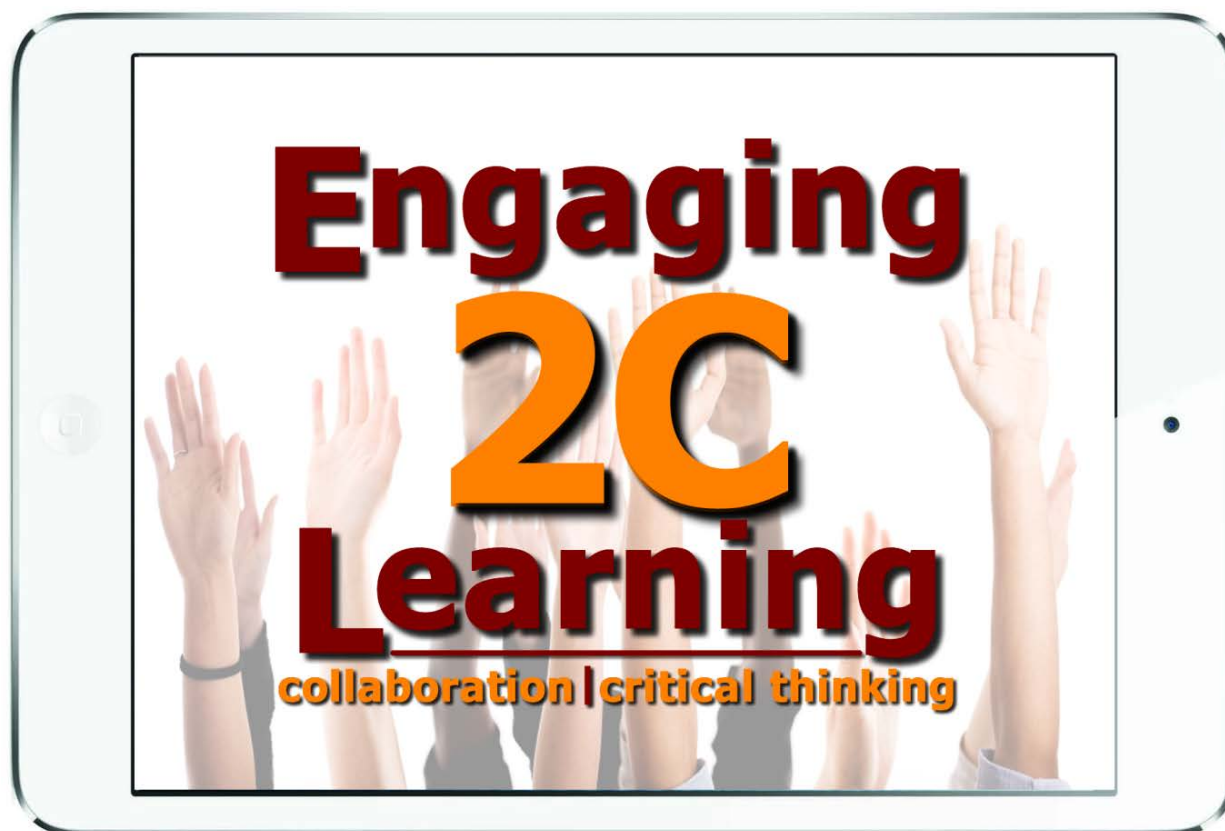


TLLP: Teacher Learning and Leadership Program for Experienced Teachers

Developing Critical Thinking and Collaboration in the 21st Century Mathematics Classroom
2014-2015



CARDINAL AMBROZIC CATHOLIC SECONDARY SCHOOL

Project Summary

Teacher Leaders: Claudio Attanasio, Pasquale D'Andrea, Rebecca Kitto and Gina Pullara

Principals: Tim Lariviere (former) & Dan Compagnon (current)

