

MATHEMATICS

MTH-1007-3 Decimals and Percent

**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 on *Decimals and Percent*. 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 on *Decimals and Percent*.

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

- * Rational numbers: decimals, percentages, fractions
- * Operations: addition, subtraction, multiplication, division
- * Changing decimals to fractions and percentages, and vice versa
- * Converting percentages to fractions and vice versa
- * Order of operations
- * Arithmetic expressions
- * Word problems

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 arrange, associate, classify, compare, complete, contrast, define, describe, distinguish, enumerate, group, name, organize, rank, recognize, state, 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 break down, calculate, construct, draw, estimate, evaluate, isolate, measure, perform, reconstruct, solve, transform, verify, and so on.

ANALYZING or SYNTHESIZING: Establishing a link between a problem and a given solution or solving 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	RATIONAL NUMBERS	THE FOUR OPERATIONS ON DECIMALS	THE ORDER OF OPERATIONS IN ARITHMETIC
SKILLS	15%	25%	60%
STRUCTURING 6%	1 Decimals, Fractions and Percentages 6%		
MATHEMATIZING 10%			7 Determining Arithmetic Expressions 10%
OPERATING 39%	4 Decimals into fractions 3% Decimals into % 3% % into fractions 3%	5 + , - , x , ÷ , Decimals 10%	8 Order of Operations 20%
ANALYZING OR SYNTHESIZING 45%		6 Problems from Everyday Life 15%	9 Problems from Everyday Life 30%

Key: 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

To associate a rational number with one of its equivalent forms (decimal, fraction or percentage; written or numerical) or with one of its representations (number line, diagram, etc.)

Dimension 2

To convert decimals to fractions and vice versa.

Dimension 3

To convert percentages to decimals and vice versa.

Dimension 4

To convert percentages to fractions and vice versa.

Dimension 5

To add, subtract, multiply and divide rational numbers expressed as decimals or fractions.

Dimension 6

To solve problems that deal with everyday situations involving rational numbers in the form of decimals or fractions. (The steps involved in solving a problem must be clearly indicated.)

Dimension 7

To translate word problems into arithmetic expressions, using decimals, fractions or percentages. (In these problems, students must follow the rules for the order of operations.)

Dimension 8

To perform operations on arithmetic expressions containing decimals or percentages following the rules for the order of operations. (The steps must be clearly indicated.)

Dimension 9

To solve word problems that are related to everyday situations and that can be written as arithmetic expressions containing decimals, fractions or percentages. (The steps involved in solving a problem must be clearly indicated.)

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 these problems: **mathematizing, operating** and **analyzing**.

Since it is also important that students be able to use 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 on the program itself and on the time normally required to master these skills.

STRUCTURING	6%
MATHEMATIZING	10%
OPERATING	39%
ANALYZING OR SYNTHESIZING	45%

With regard to concepts, the program places the greatest emphasis on the four operations and the order of operations. The concepts have been weighted as follows:

RATIONAL NUMBERS	15%
THE 4 OPERATIONS ON DECIMALS	25%
THE ORDER OF OPERATIONS IN ARITHMETIC EXPRESSIONS	60%

These percentages are slightly different from those found in the program because there is not always a direct correlation between the objectives and the dimensions. For instance, a given dimension may encompass more than one objective, and conversely, a given objective may relate to more than one dimension.

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.
- 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.

