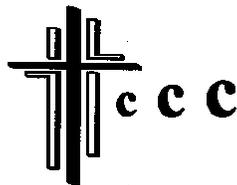


Integrating Mathematics
and
Information & Communication Technology

ICT NUMERACY ACTIVITIES

*Kindergarten to Grade 8
Data Management & Probability and Geometry & Spatial Sense
Strands*



**Catholic Curriculum Corporation
Central and Western Regions**

April 2008

Integrating Mathematics and Information & Communication Technology ICT Numeracy Activities

*Kindergarten to Grade 8
Data Management & Probability and Geometry & Spatial Sense Strands*

Table of Contents

Section 1 Introduction

Forward
Acknowledgements
Curriculum in Catholic Schools
ICT Numeracy and Catholic Curriculum
Technology and ICT Numeracy Activities
Organization of the Overview Charts and ICT Numeracy Activities
Overview Charts
Numeracy and Assessment
Resources
Appendices

Section 2 Kindergarten Numeracy Activities

Overview Chart
Data Management & Probability Lessons and Supporting Files
Geometry & Spatial Sense Lessons and Supporting Files

Section 3 Primary Numeracy Activities

Grade 1 Overview Chart
Data Management & Probability Lessons and Supporting Files
Geometry & Spatial Sense Lessons and Supporting Files

Grade 2 Overview Chart
Data Management & Probability Lessons and Supporting Files
Geometry & Spatial Sense Lessons and Supporting Files

Grade 3 Overview Chart
Data Management & Probability Lessons and Supporting Files
Geometry & Spatial Sense Lessons and Supporting Files

Section 4 Junior Numeracy Activities

Grade 4 Overview Chart

Data Management & Probability Lessons and Supporting Files
Geometry & Spatial Sense Lessons and Supporting Files

Grade 5 Overview Chart

Data Management & Probability Lessons and Supporting Files
Geometry & Spatial Sense Lessons and Supporting Files

Grade 6 Overview Chart

Data Management & Probability Lessons and Supporting Files
Geometry & Spatial Sense Lessons and Supporting Files

Section 5 Intermediate Numeracy Activities

Grade 7 Overview Chart

Data Management & Probability Lessons and Supporting Files
Geometry & Spatial Sense Lessons and Supporting Files

Grade 8 Overview Chart

Data Management & Probability Lessons and Supporting Files
Geometry & Spatial Sense Lessons and Supporting Files

Integrating Mathematics and Information & Communication Technology

ICT Numeracy Activities

Kindergarten to Grade 8

Data Management & Probability and Geometry & Spatial Sense Strands

Forward

Our Mission and Purpose

The Catholic Curriculum Corporation is a consortium of seventeen Catholic school boards across central and western Ontario. As an important partner in Catholic education, we recognize that Catholic education exists to provide a holistic formation of people as living witnesses of faith. We demonstrate our mission when we engage with, and support, our member boards in sustained, substantive school improvement and student growth that is reflective of a Catholic professional learning community.

Mission Statement

Building and sustaining the Catholic capacity of educators through the development and provision of high quality Catholic curriculum, resources, support and professional development.

Message from the Executive Director

On behalf of the Catholic Curriculum Corporation, I would like to invite educators to review and use this rich Numeracy resource. The writers have made every effort to ensure it aligns with current Ministry documents, while examining it with the lens of the Catholic learner.

The ICT Numeracy Activities resource provides a wide range of numeracy activities and resources for Kindergarten to Grade 8 based on the Data Management & Probability and the Geometry & Spatial Sense strands. The lessons focus on the integration of ministry licensed computer software to meet expectations. It has a user-friendly presentation of lessons, activity templates, student instruction BLM and other resources to assist teachers in their planning, teaching and assessment of mathematics, while incorporating technology as a tool to support the mathematical understanding.

The Catholic Curriculum Corporation would like to thank Chris Eaton, Waterloo CDSB, project lead, as well as the many writers and reviewers involved in producing this high quality Numeracy resource for teachers.

**G.A. Blake,
Executive Director**

Acknowledgements

Project Lead	Chris Eaton, Waterloo CDSB
Board Project Coordinators	Wendy Sahi, York CDSB Joanie Causarano, Halton CDSB (Ministry) Regan Dore-Anderson, Halton CDSB Lorenzo Pinazza, Windsor-Essex (retired) Chris Eaton, Waterloo CDSB
Writers	Bruna Gallace, York CDSB Luana Marinelli, York CDSB Joanie Causarano, Halton CDSB Regan Dore-Anderson, Halton CDSB Eugenia Plozczansky, HaltonCDSB Elaine Wilson, Halton CDSB Rosario Giannetti, Windsor-Essex CDSB Shawn Gaudette, Windsor-Essex CDSB Missy Routhier, Waterloo CDSB Jodi Albrecht, Waterloo CDSB Fran Craig, Curriculum Manager CCC
Reviewers	Representatives of Computers in Education Council, CCC Wendy Sahi, York CDSB Regan Dore-Anderson, Halton CDSB Melinda Ram, Halton CDSB Chris Eaton, Waterloo CDSB Jodi Albrecht, Waterloo CDSB Missy Routhier, Waterloo CDSB Fran Craig, Curriculum Manager, CCC

Curriculum in Catholic Schools

Catholic schools have the unique educational purpose of presenting a Catholic world view to their students.

A Catholic world view is a way of looking at the world through a Catholic Church lens. This world view is derived from Catholic Church teachings, scripture and Catholic Church traditions. These teachings, scripture and traditions form the basis of what is taught in Catholic schools.

