Submission to the Ministry of Education on Proposed Regulatory Amendments related to Proficiency in Mathematics

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OSSTF/FEESO

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The *Ontario Secondary School Teachers' Federation* (OSSTF/FEESO) was founded in 1919 and represents 60,000 public high school teachers, occasional teachers, educational assistants, instructors, psychologists, secretaries, speech-language pathologists, social workers, plant support personnel, and many other educational workers employed in all levels of the public education sector, from full-day kindergarten to university.

OSSTF/FEESO is a strong, independent, socially active union that promotes and advances the cause of public education and the rights of students, educators, and education workers. Teacher Candidates in training at any post-secondary institutions that provide a program of professional education accreditation under Ontario Regulation 347/02 are considered as Associate members of OSSTF/FEESO as per our Bylaw 2.1.3.1.1. As such, the Federation will always advocate for Teacher Candidates to ensure there are no artificial barriers for them to enter the profession.

OSSTF/FEESO welcomes the opportunity to provide input for the proposed regulatory amendments related to Proficiency in Mathematics.

Summary of the Recommendations from OSSTF/FEESO

OSSTF/FEESO has serious concerns about a mandatory, high-stakes math proficiency test and is proposing that no such requirement be in place for any Teacher Candidate.

Not only is there little empirical evidence that standardized teacher tests have any significant correlation to teacher effectiveness or student success, but Ontario students also currently rank very highly on the world stage. Stephen Lecce, Minister of Education, recognized in a December 5, 2023, statement about Ontario's result on the 2022 Programme for International Student Assessment (PISA), "that Ontario has maintained its strong international standing in

math, reading, and science. Students across the province are the best educated in Canada and the world."

OSSTF/FEESO agrees with the stated goals of the Crown to improve student achievement in mathematics, but it disagrees with the Crown's previous requirement that all Teacher Candidates must pass a Math Proficiency Test before becoming certified to enter the teaching profession. There are different strategies, other than a mandatory high-stakes test, that should be considered to improve student achievement in mathematics.

OSSTF/FEESO is providing the following recommendations that include reasonable alternatives to a mandatory high-stakes exit exam to become certified as a Teacher in Ontario. These recommendations, when adopted and properly implemented in a collaborative manner with sufficient resources, will improve student achievement in mathematics.

These recommendations were informed significantly by both decisions rendered in the legal challenges related to the requirement that all Teacher Candidate successfully pass the Math Proficiency Test.

The rationale and evidence supporting the following recommendations are presented in subsequent sections, should the reader require more information.

Recommendations:

1. **THAT** the Ontario Regulation 271/19 (Proficiency in Mathematics) under the Ontario College of Teachers Act (1996) be repealed and that there should not be any requirement for any Teacher Candidate to successfully pass a Mathematics Proficiency Test or any other similar high-stakes assessment to become certified as a Teacher in Ontario.

2. **THAT** the EQAO immediately cease any activities related to the development of the content of, the marking of, or the administration of any type of Math Proficiency Test (MPT).

3. **THAT** all post-secondary institutions that provide a program of professional education accreditation under Ontario Regulation 347/02 must immediately undertake to develop and/or revise required courses, in both mathematics methodology/pedagogy and mathematics content, for Teacher Candidates in all programs such as, but not limited to, Primary/Junior, Junior/Intermediate, Intermediate/Senior, Aboriginal Education (Primary/Junior), Technological Education, French as a First Language, French as a Second Language, and any other Anglophone or Francophone language programs.

4. **THAT** in the development of, or revisions to, required mathematics courses, each Faculty of Education must meaningfully consult with representatives from the *Ontario Teachers' Federation* (OTF/FEO) and each individual Teaching Affiliate: AEFO, ETFO, OECTA, and OSSTF/FEESO. The consultation shall include, but not be limited to, the number of course hours, the format of the course, the content of the course, and when in their course of study will the course be offered to Teacher Candidates.

5. **THAT** the Ministry of Education engage in meaningful and on-going consultation with representatives from the OTF/FEO and each Teaching Affiliate: AEFO, ETFO, OECTA, and OSSTF/FEESO as part of the on-going and regular curriculum review to embed strategies and concepts of mathematical literacy or numeracy in all Ministry curriculum programs.

6. **THAT** the Ministry of Education provide sufficient additional funding to allow each Ontario School Board and School Authority to work with their respective local stakeholder groups, as required under *Policy/Program Memorandum 159 – Collaborative Professionalism*, to develop grade and level appropriate mathematical resources for teachers and education workers to use in the classroom.

Background Information:

When referring to either of the two (2) court decisions in this submission, these are the citations for them and specific excerpts will include the shortform notations of **[ONSC]** or **[ONCA]**:

- Ontario Teacher Candidates' Council v. The Queen, 2021 ONSC 7386 (Divisional Court File NO: 20-2584) – Shortform reference in the text will be **[ONSC]**
- Ontario Teacher Candidates' Council v. Ontario (Education), 2023 (ONCA 788 – Docket COA-22-CV-0223) - Shortform reference in the text will be **[ONCA]**

Court Decisions Re: Alleged violation of *s. 15* of the Canadian Charter

The Divisional Court of the *Ontario Superior Court of Justice* **[ONSC]** ruled on December 17, 2021, that the successful completion of the Math Proficiency Test (MPT) requirement for teacher certification violated s. 15 of the *Canadian Charter of Rights and Freedoms* (the "Charter"). The Court of Appeal for Ontario **[ONCA]** ruled on November 28, 2023, that the Divisional Court of the *Ontario Superior Court of Justice* had erred in its findings.

The two court decisions disagreed about the MPT having a disproportionate adverse impact on entry to the teaching profession for racialized Teacher Candidates. Even though this is a significant issue that needs immediate remediation, the OSSTF/FEESO submission will not focus on this issue except for this section of the report. It is important to acknowledge that the demographic data provided in each hearing, mainly by the EQAO, came from different time

frames for when the Math Proficiency Test was administered. This resulted in different demographic data sets being used in each court case which may have contributed to the different outcomes of the cases.

The data provided in Appendix A of the Court of Appeal's decision, which covered a longer period for the administration of the MPT than in the Ontario Superior Court's decision, did recognize there were still some important differences in the success rates by age group, language spoken, and race. Based on demographic data also provided in the same Appendix in the **ONCA** decision, there was little variation in success rates across all gender identity groups, different sexual orientations, for those who specified an exceptionality and those who did not have any condition or disability.

OSSTF/FEESO submits its own **Appendix A** to this submission which provides excerpts from the Court of Appeal's Appendix A about the potential variance in the level of success rates for Teacher Candidates based on their identified age, spoken language, and race.

Teacher Candidates who identified as:

- being 30 or more years of age had a higher "*not yet successful*" rate of 7% than those Teacher Candidates who identified as being between 20 and 24 years of age had a lower "*not yet successful*" rate of 3%.
- speaking something other than English or French had a much higher "*not yet successful*" rate of 11% than those Teacher Candidates who identified as speaking English, French, or who provided multiple responses, who had a much lower "*not yet successful*" rate of 4% or 5%.
- being Black or Indigenous had a significantly higher "*not yet successful*" rate of 10% and 28% respectively than those Teacher Candidates who identified as White or of Mixed race who had a "*not yet successful*" rate of 3%.

It is OSSTF/FEESO's position that any barrier, be they intentional or unintentional, to the full participation of all Teacher Candidates in the teaching profession, must be eliminated. Based on the above data, the Math Proficiency Test may be more of a barrier to the entry into the profession for Teacher Candidates who identify as being older, as having a first language other than English or French, or as being Black or Indigenous than those Teacher Candidates who identify as younger, whose first language is English or French, or who are White or Mixed race. As such, any form of high-stakes test to become certified as a teacher in Ontario should not be implemented.

Correlation Between Standardized Teacher Tests and Student Achievement?

The empirical evidence and the arguments presented by both the *Ontario Teacher Candidates' Council* **[OTCC]** and the Crown, as it relates to the correlation between standardized teacher tests and teacher effectiveness or student achievement, clearly indicated that a Mathematics Proficiency Test has a minimal impact on student achievement in mathematics.

The EQAO literature review clearly demonstrated this as presented in Paragraph [21 (a)] of the decision in the **ONSC** case where EQAO concluded that "[t]here is some positive correlation between teacher competency scores in mathematics and student outcomes, but this correlation is weak, with small effect sizes, and is not universal."

