Mathematics
Straight Lines I

Equations, Graphs and Slope

Québec

Mathematics
Straight Lines I

Equations, Graphs and Slope

1. INTRODUCTION

This Definition of the Domain for Summative Evaluation describes and classifies the essential and representative elements of the secondary-level adult education Mathematics program and, more specifically, of the course entitled Straight Lines I (Equations, Graphs and Slope). 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 course in this program is organized in a similar manner; however, the content of this definition of the domain is specific to the course entitled Straight Lines I (Equations, Graphs and Slope).

The goal of the Definition of the Domain for Summative Evaluation is to prepare examinations that are valid from one version to another or 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	CONSEQUENCES
The main objective of the secondary-level adult education Mathematics program is to help students fully understand mathematical concepts.	Evaluation should involve verifying whether the student has fully understood the different concepts.
The program is designed to help students master the use of certain mathematical tools used in the field of science and technology or in different trades.	Evaluation items should pertain to situations in the field of science and technology or to situations related to trades.
The program aims to provide students with the skills they need to process information by applying mathematical models and appropriate strategies for solving problems.	Evaluation items should involve performing tasks that require the students to classify information, use mathematical models and solve problems.
The program also aims to improve the students' ability to clearly relate information using mathematical language.	Evaluation items should involve performing tasks that require the use of mathematical language. The appropriateness and clarity of the language used should be taken into account in the marking process.
The program is intended to help students develop a systematic work method.	Evaluation items should require the students to present their work in a clear and structured manner. This should be taken into account in the marking process.
The program will help students master the use of technological tools.	The use of a scientific calculator is permitted for the examinations related to this course.

3. CONTENT OF THE PROGRAM FOR PURPOSES OF SUMMATIVE EVALUATION

Concepts

- Equation of a line
  - Slope of a line
  - *y*-intercept

- Graph of a line
  - Types of slopes
  - Coordinates of the points on a line

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: 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 (arithmetic, 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 or 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

CONCEPTS SKILLS	EQUATION OF A LINE 35%	GRAPH OF A LINE 65%
STRUCTURING **10%**	Slope and *y*-intercept of an equation of the form *y = mx + b* 1 5%	Types of slopes 5 5%
MATHEMATIZING **55%**	Equation given the graph 2 20%	Graph given the slope and 1 point 6 5%
		Graph given the equation 7 30%
OPERATING **15%**	Slope given the coordinates of two points 3 5%	Slope given a graph 8 5%
	Slope given the equation of a line 4 5%	
ANALYZING OR **SYNTHESIZING** **20%**		Word problems 9 20%

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 dimensions and the objectives of the program must be observed.

Dimension 1

Given an equation of the form $y = mx + b$, identify the slope or the y-intercept.
(structuring)   /5

Dimension 2

Determine the equation of a line, given its graph and two of its points, or one of its points and its slope.
(mathematizing)   /20

Dimension 3

Calculate the slope of a line, given two of its points.
(operating)   /5

Dimension 4

Calculate the slope of a line, given its equation.
(operating)   /5

Dimension 5

Given different graphs, identify the different types of slopes (undefined, equal to zero, positive, negative).
(structuring)   /5

Dimension 6

Graph a line, given its slope and one of its points.
(mathematizing)   /5

Dimension 7

Graph an equation of the form $Ax + By + C = 0$.
(mathematizing)   /30

Dimension 8

Calculate the slope of a line, given its graph (the graph should illustrate an everyday situation).
(operating)   /5

Dimension 9

Solve one or two word problems that are illustrated by graphs and that involve finding the missing coordinate of a point on a line, given two of its points and one of the coordinates of a third point.
(synthesizing)   /20

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 on the program itself and the time normally required to master these skills.

STRUCTURING	10%
MATHEMATIZING	55%
OPERATING	15%
ANALYZING OR SYNTHESIZING	20%

Similarly, with regard to the concepts, the study of the equation of a line in all its forms and of the graph of a line encompasses all the objectives of this course. The concepts have thus been weighted as follows:

EQUATION OF A LINE	35%
GRAPH OF A LINE	65%

7.   DESCRIPTION OF THE EXAMINATION

A.   TYPE OF EXAMINATION

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

The items should take into account the restrictions and the requirements specified in the dimensions and the objectives of the program. The weighting of marks should be consistent with the percentages set out in the table of dimensions.

B.   CHARACTERISTICS OF THE EXAMINATION

The examination will be administered in a single session lasting no more than two hours.

Students are permitted to use a scientific calculator and a ruler graduated in centimetres.

C.   PASS MARK

The pass mark is set at 60 out of 100.