A Catholic world view is infused into Catholic Curriculum when writers combine Ontario Catholic School Graduate Expectations and Ontario Ministry of Education expectations for a specific subject to create resources for teachers to use in Catholic classrooms.

The perspective of the Catholic Church permeates all of the content that teachers present in each subject area. Teachers make the students aware of the Church's position during lessons, discussions, and other curriculum activities. The integration of our faith into all aspects of our curriculum, demonstrates the oneness of ourselves, our world and God's vision for us.

While following Ministry's curriculum expectations for Kindergarten, Catholic curriculum is developed from the following foundational elements:

- *Scripture and Catholic Church Teaching,*
- *Curriculum Support for Catholic Schools,*
- *The Ontario Catholic School Graduate Expectations*
- *Education for All*
- *Educating the Soul*

These resources embody and proclaim the philosophy and distinctiveness of Catholic curriculum.

In our classrooms, both teachers and students need to be able to articulate a Catholic world view. The challenge for writers of Catholic curriculum is to ensure that the Catholic world view is explicitly evident in their writing if they are to produce support resources that teachers can use with confidence that they reflect Catholic Church teachings.

*Writing Catholic Curriculum: A Course for Writers of Catholic Curriculum
CCC 2006, p 7-8*

ICT Numeracy Activities and Catholic Curriculum

As a part of the Catholic Curriculum Corporation's mandate, we recognize the need to develop resources which will support teachers in their efforts to teach students, guiding them to learn and develop to their full potential as living witnesses of the Catholic faith.

Monsignor Dennis Murphy in his recent book, Catholic Education: A Light of Truth, writes that ...there are many distinctive features or characteristics of Catholic schools...Ultimately, however, the Catholic school is distinguishable from public or secular schools because there is a fundamental difference in the intentional learning environment which Catholic schools seek to create. That unique learning environment which is both the genius and the hallmark of a Catholic school is Christian community – a place and space where the echoes and presence of God are everywhere.

Catholic Education: A Light of Truth, Msgr. D. Murphy, 2007, p 116-117

Connected with our goal as Catholic educators in nurturing the spiritual well being of our students within that 'unique learning environment', we are equally challenged to provide an engaging experience academically. As Catholic teachers, we might pose the question, "How do we employ the Catholic lens in teaching Numeracy?" Certainly, this presents some challenges but if we truly believe that every day, in every subject, every lesson is set in a learning environment that is infused with the Catholic faith, it is a natural part of our daily activities, including mathematics.

The Catholic Graduate Expectations (CGE's) are overt beacons to guide educators in ensuring our students grow and live the Catholic faith. In the ICT Numeracy resource, the Catholic Graduate Expectations are listed, where appropriate to the activity, in the Expectations section. As well, the CGE's are addressed in the Assessment for Learning section of the lesson.

With the assistance of the Catholic Curriculum Maps, Appendix A, teachers can present the Unifying Catholic Theme and Essential Questions to frame classroom activities and lessons. The themes and questions, which are grade specific, help to frame lessons, extensions and cross-curricular integration in the classroom. The Catholic Theme and Essential Questions can be posted as a visual reminder to the class, placing this lens over all curriculum activities to analyse the learning from the Catholic perspective.

As Catholic educators the way we approach our planning, teach our lessons, interact with our students and assess their learning, supports the '*fundamental difference in the intentional learning environment which Catholic schools seek to create*'.

Technology and the ICT Numeracy Activities

The province of Ontario has made Numeracy a priority and has continued to place a strong emphasis on mathematical literacy of students. It is a subject that pervades all areas of the curriculum and everyday life.

Mathematics is a fundamental human activity – a way of making sense of the world.

*Teaching and Learning Mathematics,
The Report of the Expert Panel on Mathematics in Grades 4-6 in Ontario, p 1*

About the Teaching and Learning of Data Management and Probability

The related topics of data management and probability are highly relevant to everyday life. Graphs and statistics bombard the public in advertising, opinion polls, population trends, reliability estimates, descriptions of discoveries by scientists, and estimates of health risks, to name a few.

The Ontario Curriculum, Grades 1-8: Mathematics, 2005, p 9

The Big Ideas in Geometry and Spatial Sense

Geometry enables us to describe, analyse and understand our physical world, so there is little wonder it holds a central place in mathematics or that it should be a focus throughout the school mathematics curriculum.

*Gavin, M.K., Belkin, L.P., Spinelli, A.M., & St. Marie, J.,
Navigating through geometry in Grades 3-5, p 1*

As educators we are commissioned to assist students in making sense of mathematics, in developing their mathematical thinking, and in making connections and persevering to understand and solve mathematical challenges, while assisting them in their communication of their mathematical thinking and understanding to others. In order to do that, teachers are encouraged to use a wide range of resources and pedagogical approaches in teaching Mathematics including manipulatives, children's literature, textbooks, teacher's guides and other professional resources for teachers, including technology.

Technology that is used well can play an important role in the junior classroom.

*Teaching and Learning Mathematics,
The Report of the Expert Panel on Mathematics in Grades 4-6 in Ontario, p 28*

Believing in the importance of technology, as one effective tool in teaching Mathematics, the writers from four school boards set out to create a Numeracy resource to support teachers from K-Grade 8. They developed lessons and activities integrating mathematics and the use of technology in teaching the Data Management & Probability and Geometry & Spatial Sense strands. The lessons are organized by grade to assist teachers in providing learning opportunities which encourage investigation, require critical thinking skills to analyse and compare results, and develop diagrammatic reasoning and application of this learning to new situations.