This is the same conclusion the Applicants' **[OTCC]** expert witness Dr. Mary Reid reached as stated in Paragraph [43] of the **ONSC** decision that "the literature demonstrates little connection between teacher testing and teacher quality."

The Respondent's **[Crown]** own expert witness, Dr. Jacob Vigdor, an expert in math pedagogy who was supportive of the MPT, acknowledged in Paragraph [48] in the **ONSC** decision "that the effect of this positive association [between teacher licensure test scores and student

achievement] is smaller than other factors such as teacher experience and pedagogical approach."

When reviewing the arguments presented by both sides in the court cases along with the analysis and observations rendered by both courts, there is a pathway that emerges that can be used to improve student achievement in mathematics without a need for a high-stakes Math Proficiency Test as a condition of Teacher Candidate certification.

EQAO, the expert witnesses called by both sides, and the OTCC itself supported increasing the quality of required mathematics courses with focus on both the methodology/pedagogy and content, in the *B.Ed*. programs since this would be one of the most helpful steps towards improving student outcomes. This consensus aligns with OSSTF/FEESO's recommendations.

There was more information in the **ONSC** decision about the link between a mandatory Math Proficiency Test for Teacher Candidates and student achievement in mathematics than in the **ONCA** decision, but both decisions suggested that if there was a correlation between the two, then it would be a weak one or at least not as strong as other factors such as teacher experience and required pre-service mathematics course focusing on both mathematics content and methodology.

In Paragraph 102 in the **ONCA** decision, the Justice wrote "I note that over the course of 2021, teacher candidates and faculties of education in Ontario were adjusting to the introduction of the MPT by introducing or expanding math instruction within the *B.Ed.* curriculum. These adjustments can be reasonably expected to improve the mathematical knowledge of [T]eacher [C]andidates in the future, particularly amongst those who may have previously been math-avoidant."

The decision continues to state that "It is therefore not unreasonable to expect even higher success rates on the MPT if it were to be administered in future years."

OSSTF/FEESO disagrees vehemently with that statement. There are more effective, less costly, and lower risk ways of assessing, and ultimately evaluating, each Teacher Candidate's readiness to become a knowledgeable and effective Teacher.

Based on the evidence provided in both court cases and in this submission, allocating any funds to improve the success rate on a MPT is a needless government expenditure. By reallocating those funds to the classroom and to faculties of education to better support Teacher Candidates will be an investment that will strengthen math instruction and improve student achievement in mathematics.

The previous requirement of the successful completion of the MPT to become certified as a Teacher in Ontario went against the Government's own recent steps to reduce the time needed for entry into the profession. If the successful completion of the MPT was ever enacted again, this may dissuade prospective Teacher Candidates from even applying to an Initial Teacher Education program should there be a requirement of passing a high-stakes test, that has shown little impact on student achievement, to be able to enter a profession after six or more years of post-secondary education. This would further exacerbate the existing situation of the dire shortage of occasional teachers across the province.

The elimination of the MPT is one small way that will alleviate the recruitment and retention problems affecting most School Boards in Ontario.

Investments in Teacher Candidates

Required Mathematical Concepts and Methodology Course:

Teacher Candidates are required to complete and pass every course and practicum in their program to become Certified Teachers. The successful completion of a required three- or six-unit course on mathematical concepts and methodology would be more pedagogically sound than a high-stakes test. This mathematics course should only be required for Teacher

Candidates who are not recognized as working towards a first or a second mathematics teachable qualification since they are already required to take mathematics focused courses.

Integration of Mathematics in a Practicum:

By requiring all students who complete a practicum in a Grade 1 to Grade 8 class to teach some math lessons, that would be putting the theory learned in their mathematics courses into practice. During each practicum, a Teacher Candidate would work with an experienced Associate Teacher, who can give them immediate and detailed feedback to improve the Teacher Candidate's skills and knowledge of teaching mathematics.

Conversations focused on mathematical content and pedagogical strategies between the Teacher Candidate and their Associate Teacher will provide a Teacher Candidate with a model on how they will be better able to engage in assessment as learning with their students. This would help Teacher Candidates to assist all their students to develop their capacity to be independent, autonomous learners who are able to set individual goals, monitor their own progress, determine next steps, and reflect on their thinking and learning.

Those conversations between a Teacher Candidate and their Associate Teacher will be the basis of how the Associate Teacher will conduct their assessment of the Teacher Candidate's level of understanding of:

- the mathematical content of their specific program;
- the different strategies to prepare effective grade and level appropriate lesson plans;
- how to integrate math concepts across the curriculum; and
- successfully teaching those lessons to students.

This would be a much richer assessment tool and practice of the learning demonstrated by the Teacher Candidate than any high-stakes multiple choice test that has been in place for Teacher Candidates to pass to become Certified Teachers.

The development, administration, and marking of a standardized MPT requires significant financial resources with limited proof that it will have any significant impact on the level of student achievement in mathematics. Reinvesting funds that were used for the MPT into enhanced math related Teacher Candidate pre-service training will result in better student achievement as indicated by the uncontested research submitted by both parties in each legal case.

Student achievement on International Student Assessment:

Improved student achievement in mathematics should be the focus for all stakeholders in this consultation. Both court decisions concluded that improving student achievement in mathematics was the primary objective of all parties involved, but that the disagreement was on the way forward to achieving this worthy objective.

Ontario, and every other Province, participates in the *Programme for International Student Assessment* (PISA) test which is a collaborative effort among member countries of the *Organisation for Economic Co-operation and Development* (OECD).

The test is designed to assess the skills and knowledge of 15-year-old students in mathematics, science, and reading. The primary focus of the PISA 2022 was on mathematics, but also assessed the performance of 23,000 randomly selected 15-year-old students from across Canada in science and reading.

There were enough students from each Province to compare the provincial level of achievement of students in math, science, and reading. **Appendix B** provides background information on the content of the math component of the PISA 2022 test and the performance of students in each of the 81 countries and 10 Canadian Provinces which participated.

On December 5, 2023, Stephen Lecce, Minister of Education, issued the following statement on the 2022 *Programme for International Student Assessment* (PISA) results: “I am proud to share

that the PISA 2022 results released this morning show that Ontario has maintained its strong international standing in math, reading and science. Students across the province are the best educated in Canada and the world."

The following are some highlights comparing the performance of Ontario students to the Canadian, OECD, and some Canadian Provinces average scores.

Ontario ranked 13 out of all 91 jurisdictions (which includes all countries and all 10 Canadian provinces) who participated in the PISA 2022 test.

Ontario's average overall achievement score in mathematics was 495 which is not significantly different than the average score of Alberta (504), Canada (497), British Colombia (496), Netherlands (493), Ireland (492), Belgium (489), Denmark (489), United Kingdom (489), and Poland (489).

Quebec, with an average score of 514, was the top performing Canadian Province and ranked as the 7 highest international jurisdiction.

Alberta (504) was the 10 ranked jurisdiction, followed by Canada (497/11), British Columbia (496/12), and then Ontario (495/13).

Percentage of Students at Each Proficiency Level in Mathematics:

PISA defines Level 2 in mathematics as the baseline level of mathematics literacy required to take advantage of further learning opportunities and to participate fully in modern society.

Jurisdiction	Average score	Below Level 2	Level 2	Level 3	Level 4	Levels 5 & 6
Alberta	504	21%	21%	24%	19%	15%
British Columbia	496	21%	23%	25%	18%	12%
Manitoba	470	29%	27%	25%	14%	6%
New Brunswick	468	31%	25%	24%	13%	6%
Ontario	495	22%	24%	26%	18%	12%
Quebec	514	17%	19%	25%	23%	16%
Canada	497	22%	23%	25%	18%	12%
OECD	472	31%	23%	22%	15%	9%

- Ontario student performance across all levels of achievement is very similar to the Canadian average and the BC results.
- Ontario significantly outperforms the OECD average of the 81 jurisdictions tested.
- Alberta's results are comparable to Ontario's, but it outperforms Ontario for the top levels (5 & 6).
- Ontario significantly outperforms New Brunswick, Saskatchewan, and Manitoba by having a greater percentage of its students achieving at Level 3 and above.
- Quebec significantly outperforms Ontario with 8% more of its students achieving a Level 3 or more.

PISA also assessed student achievement on four (4) mathematical processes and four (4) mathematical content knowledge subscales. The following provides a ranking of student achievement for each subscale for Ontario, Quebec, and Canadian results by gender where

Quebec students significantly outperformed Ontario students while Ontario students were either slightly under the Canadian average or equal to for each individual subscale measured.

