

LOCALLY DEVELOPED COURSE OUTLINE

ESL Introduction to Mathematics15-!

Submitted By:

Red Deer Catholic Regional Division No. 39

Submitted On:

Mar. 22, 2016

Course Basic Information

<u>Outline Number</u>	<u>Hours</u>	<u>Start Date</u>	<u>End Date</u>	<u>Development Type</u>	<u>Proposal Type</u>	<u>Grades</u>
15-5	125.00	09/01/2016	08/31/2020	Acquired	Reauthorization	G10 G11 G12

Course Description

The goal of this course is to enable students to acquire academic language skills while mastering the key foundational mathematical ideas and basic math content necessary for entry into grade-level mathematics classes. This course is appropriate for those English Language Learners who enter high school without the pre-requisite skills necessary for entry into Math 14 and Math 10-4, when required.

Course Prerequisites

This course is appropriate for English language learners who enter high school without the prerequisite language skills necessary for entry to Math 10C, 10-3, or 10-4.

Sequence Introduction (formerly: Philosophy)

The intent of this course is to enable students to acquire academic language, literacy, and numeracy skills while mastering the key foundational mathematical concepts necessary for entry into high school mathematics courses. The structure is designed to offer a number of years of math instruction in a condensed period of time by compacting learning outcomes of mathematical strands across the beginning grade levels of the Alberta Program of Studies. The course will challenge the students to increase their receptive and expressive language skills in order to communicate critical thinking in mathematics. Students will be introduced to technologies that enhance their ability to learn and communicate mathematical understandings. They will be exposed to multiple perspectives for problem solving (e.g. manipulatives and cooperative learning) and the finding of solutions. The instruction will incorporate multiple approaches for language learning, mathematical numeracy and literacy, mathematical reasoning, and communicating mathematically.

Student Need (formerly: Rationale)

In keeping with the values defined within Alberta Education's Ministerial Order on Student Learning, ESL Introduction to Mathematics 15-5 is a 5-credit course designed to meet the needs of English language learners who require scaffolded support with the English language and content of mathematics to access the Alberta Education High School Mathematics Program of Studies.

This course is meant for Language Proficiency (LP) 1 students who, due to limited or interrupted schooling in their first language, need explicit language, literacy, and numeracy instruction. It is also intended for LP Level 1/2 (Literacy) students who are approaching grade level in their mathematical understanding but would benefit from explicit language instruction to access the mathematical content in higher grades.

The course focuses on essential pre-requisite skills from the mathematical strands of number, shape and space, statistics and probability, patterns and relations. This course is intended to support the student in the acquisition of competencies in language, literacy, and numeracy in mathematics to successfully transition into the Alberta Education High School Mathematics Program of Studies.

Scope and Sequence (formerly: Learner Outcomes)

ESL Introduction to Mathematics 15, a 5 credit course, focuses on multiple approaches to learning language functions, forms, and vocabulary specific to mathematics. This course will consolidate learning of the early years outcomes of the mathematical strands: Number Sense, Shapes and Space, Patterns and Relations, and Statistics and Probability. Technology will be infused in the teaching and learning environment.

Guiding Questions (formerly: General Outcomes)

- 1 Discover multiple approaches to learning mathematics and language; learning mathematical numeracy and literacy, mathematical reasoning, and ways for communicating mathematically.**
- 2 Understand and effectively utilize language functions, forms (grammatical structures), and vocabulary that are specific to mathematics.**
- 3 Develop number sense of whole numbers, decimals, and common fractions and explore integers.,**
- 4 Apply arithmetic operations on whole numbers and decimals in solving problems**
- 5 Utilize direct and indirect measurement to solve problems and discover relationships among 2-D shapes and 3-D objects**
- 6 Create patterns and designs that incorporate symmetry and transformations**
- 7 Utilize patterns and relations to summarize, generalize and extend patterns and solve problems.**
- 8 Utilize informal, concrete, pictorial and abstract representations of equality and operations on equality to solve problems**
- 9 Develop and implement a plan for the collection, display and interpretation of data gathered from appropriate settings**
- 10 Effectively use technology to enhance understanding of mathematical concepts.**