Just as the Expert Panel suggests that exploring mathematics through technological applications should be an integral part of the junior mathematics program, this resource sees that as applicable to all grades.

Exploring mathematics with technological applications should be an integral part of the junior mathematics program. Many junior students use technology on a daily basis to investigate and to communicate ideas. Technology is part of their world and the world of their future (deSessa, 2000). Technology is not meant to replace mathematical thought but to expand it. Mathematicians themselves use technology. In mathematical activities, tools not only expand cognitive capabilities, they transform them (Wersch, 1985), and computer tools have become as fundamental to the work of professional mathematicians as the protractor was to the work of the ancient geometers. p 28

Technology changes the mathematics that students do and the way that students do mathematics. It changes teachers' priorities about what needs to be taught. For example, in the twenty-first century it is not necessary for students to do extensive calculations by hand, but it is necessary for them to develop deep number sense (Reys & Arbaugh, 2001). Technology also allows students to "play" with ideas – both numerical and geometrical –and to ask questions and make hypotheses about their world that they could not before. Through self-directed discovery, students gain access to new levels of mathematics (Sinclair, 2004) and develop their curiosity and a willingness to consider various options. This suggests that... experiences with technology should include opportunities for free exploration.

*Teaching and Learning Mathematics,
The Report of the Expert Panel on Mathematics in Grades 4-6 in Ontario, p 29*

It is our hope that the activities in the ICT Numeracy resource will enhance the mathematical experience for students in investigating and communicating ideas, through the use of technology in our Catholic schools.

Organization of the Overview Charts and ICT Numeracy Activities

The Overview Chart

The Overview Chart lists the **Activity, Description of Task, Student Instruction Black line Masters (BLM), Activity Template, Software** and **Concepts** for each grade. The charts are organized with Data activities first, followed by the Geometry activities for that grade. A full set of Overview Charts for each grade has been included in this introductory section for easy reference and lesson location.

- **Activity** identifies the grade, strand, and activity number e.g. 1D1 – Grade One, Data Management & Probability, Activity One
- **Description of Task** summarizes the activity the students will complete
- **Student Instruction BLM** indicates if there is a Black Line Master provided for the lesson, denoted by a Yes or No. The BLM is available to support the teacher or EA who might be working with a student, or provide students with independent instructions, depending on the age or needs of the student
- **Activity Template** is an actual template created using a specific piece of software. If an Activity Template is provided, it is denoted with a Yes or No. Students would use the Activity Template to complete the learning task. (e.g. gsp – Geometer’s Sketchpad file)
- **Software** lists the Ministry licensed software available to all publicly funded schools in Ontario. The type of software is identified by its purpose as listed in Ontario Software Acquisition Program Advisory Committee (OSAPAC). The specific software title then follows in brackets e.g. Presentation (KidPix Deluxe 4). See Appendix C for a complete list
- **Concepts** identifies the mathematical understandings students are developing during the activity

Lesson Template

The Lesson Template includes the following sections:

- Title Bar (Activity, Strand, and Concept)
- Description of Task
- Expectations (Process, Overall, Specific, Catholic Graduate Expectations)
- Software Type
- Computer Skills Prerequisite
- Student Instructions (for teacher)
- Teacher Notes
- Indicator of Additional Lesson Materials: Activity Template File (pre-made template using specific software) and Student Instruction BLM
- Assessment for Learning

It should be recognized that the activities offered in this resource would be used in conjunction with other lessons related to teaching the Data Management & Probability or Geometry & Spatial Sense strands. The lessons do not attempt to cover all expectations, but do offer teachers a technological option in meeting some of the expectations.

Integrating Mathematics and Information & Communication Technology

Activity Overview Chart: Kindergarten

Activity	Description of Task	Student Instruction BLM	Activity Template	Software	Concept
KD1 Favourite_Sports	Students practice interpreting a graph.	No	Yes	Graphic Organizer (<i>SMART Ideas 5</i>)	Interpret a three column graph.
KD2 Pets	Students practice creating a graph.	No	Yes	Word Processing (WordPerfect)	Create and interpret a graph.
KD3 Living_Non-Living	Students practice sorting objects into groups.	No	Yes	Graphic Organizer (<i>SMART Ideas 5</i>)	Investigate the relationship between objects. Sorting objects.
KD4 Fruits	Students practice interpreting a graph.	No	Yes	Word Processing (<i>WordPerfect</i>)	Interpret a three column graph.
KD5 Grouping_Children	Students practice sorting objects into groups.	No	Yes	Graphic Organizer (<i>SMART Ideas 5</i>)	Investigate the relationship between objects. Sorting objects.
KD6 Sorting_Colours	Students practice sorting objects into groups.	No	Yes	Graphic Organizer (<i>SMART Ideas 5</i>)	Investigate the relationship between objects. Sorting objects.
KG1 Recognizing_Shapes	Students practice sorting objects into groups.	No	Yes	Graphic Organizer (<i>SMART Ideas 5</i>)	Investigate the relationship between objects. Sorting objects.
KG2 Many_Shapes	Students practice identifying and describe shapes.	No	Yes	Graphics (<i>KidPix Deluxe 4</i>)	Investigate the relationship between objects.
KG3 Sorting_Apples	Students practice sorting objects by size.	No	Yes	Graphic Organizer (<i>SMART Ideas 5</i>)	Sorting objects by size.
KG4 Shape_Art	Students create a picture.	No	Yes	Graphic Organizer (<i>SMART Ideas 5</i>)	Investigate the relationship between objects. Sorting objects.
KG5 Slide_Roll	Students practice sorting objects into groups.	No	Yes	Graphic Organizer (<i>SMART Ideas 5</i>)	Investigate the relationship between objects. Sorting objects.
KG6 Shapes_that_Belong	Students practice sorting objects into groups.	No	Yes	Graphic Organizer (<i>SMART Ideas 5</i>)	Investigate the relationship between objects. Sorting objects.