Mathematical Process Subscales:

- ***Mathematical reasoning***:
    - *Female gender*: Quebec (506) > Canada (494) > Ontario (493)
    - *Male gender*: Quebec (515) > Canada (505) = Ontario (505)
- ***Formulating situations mathematically*** *(formulating)*:
    - *Female gender:* Quebec (508) > Canada (484) > Ontario (478)
    - *Male gender*: Quebec (519) > Canada (503) > Ontario (501)
- ***Employing mathematical concepts, facts, procedures*** *(employing)*:
    - *Female gender*: Quebec (509) > Canada (487) > Ontario (482)
    - *Male gender*: Quebec (522) > Canada (502) > Ontario (499)
- ***Interpreting, applying, & evaluating mathematical outcomes*** *(interpreting)*:
    - *Female gender*: Quebec (511) > Canada (498) > Ontario (496)
    - *Male gender*: Quebec (522) > Canada (508) > Ontario (507)

Mathematical Content Knowledge Subscales:

- ***Change & relationships***:
    - *Female gender:* Quebec (507) > Canada (496) > Ontario (494)
    - *Male gender*: Quebec (516) > Canada (508) = Ontario (508)
- ***Quantity***:
    - *Female gender:* Quebec (510) > Canada (486) > Ontario (480)
    - *Male gender*: Quebec (517) > Canada (502) > Ontario (500)
- ***Space and shape***:
    - *Female gender:* Quebec (505) > Canada (484) = Ontario (484)
    - *Male gender*: Quebec (518) > Canada (498) > Ontario (497)

- ***Uncertainty and data***:
    - *Female gender:* Quebec (510) > Canada (495) > Ontario (493)
    - *Male gender*: Quebec (520) > Canada (506) > Ontario (505)

The explanation for Quebec's performance on standardized international assessments is explained by the following excerpt from the submitted evidence in the *Ontario Teacher Candidates' Council v. The Queen, 2021* ***ONSC*** decision which quotes:

> [21] In response to this new mandate, the EQAO conducted a social science literature review on teacher licensure exams. This literature review was completed in August 2019 and arrived at the following conclusions:
>
> (a) There is some positive correlation between teacher competency scores in mathematics and student outcomes, but this correlation is weak, with small effect sizes, and is not universal. Standardized test scores are much less related to student outcomes than are teacher certification (both general and subject-specific), teacher experience, and other contributors to teacher effectiveness.
>
> (b) **Increasing the quality and quantity of required mathematics courses at the pre-service (ITE) level was one of the most helpful steps toward improving student outcomes. Research from the province of Quebec, where student math test scores are high relative to the rest of Canada, attributes that province's student achievement to "a uniquely strong emphasis on requiring trainee teachers to undertake more courses in both mathematics methodology and mathematics content." [Emphasis added]**
>
> [73] The focus of the EQAO Literature Review was not the potential impact of standardized teacher testing on diversity in the profession but, rather, on the relationship between mandatory standardized testing and student performance.

That research is more relevant to the s. 1 analysis than it is here, however, it is worth noting at this stage that the EQAO found that:

> "Current research demonstrates that standardized teacher tests [are] not linked with a level of performance consistency that justifies widespread implementation at this time. The use of caution with these tests is advised by many researchers on the basis that these tests are not consistently associated with the positive benefits that are often claimed. Furthermore, the potential negative impacts of these programs, including bias against marginalized groups and the decrease in the availability of qualified teachers, are more consistent impacts of these test".

Quebec chose to invest in pre-service teacher training and focused on providing students with the necessary knowledge and methodologies to better teach mathematics to students in Quebec. A reallocation of financial resources from the development, administration, and marking of a mandatory Math Proficiency Test, to developing better pre-service courses and resources for Teacher Candidates would be an efficient investment rather than an unneeded expense. This could reduce the barriers for some Teacher Candidates who identify as being older, Indigenous or Black, and/or do not have English or French as their first language from entering the teaching profession based on the demographic data submitted by the Crown demonstrates.

Teacher Recruitment and Retention

Under the Canadian Free Trade Agreement (CFTA), Teachers who hold a valid teaching certificate from another Canadian jurisdiction are eligible for certification in another Province without requiring additional education, training, or examination. Ontario is the only Canadian jurisdiction that has implemented a successful completion of a high-stakes Math Proficiency Test for Teacher Candidates to be allowed to enter the teaching profession in Ontario. The

imposition of a new Teacher Candidate certification condition, such as a mandatory high-stakes exit exam, may impact cross-Canada labour mobility.

If there was a requirement for Teacher Candidates to successfully pass a MPT, then students in Ontario post-secondary institutions may choose to apply to Initial Teacher Education programs in other provinces to remove the barriers to becoming a part of the teaching profession in Ontario.

The MPT could be another roadblock to address the recruitment and retention of teachers in Ontario. OSSTF/FEESO is open to working with the Government of Ontario to improve the recruitment and retention of staff, for both Teachers and Education Workers, in all parts of Ontario.

Math Specific Courses in Initial Teacher Education Programs at Faculties of Education

OSSTF/FEESO represents more than 2,500 Education Workers at six different Ontario Universities. We chose to review the math specific courses, either compulsory or optional, offered at three Faculty of Educations where members of OSSTF/FEESO work. These Universities were representative of all post-secondary institutions that provide a program of professional education accreditation under Ontario Regulation 347/02. For more detailed information about the specific mathematics focused courses offered to Teacher Candidates in their Initial Teacher Education programs, please refer to **Appendix C**.

- **Brock University** offers five (5) Teacher Candidate Programs: Primary/Junior (P/J), Junior/Intermediate (J/I), Aboriginal Education (P/J), Intermediate/Senior (I/S), and Technological Education at the I/S grade levels (7-12).
- **Wilfrid Laurier University** offers a full-time 2-year B.Ed. program, offered at both the Waterloo and Brantford campuses, to prepare Teacher Candidates to teach students in:

- Primary & Junior (P/J) from Junior Kindergarten to Grade 6
- Junior & Intermediate (I/S) from Grades 4 to 10.

- **Université d'Ottawa/University of Ottawa** offers several 2-year Initial Teacher Education Programs in both French and English languages of instruction as well as a 3-year Indigenous Teacher Education Program (ITEP) at the Primary/Junior level which is only offered in English.
  - The 2-year English language Programs are Primary/Junior; Primary/Junior – French as a Second Language; Junior/Intermediate; and Intermediate/Senior
  - The 2-year French language Programs offered are at the Cycle primaire/moyen (Primary/Junior); Cycle moyen/intermédiaire (Junior/Intermediate); Cycle intermédiaire/supérieur (Intermediate/Senior); and Éducation technologique (EduTek) (Technological Education) which is only offered in French language instruction and at the Intermediate/Senior grade level.

Highlights of the Mathematics Specific Content and Methodology Courses

Brock University:

- Teacher Candidates in the Primary/Junior & Junior/Intermediate programs will take two courses, one in each year, earning nine credits of Mathematics specific content and methodology.
- Teacher Candidates in the Aboriginal Education (P/J) will take two courses, one in each year, earning six credits of Mathematics specific content and methodology. This is three credits less than Teacher Candidates in the regular P/J & J/I programs.
- Teacher Candidates in the Intermediate/Senior program:
  - will only be able to take Mathematics specific content and methodology courses if they have a recognized teachable in mathematics. To be admitted into the

specific mathematics qualification course, a Teacher Candidate will need to have completed five full year university courses in Mathematics or equivalent with an average of 75% to be granted a first teachable or three full year university courses in Mathematics or equivalent with an average of 70% to be granted a second teachable.

    - Teacher Candidates may opt to take a 0.25 credit course titled “Special Topics: Teaching Middle School (Grades 7 & 8)” where the context of a generalist teacher and an introduction to all Grade 7 & 8 curriculum are some of the Mathematics specific content and methodology may be presented. To take the Teaching Middle School course, Teacher Candidates would need to opt out of taking the other 0.25 credit which deals with Environmental Education in the Secondary Curriculum.

- Teacher Candidates in the Technological Education program do not have any opportunity to take any Mathematics content and methodology specific course.

Wilfrid Laurier University:

- Teacher Candidates in the Primary/Junior and in the Junior/Intermediate programs must take two required Mathematics content and methodology specific courses, one in each year, earning a total of six credits.
- Teacher Candidates in the P/J and the I/S programs may also choose an elective course, worth 0.25 credits, that deals with Mathematical Cognition and Exceptionalities.

