



INFORMATION DOCUMENT

Uniform Examinations

Mathematics

Secondary IV

January 2022 – June 2022 – August 2022

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Technical and Scientific Option 564-420

Science Option 565-420

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INTRODUCTION

This document provides information about the uniform examinations for each of the three mathematics options offered in Secondary IV.

The Ministère de l'Éducation is responsible for producing uniform examinations for the three examination sessions, in January, June and August.

Each examination is based on the [Framework for the Evaluation of Learning](#), the [Progression of Learning](#) and the [Québec Education Program](#). Information gathered on examinations administered in previous years is also taken into account. In addition, the Ministère enlists teachers and education consultants representing different schools to contribute to the development of each examination.

These examinations evaluate the development of the competency *Uses mathematical reasoning*. They focus on the main concepts and processes covered in each of the options that make up the Secondary IV Mathematics program.

Schools must administer each uniform examination in accordance with the [official schedule](#) for the examination sessions.

Information Specific to the Examinations for the 2021-2022 School Year

The uniform examinations are in line with the [Learning to Be Prioritized at the Secondary Level for the 2021-2022 School Year in the Context of the Pandemic](#).

The concepts and processes that could be used in the examinations are indicated in Appendices I, II and III of this document.

The weighting assigned to the uniform examinations has been reduced to 20%. Clarifications in this regard are provided in Section 6.

1. STRUCTURE OF THE UNIFORM EXAMINATIONS

Each uniform examination is divided into three parts. The following table gives a breakdown of the types of tasks involved as well as the number of marks allotted.

Breakdown of the types of tasks and the number of marks allotted in each uniform examination

EXAMINATION PART	TYPE OF TASK	NUMBER OF TASKS	MARKS PER TASK	TOTAL MARKS
A	Multiple-choice questions	6	4	24
B	Short-answer questions	4	4	16
C	Situations involving applications	6	10	60

For the uniform examination in each of the three options, the Ministère provides the following documents:

For the students:

- ◆ A Student Booklet containing the 16 questions in the examination.
In this booklet, the student will indicate the reasoning they used for each of the six situations involving applications in Part C. For the January and August sessions, the student must also record their answers to the questions in parts A and B in the Student Booklet.
- ◆ A scannable answer sheet (for the June examinations only)
The student will use the front of the sheet to record their answers for the questions in Part A and the back of the sheet to record their answers for the questions in Part B.

For the person in charge of the administration of ministerial examinations:

- ◆ Instructions for the Person in Charge of the Administration of Ministerial Examinations in the School.

For teachers:

- ◆ Marking Guide

For invigilators:

- ◆ Instructions for the Invigilator

2. CONTENT OF THE UNIFORM EXAMINATIONS

The questions in Parts A and B of the uniform examinations are intended to evaluate mastery of mathematical concepts and processes.

Part C consists of six situations involving applications, which require the student to explain their mathematical reasoning and organize and apply mathematical concepts and processes in a clearly defined context. Because there are different aspects of reasoning, these tasks may involve a variety of different actions (e.g. choosing and using mathematical concepts and processes, justifying, proving, convincing, assessing, taking a position, comparing, deducing, generalizing).

The examinations are developed by taking into account the relative importance of the branches of mathematics in the examination for each option.

The following table presents the distribution of the marks for each branch of mathematics in the examinations for the three options for the 2021-2022 school year. The interval presented under each percentage weighting indicates the possible differences among the examinations for the same option. These differences stem from the number of marks allotted for the different types of tasks.

**Relative importance of each branch of mathematics in the examinations
for the 2021-2022 school year**

	ARITHMETIC AND ALGEBRA	STATISTICS AND PROBABILITY	GEOMETRY
<i>Cultural, Social and Technical Option</i>	38% From 34% to 42%	12% From 10% to 14%	50% From 46% to 54%
<i>Technical and Scientific Option</i>	48% From 44% to 52%	12% From 8% to 16%	40% From 36% to 44%
<i>Science Option</i>	54% From 52% to 56%	8% From 6% to 10%	38% From 36% to 40%

The situations involving applications in Part C were developed by taking into account the requirements associated with the tasks designed to evaluate the different aspects of mathematical reasoning. For the purpose of developing the uniform examinations, these situations have been grouped into two categories.