Learning Outcomes (formerly: Specific Outcomes)

1 Discover multiple approaches to learning mathematics and language; learning mathematical numeracy and literacy, mathematical reasoning, and ways for communicating mathematically.	15-5
1.1 Become familiar with classroom routines, instructions, process, and assessment related to the typical high school mathematics classroom.	X
1.2 Integrate background knowledge and real-life experiences into the introduction of math	X
1.3 Identify personal learning strategies	X
1.4 Practice cooperative learning skills in flexible learning groups	X
1.5 Utilize manipulatives (e.g. base ten blocks), for projects, and deepening understandings through inquiry-based learning re: big ideas	X
1.6 Investigate problem solving steps and strategies.	X

2 Understand and effectively utilize language functions, forms (grammatical structures), and vocabulary that are specific to mathematics.	15-5
2.1 Identify and effectively use the functions of language found in math. (e.g. compare, cause and effect, predict)	X
2.2 Effectively practice modeled forms (grammatical structures) used in expressing understanding in math. (e.g. sentence frames for inequalities- ___ is less than ___ but more than ___.)	X
2.3 Increase personal banks of academic transferable vocabulary (e.g. solution) as well as content-specific vocabulary. (e.g. Cartesian plane)	X

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3 Develop number sense of whole numbers, decimals, and common fractions and explore integers.,	15-5
3.1 Describe order or relative position, using ordinal numbers (up to tenth)	X
3.2 Recognize at a glance (subitize) arrangements of 1 - 10 objects	X
3.3 Describe, represent and compare quantities from 0.01 to 10 000 (as whole numbers, fractions and decimals)	X
3.4 Compare quantities from 0.01 to 10 000 using the terms more, fewer, as many as and the same(as whole numbers, fractions and decimals)	X
3.5 Skip count by two's, fives, tens, hundreds and thousands from appropriate multiples	X
3.6 Express, construct and deconstruct numbers based on their place value from 0.01 to 10 000	X
3.7 Describe, represent and compare integers.	X
3.8 Express numerals as found in addresses, phone numbers, dates, prices, temperature, time using the appropriate vocabulary and in the correct context	X

4 Apply arithmetic operations on whole numbers and decimals in solving problems	15-5
4.1 Demonstrate addition with answers to 10 000 and corresponding subtraction to solve problems.	X
4.2 Use multiplication (2-digit by 2-digit) and division (3-digit by 1-digit) strategies to solve problems	X
4.3 Identify the monetary values of Canadian currency and solve problems involving currency such as making change	X
4.4 Estimate and round prices on various goods and services	X
4.5 Identify when GST should be applied and calculate the GST in various situations.	X

5 Utilize direct and indirect measurement to solve problems and discover relationships among 2-D shapes and 3-D objects	15-5
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5.1 Use direct measurement to compare two objects based on a single attribute	X
5.2 Sort, build, and classify real world objects	X
5.3 Demonstrate an understanding of measurement	X
5.4 Sort 2-D shapes and 3-D objects using one attribute	X
5.5 Estimate, measure, compare, and order, using nonstandard units of measurement	X
5.6 Describe, compare, and construct 3-D objects and 2-D shapes	X
5.7 Relate the passage of time to common activities	X
5.8 Estimate, measure, and record using whole numbers and standard measurement units	X
5.9 Describe 3-D objects according to faces, edges, and vertices	X
5.10 Sort regular and irregular polygons	X
5.11 Read and record time and dates	X
5.12 Determine area of regular and irregular 2-D shapes	X
5.13 Demonstrate understanding of measuring length, volume and capacity	X
5.14 Describe the relationship of two 3-D objects and 2-D shapes	X

6 Create patterns and designs that incorporate symmetry and transformations	15-5
6.1 Identify and create line symmetries on various 2-D shapes	X
6.2 Identify, perform, and draw a single transformation	X