Université d’Ottawa/University of Ottawa:

- **English Language Programs:**
    - Teacher Candidates in the P/J will take three courses, one in the first year and two in the second year, earning nine credits of math specific content and methodology.

- Teacher Candidates in the J/I program must take two courses, one in each year, earning six credits of math specific content and methodology.

  Teacher Candidate with a teachable in Mathematics must take three math specific courses for a total of nine credits.

  Teacher Candidates without a mathematics teachable may choose, as their sole elective, an additional three credit math content and methodology specific course for a potential total of nine credits in math courses.

- Teacher Candidates in the Aboriginal Education (P/J) will only have one Math content and methodology specific course throughout their 3-year program. This means that Teacher Candidates who are enrolled in the Aboriginal Teacher Education program will have six fewer math specific credits than Teacher Candidates in the regular P/J or J/I programs.

  This program is currently under review and new Teacher Candidates will only be admitted in the 2025-2026 school year.

- Teacher Candidates in the I/S program with a Mathematics teachable designation will have a total of twelve credits of math specific content.

To qualify for a Mathematics teachable, Teacher Candidates must have five full-year university courses in Math with an average of 75% for a first teachable or three full-year university courses with an average of 70% for a second teachable. Teacher Candidates in the Intermediate/Senior program who do not have a Mathematics teachable designation, have the option of taking a 3-credit Mathematics content and methodology specific course that will count as one of their two elective courses.

It is necessary to highlight that choosing the Math focused elective course limits Teacher Candidates from taking more than one of the following courses:

- Teaching in Roman Catholic Separate Schools;
- Integrating Technology in the Classroom;
- Equity in Education: Theory and Practice;
- Second Language Perspectives in Education;
- Counselling Applications in Secondary Schools;
- Social Justice and Global Education;
- Holistic and Non-Traditional Approaches to Education;
- Creating Healthy, Safe and Supportive Learning Environments;
- Teaching Writing Across the Curriculum;
- Introduction to Educational Leadership;
- Exploring Gender Sexual Diversity through a Critical Lens;
- Language and Literacy in the Elementary Schools: Development and Practice; or
- Pratiquons ensemble!: Empowering FSL teachers' personal and professional practice

- **<u>French Language Programs</u>:**
    - Teacher Candidates in the P/J French as a First Language (FFL) program are only required to take one mathematics focused course (3-credits) and have the option of taking one elective math focused course worth 3-credits.

      If the Mathematics optional course is selected, then Teacher Candidates cannot take the following other elective courses:
        - Enseignement religieux catholique à l'élémentaire (Teaching in Roman Catholic Separate Schools);
        - Stage en engagement communautaire (Practicum in community engagement); and
        - Enseignement en contexte minoritaire pluriethnique (Teaching in a minority pluriethnic context).

      Teacher Candidates in the P/J French as a First Language program will have two fewer Mathematics content and methodology specific courses than their counterparts in the English program. They also have fewer options as to the elective courses they could choose to take in the French language of instruction.

    - Teacher Candidates without a Mathematics teachable in the I/S French as a First Language (FFL) program are only required to take one Mathematics focused course (3-credits) and the option of one elective math focused course worth 3-credits.

Teacher Candidates with a Mathematics teachable are required to take two math specific courses for a total of six credits with the option of taking an additional three credit elective math specific course.

For the elective course options for J/I Teacher Candidates, they are the same as for the FFL Teacher Candidates in the P/J FFL program.

- Teacher Candidates with a Mathematics Teachable will be required to take two courses specializing in math content and methodology, one each year, worth a total of six credits.

  Teacher Candidates without a Mathematics teachable do not need to take any Mathematics specific course but do have the option of taking a three-credit math specific course, but they will forgo the opportunity of taking the following curriculum-based courses:

  - French as a First Language for Beginners; and
  - Dramatic Arts for Beginners.

- Teacher Candidates in the Technological Education program, which is only available in French at uOttawa, are not required or offered the opportunity to take any mathematics content and methodology specific courses.

Content and Structure of the Math Proficiency Test

The Math Proficiency Test was developed to be a standardized evaluation tool of the mathematics content from the Grades 3 to 9 curriculum, which must account for 70% of the test, with the remainder of the test dealing with mathematical pedagogy. Teacher Candidates had to achieve a 70% on each of these components to pass the MPT.

The OSSTF/FEESO recommendations focus on providing all Teacher Candidates an appropriate amount of mathematics specific courses that deal with both content and methodology/pedagogy of instruction.

Based on a sampling of math specific courses in three representative Ontario universities, there are differences in the type and number of math specific courses that are available or required for different programs within the same institution and amongst different Universities.

Teacher Candidates in the Intermediate/Senior programs at Brock University and the University of Ottawa are not required to take any mathematics focused courses unless they have Mathematics as one of their teachable courses.

Requiring Teacher Candidates in the Intermediate/Senior programs without a designated mathematics teachable, to successfully pass a Math Proficiency Test as a condition of Certification puts them at a significant disadvantage over Teacher Candidates in different programs. These Teacher Candidates do not learn pedagogy that is mathematics specific in any of their courses.

Teacher Candidates in both Technological Education Programs reviewed in **Appendix C** do not have any mathematics specific courses and neither offer Teacher Candidates the option of electing to take a mathematics specific course.

Teacher Candidates in an Aboriginal Education in the Primary/Junior (K-6) program, which is different than a Teacher Candidate in a Native Languages program which are explicitly exempted under the current legislation, have fewer math specific courses compared to their colleagues in the traditional Primary/Junior programs.

As such, the previous Math Proficiency Test evaluated mathematical content knowledge and mathematical methodology/pedagogy that not all Teacher Candidates had the opportunity to learn about simply based on the University they attended and the specific Initial Teacher

Education program they were enrolled it at the time the MPT became a certification requirement.

Conclusion

OSSTF/FEESO believes that its submissions on the Math Proficiency Test consultation are reasonable and supported by evidence.

It is imperative that the Government take immediate and appropriate actions to reduce all barriers to the entry to the teaching profession for all Teacher candidates without reducing the standards of the profession.

That is why OSSTF/FEESO strongly requests that the Math Proficiency Test legislation be repealed and that all associated savings be reinvested into publicly funded education from Junior Kindergarten to the post-secondary levels.

Consolidated recommendations:

1. **THAT** the Ontario Regulation 271/19 (Proficiency in Mathematics) under the Ontario College of Teachers Act (1996) be repealed and that there should not be any requirement for any Teacher Candidate to successfully pass a Mathematics Proficiency Test or any other similar high-stakes assessment to become certified as a Teacher in Ontario.

2. **THAT** the EQAO immediately cease any activities related to the development of the content of, the marking of, or the administration of any type of Math Proficiency Test (MPT).

3. **THAT** all post-secondary institutions that provide a program of professional education accreditation under Ontario Regulation 347/02 must immediately undertake to develop

and/or revise required courses, in both mathematics methodology and mathematics content, for Teacher Candidates in all programs such as, but not limited to, Primary/Junior, Junior/Intermediate, Intermediate/Senior, Aboriginal Education (Primary/Junior), Technological Education, French as a First Language, French as a Second Language, any other Anglophone or Francophone language programs.

4. **THAT** in the development of, or revisions to, required mathematics courses, each Faculty of Education must meaningfully consult with representatives from the *Ontario Teachers' Federation* (OTF/FEO) and each individual Teaching Affiliate: AEFO, ETFO, OECTA, and OSSTF/FEESO. The consultation shall include, but not be limited to, the number of course hours, the format of the course, the content of the course, and when in their course of study will the course, or courses, be offered to Teacher Candidates.

5. **THAT** the Ministry of Education engage in meaningful and on-going consultation with representatives from the OTF/FEO and each Teaching Affiliate: AEFO, ETFO, OECTA, and OSSTF/FEESO as part of the on-going and regular curriculum review to embed strategies and concepts of mathematical literacy or numeracy in all Ministry curriculum programs.

6. **THAT** the Ministry of Education provide sufficient additional funding to allow each Ontario School Board and School Authority to work with their respective local stakeholder groups, as required under Policy/Program Memorandum 159 – Collaborative Professionalism, to develop grade and level appropriate mathematical resources for teachers and education workers to use in the classroom.