- Category I Tasks in which the student must choose and carry out a set or series of operations to meet the requirements of the task by using the appropriate mathematical concepts and processes as well as appropriate strategies
- Category II Tasks in which the student must draw on different aspects of reasoning to convince using mathematical arguments, to recognize a model and apply it, to prove a statement or property, to disprove a statement using a counterexample or to formulate a conjecture

The following table presents the breakdown, by category, of the six situations involving applications in Part C of the examinations for the three options.

Distribution of the situations involving applications in the uniform examinations

	Category I	Category II
<i>Cultural, Social and Technical Option</i>	5	1
<i>Technical and Scientific Option</i>	4	2
<i>Science Option</i>	4	2

3. CONDITIONS FOR ADMINISTERING THE UNIFORM EXAMINATIONS

It is forbidden to disclose any information about the content of a ministerial examination to anyone who is not directly involved in its administration, or to distribute any examination document, in whole or in part, at any time or by any means whatsoever, including social media.

3.1 Examination dates

The uniform examinations will be administered in January, June and August in accordance with the [official schedule](#) for the examination sessions.

3.2 Time allotted

According to the official schedule, three hours are allotted for each examination. According to the [Administrative Guide for the Certification of Studies and Management of Ministerial Examinations](#) (2015 edition), however, an additional 15 minutes must be allotted for each examination if necessary.

3.3 Preparation phase

One week before each uniform examination, the teacher asks the students to prepare a memory aid on one letter-sized sheet of paper (8½ × 11). Both sides of the sheet may be used. This memory aid must be handwritten. Mechanical reproduction of this memory aid is forbidden. The student's name and the examination code must be indicated on the memory aid.

3.4 Performance phase

Authorized materials

- Memory aid prepared by the student prior to the examination
- Calculator (see Section 3.5)
- Ruler, set square, compass, protractor, graph paper

Administration of the uniform examinations

- The invigilator explains the rules for taking the examination.
- The invigilator asks the students to read the instructions in the Student Booklet.
- Each student works alone.
- After the examination, the invigilator collects the graph paper and the documents distributed to students as well as the memory aids.

In the interest of equity and justice, the examination must be administered under the same conditions to all students across Québec. It is thus forbidden for anyone to help students in any way, for example by clarifying a question or rewording instructions. Examinations in which a teacher or any other school staff member is deemed to have overstepped the boundaries of their role may be declared invalid by the Ministère.

During the examination, students are strictly forbidden to have in their possession any digital device (smartphone, wireless headphones or earbuds, smartwatch, etc.) that can be used to communicate, access the Internet, translate text, or create, save or consult data.

Any student who is caught in possession of unauthorized materials during the examination will be expelled from the examination room for cheating and will receive a mark of 0% on the examination. This rule applies even if a student who is found in possession of a digital device is not using the device or has turned it off.

3.5 Rules for using calculators

Prior to the examination, students must be duly informed in writing of the rules regarding the use of calculators during a ministerial examination.

Rules for using calculators

Calculators with or without a graphic display may be used during the uniform examinations for Secondary IV mathematics.

Certain digital tools (such as an application with features equivalent to those permitted in a calculator) may be used under certain conditions. Further details will be provided by the Direction de la sanction des études.

The data and programs stored in the calculator's memory must be erased before the examination begins. Students must therefore have been given the opportunity beforehand to learn how to reset their calculator's memory. In addition, it is forbidden to store programs and data libraries in the calculator's memory during the examination.

User guides, memory expansion features or any other calculator accessories or peripherals are not allowed during the examination. Communication between calculators is also not permitted during the examination.

If, during the examination, a student is caught in possession of a calculator whose memory contains data or programs, this will be considered a form of cheating, and the examination may be declared invalid by the Ministère.

