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 career. Consequently, in the program, mathematics is presented as a practical tool for solving common, real-life problems.

Another area of development emphasized in the program involves mastering the mathematical operations used in science and technology for processing the kind of information students encounter in their daily lives, and which enables them to understand various everyday phenomena in terms of quantities and relations. In developing these skills, the *Mathematics* program can also prepare interested adults for studies leading to a career in science.

Whether the aim is to enable students to solve practical problems or to orient them towards 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 of development is addressed throughout the different learning activities.

Consequences

Evaluation items should deal with either original and practical situations taken from everyday life or those associated with an occupation.

Evaluation items should also pertain to situations in the fields of science or mathematics. For example, examination problems could deal with such things as the calculation of interest rates or the use of mathematical formulas used in science.

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

- * Construction of polygons and circles.
- * Perimeter and area of familiar polygons.
- * Perimeter and area of irregular polygons.
- * Circumference and area of a circle.
- * Lateral area and total area of solids.
- * Volume and capacity of solids.

Skills

Each skill is defined within the context of a mathematics program. Given that the adult education *Mathematics* program harmonizes with 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: to associate, classify, compare, complete, describe, define, contrast, distinguish, state, enumerate, group, name, rank, organize, recognize, arrange, and so on.

MATHEMATIZING: Interpreting a given situation using a mathematical model (arithmetical, algebraic or graphical).

Possible actions: to formalize, illustrate, represent, schematize, symbolize, translate, transpose, and so on.

OPERATING: Performing a given operation or transformation.

Possible actions: to calculate, construct, break down, perform, estimate, evaluate, isolate, measure, reconstruct, solve, draw, transform, verify, and so on.

ANALYZING or SYNTHESIZING: Establishing a link between a problem and a given solution finding a solution to a given problem.

Possible actions: to conclude, deduce, derive, explain, extrapolate, infer, justify, prove, solve, transfer, and so on.

4. TABLE OF DIMENSIONS

For purposes of summative evaluation, only skills and knowledge (concepts) will be measured. In the table below, essential and representative elements of the program have been grouped by combining concepts with skills. Each combination of one or more concepts with a skill is called a dimension. A given dimension may encompass more than one objective and, conversely, a given objective can be related to more than one dimension.

CONCEPTS	FAMILIAR		IRREGULAR		CIRCLES		SOLIDS	
		30%		15%		15%		40%
STRUCTURING					Radius, diameter		Cube, rectangular prism, cylinder, cone	
	4%				6	2%	10	2%
MATHEMATIZING								
OPERATING	Construction		Perimeter and area		Construction		Lateral area and total area	
	1	18%			7	3%	11	5%
	Perimeter and area				Circumference and area		Volume and capacity	
	2	7%	4	5%	8	5%	12	8%
ANALYZING OR SYNTHESIZING	Perimeter and area		Perimeter and area		Circumference and area		Area, volume and capacity	
	3	5%	5	10%	9	5%	13	25%

Key: The numbers 1 to 13 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. For all problems dealing with perimeter, circumference, area, volume or capacity, each step of the solution should be shown and answers must be given in the appropriate units of measure.

Dimension 1

To construct, using a ruler, set-square and protractor, various quadrilaterals and triangles, in accordance with the objectives of the program.

Dimension 2

To calculate the perimeter and area of the following familiar polygons: a square, a rectangle, a parallelogram, a triangle, a rhombus and a trapezoid. (No measurement to be deduced)

Dimension 3

To solve problems requiring the calculation of the perimeter and area of familiar polygons. (Most of these problems will be taken from daily life.)

Dimension 4

To calculate the perimeter and area of irregular polygons using the technique of decomposition into familiar figures.

Dimension 5

To solve problems requiring the calculation of the perimeter and area of irregular polygons. (Most of these problems will be taken from daily life.)

Dimension 6

To distinguish between the radius and the diameter of a circle.

Dimension 7

To construct, using a ruler and compass, a circle with a given radius.

Dimension 8

To calculate the circumference and area of a circle with a given radius.

Dimension 9

To solve problems requiring the calculation of the circumference and the area of a circle. (Most of these problems will be drawn from daily life).

Dimension 10

To recognize the following solids from among a group of figures: cube, rectangular prism, cylinder and cone.

Dimension 11

To calculate the total area and lateral area of solids.

Dimension 12

To calculate the volume and capacity of solids.

Dimension 13

To solve problems requiring calculation of lateral area, total area, volume and capacity of solids. (Most of these problems will be drawn from daily life.)

6. JUSTIFICATION OF CHOICES

Given that the program focuses on helping the students learn how to use various mathematical tools to solve practical problems dealing with everyday situations, the emphasis has been placed on the skills needed to solve such problems: **mathematizing, operating** and **analyzing**.

Since it is also important that students be able to follow a systematic procedure to solve a word problem, they should clearly understand the steps involved in solving a problem.

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

STRUCTURING	4%
MATHEMATIZING	0%
OPERATING	51%
ANALYZING OR SYNTHESIZING	45%

With regard to concepts, the study of the perimeter and area of polygons, and the study of the volume of solids, are of prime importance. The concepts have been weighted as follows:

FAMILIAR POLYGONS	30%
IRREGULAR POLYGONS	15%
CIRCLES	15%
SOLIDS	40%

7. DESCRIPTION OF THE EXAMINATION

A. TYPE OF EXAMINATION

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

B. 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, as well as a geometry set.
- The items must reflect the requirements and restrictions outlined in the objectives of the program.

C. PASS MARK

The pass mark is set at 60 out of 100.