Court Decisions Re: Alleged violation of *s. 15* of the Canadian Charter

OSSTF/FEESO believes that references to the MPT as having a disproportionate adverse impact on entry to the teaching profession for racialized Teacher Candidates should not be the primary focus of the OSSTF/FEESO's recommendations as to why the Math Proficiency test, or any other type of high-stakes exit exam. The reason for this is that the Courts have already made their decisions on this question, but it is important that the record states that the conclusions reached may not be determinative based on the evidence that was provided in both cases.

The December 17, 2021, decision from the Divisional Court **(ONSC)** stated the Math Proficiency Test violated *s. 15(1)* of the *Canadian Charter of Rights and Freedoms,* used demographic data compiled by the EQAO from the MPT Field Test, administered between February 18 and March 7, 2020, and from the First Administration of the MPT beginning on May 10, 2021, and until June 26, 2021.

In the Crown's appeal of the Divisional Court's decision, it submitted expanded demographic data compiled by the EQAO covering the period of May 10 to December 15, 2021. Using data from different time frames to answer the same question may lead to reaching different conclusions. This is the case for the Ontario Court of Appeals' Decision **(ONCA).** The question becomes what the provided data indicate? This section will present an objective review of the expanded demographic data that was used in the **ONCA** decision, for the reader's consideration.

The following charts summarize relevant data that indicates there were measurable differences on the success rate of Teacher Candidates based on age, language spoken, and race.

MPT Success Rates by Age Group

Outcome		Age Group (Years)		
		20-24 years	25-29 years	30+ years
Successful	**Count**	2375	1885	1345
	Column %	97%	96%	93%
Not yet successful	**Count**	61	76	106
	Column %	3%	4%	7%
Column Total		**2436**	**1961**	**1451**

According to the statistical analysis by EQAO (**ONCA** 788 decision, p. 3 of Appendix A) the success rates differ significantly by age.

Those in the 30+ years of age category have a lower success rate (93%) than their younger counterparts.

MPT Success Rates by Language Spoken

Outcome		Language Spoken			
		English	French	Something other than English or French	Multiple Answers
Successful	**Count**	4023	486	56	1332
	Column %	96%	95%	89%	96%
Not yet successful	**Count**	180	28	7	52
	Column %	4%	5%	11%	4%

Column Total	4203	514	63	1384

According to the analysis by EQAO (**ONCA** 788 decision, p. 3 of Appendix A) those Teacher Candidates who speak languages other than English or French have a lower success rate (89%) than those who speak English (96%), French (95%), or multiple languages (96%).

MPT Success Rates by Race

Outcome		Race								
		Black	East/ South east Asian	Indigen-ous	Latinx	Middle Eastern	South Asian	White	Another race cate-gory	Mix
Successful	Count	333	356	34	63	172	261	3733	61	227
	Column %	90%	96%	72%	94%	93%	93%	97%	91%	97%
Not yet successful	Count	36	13	13	4	12	21	105	6	7
	Column %	10%	4%	28%	6%	7%	7%	3%	9%	3%
Column Total		369	369	47	67	184	282	3838	67	234

According to the analysis by EQAO (**ONCA** 788 decision, p. 5 of Appendix A) Teacher Candidates who took the MPT and who identify as White or Mixed have the highest success rates (97% each); while those who identify as Indigenous have lower success rates (72%).

For Teacher Candidates who identify as Black, they have a success rate of 90% which is 6% lower than the average of all first-time Math Proficiency Test takers.

Differences need to be interpreted with caution given the small numbers of some groups, for example, Indigenous (34) and Latinx (63) test takers. This empirical evidence does not change the fact that 13 of the 34 Teacher Candidates who identify as Indigenous had a "*not yet successful*" rate of 28% which is seven times greater than the "*not yet successful*" (4%) rate for all first-time Math Proficiency Test takers.

Appendix B

Ranking of Ontario Students on the World Stage:

The *Council of Ministers of Education, Canada* (CMEC) prepared a report titled *Measuring Up: Canadian Results of the OECD PISA 2022 Study* which had mathematics as the major domain of study with Science and Reading as the 2 minor domains. The report can be accessed via this link: www.cmec.ca/Publications/Lists/Publications/Attachments/438/PISA-2022_Canadian_Report_EN.pdf

The following section will contain excerpts, with minimal stylistic modifications, from the CMEC document referenced above.

The *Programme for International Student Assessment* (PISA) is a collaborative effort among member countries of the *Organisation for Economic Co-operation and Development* (OECD) and it is designed to provide policy-oriented international indicators of the skills and knowledge of 15-year-old students and to shed light on a range of factors that contribute to successful students, schools, education systems, and learning environments.

The assessment measures skills that are generally recognized as key outcomes of the educational process and that are believed to be prerequisites for efficient learning throughout life and for full participation in society. The assessment does not focus on whether students can reproduce knowledge but rather on young people's ability to use and apply their knowledge and skills to meet real-life challenges.

In Canada, individual provinces and territories are responsible for K-12 education including establishing teacher qualifications, determining curriculum, and allocating the financial resources for the provision of elementary and secondary education. This differs significantly from many other OECD countries who have a more federal or National approach to setting standards, determining curriculum, and financing their education systems.

There were eighty-one (81) countries who participated in PISA in 2022. In most countries, there were between 5,000 and 10,000 15-year-old students from at least 150 schools that were tested. In Canada, about 23,000 students from over 850 schools participated across the ten (10) provinces to ensure the sample size of randomly selected students was large enough to produce reliable estimates representative of each province and for both French- and English-language school systems in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Colombia. PISA was administered in English and in French, depending on the school system in which students were enrolled.

Ontario had 7,803 out of the 23,000 or so Canadian 15-year-old students who were randomly selected to take the PISA 2022 test.

Each jurisdiction, including individual Canadian provinces, had the option of adding a maximum of ten (10) minutes of additional questions administered to students on the following topics: student attitudes toward the trades; student participation in French Immersion programs; Indigenous self-identity and student expectations; as well as their parents'/guardians' expectations (as perceived by the students), with regards to educational attainment. Ontario only opted for the French Immersion additional questions while six other provinces chose all four.

Ontario did join seven other provinces to add a 1-hour optional assessment of financial literacy which included cognitive components and a questionnaire.

Defining Mathematics in the PISA Context

In the PISA context, mathematics refers to mathematical literacy, which is defined as "an individual's capacity to reason mathematically and to formulate, employ, and interpret mathematics to solve problems in a variety of real-world contexts. It includes concepts, procedures, facts, and tools to describe, explain, and predict phenomena. It helps individuals

know the role that mathematics plays in the world and make the well-founded judgements and decisions needed by constructive, engaged, reflective 21st century citizens." (OECD, 2018, p.7)

Mathematical literacy prepares students to address real-world critical issues facing 21st century society through problem solving, mathematical reasoning, and computational thinking. PISA 2022 measures students' mathematical reasoning as well as their ability to apply the three processes of the problem-solving cycle as defined by the following four items adapted from OECD, 2023a:

- ***Mathematical reasoning*** refers to "thinking mathematically" and is the capacity to use mathematical concepts, tools, and logic to conceptualize and create solutions to real-life problems and situations.
- ***Formulating situations mathematically*** *(formulating)* refers to the ability to recognize or identify the mathematical concepts and ideas underlying real-world problems and to then provide mathematical structures to the problems.
- ***Employing mathematical concepts, facts, procedures*** *(employing)* refers to the ability to apply appropriate mathematics tools to solve mathematically formulated problems to obtain mathematical conclusions.
- ***Interpreting, applying, and evaluating mathematical outcomes*** *(interpreting)* refers to the ability to reflect on mathematical solutions, results, or conclusions and interpret them in the context of real-life problems.

The above four (4) points are incorporated in the subscales identified in the report as **Mathematical Process**. To assess mathematical processes, there is a need for mathematical content knowledge to be included in all questions.

The **Mathematical Content Knowledge** of the PISA 2022 test is organized around four (4) broad content areas central to the discipline and part of the Ontario mathematics curriculum. They are as follows, adapted from the OECD, 2018, pp. 24-26):

- ***Change and relationships*** involves understanding fundamental types of change and recognizing when they occur in order to use suitable mathematical models to describe and predict change. Mathematically, this means modelling the change and the relationships with appropriate functions and equations, as well as creating, interpreting, and translating among symbolic and graphical representations of relationships.
- ***Quantity*** incorporates the quantification of attributes of objects, relationships, situations, and entities in the world; understanding various representations of those quantifications; and judging interpretations and arguments based on quantity. To engage with the quantification of the world involves understanding measurements, counts, magnitudes, units, indicators, relative size, and numerical trends and patterns.
- ***Space and shape*** encompasses a wide range of phenomena that are encountered everywhere in our visual and physical world: patterns, properties of objects, positions and orientations, representations of objects, decoding and encoding of visual information, and navigation and dynamic interaction with real shapes as well as with representations.
- ***Uncertainty and data*** includes recognizing the place of variation in processes, having a sense of the quantification of that variation, acknowledging uncertainty and error in measurement, and knowing about chance. It also includes forming, interpreting, and evaluating conclusions drawn in situations where uncertainty is central. Quantification is a primary method for describing and measuring a vast set of attributes of aspects of the world.

