

INFORMATION DOCUMENT

DEFINITIONS OF THE DOMAIN

MATHEMATICS 116

MATHEMATICS 216

MATHEMATICS 314

MATHEMATICS 416

MATHEMATICS 436

MATHEMATICS 514

MATHEMATICS 536

Québec 

INFORMATION DOCUMENT

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MATHEMATICS 116

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MATHEMATICS 436

MATHEMATICS 514

MATHEMATICS 536

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INTRODUCTION

These definitions of the domain may be used to prepare examinations **for purposes of summative evaluation** for the following mathematics programs: Secondary I (568-116), Secondary II (568-216), Secondary III (568-314), Secondary IV (568-416 and 568-436) and Secondary V (568-514 and 568-536).

These definitions of the domain take into account the knowledge and know-how described in the above-mentioned programs. This information is to be used to prepare written examinations consisting of multiple-choice or constructed-response items. Each province-wide summative examination consisting of multiple-choice or constructed-response items shall be designed according to its corresponding definition of the domain. School boards and private schools are responsible for choosing and preparing all other types of examinations that may be used for summative evaluation.

1 ELEMENTS OF THE PROGRAM

1.1 Skills

The skills described in these definitions of the domain are as follows: mastery of concepts, mastery of applications and mastery of problem-solving techniques.

1.1.1 Mastery of Concepts (knowledge)

The student will be able to perform a task which shows that he or she knows and understands a mathematical concept.

The evaluation tasks related to this skill may involve any of the following:

- identifying, explaining or illustrating a concept;
- identifying or describing examples or counter-examples of a concept.

1.1.2 Mastery of Applications (knowledge)

The student will be able to perform a specific task by applying a combination of concepts (relation, operation or structure)¹ that he or she has already learned.

The evaluation tasks related to this skill may involve any of the following:

- applying a combination of concepts (for example, a formula may be provided in a given question);
- choosing and applying a combination of concepts;
- explaining or justifying a combination of concepts.

Students should already be familiar with the given combination of concepts as well as the individual concepts involved in this combination.

1.1.3 Mastery of Problem-Solving Techniques (know-how)

The student will be able to provide a result for a given situation by applying a combination of concepts (relation, operation or structure)² that he or she has not learned previously.

The evaluation tasks related to this skill may involve any of the following:

- choosing and applying a new combination of concepts;
- explaining or justifying a new combination of concepts;
- analyzing a new combination of concepts.

The given combination of concepts should be new, but students should already be familiar with the individual concepts involved in this combination.

¹ See Appendix.

² See Appendix.

1.2 Related Content

The related content for each of the above-mentioned programs pertains to the following themes:

Mathematics 116 (568-116)

- Arithmetic
- Geometry
- Statistics

Mathematics 216 (568-216)

- Algebra
- Proportions
- Geometry
- Probability

Mathematics 314 (568-314)

- Algebra
- Geometry
- Statistics

Mathematics 416 (568-416)

- Algebra
- Geometry
- Statistics

Mathematics 436 (568-436)

- Algebra
- Geometry
- Statistics

Mathematics 514 (568-514)

- Algebra
- Geometry
- Statistics and Probability

Mathematics 536 (568-536)

- Algebra
- Geometry
- Statistics

Summative evaluation should not go beyond the scope of the intermediate objectives.

2 TABLE OF ESSENTIAL ELEMENTS

Each combination of a theme and a skill is called a dimension. In the table, each dimension is identified by a number. Note that a given program objective may encompass more than one dimension. Evaluating students with regard to a given element of related content may involve testing their mastery of any of the three skills, depending on the task assigned.

**Table of Dimensions
Mathematics 116**

Theme Skill	Arithmetic 52%	Geometry 36%	Statistics 12%
Mastery of Concepts 34%	1	4	7
Mastery of Applications 40%	2	5	8
Mastery of Problem-Solving Techniques 26%	3	6	9*

*For example, an in-class research project may be used to evaluate students with respect to dimension 9.

Examples of items related to each of dimensions 1 through 8 in the above table are provided in the complementary examination for June 1995.