Integrating Mathematics and Information & Communication Technology

Activity Overview Chart: Grade One

Activity	Description of Task	Student Instruction BLM	Activity Template	Software	Concept
1D1 Sort_classify_shapes	Students sort and classify objects (two-dimensional shapes) using one attribute.	Yes	No	CAI (<i>Graphers</i>)	Sorting and classifying
1D2 Organize_display_read_data	Students organize, display and read data.	Yes	No	CAI (<i>Graphers</i>)	Organizing, displaying and reading data
1D3 Representing_data_pictograph	Students conduct a survey about favourite fruit and represent the data on a pictograph.	Yes	Yes	Presentation (<i>KidPix Deluxe 4</i>)	Representing data on a Pictograph
1D4 Probability_measure	Students stamp pictures of animals and objects onto a background and determine which of them are likely to be found in that environment.	Yes	Yes	Presentation (<i>KidPix Deluxe 4</i>)	Describing probability as a measure of likelihood
1D5 Surveys_vertical_pictographs	Students conduct a simple survey and represent the data on a vertical pictograph.	No	Yes	<i>AppleWorks 6</i>	Conducting a survey/Representing data on a vertical pictograph
1D6 Comparing_sets	Students display data using one-to-one correspondence and describe data using comparative language.	No	No	Drill and Practice (<i>Mathville Kidway</i>)	Describing data using comparative language
1G1 Covering_2D_shapes	Students cover an outline puzzle with two-dimensional shapes.	Yes	No	CAI (<i>ABCircus</i>)	Covering 2D shapes
1G2 Identify_3D_name	Students identify and name three-dimensional figures.	No	No	CAI (<i>Mathville Jungleway</i>)	Identifying and naming 3D figures
1G3 Sort_attributes	Students sort shapes according to attributes.	Yes	No	Internet Browser	Sorting shapes by attribute
1G4 Identify_2D_3D	Students identify and name two-dimensional shapes and three-dimensional figures.	No	No	Drill and Practice (<i>Mathville Kidway</i>)	Identifying and naming 2D shapes and 3D figures
1G5 Relative_locations	Students describe locations of objects using positional language.	Yes	No	Presentation (<i>KidPix Deluxe 4</i>)	Describing relative locations of objects using positional language
1G6 Geometric_designs	Students recreate geometric designs from memory.	Yes	Yes	CAI (<i>AppleWorks 6</i>)	Comparing geometric designs

Integrating Mathematics and Information & Communication Technology

Activity Overview Chart: Grade Two

Activity	Description of Task	Student Instruction BLM	Activity Template	Software	Concept
2D1 Sort_classify_shape	Students sort and classify objects (two-dimensional shapes) using two attributes simultaneously.	Yes	No	CAI (<i>Graphers</i>)	Sorting and classifying
2D2 Organize_display_read	Students organize, display and read data.	Yes	No	CAI (<i>Graphers</i>)	Organizing, displaying and reading data
2D3 Probability_game	Students use a spinner to predict the winner of a race and then test their prediction.	No	No	Drill and Practice (<i>Mathville Jungleway</i>)	Probability game
2D4 Probability_measure	Students examine a given background and write three things that are likely to be found in that environment and three things which are unlikely to be found there.	Yes	Yes	Presentation (<i>KidPix Deluxe 4</i>)	Describing probability as a measure of likelihood
2D5 Representing_measure	Students will represent given data and compare different parts of the data.	No	No	CAI (<i>Math Trek 1, 2, 3</i>)	Representing and comparing data
2D6 Sort_classify_objects	Students use a graphic organizer (Venn diagram) to sort and classify objects using two attributes.	No	No	CAI (<i>Math Trek 1, 2, 3</i>)	Sorting and classifying objects
2G1 Cover_2D shapes	Students cover an outline puzzle with two-dimensional shapes.	Yes	No	Drill and Practice (<i>Math Circus Act 2</i>)	Working with 2D shapes
2G2 Concentration	Students play a form of concentration identifying two-dimensional shapes and three-dimensional figures.	No	No	Drill and Practice (<i>Mathville Jungleway</i>)	Matching 2D shapes and 3D figures with their names
2G3 Identify_3D figures	Students identify and name three-dimensional figures.	No	No	Drill and Practice (<i>Mathville Jungleway</i>)	Identifying 3D figures
2G4 2D shapes_pictures	Students describe pictures they create using two-dimensional shapes.	Yes	Yes	CAI (<i>AppleWorks 6</i>)	Creating and describing 2D shapes
2G5 Positional_language	Students describe the relative locations and movements of objects using positional language.	Yes	No	Presentation (<i>KidPix Deluxe 4</i>)	Describing relative locations of objects using positional language
2G6 Properties_figures	Students identify the properties of three-dimensional figures.	No	Yes	Concept Mapping (<i>Smart Ideas</i>)	Properties of 3D figures