In the PISA 2022 assessment, four (4) topics within the above content categories were flagged for special emphasis:

- growth phenomena (change and relationships)
- geometric approximation (space and shape)
- computer simulations (quantity)
- conditional decision making (uncertainty and data)

The key 21st-century skills connected to mathematical literacy within the framework are as follows:

- critical thinking
- creativity
- research and inquiry
- self-direction, initiative, and persistence
- information use
- systems thinking
- communication
- reflection

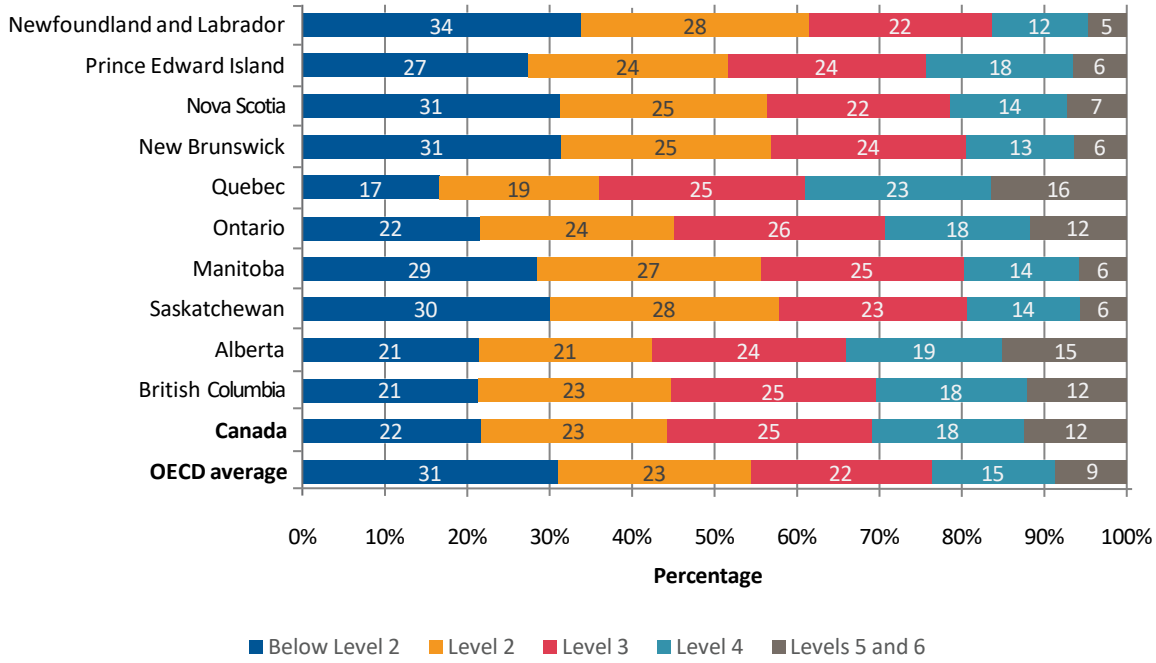
Results in Mathematics by Proficiency Level:

In PISA 2022, 78% of Canadian students and 69% of students in OECD countries performed at or above Level 2 in mathematics, which is the baseline level of mathematics literacy required to take advantage of further learning opportunities and to participate fully in modern society.

For Ontario students, 80% performed at or above Level 2 in mathematics. Ontario outperformed the Canadian results for percentage of students achieving at or above Level 2 in mathematics for Anglophone school systems but was below the Canadian average for Francophone school systems.

Figure 1.2

Percentage of students at each proficiency level in mathematics



Canadian, Provincial, and OECD results were also reported for the four (4) mathematical processes subscales where both Canada and Ontario significantly outperformed the average OECD country:

- ***Mathematical reasoning***: Canada (499) = Ontario (499) > OECD (473)
- ***Formulating situations mathematically*** *(formulating)*:

  Canada (494) > Ontario (490) > OECD (469)
- ***Employing mathematical concepts, facts, procedures*** *(employing)*:

  Canada (495) > Ontario (491) > OECD (472)
- ***Interpreting, applying, & evaluating mathematical outcomes*** *(interpreting)*:

  Canada (503) > Ontario (502) > OECD (474)

Canadian, Provincial, and OECD results were also reported for the four (4) mathematical content knowledge subscales where both Canada and Ontario significantly outperformed the average OECD country:

- ***Change & relationships***: Canada (502) > Ontario (501) > OECD (470)
- ***Quantity***: Canada (494) > Ontario (490) > OECD (472)
- ***Space and shape***: Canada (491) = Ontario (491) > OECD (471)
- ***Uncertainty and data***: Canada (500) > Ontario (499) > OECD (474)

Ontario ranked 13 out of all 91 jurisdictions (includes all countries and all 10 Canadian provinces) who participated in the PISA 2022 test. Ontario's average overall achievement score in mathematics was 495 which is not significantly different than the average score of Alberta (504), Canada (497), British Colombia (496), Netherlands (493), Ireland (492), Belgium (489), Denmark (489), United Kingdom (489), and Poland (489).

Math Specific Courses in Initial Teacher Education Programs at Faculties of Education

Brock University

Brock University Programs	Year One	Year Two	Analysis
Primary/ Junior (K-6)	**EDBE 8P39 Mathematics I Primary/Junior** Introduction to the Ontario Primary/Junior curriculum in Mathematics. Focus on deeper understanding of mathematical content, processes and ideas. Concepts, and procedures that build and connect across the grades and strands. **Lectures, seminar, 3 hours per week**.	**EDBE 8P44 Mathematics II Primary/Junior** Current trends and research-based issues in teaching and learning of mathematics focusing on the integration of content knowledge and pedagogy for Primary/Junior grades. **Lectures, seminar, 6 hours per week.** ***Prerequisite(s): EDBE 8P39***	Teacher Candidates in the P/J will take 2 courses, one in each year, earning 9 credits of math specific content and methodology.
Junior/ Intermediate (4-10)	**EDBE 8P29 Mathematics I Junior/Intermediate** Introduction to the Ontario Junior/Intermediate curriculum in Mathematics. Focus on	**EDBE 8P54 Mathematics II Junior/Intermediate** Current trends and research-based issues in teaching and learning of mathematics focusing on the integration of content	Teacher Candidates in the J/I will take 2 courses, one in each year, earning 9 credits of math specific content and methodology.

Brock University Programs	Year One	Year Two	Analysis
	deeper understanding of mathematical content, processes and ideas. Concepts, and procedures that build and connect across the grades and strands. **Lectures, seminar, 3 hours per week**.	knowledge and pedagogy for the Junior/Intermediate grades. ***Lectures, seminar, 6 hours per week. Prerequisite(s): EDBE 8P29***	
Aboriginal Education (K-6)	**ABTE 8P81 Mathematics I** Introduction to the Ontario Primary/Junior curriculum in Mathematics. Focus on deeper understanding of mathematical content, processes and ideas. Concepts and procedures that build and connect across the grades and strands. ***Lectures, seminar, 3 hours per week***. **Restriction: open to students admitted to the** Primary and Junior (Aboriginal) **program**.	**ABTE 8P93 Mathematics II** Current trends and research-based issues in teaching and learning of mathematics focusing on the integration of content knowledge and pedagogy for Primary/Junior Indigenous learners. ***Lectures, seminar, 3 hours per week.*** **Restriction: open to students admitted to the Primary/Junior program.**	Teacher Candidates in the Aboriginal Education (P/J) will take 2 courses, one in each year, earning 6 credits of math specific content and methodology. This means they will have 3 credits less than Teacher Candidates in the P/J or J/I programs.