7 Utilize patterns and relations to summarize, generalize and extend patterns and solve problems.	15-5
7.1 Identify, reproduce, extend, and create repeating patterns from daily experiences.	X
7.2 Demonstrate an understanding of increasing and decreasing numerical and non-numerical patterns	X

7.3 Describe equality and record using the symbol	X
7.4 Explore numerical and non-numerical patterns in daily experience	X
7.5 Represent, describe, and extend patterns and relationships using charts and tables	X
7.6 Determine the pattern rule to make predictions about subsequent elements	X

8 Utilize informal, concrete, pictorial and abstract representations of equality and operations on equality to solve problems	15-5
8.1 Describe equality and record using the symbol	X
8.2 Demonstrate and explain the meaning of equality concretely, pictorially and symbolically.	X
8.3 Express problems in one-step equations, with a single variable and solve	X
8.4 Represent algebraic expressions in multiple ways	X

9 Develop and implement a plan for the collection, display and interpretation of data gathered from appropriate settings	15-5
9.1 Gather and record data about self and others	X
9.2 Construct and interpret concrete graphs and pictographs	X
9.3 Collect first-hand data and organize it to answer questions	X
9.4 Construct, label, and interpret bar graphs to solve problems	X
9.5 Construct and interpret pictographs	X
9.6 Represent, display, and interpret double bar graphs to draw conclusions	X

10 Effectively use technology to enhance understanding of mathematical concepts.	15-5
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10.1 Effectively use technologies such as hand-held non-electronic measuring devices to understand shape and space (e.g. rulers)-	X
10.2 Effectively use calculators to solve problems.(simple to scientific)	X
10.3 Effectively use computer software from (operations, visual displays, graphing, up to spreadsheets)	X

Facilities or Equipment

Facility

Delivery of the course will be in regular classroom or on a one-to-one basis dependent on the security level of the institution where the Education department is situated.

Facilities:

Equipment

Basic manipulatives (base ten blocks, cards, number lines, computers, measuring cups and spoons, rulers, tape measures, dice, beakers, cylinders, thermometers, protractors).
Computers with internet access, Smartboards, basic calculators. (Extension-Scientific calculators)

Learning and Teaching Resources

Iwamoto, Julie. Coming Together, Books 1 and 2. Prentice Hall, 1994.(Limited Quan Available)

Math Makes Sense 5 (Student Text), Pearson Education Canada, 2009

Math Makes Sense 6 (Student Text), Pearson Education Canada, 2009

Math Focus 5 (Student Text), Nelson Education, 2008

Math Focus 6 (Student Text), Nelson Education, 2010

National Library of Virtual Manipulatives: Utah State University

<http://nlvm.usu.edu/en/nav/vlibrary.html>

Sensitive or Controversial Content

Some expected classroom routines and behaviours will be outside of the experience of students with limited formal schooling and/or from other cultural traditions and must be strategically addressed and supported; e.g. the use of partners and group work; differences in symbols and their use, differences in conceptual strategies and study or problem solving procedures, differences in measurement systems, the use of some manipulatives like cards or dice, and difference in focus on computational skills vs. investigation and reasoning.

Students in consultation with their teacher advisors shall choose projects and presentations that are appropriate to the school philosophy and community of a Catholic School. Please refer to Administrative Procedure 103 - Safe and Caring Schools on our website.

Issue Management Strategy

Health and Safety

Some expected classroom routines and behaviours will be outside of the experience of students with limited formal schooling and/or from other cultural traditions and must be strategically addressed and supported; e.g. the use of partners and group work; differences in symbols and their use, differences in conceptual strategies and study or problem solving procedures, differences in measurement systems, the use of some manipulatives like cards or dice, and difference in focus on computational skills vs. investigation and reasoning.

External resources such as guest speakers must be approved by school administration.

All Off-site activities are organized according to Red Deer Catholic Regional Schools – Administrative Procedure 342 - Field Trips and Other Curricular Activities.