Integrating Mathematics and Information & Communication Technology

Activity Overview Chart: Grade Three

Activity	Description of Task	Student Instruction BLM	Activity Template	Software	Concept
3D1 Sort_classify_shape	Students sort and classify objects (two-dimensional shapes) using two or more attributes simultaneously.	Yes	No	CAI (<i>Graphers</i>)	Sorting and classifying
3D2 Organize_display-read	Students organize, display and read data.	Yes	No	CAI (<i>Graphers</i>)	Organizing, displaying and reading data
3D3 Probability_game	Students predict the frequency of an outcome, test their predictions, and graph their actual results.	No	No	Drill and Practice (<i>Mathville Speedway</i>)	Predicting likelihood
3D4 Theoretical_experimental	Students will conduct simple probability experiments, predict results, and apply mathematical language to describe probability.	No	No	CAI (<i>Math Trek 1, 2, 3</i>)	Theoretical and experimental probability
3D5 Re Predicting_results	Students use a spinner to predict the winner of a race and then test their prediction.	No	No	Drill and Practice (<i>Mathville Jungleway</i>)	Predicting results
3D6 Label_graphs	Students label graphs and read and plot given data.	No	No	CAI (<i>Math Trek 1, 2, 3</i>)	Labelling graphs and plotting data
3G1 Figure_riddle	Students create riddles using the properties of figures	Yes	Yes	Concept Mapping (<i>Smart Ideas</i>)	Identifying and describing 3D figures
3G2 Cover_2Dshapes	Students cover an outline puzzle with two-dimensional shapes.	Yes	No	Drill and Practice (<i>Math Circus Act 2</i>)	Working with 2D shapes
3G3 Transformation_rotation	Students compose shapes, rotate them and identify the angle.	Yes	No	Internet Browser	Rotating shapes
3G4 Identify_3D figures	Students identify and name three-dimensional figures	No	No	Drill and Practice (<i>Mathville Jungleway</i>)	Identifying 3D figures
3G5 Turtle_maze	Students try to create a safe path for a turtle using estimating skills and their knowledge of rotational geometry.	Yes	No	Internet Browser	Navigating a maze
3G6 Properties_figures	Students identify the properties of three dimensional figures.	No	Yes	Concept Mapping (<i>Smart Ideas</i>)	Properties of 3D figures

Integrating Mathematics and Information & Communication Technology

Activity Overview Chart: Grade Four

Activity	Description of Task	Student Instruction BLM	Activity Template	Software	Concept
4D1 Making Predictions	Students make predictions about the frequencies of outcomes in probability experiments and compare them with the results.	Yes	No	Internet Browser	Making and testing predictions in probability experiments
4D2 Median	Students organize data and determine the median.	Yes	Yes	CAI (<i>AppleWorks 6</i>)	Identifying the median
4D3 Graphing	Students organize and display data in a bar graph.	Yes	Yes	CAI (<i>AppleWorks 6</i>)	Organizing and displaying data in a bar graph
4G1 Symmetry	Students complete symmetrical shapes given a line of symmetry.	Yes	No	Internet Browser	Symmetry
4G2 Geometric Properties	Students examine the number of faces, edges, and vertices of geometric figures.	Yes	No	Internet Browser	Identifying and counting faces, edges, and vertices
4G3 Reflections	Students explore reflections and how changing the location of the original 2-D shape and/or the mirror line changes the location of the reflected object.	Yes	No	Internet Browser	Reflections

Integrating Mathematics and Information & Communication Technology

Activity Overview Chart: Grade Five

Activity	Description of Task	Student Instruction BLM	Activity Template	Software	Concept
5D1 Making Predictions	Students make predictions about probability experiments and compare them with the results.	Yes	Yes	Internet Browser; CAI (AppleWorks 6)	Making and testing predictions in probability experiments
5D2 Mean	Students organize data and determine the mean.	Yes	Yes	CAI (AppleWorks 6)	Calculating the mean
5D3 Graphing	Students organize and display data in a bar graph.	Yes	Yes	CAI (AppleWorks 6)	Organizing and displaying data in a bar graph
5G1 Identifying, Classifying Triangles	Students use side lengths and angle measures to identify and classify triangles.	Yes	No	Internet Browser	Identifying and classifying triangles
5G2 Measuring, Constructing Angles	Students construct, estimate, and measure angles.	Yes	No	Internet Browser	Measuring and constructing angles
5G3 Translations, Reflections	Students explore and compare translations and reflections.	Yes	No	Internet Browser	Comparing and exploring translations and reflections

Activity Overview Chart: Grade Six

Activity	Description of Task	Student Instruction BLM	Activity Template	Software	Concept
6D1 Data Relationships	Students find relationships between attributes in a set of data and then make inferences based on their observations.	Yes	No	CIA (<i>TinkerPlots</i>)	Data relationships
6D2 Data Relationships	Students find relationships between attributes in a set of data and then make inferences based on their observations	Yes	No	CIA (<i>TinkerPlots</i>)	Data relationships
6D3 Creating Data Set	Students create their own data set from survey materials.	Yes	No	CIA (<i>TinkerPlots</i>)	Creating own data sets
6G1 Ordered Pairs and trapezoid	Students plot ordered pairs on a coordinate grid to create a trapezoid.	Yes	No	CIA (<i>Geometer's Sketchpad</i>)	Graphing ordered pairs
Measuring trapezoid	Students measure the side lengths and angles of the created trapezoid.	Yes	No		Measuring side lengths and angles
6G2 Ordered Pairs and Rectangle	Students plot ordered pairs on a coordinate grid to create a rectangle.	Yes	No	CIA (<i>Geometer's Sketchpad</i>)	Graphing ordered pairs
Measuring Rectangle	Students measure the side lengths and area of the created rectangle.	Yes	No		Measuring side lengths and area
6G3 Ordered Pairs and Triangle	Students plot ordered pairs on a coordinate grid to create a triangle.	Yes	No	CIA (<i>Geometer's Sketchpad</i>)	Graphing ordered pairs
Measuring Triangle	Students predict and measure the area of a triangle.	Yes	No		Estimating and measuring area
Parallelogram	Students create a parallelogram using 2 congruent triangles, a rotation and a translation.	Yes	No		Creating a parallelogram using 2 triangles and transformations on a coordinate grid.