Brock University Programs	Year One	Year Two	Analysis
Intermediate/ Senior (7-12)	**EDBE 8F83** **Teaching Mathematics I Intermediate/Senior** [Only Teacher Candidates with 5 full-year courses in Math for a 1st teachable or 3 full-year courses for a 2nd teachable will be able to take a math specific curriculum course in the Intermediate/Senior Program] Intermediate/Senior curriculum in Mathematics emphasizing practice and theory. Planning, instructional and assessment strategies. **Lectures, seminar, 3 hours per week.** **Restriction**: open to students admitted to the Intermediate/Senior	**EDBE 8Y04** **(0.25 Credit)** **Special Topics: Teaching in Middle School (Grades 7 and 8)** Introduction to the middle school context: ***being a generalist teacher, the grade 7 and 8 curriculum***, the culture of elementary/middle schools, and the transition to secondary school. ***Lectures, seminar, 3 hours per week.*** In addition to: **EDBE 8P92** **Teaching Mathematics II Intermediate/Senior** Connecting prior curriculum knowledge and instructional approaches examined in Teaching Mathematics Intermediate/Senior.	Teacher Candidates with a Mathematics teachable designation will have a total of six (6) credits of math specific content or 6.25 credits if they choose the special topic course of Teaching Middle School. To qualify for a Mathematics teachable, Teacher Candidates must have 5 full-year courses in Math with an average of 75 % for a 1st teachable or 3 full-year courses with an average of 70 % for a 2nd teachable. Teacher Candidates in the Intermediate/Senior program who do not have a Mathematics teachable designation, will only have the option of taking the Special Topics: Teaching in Middle Schools (Grades 7 & 8) 0.25 credit which provides context on being a generalist teacher and exploring the different grade 7 & 8 curriculum documents which could include some specific math content.

Brock University Programs	Year One	Year Two	Analysis
	program with a declared Mathematics teachable. To be granted a teachable, Teacher Candidates must have at least five credits (full year courses), averaging 75 percent, in a first teachable subject and three credits (full year courses), averaging 70 percent, in a second teachable subject.	***Lectures, seminar, 3 hours per week.***	It is necessary to highlight that choosing to take the Teaching in Middle School Special Topic course prevents Teacher Candidates from taking the Environmental Education in Secondary Schools course.
Technological Education (7-12)	**None**	**None**	Teacher Candidates in the Technological Education program are not required or offered the opportunity to take any mathematics content and methodology specific courses.

Wilfrid Laurier University

Laurier University Programs	Year One	Year Two	Analysis
Primary/ Junior (K-6) & **Junior/ Intermediate (4-10)**	**EU418, EU419: Mathematics Education (Foundations of Mathematics for Teaching and Extending Mathematics for Teaching)** These courses examine current theory and practice related to mathematics education across the primary/junior grades (K-6) or junior/intermediate grades (4-10) with a lens of equitable and inclusive teaching practices. These courses build and consolidate mathematical knowledge through hands-on exploration of learning trajectories in topics relating to Number and Algebra, Data, Spatial Sense, and Financial Literacy to build an understanding of research-based teaching practices in mathematics.		Teacher Candidates in the P/J and the J/I programs will take 2 required courses, one in each year, earning 6-credits of math specific content and methodology.
	EU432/EM432 Introduction to Mathematical Cognition and Exceptionalities 0.25 Credit Hours per week: Lecture/Discussion: 1.5 This course explores exceptionalities in mathematics, including delays in typically developing children. The course content will include an introduction to mathematical cognition, an overview of cognitive and developmental disabilities in mathematics, teaching and learning strategies and interventions for atypically and typically developing children (those without known cognitive or biological delays), and classroom and standardized testing protocols. (Online Learning only) (Cross-listed as EM432°.)		Teacher Candidates can also choose an elective course, worth 0.25 credits, that deals with Mathematical Cognition and Exceptionalities.

University of Ottawa/Université d'Ottawa

Ottawa Programs	Year One	Year Two	Analysis
Primary/ Junior (K-6)	**PED 3111Teaching at the Primary Division: Part I** Examination of instructional design and assessment strategies, models of inquiry and critical thinking, and approaches to curriculum integration relevant to the primary division (kindergarten to grade 3), special focus on Mathematics and the Arts Ontario Curriculum and other pedagogical resources. **Course Component: Lecture Credits: 3 units**	**PED 3121 Teaching at the Junior Division: Part III** Examination of instructional and assessment strategies, models of inquiry and critical thinking, and approaches to curriculum integration relevant to the junior division (grade 4 to grade 6); special focus on Science and Mathematics Ontario Curriculum and other pedagogical resources. **Course Component: Lecture Credits: 3 Units** **PED 3152 Enhancing Mathematics and Science Thinking** Focus on deepening understanding of fundamental mathematics and science concepts relevant for teaching and learning at the elementary school level. **Course Component: Lecture Credits: 3 Units**	Teacher Candidates in the P/J will take 3 courses, one in the 1st year and 2 in the 2nd, earning 9 credits of math specific content and methodology.

Ottawa Programs	Year One	Year Two	Analysis
Junior/ Intermediate (4-10)	**PED 3121 Teaching at the Junior Division: Part III** Examination of instructional and assessment strategies, models of inquiry and critical thinking, and approaches to curriculum integration relevant to the junior division (grade 4 to grade 6); special focus on Science and Mathematics Ontario Curriculum and other pedagogical resources. **Course Component: Lecture** **Credits: 3 Units**	**PED 3152 Enhancing Mathematics and Science Thinking** Focus on deepening understanding of fundamental mathematics and science concepts relevant for teaching and learning at the elementary school level. **Course Component: Lecture** **Credits: 3 Units** ***This course is only available with a Mathematics teachable designation.*** **PED 3187 Teaching Mathematics at the Intermediate Division** Introduction to the teaching of one of many disciplines at the intermediate and senior divisions. Impact of the particular discipline on the whole learner; individualized instruction; theoretical framework and pedagogical implications; critical examination and interpretation of relevant curriculum	Teacher Candidates in the J/I program must take 2 courses, one in each year, earning 6 credits of math specific content and methodology. Teacher Candidate with a teachable in Mathematics must take 3 math specific courses for a total of 9 credits. Teacher Candidates without a mathematics teachable may choose, as their sole elective, an additional 3 credit math content and methodology specific course.

Ottawa Programs	Year One	Year Two	Analysis
		guidelines. Development of programs; analysis and application of specific teaching strategies and techniques unique to the discipline. Evaluation procedures and techniques. **Course Component: Lecture** **Credits: 3 Units** **Optional Course** **Connecting Math to your World** Designed for Intermediate/Senior teacher candidates who do not have math as a teachable; Engagement with fundamental math concepts in ways intended to enhance confidence and support the rewriting of one's own math story; focus on challenging established views of mathematics, building on one's natural curiosity and developing mathematical agency. **Course Component: Lecture** **Credits: 3 Units**	

Ottawa Programs	Year One	Year Two	Analysis
Aboriginal Education (K-6)	PED1158 Education in the Primary/Junior Division - Mathematics (3 units)		Teacher Candidates in the Aboriginal Education (P/J) will only have one Math content and methodology specific course throughout their 3-year program. This means they will have 6 credits less than Teacher Candidates in the P/J or J/I program. *This program is currently under review and new Teacher Candidates will only be admitted in the 2025-2026 school year.*
Intermediate/ Senior (7-12)	**PED 3187 Teaching Mathematics at the Intermediate Division** Introduction to the teaching of one of many disciplines at the intermediate and senior divisions. Impact of the	**PED 4187 Teaching Mathematics at the Senior Division** Introduction to the teaching of one of many disciplines at the intermediate and senior divisions. Impact of the	Teacher Candidates with a Mathematics teachable designation will have a total of 12 credits of math specific content.