**Table of Dimensions
Mathematics 216**

Theme Skill	Algebra 25%	Proportions 25%	Geometry 35%	Probability 15%
Mastery of Concepts 32%	1	4	7	10
Mastery of Applications 40%	2	5	8	11
Mastery of Problem-Solving Techniques 28%	3	6	9	12

Examples of items related to each dimension in the above table are provided in the complementary examination for June 1996.

**Table of Dimensions
Mathematics 314**

Theme Skill	Algebra 45%	Geometry 40%	Statistics 15%
Mastery of Concepts 30%	1	4	7
Mastery of Applications 40%	2	5	8
Mastery of Problem-Solving Techniques 30%	3	6	9

Examples of items related to each dimension in the above table are provided in the complementary examination for June 1997.

**Table of Dimensions
Mathematics 416**

Skill \ Theme	Optimization 38 %	Geometry 38 %	Statistics 24 %
Mastery of Concepts 30 %	1	4	7
Mastery of Applications 38 %	2	5	8
Mastery of Problem-Solving Techniques 32 %	3	6	9

Examples of items related to each dimension in the above table are provided in the complementary examination for June 1998.

**Table of Dimensions
Mathematics 436**

Skill \ Theme	Algebra 55%	Geometry 35%	Statistics 10%
Mastery of Concepts 28%	1	4	7
Mastery of Applications 38%	2	5	8
Mastery of Problem-Solving Techniques 34%	3	6	9

Examples of items related to each dimension in the above table are provided in the complementary examination for June 1997.

**Table of Dimensions
Mathematics 514**

Theme	Algebra	Geometry	Statistics and Probability
Skill	50%	20%	30%
Mastery of Concepts 28%	1	4	7
Mastery of Applications 38%	2	5	8
Mastery of Problem-Solving Techniques 34%	3	6	9

Examples of items related to each dimension in the above table are provided in the complementary examination for June 1998.

**Table of Dimensions
Mathematics 536**

Theme	Algebra	Geometry	Statistics
Skill	67%	23%	10%
Mastery of Concepts 28%	1	4	7
Mastery of Applications 36%	2	5	8
Mastery of Problem-Solving Techniques 36%	3	6	9

Examples of items related to each dimension in the above table are provided in the complementary examination for June 1999.

3 INSTRUCTIONS FOR SUMMATIVE EXAMINATIONS CONSISTING OF MULTIPLE CHOICE OR CONSTRUCTED-RESPONSE ITEMS

1. This type of examination should measure all the dimensions in the corresponding table.
2. Use of a scientific calculator with or without a graphic display is permissible except for the section on arithmetic calculations in the Secondary I examination.
3. No list of formulas should be provided in the student's examination booklet.

GLOSSARY³

Operation

An operation is a procedure that must be used to perform a given task.

Example: The formula $V = \frac{1}{3} \pi r^2 h$, which is used to calculate the volume of a cone, is an operation.

Other examples of operations:

- numerical operations (calculations) resulting from a rule or a formula;
- logical operations (e.g. not, and, or, if, if and only if, either...or, exclusion, inclusion, inverse, identity);
- transformations (e.g. permutations, translations, symmetry, rotations, representations);
- methods (e.g. procedures, algorithms, techniques, strategies);
- variations, interpolation, extrapolation;
- factoring.

Relation

A relation is a statement consisting of general terms that may be replaced by more specific terms.

Example: “The area of a rectangle is equal to its length times its width” is a relation because the term “rectangle” may be replaced by a specific rectangle and the terms “length” and “width” may be replaced by specific values.

Other examples of relations:

- order relations (hierarchy, direction, precedence, position);
- cause-effect relations, dependence, independence;
- laws, conventions, axioms, theorems, rules, exceptions;
- logical or mathematical relations (opposite, inverse, correlative, complementary, equal, compatible, incompatible);
- conditions (more specifically, conditions under which a rule applies or does not apply).

³ The information given in this glossary was taken from the following source:
Louis d’Hainaut, *Des fins aux objectifs*, 4th ed. (Brussels and Paris: Éditions Labor et Fernand Nathan, 1977, Coll. Éducation 2000). **Translator’s Note:** This is a free translation.

Structure

A structure is a set of elements and the set of relationships among these elements.

Examples: A multiplication table, a classification system, a number system, a proof, a truth table and rules concerning arithmetic and algebraic operations are structures.



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