Risk Management Strategy

Statement of Overlap with Existing Programs

The outcomes in this course do not overlap with outcomes in the high school program of studies for mathematics. However, four of the outcomes for this course are taken from the provincial curriculum for elementary mathematics. The outcomes have been purposely selected from earlier grades within our curriculum to help educators understand the spiral nature of mathematics learning. As well, these outcomes will be used as pre assessment, and post assessment criteria based on Alberta curriculum understandings to support successful transitions for students to the mainstream high school courses.

This course is a reauthorization and previously has been found by Alberta Education not to have any significant overlap with existing provincially developed courses.

Student Assessment

Assessment practices for this course should invite student participation in articulating learning targets and setting criteria for success, in providing evidence of understanding and in developing appropriate grading practices. Assessment and grading practices should also reflect the context of particular student, school and classroom learning needs.

Teachers will set specific criteria and grading practices, with students, as they assess student learning based on the learning outcomes from the course. These criteria form the basis for assessing, grading and reporting student progress. Communicating student progress is an ongoing conversation between the teacher, the student and the parent, throughout the course, with the goal of improving student learning.

The validity of assessment will be enhanced if evidence of student achievement, related to the general and specific outcomes, is gathered over time, and through communication with students as they build understanding, revise misunderstandings and refine approaches to learning. Careful observation of students as they engage in learning tasks and critical examination of the work they produce allows teachers to build out a multi-dimensional picture of student learning.

Valid grading reflects a student's achievement towards the learning outcomes. The reporting of behavior, effort, attendance, neatness, group contribution, initiative etc. is reported separately (Webber, Aitken, Lupart, & Scott, 2009, Guskey, 2006, Reeves, 2004).

To be credible and defensible, assessment information that is used in grading a body of evidence, samples student performance, and is related to specified outcomes, based on professional judgment rather than being based on a calculated mean (average).

Assessment and grading practices should take into consideration the helical nature of learning - the recursive and increasingly complex skills and knowledge required of students as they demonstrate what they know and can do in relation to each of the specific and general outcomes. As the complexity of learning outcomes increases within each level of the course (15-25-25), evidence of a more comprehensive understanding is required.

Where a specific learner outcome spans all levels (15-25-35), students are expected to show an increasing level of sophistication and refinement of skills in demonstrating the outcome. Overall, general and specific outcomes can be achieved and assessed concurrently rather than sequentially.

Teachers should adhere to the following assessment standards when determining appropriate assessment and grading practices for this Locally Developed Course.

Assessment practices should reflect the following principles:

- Assessment of student performance is explicitly tied to the learning outcomes of the course
- Students are involved in understanding and articulating learning targets and criteria of success
- Students have opportunities to receive feedback in non-graded and formative learning activities and assignments before submitting assignments or engaging in activities for summative evaluation
- Assessments are purposefully designed in ways that motivate and challenge students, and are respectful of student diversity
- Students are provided choice in how they demonstrate learning

- Assessment data is gathered from a broad range of assessment activities and includes information from student work products and performances, from teacher observations of student learning processes, and from student reflections/student-provided evidence of success
- Assigned grades emphasize the most recent and most consistent evidence of student learning
- Assessment of Citizenship, Personal Development and Character is considered within all learning programs as included within the Calgary Board of Education Board of Trustees' Governance Policies.

References

Guskey, T. R. (May, 2006). Making high school grades meaningful. Phi Delta Kappa International,

87(9), pp. 670-675. Retrieved from <http://www.jstor.org/stable/20442125>

Reeves, D.B. (Dec 2004). The case against zeros. Phi Delta Kappan 86 (4). Retrieved from

<http://schools.esu13.org/bannercounty/Documents/caseagainstzero.pdf>

Webber, C.F., Aitken, N. Lupart, J. & Scott, S. (2009). The Alberta student assessment study final

report. Edmonton, Canada:

Course Approval Implementation and Evaluation