Integrating Mathematics and Information & Communication Technology

Activity Overview Chart: Grade Seven

Activity	Description of Task	Student Instruction BLM	Activity Template	Software	Concept
7D1 Backpacks	Students look at a set of data and determine which measure of central tendency best represents the information. Students explore the impact of outliers on measures of central tendency.	Yes Video	No	CAI (<i>TinkerPlots</i>)	Measures of central tendency
7D2 Misleading Data	Students examine graphical representations looking for displays of misleading data and reflect on the purpose of the misrepresentation. Then students create their own graphs representing data in misleading ways.	Yes Video	No	Spreadsheets	Misleading data
7D3 Estimating Weight	Students examine relationships between attributes in a set of data and then make inferences based on their observations.	Yes Video	No	CAI (<i>TinkerPlots</i>)	Data Relationships: Organizing, displaying, reading and analyzing data
7G1 Similar and Congruent Figures	Students create, transform, and explore similar and congruent shapes.	Yes Video	Yes	CAI (<i>Geometer's Sketchpad</i>)	Explore the impact of a reflection, rotation, translation and dilation on the shape and size of polygons.
7G2 Tessellations	Students create original tessellations using translations with a base figure that will tile the plane.	Yes Video	Yes	CAI (<i>Geometer's Sketchpad</i>)	Creating tessellations using only translations.
7G3 Area of a Triangle	Students create several triangles with the same base and height, then explore and make observations about their areas.	Yes Video	Yes	CAI (<i>Geometer's Sketchpad</i>)	Areas of triangles with same base and height.

Integrating Mathematics and Information & Communication Technology

Activity Overview Chart: Grade Eight

Activity	Description of Task	Student Instruction BLM	Activity Template	Software	Concept
8D1 Wages	Students examine relationships between attributes in a set of data (wages) and then make inferences based on their observations.	Yes Video	No	CAI (<i>TinkerPlots</i>)	Data Relationships: Organizing, displaying, reading and analysing data
8D2 Marathon	Students use TinkerPlots to examine data collected over years of marathons, then use the data to draw conclusions and predict future times based on their observations. Students will also extend their thinking by researching and predicting.	Yes Video	No	CAI (<i>TinkerPlots</i>)	Analysing data and making predictions based on previous data (extension researching data sets)
8D3 Rolling Dice	Students use SmartIdeas to generate random sums then take the data and put it into a spreadsheet, to generate a graph they can use to make inferences on how the experimental probability approaches theoretical probability with the increased number of trials.	Yes Video	No	Spreadsheet; Graphic Organizers (<i>Smart Ideas</i>)	Experimental vs. theoretical probability
8G1 Circumference	Students construct circles in three different ways then use their constructions to explore the relationship between circumference and the radius and diameter using Geometer's Sketchpad.	Yes Video	Yes	CAI (<i>Geometer's Sketchpad</i>)	Constructing circles and determining the significance of Pi in relation to the circumference of a circle.
8G2 Area of a Circle	Students construct a circle then use their construction to explore the relationship between area and the radius and diameter using Geometer's Sketchpad.	Yes Video	Yes	CAI (<i>Geometer's Sketchpad</i>)	Constructing circles and determining the significance of Pi in relation to the area of a circle.
8G3 Exploring Polyhedra	Students will explore the relationship between the numbers of edges, faces and vertices among regular polyhedra.	Yes Video	No	Internet Browser	Exploring Euler's Theorem using 5 platonic solids
8G4 Similar rectangles	Students create, transform, and explore measurements of similar rectangles in Geometer's Sketchpad.	Yes Video	Yes	CAI (<i>Geometer's Sketchpad</i>)	The relationship between the areas, perimeters, corresponding angles and corresponding side lengths of similar rectangles.

Numeracy and Assessment

Well constructed and well implemented assessment plays an essential role in the improvement of student learning as an ongoing part of the learning-teaching process.

There are three types of assessment: assessment for learning, assessment as learning, and assessment of learning.

***Assessment for learning** involves teachers observing the knowledge, skills, experience, and interests their students demonstrate, and using those observations to tailor instruction to meet identified student needs and to provide detailed feedback to students to help them improve their learning.*

***Assessment as learning** is a process of developing and supporting students' metacognitive skills. Students develop these skills as they monitor their own learning, adapt their thinking, and let the ideas of others (peers and teachers) influence their learning. Assessment as learning helps students achieve deeper understanding.*

***Assessment of learning** is summative. It includes cumulative observations of learning and involves the use of the achievement chart to make judgments about how the student has done with respect to the standards. Assessment of learning confirms what students know and are able to do, and involves reporting on whether and how well they have achieved the curriculum expectations.*

Teachers use assessment data, gathered throughout the instruction–assessment–instruction cycle, to monitor students' progress, inform teaching, and provide feedback to improve student learning. Effective teachers view instruction and assessment as integrated and simultaneous processes. Successful assessment strategies – those that help to improve student learning – are thought out and defined ahead of time in an assessment plan.