Students may not lend their calculator to other students.

3.6 Adaptation measures

Measures that adapt the conditions for administering ministerial examinations may be taken to enable students with specific needs to demonstrate their learning. For further information on the implementation of these measures, please refer to the documents made available to schools by the Direction de la sanction des études.

4. MARKING PROCEDURES FOR THE UNIFORM EXAMINATIONS

4.1 Responsibility for grading the examinations

June examinations

The answers to the questions in Part A, which students must record on the scannable answer sheet, will be graded by the Ministère. Educational institutions are responsible for grading Parts B and C in accordance with the instructions provided by the Ministère in the Marking Guide.

January and August examinations

Educational institutions are responsible for grading all three parts of the uniform examinations in accordance with the instructions provided by the Ministère in the Marking Guide.

4.2 Marking tools

In grading the examination papers, teachers must refer to the instructions in the Marking Guide provided by the Ministère.

The situations involving applications in Part C of the examination are graded using the rubric at the end of this document. The five performance levels in this rubric, which are presented as brief descriptions, make it possible to evaluate student work in accordance with the criteria indicated.

The result obtained for the situations involving applications in Part C of the uniform examination is determined using the weighting of the evaluation criteria.

The weighting of the evaluation criteria will vary according to the purpose and requirements of the situation involving applications. Both the Marking Guide and the Student Booklet will show the weighting for each situation involving applications.

Teachers should ensure that they have a common understanding of the requirements of these situations involving applications.

5. STUDENT'S MARK ON THE UNIFORM EXAMINATION

June examinations

Once educational institutions have finished marking the questions in Part B and the situations involving applications in Part C, the scannable answer sheet must be submitted to the Direction de la sanction des études in accordance with instructions that will be specified at a later date. All calculations for determining the student's examination result are carried out by the Ministère.

January and August examinations

The preliminary result obtained for Part C of the examination consists of the sum of the results obtained for the situations involving applications. This result is expressed as a mark out of 600. The final result for Part C, expressed as a mark out of 60, is calculated by dividing the preliminary result by 10 and rounding it off to the nearest whole number.

The final result for Part C must be added to the results for Parts A and B in order to calculate the total examination mark.

Details on how to submit the results for these examinations will be specified at a later date by the Direction de la sanction des études.

6. STUDENT'S SUBJECT MARK

Calculating the final mark for the competency *Uses mathematical reasoning*

The mark students obtain on the uniform examination is combined with their moderated school mark for the competency *Uses mathematical reasoning*. Owing to the exceptional circumstances, the student's mark on the uniform examination for the 2021-2022 school year will count for 20% of the final mark for this competency, instead of the usual 50%. Therefore, the moderated school mark will be worth 80% of the final mark.

Calculating the subject mark

The subject mark is obtained by combining the results for the competencies *Uses mathematical reasoning* and *Solves a situational problem* according to the weighting established by the Ministère. This weighting can be found in the [Framework for the Evaluation of Learning](#).

Additional information in this regard is available in the [Processing of results](#) section on the Ministère's website.

**CONCEPTS AND PROCESSES THAT COULD BE USED IN THE *CULTURAL, SOCIAL AND TECHNICAL* OPTION
EXAMINATIONS FOR THE 2021-2022 SCHOOL YEAR**

Arithmetic and Algebra	
UNDERSTANDING AND MANIPULATING ALGEBRAIC EXPRESSIONS	UNDERSTANDING DEPENDENCY RELATIONSHIPS
<p>Analyzing situations using systems of equations</p> <ul style="list-style-type: none"> • Solving a system of first-degree equations in two variables • Validating the solution, with or without technological tools • Interpreting the solution or making decisions if necessary, depending on the context 	<p>Analyzing situations using real functions</p> <ul style="list-style-type: none"> • Second-degree polynomial functions • Exponential functions • Functions modelling periodic occurrences (e.g. natural phenomena such as tides or sound, medical or electrical phenomena)