Ottawa Programs	Year One	Year Two	Analysis
	particular discipline on the whole learner; individualized instruction; theoretical framework and pedagogical implications; critical examination and interpretation of relevant curriculum guidelines. Development of programs; analysis and application of specific teaching strategies and techniques unique to the discipline. Evaluation procedures and techniques. **Course Component: Lecture** **Credits: 6 Units**	particular discipline on the whole learner; individualized instruction; theoretical framework and pedagogical implications; critical examination and interpretation of relevant curriculum guidelines. Development of programs; analysis and application of specific teaching strategies and techniques unique to the discipline. Evaluation procedures and techniques. **Course Component:** Lecture **Credits: 6 Units** **Optional Course** **Connecting Math to your World** Designed for Intermediate/Senior teacher candidates who do not have math as a teachable; Engagement with fundamental math concepts in ways intended to enhance confidence and support the rewriting of	To qualify for a Mathematics teachable, Teacher Candidates must have 5 full-year courses in Math with an average of 75 % for a 1st teachable or 3 full-year courses with an average of 70 % for a 2nd teachable. Teacher Candidates in I/S program who do not have a Mathematics teachable designation, have the option of taking a 3-credit Math content and methodology specific course that will count as one of their 2 elective courses. It is necessary to highlight that choosing the Math focused

Ottawa Programs	Year One	Year Two	Analysis
		one's own math story; focus on challenging established views of mathematics, building on one's natural curiosity and developing mathematical agency. **Course Component: Lecture** **Credits: 3 Units**	elective course limits Teacher Candidates from taking more than one of the following courses: Teaching in Roman Catholic Separate Schools; Integrating Technology in the Classroom; Equity in Education: Theory and Practice; Second Language Perspectives in Education; Counselling Applications in Secondary Schools; Social Justice and Global Education; Holistic and Non-Traditional Approaches to Education; Creating Healthy, Safe and Supportive Learning Environments;

Ottawa Programs	Year One	Year Two	Analysis
			Teaching Writing Across the Curriculum; Introduction to Educational Leadership; Exploring Gender Sexual Diversity through a Critical Lens; Language and Literacy in the Elementary Schools: Development and Practice; or Pratiquons ensemble!: Empowering FSL teachers' personal and professional practice
Initial Teacher Education Programs Offered in French at uOttawa			
Cycle Primaire/ Moyen (PM à 6) ***Primary/***	**PED 3757 Didactique des mathématiques à l'élémentaire (3 crédits)** Étude des principes et des contenus du curriculum de l'Ontario et d'autres documents d'appui du ministère, pour acquérir des connaissances et des compétences nécessaires	**PED 4599 Développement des compétences mathématiques** Approfondissement des connaissances mathématiques de la 1re à la 9e année. Étude critique des programmes-cadres en mathématiques et des stratégies pédagogiques,	Teacher Candidates in the P/J French as a First Language (FFL) program are only required to take 1 mathematics focused course (3-credits) and the option of one elective math focused

Ottawa Programs	Year One	Year Two	Analysis
Junior Program (JK to 6)	pour enseigner les mathématiques aux cycles primaire et moyen. Étude critique des programmes et du matériel pédagogique utilisé en classe. Examen des stratégies d'enseignement et d'évaluation, tout en soutenant les élèves et en valorisant leur diversité linguistique, culturelle et leurs besoins particuliers lors de la planification de l'activité mathématique. Intégration de la technologie éducative dans l'enseignement des mathématiques. **Volet : Cours magistral**	des difficultés et obstacles liés à l'enseignement - apprentissage des mathématiques. Examen du processus de construction des connaissances mathématiques par les élèves selon les résultats de recherches en didactique en mathématiques. Choix des stratégies d'enseignement et d'évaluation, tout en soutenant les élèves et en valorisant leur diversité linguistique, culturelle et leurs besoins particuliers lors de l'élaboration de situations d'apprentissage. Intégration de la technologie éducative en tant que ressource d'apprentissage et comme outil pour le développement de compétences. **Volet : Cours magistral** **Crédit : 3 unités**	course worth 3-credits. If the Mathematics optional course is selected, then Teacher Candidates cannot take the following other elective courses: Enseignement religieux catholique à l'élémentaire; Stage en engagement communautaire; Thème choisi; et Enseignement en contexte minoritaire pluriethnique.
Cycle Moyen/ Intermédiaire (4 à 10)	**PED 3757 Didactique des mathématiques à l'élémentaire (3 crédits)** Étude des principes et des contenus du curriculum de	**PED 3724 Didactique des mathématiques au cycle intermédiaire**	Teacher Candidates without a Mathematics teachable in the I/S French as a First Language (FFL)

Ottawa Programs	Year One	Year Two	Analysis
Junior/ Intermediate Program (4 to 10)	l'Ontario et d'autres documents d'appui du ministère, pour acquérir des connaissances et des compétences nécessaires pour enseigner les mathématiques aux cycles primaire et moyen. Étude critique des programmes et du matériel pédagogique utilisé en classe. Examen des stratégies d'enseignement et d'évaluation, tout en soutenant les élèves et en valorisant leur diversité linguistique, culturelle et leurs besoins particuliers lors de la planification de l'activité mathématique. Intégration de la technologie éducative dans l'enseignement des mathématiques. **Volet : Cours magistral**	Étude des principes et des contenus du curriculum de l'Ontario et d'autres documents d'appui du ministère, pour acquérir des connaissances et des compétences nécessaires pour enseigner les mathématiques aux cycles moyen et intermédiaire. Étude critique des programmes et du matériel pédagogique utilisé en classe. Choix et étude des stratégies d'enseignement et d'évaluation, tout en soutenant les élèves et en valorisant leur diversité linguistique, culturelle et leurs besoins particuliers lors de la planification de l'activité mathématique. Intégration de la technologie éducative dans l'enseignement des mathématiques. **Volet : Cours magistral** **Optional Course : PED 4599 Développement des compétences mathématiques** Approfondissement des	program are only required to take 1 mathematics focused course (3-credits) and the option of one elective math focused course worth 3-credits. If the Mathematics optional course is selected, then Teacher Candidates cannot take the following other elective courses: Enseignement religieux catholique à l'élémentaire; Stage en engagement communautaire; Thème choisi; et Enseignement en contexte minoritaire pluriethnique. Teacher Candidates with a mathematics

Ottawa Programs	Year One	Year Two	Analysis
		connaissances mathématiques de la 1re à la 9e année. Étude critique des programmes-cadres en mathématiques et des stratégies pédagogiques, des difficultés et obstacles liés à l'enseignement - apprentissage des mathématiques. Examen du processus de construction des connaissances mathématiques par les élèves selon les résultats de recherches en didactique en mathématiques. Choix des stratégies d'enseignement et d'évaluation, tout en soutenant les élèves et en valorisant leur diversité linguistique, culturelle et leurs besoins particuliers lors de l'élaboration de situations d'apprentissage. Intégration de la technologie éducative en tant que ressource d'apprentissage et comme outil pour le développement de compétences. **Volet : Cours magistral** **Crédit : 3 unités**	teachable are required to take 2 math specific courses for a total of 6 credits with the option of taking an additional 3-credit elective moth specific course.

Ottawa Programs	Year One	Year Two	Analysis
Cycle Intermédiaire/ Supérieur (7 à 12) ***Intermediate/ Senior Program (7 to 12)***	**PED 4771 Didactique des mathématiques au cycle intermédiaire (débutant) (3 crédits)** OU **PED 3724 Didactique des mathématiques au cycle intermédiaire** **(3 crédits)** Étude des principes et des contenus du curriculum de l'Ontario et d'autres documents d'appui du ministère, pour acquérir des connaissances et des compétences nécessaires pour enseigner les mathématiques aux cycles moyen et intermédiaire. Étude critique des programmes et du matériel pédagogique utilisé en classe. Choix et étude des stratégies d'enseignement et d'évaluation, tout en soutenant les élèves et en valorisant leur diversité linguistique, culturelle et leurs besoins particuliers lors de la planification de l'activité	**PED 4724 Didactique de mathématiques au cycle supérieur** **(3 crédits)** Initiation à l'enseignement d'une ou de plusieurs disciplines aux cycles intermédiaire et supérieur selon les stages de croissance et du développement de l'élève. Contribution de la matière à ce stade de développement, cadre théorique de l'apprentissage de cette discipline et implications pédagogiques; étude critique et interprétation des exigences des programmes à divers niveaux de difficultés; travaux d'analyse et d'application de stratégies d'enseignement, de méthodologies et de techniques propres à l'enseignement de la matière en question; préparation et utilisation du matériel didactique particulier à la matière; mise en situation. Mesure et évaluation de l'élève. Problème particulier :	Teacher Candidates with a Mathematics Teachable will be required to take two (2) courses would be a specializing in math content and methodology, one each year, worth a total of six (6) credits. Teacher Candidates without a Mathematics teachable have the option of taking a 3-credit math specific course, but then will forgo the following other curriculum-based courses: French as a First Language for beginners and Dramatic Arts for Beginners

Ottawa Programs	Year One	Year Two	Analysis
	mathématique. Intégration de la technologie éducative dans l'enseignement des mathématiques. **Volet : Cours magistral**	satisfaction des besoins individuels. **Volet : Cours magistral**	
Éducation technologique (9 à 12) ***Technological Education (9 to12)***	***None***	***None***	Teacher Candidates in the Technological Education program are not required or offered the opportunity to take any mathematics content and methodology specific courses.

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