Ministry of Education, A Guide to Effective Instruction in Mathematics Kindergarten to Grade 6, Geometry and Spatial Sense Gr. 4-6, 2008, p. 239

Methods of gathering information for assessment in numeracy should consist of a variety of methods including: determining prior knowledge, observing students' oral and written work, examining mathematical tasks and math portfolios, reviewing projects and tests, and engaging in student interviews and conferences. The information gathered can assist teachers in identifying individual difficulties, future lessons and provide rich dialogue with students, parents and administration.

As well teachers will use the Achievement Chart, found in the Ontario Curriculum Gr. 1-8, Mathematics 2005 (Revised) pages 22-23, in the assessment process. It enables teachers to make judgements about student work based on clear performance standards and on a body of evidence collected over time.

The achievement chart provides a framework to help teachers plan instruction for learning and provide meaningful feedback to students. The four categories of knowledge and skills outlined in the achievement chart are interrelated, reflecting the wholeness and interconnectedness of learning. They are: *Knowledge and Understanding, Thinking, Communication* and *Application*. Teachers are required to assess and/or evaluate student work in a balanced manner with respect to the four categories, considering the achievement of particular expectations within the appropriate categories.

Within the ICT Numeracy lesson template, the section **Assessment for Learning** is directly linked to the **Expectation** section. A question is posed to assist the teacher in focusing the assessment for learning based on the expectations of the lesson, addressing the Curriculum, ICT or Catholic Graduate Expectations. E.g. Do students understand the data represented on their pictograph? (Curriculum) or Do the students apply effective communication, decision making, and problem solving, time and resource management skills? (CGE)

Catholic education's universality of dealing with the whole child as an individual and respecting his or her uniqueness requires a new approach to assessment. The challenge of the Catholic school educator is to deal with assessment as integral to the fundamental purpose of the Catholic school, rather than as a hurdle, a competition, something to be endured.

Keeping our Promise, Sister Remigia Kushner, Momentum 2001, p.18

Teachers, through their observations and interactions with students, will determine the student understanding of the topic and the next steps for learning in the context and culture of the Catholic classroom. Teachers are invited to review the Catholic Curriculum resource *Learning from Assessment* May 2007 for more in-depth information on assessment and evaluation, on the CCC website: www.catholiccurriculumcorp.org

Resources

Burns, M. (2000). *About teaching mathematics: A K-8 resource* (2nd ed.). Sausalito, CA: Math Solutions Publication

Burns, M. (2000). *Writing in math class: A resource for Grades 2-8*. Sausalito, CA: Math Solutions Publication

Chapin, S., & Johnson, A. (2000). *Math Matters: Understanding the math that you teach*. Sausalito, CA: Math Solutions Publications

Gavin, M.K., Belkin, L.P., Spinelli, A.M., & St. Marie, J. (2001). *Navigating through geometry in Grades 3-5*. Reston, VA: National Council of Teachers of Mathematics.

Haylock, D., & McDougall, D. (1999). *Mathematics every elementary teacher should know*. Trifolium Books

Ma, L. (1999). *Knowing and teaching elementary mathematics*. Mahway, NJ: Erlbaum.

Ministry of Education (2008), *A Guide to Effective Instruction in Mathematics Kindergarten to Grade 6, Geometry and Spatial Sense Gr. 4-6*.

Ministry of Education (2005), *The Ontario Curriculum Grade 1-8 Mathematics*

Ministry of Education (2004), *Teaching and Learning Mathematics The Report of the Expert Panel on Mathematics in Grades 4 to 6 in Ontario*

Thiessen, D. (Ed.). (2004). *Exploring mathematics through literature: Articles and lessons for Pre-kindergarten through Grade 8*. Reston, VA: National Council of Teachers of Mathematics

Van de Walle, J., & Folk, S. (2005). *Elementary and middle school mathematics: Teaching developmentally* (Canadian edition). New York: Longman

Related Websites

www.osapac.org – software support, lessons and online data base for Geometer's Sketchpad Tutorials

www.ocup.org – Ontario Curriculum Unit Planner resources

Other Catholic Curriculum Resources

Catholic Curriculum Maps - Foundational Support for Catholic Teachers, September 2006, www.catholiccurriculumcorp.org

Catholic Graduate Expectations, Institute of Catholic Education
<http://www.occb.on.ca/ice>

Kushner, Sister Remigia (2001). *Keeping Our Promise: The Spirituality of Assessment*, Momentum

Murphy, Monsignor D (2007) *Catholic Education: A Light of Truth*, Catholic Register Books