Statistics
ANALYZING AND MAKING DECISIONS ABOUT ONE- OR TWO-VARIABLE DISTRIBUTIONS, USING STATISTICAL TOOLS
<p>Two-variable distributions</p> <ul style="list-style-type: none"> • Associating the most appropriate functional model with a scatter plot <ul style="list-style-type: none"> – first-degree polynomial function • Giving a qualitative assessment of a linear correlation • Approximating and interpreting the linear correlation coefficient • Comparing two-variable distributions

Geometry and Analytic Geometry	
ANALYZING SITUATIONS INVOLVING MEASUREMENTS	ANALYZING SITUATIONS USING ANALYTIC GEOMETRY
<p>Trigonometric relations</p> <ul style="list-style-type: none"> • Finding unknown measurements in various situations <ul style="list-style-type: none"> – in a right triangle using <ul style="list-style-type: none"> ▫ trigonometric ratios: sine, cosine, tangent – in any triangle using <ul style="list-style-type: none"> ▫ the sine law ▫ Hero's formula • Calculating the area of a triangle given the measure of an angle and the lengths of two sides or given the measures of two angles and the length of one side • Justifying statements concerning trigonometric relations 	<p>Straight lines</p> <ul style="list-style-type: none"> • Using the concept of change to: <ul style="list-style-type: none"> – calculate the distance between two points – calculate and interpret a slope • Determining the relative position of two straight lines using their respective slope • Determining the equation of a line using the slope and a point or using two points • Determining the equation of a line parallel or perpendicular to another line

**CONCEPTS AND PROCESSES THAT COULD BE USED IN THE *TECHNICAL AND SCIENTIFIC* OPTION
EXAMINATIONS FOR THE 2021-2022 SCHOOL YEAR**

Arithmetic and Algebra	
UNDERSTANDING AND MANIPULATING ALGEBRAIC EXPRESSIONS	UNDERSTANDING DEPENDENCY RELATIONSHIPS
<p>Manipulating algebraic expressions</p> <ul style="list-style-type: none"> • Multiplying algebraic expressions • Dividing a polynomial by a binomial (with or without a remainder) • Factoring polynomials • Manipulating rational expressions <p>Analyzing situations using systems of equations</p> <ul style="list-style-type: none"> • Solving a system of first-degree equations in two variables • Validating the solution, with or without technological tools • Interpreting the solution or making decisions if necessary, depending on the context 	<p>Relations, functions and inverses</p> <ul style="list-style-type: none"> • Describing, in the functions under study, the role of multiplicative parameters <p>Analyzing situations using real functions</p> <ul style="list-style-type: none"> • Second-degree polynomial functions • Exponential functions • Functions modelling periodic occurrences (e.g. natural phenomena such as tides or sound, medical or electrical phenomena)
Statistics	
ANALYZING AND MAKING DECISIONS ABOUT ONE- OR TWO-VARIABLE DISTRIBUTIONS, USING STATISTICAL TOOLS	
<p>Two-variable distributions</p> <ul style="list-style-type: none"> • Associating the most appropriate functional model with a scatter plot <ul style="list-style-type: none"> – first-degree polynomial function – functions under study • Giving a qualitative assessment of a linear correlation • Approximating and interpreting the linear correlation coefficient • Drawing a curve associated with the chosen model • Comparing two-variable distributions 	
Geometry and Analytic Geometry	
ANALYZING SITUATIONS INVOLVING MEASUREMENTS	ANALYZING SITUATIONS USING ANALYTIC GEOMETRY
<p>Trigonometric relations</p> <ul style="list-style-type: none"> • Finding unknown measurements in a right triangle using trigonometric ratios: sine, cosine, tangent • Calculating the area of a triangle given the measure of an angle and the lengths of two sides or given the measures of two angles and the length of one side • Justifying statements concerning trigonometric relations 	<p>Straight lines</p> <ul style="list-style-type: none"> • Using the concept of change to: <ul style="list-style-type: none"> – calculate the distance between two points – calculate and interpret a slope • Determining the relative position of two straight lines using their respective slope • Determining the equation of a line using the slope and a point or using two points • Determining the equation of a line parallel or perpendicular to another line

**CONCEPTS AND PROCESSES THAT COULD BE USED IN THE SCIENCE OPTION
EXAMINATIONS FOR THE 2021-2022 SCHOOL YEAR**

Arithmetic and Algebra		
UNDERSTANDING AND MANIPULATING ALGEBRAIC EXPRESSIONS		UNDERSTANDING DEPENDENCY RELATIONSHIPS
<p>Algebraic expressions</p> <ul style="list-style-type: none"> Describing the role of components of algebraic expressions: <ul style="list-style-type: none"> parameter <p>Manipulating algebraic expressions</p> <ul style="list-style-type: none"> Multiplying algebraic expressions Dividing a polynomial by another polynomial (with or without a remainder) Factoring polynomials Manipulating rational expressions 	<p>Analyzing situations using equations or inequalities</p> <ul style="list-style-type: none"> Solving a second-degree equation or an inequality in one variable Solving a second-degree equation in two variables <p>Analyzing situations using systems of equations</p> <ul style="list-style-type: none"> Solving a system <ul style="list-style-type: none"> of first-degree equations in two variables composed of a first-degree equation in two variables and a second-degree equation in two variables Validating a solution, with or without technological tools Interpreting solutions or making decisions if necessary, depending on the context 	<p>Relations, functions and inverses</p> <ul style="list-style-type: none"> Describing, in the functions under study, the role of <ul style="list-style-type: none"> multiplicative parameters additive parameters <p>Analyzing situations using real functions</p> <ul style="list-style-type: none"> Second-degree polynomial functions

Statistics				
ANALYZING AND MAKING DECISIONS ABOUT ONE- OR TWO-VARIABLE DISTRIBUTIONS, USING STATISTICAL TOOLS				
<p>Two-variable distributions</p> <ul style="list-style-type: none"> Associating the most appropriate functional model with a scatter plot <ul style="list-style-type: none"> first-degree polynomial function Giving a qualitative assessment of a linear correlation 			<ul style="list-style-type: none"> Approximating and interpreting the linear correlation coefficient Comparing two-variable distributions 	

Geometry and Analytic Geometry	
ANALYZING SITUATIONS INVOLVING MEASUREMENTS	ANALYZING SITUATIONS USING ANALYTIC GEOMETRY
<p>Trigonometric relations</p> <ul style="list-style-type: none"> Finding unknown measurements in various situations <ul style="list-style-type: none"> in a right triangle using <ul style="list-style-type: none"> trigonometric ratios: sine, cosine, tangent in any triangle using <ul style="list-style-type: none"> the sine law the cosine law Calculating the area of a triangle given the measure of an angle and the lengths of two sides or given the measures of two angles and the length of one side Justifying statements concerning trigonometric relations 	<p>Straight lines</p> <ul style="list-style-type: none"> Using the concept of change to: <ul style="list-style-type: none"> calculate the distance between two points calculate and interpret a slope Determining the relative position of two straight lines using their respective slope Determining the equation of a line using the slope and a point or using two points Determining the equation of a line parallel or perpendicular to another line