Learning from Assessment, May 2007, www.catholiccurriculumcorp.org

Overview Chart - Unifying Catholic Themes and Essential Questions

Grade	Catholic Theme	Essential Question	Points for Consideration
K	Stewardship of Creation	Where is God?	<ul style="list-style-type: none"> • Our Catholic tradition teaches that we are charged with caring for all of God’s creation • We come to know God through our experience and understanding of our selves, others, and the rest of the created world • Students explore and experience elements of creation as a trace of God
1	Dignity of the Human Person	Who is God?	<ul style="list-style-type: none"> • The Catholic Church professes that all human life is sacred • The inherent dignity of the human person is foundational to all other Catholic social teaching • We develop a deeper awareness of our human dignity when we come to more fully understand God, our Creator • Students use Scripture stories to develop an understanding of the attributes of God
2	Promotion of Peace	How are we members of God’s family?	<ul style="list-style-type: none"> • Peace is the work of justice and the result of love (EOCCC) • Peace is not just the absence of war. It involves the mutual respect and confidence between peoples and nations. (Pope John Paul II) • As members of God’s family, we are called to seek justice and peace for all of the members • Students develop an understanding Eucharist as a sacrament of belonging
3	Community and the Common Good	Who is the Holy Spirit?	<ul style="list-style-type: none"> • The Catholic tradition teaches that all humans are called to live with, and for, others in community • The Holy Spirit is God’s loving and guiding presence in the community • Students recognize that the Holy Spirit gathers us to be a people of God and inspires us to share in the mission of Jesus
4	Preferential Option for the Poor and Vulnerable	What does Jesus ask of us?	<ul style="list-style-type: none"> • A distinctly Catholic perspective on the world maintains that we can measure the quality of any society by the way its most poor and vulnerable are treated (EOCCC) • Jesus is the ultimate model of how we are called to care for those that society overlooks • Students use Scripture to develop a deeper understanding Jesus, and what Jesus expects of his followers

5	Community and the Common Good	How do we live in community?	<ul style="list-style-type: none"> • The Catholic tradition proclaims that humans are not only sacred, but are also social • We must be mindful of the human dignity and rights of all as we come together in community • We are called to critique prevailing social structures to ensure that all are fairly represented • Students investigate covenant stories in Scripture as well as stories of the early formation of the Church
6	Human Rights and Responsibilities	How do we live in accordance with God's will?	<ul style="list-style-type: none"> • By virtue of our human dignity, our Catholic tradition teaches that all humans have the right to life, food, shelter, health care, education, and employment • We, in turn, have the duty and responsibility to care for one another, our families, and those in society • We come to a greater understanding of how we are to ensure the rights of all, and what our obligations are, by understanding God's will for humanity • Students examine the Decalogue and the Beatitudes as guides for right action
7	Dignity of the Human Person	What is our story?	<ul style="list-style-type: none"> • This foundational social teaching is revisited, allowing students to come to a deeper understanding of its implications appropriate to the developmental stage of an adolescent • A greater appreciation of the sacred and social nature of the human emerges, this time, through an investigation of the Christian story • Students develop an understanding of the Bible as our story to more fully understand what it means to be called into relationship with God through Jesus
8	Solidarity	How are we Church in the world?	<ul style="list-style-type: none"> • The Catholic tradition proclaims that we are to love our neighbour regardless of national, racial, ethnic, economic, or ideological differences • Solidarity means that "loving our neighbour" has global dimensions in an interdependent world (www.osjspm.org) • Students are challenged, appropriate to their now more advanced developmental level, to extend their prior understanding of the Common Good to the broader global community • Students identify how the Ten Commandments and Jesus' rule of love are related, and develop an understanding of the Catholic view of social justice and its need in the world

The Catholic Graduate Expectations

Vision of the Learner

The Ontario Catholic school graduate is expected to be:

- **A discerning believer** formed in the Catholic Faith community who celebrates the signs and sacred mystery of God's presence through word, sacrament, prayer, forgiveness, reflection and moral living
- **An effective communicator** who speaks, writes and listens honestly and sensitively, responding critically in light of gospel values
- **A reflective, creative and holistic thinker** who solves problems and makes responsible decisions with an informed moral conscience for the common good
- **A self-directed, responsible, lifelong learner** who develops and demonstrates their God-given potential
- **A collaborative contributor** who finds meaning, dignity and vocation in work which respects the rights of all and contributes to the common good
- **A caring family member** who attends to family, school, parish, and the wider community
- **A responsible citizen** who gives witness to Catholic social teaching by promoting peace, justice and the sacredness of human life

TYPES OF SOFTWARE

APPLICATION TYPE	USES	SOFTWARE TITLES (e.g.)
Word Processing	Entering, editing and printing text (e.g. letters, poems)	AppleWorks, Word Perfect, WordPad, Star Office
Spreadsheet	Recording, tracking, displaying text and numbers, manipulating numerical data (e.g. statistics, tables, charts, graphs)	AppleWorks, Graphers, Quattro Pro, Fathom 2, Tinkerplots
Database	Organizing and sorting information (e.g. records of books read, personal dictionary)	AppleWorks, FileMakerPro
Graphics	Creating and editing illustrations, drawings, maps, diagrams	Adobe Photoshop, Paint, KidPix, Fireworks, Freehand, Smart Ideas
Desktop Publishing	Creating, editing and printing documents containing text, graphics, etc. (e.g. newsletters, flyers, posters)	MS Publisher, Easybook Deluxe
Presentation	Creating and editing multimedia presentations to be displayed on the computer monitor or projected onto a screen	Corel Presentations, HyperStudio, KidPix, AppleWorks
Internet Browser	Accessing the Internet, World Wide Web, FTP, etc.	Internet Explorer, StudentLink 2
Telecommunications	Receiving and sending e-mail, chatting, sending files and graphics, conferencing	First Class, Microsoft Outlook
Computer Assisted Instruction	Supporting skill development, knowledge acquisition, individualized programming with tracking of student achievement	Geometer's Sketchpad, Academy of Reading, Math Strategies - Primary
Simulations	Identifying with past and future, exploration	
Drill and Practice	Practising skills	All the Right Type, Wordville Kidway, Speedway, Jungleway, Math Trek, Millie's Math House, Trudy's Time and Place
Web Publishing	Creating, editing and publishing web pages	Claris Home Page, Dreamweaver