RUBRIC FOR THE SITUATIONS INVOLVING APPLICATIONS

		OBSERVABLE INDICATORS				
		LEVEL A	LEVEL B	LEVEL C	LEVEL D	LEVEL E
EVALUATION CRITERIA	Cr. 3 Proper implementation of mathematical reasoning suited to the situation	<i>The student . . .</i> <ul style="list-style-type: none"> chooses appropriate concepts and processes and uses actions, strategies, hypotheses, assumptions, etc. that make it possible to meet the requirements of the situation 	<i>The student . . .</i> <ul style="list-style-type: none"> chooses appropriate concepts and processes and uses actions, strategies, hypotheses, assumptions, etc. that make it possible to meet most of the requirements of the situation 	<i>The student . . .</i> <ul style="list-style-type: none"> chooses appropriate concepts and processes and uses actions, strategies, hypotheses, assumptions, etc. that make it possible to meet some of the requirements of the situation 	<i>The student . . .</i> <ul style="list-style-type: none"> chooses appropriate concepts and processes and uses actions, strategies, hypotheses, assumptions, etc. that make it possible to: <ul style="list-style-type: none"> meet few of the requirements of the situation OR partially meet some of the requirements of the situation 	<i>The student . . .</i> <ul style="list-style-type: none"> chooses concepts and processes and uses actions, strategies, hypotheses, assumptions, etc. that make it possible to partially meet one of the requirements of the situation
	Cr. 2* Correct use of appropriate mathematical concepts and processes	<ul style="list-style-type: none"> applies the required concepts and processes appropriately to meet the requirements of the situation 	<ul style="list-style-type: none"> applies the required concepts and processes appropriately to: <ul style="list-style-type: none"> meet the requirements of the situation, and makes one or more minor mistakes OR meet most of the requirements of the situation, and may or may not make minor mistakes 	<ul style="list-style-type: none"> applies some of the required concepts and processes appropriately to meet the requirements of the situation, and may or may not make minor mistakes 	<ul style="list-style-type: none"> applies few of the required concepts and processes appropriately to meet the requirements of the situation, and may or may not make minor mistakes 	<ul style="list-style-type: none"> does not apply any of the required concepts and processes appropriately to meet the requirements of the situation
	Cr. 4 Proper organization of the steps in an appropriate procedure	<ul style="list-style-type: none"> shows clear and organized work that is in keeping with the rules and conventions of mathematical language 	<ul style="list-style-type: none"> shows clear work, although some elements are implicit, and makes few or no mistakes regarding the rules and conventions of mathematical language 	<ul style="list-style-type: none"> shows work that lacks clarity because it is incomplete or includes several mistakes regarding the rules and conventions of mathematical language 	<ul style="list-style-type: none"> shows work that consists of confusing or isolated elements that may include mistakes regarding the rules and conventions of mathematical language 	<ul style="list-style-type: none"> shows little work
	Cr. 5 Correct justification of the steps in an appropriate procedure	<ul style="list-style-type: none"> uses appropriate arguments to justify or support the statements, conclusions or results that need to be justified or supported 	<ul style="list-style-type: none"> uses appropriate arguments to justify or support most of the statements, conclusions or results that need to be justified or supported 	<ul style="list-style-type: none"> uses appropriate arguments to justify or support some of the statements, conclusions or results that need to be justified or supported 	<ul style="list-style-type: none"> uses appropriate arguments to justify or support few of the statements, conclusions or results that need to be justified or supported 	<ul style="list-style-type: none"> does not justify or support the statements, conclusions or results with appropriate arguments
	Cr. 1** Formulation of a conjecture suited to the situation	<ul style="list-style-type: none"> formulates one or more appropriate conjectures that account for every aspect of the situation 	<ul style="list-style-type: none"> formulates one or more appropriate conjectures that account for most of the aspects of the situation 	<ul style="list-style-type: none"> formulates one or more partially appropriate conjectures that account for certain aspects of the situation 	<ul style="list-style-type: none"> formulates one or more largely inappropriate conjectures that account for few aspects of the situation 	<ul style="list-style-type: none"> formulates one or more inappropriate conjectures

* – To apply a concept or process appropriately means that the student must apply it without making a conceptual or procedural error.
 – The student may fail to apply a concept or process that is required to carry out all the steps in a line of reasoning and that was not part of the learning prescribed for an academic level lower than the level for which the examination is designed. In such cases, the student is considered to have made a conceptual or procedural error.
 – The student is considered to have made a minor mistake if there is an error in the application of a concept or process that was part of the learning prescribed for an academic level lower than the level for which the examination is designed.

** – The student may be required to make conjectures (hypotheses, assumptions, etc.) at different stages in their line of mathematical reasoning. Criterion 3 will be used to evaluate these conjectures, but the written work involved in making these conjectures may not always be fully shown.



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