Superintendent Brampton North: Denise Oude-Reimerink

Principal of Program: Joanna Boudreau

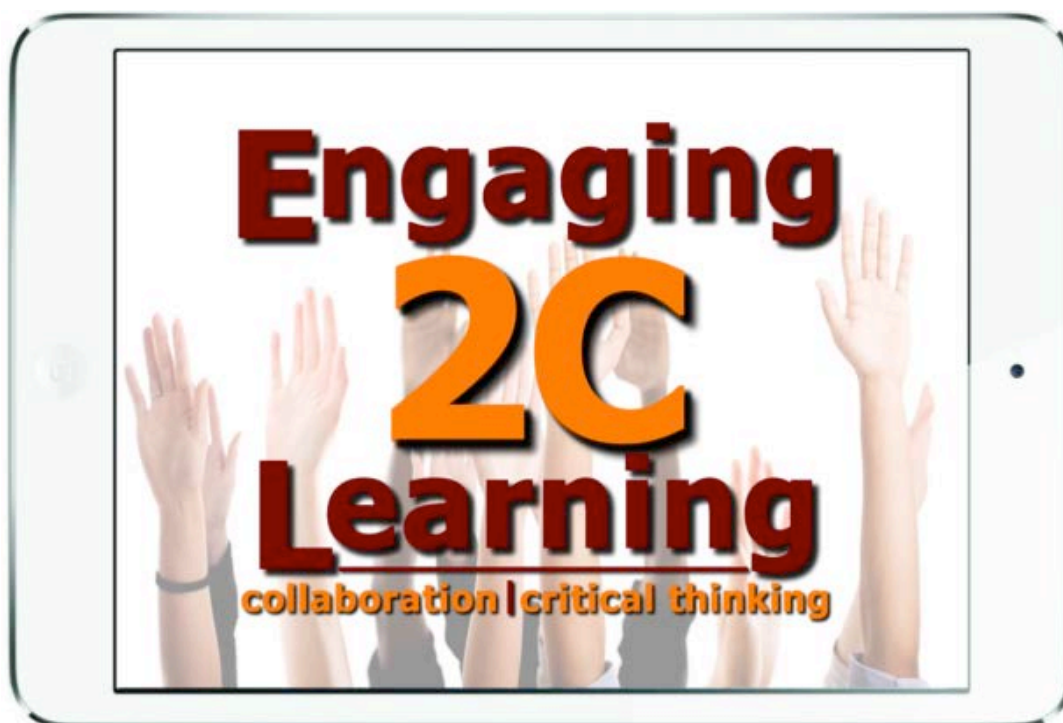
Superintendent of Program: Max Vecchiarino



**Dufferin-Peel
Catholic District
School Board**

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Executive Summary

This report will provide information with respect to Cardinal Ambrozic Catholic Secondary School TLLP

- ✓ TLLP Background
- ✓ Project Overview and Pedagogy
- ✓ Team Observations
- ✓ Choice of Learning Technology

TLLP Background

The Teacher Learning and Leadership Program (TLLP) is a project-based activity for selected experienced teachers whose choice of career is the classroom. It is intended to create opportunities for experienced teachers to enhance their professionalism and skills, extend their learning and share their expertise with others for the broader benefit of Ontario's students. The TLLP is in alignment with DPCDSB Catholic Board Learning Plan's Shared Priorities of "Creating Catholic Conditions for Well-Being, Learning and Leading", "Building Collaborative Practices Through Inquiry", "Knowing the Learner Through Assessment, and "Responding Through Effective Instruction".

Project Overview and Pedagogy

The Cardinal Ambrozic Math TLLP provides students the avenue to learn through critical thinking within real-life contexts achievable through project-based learning. This encourages students to think reflectively and creatively to evaluate situations and solve problems. To support this learning environment, students will use technology, as a learning tool, a collaboration device, a brainstorming tool and an assessment device and a creativity tool.

Employing the use of various technologies enhances learning in three main ways:

- 1) Improving student engagement
- 2) Improving collaboration
- 3) Improving critical thinking

Team Observations

- when students are given a task or purpose using technology they are engaged and focused with the task at hand
- The technology allowed for assessments to take on a variety of forms in a non-threatening, enjoyable manner where the focus is on learning, and not the grades
- when technology is easy to use and implement, teachers are more likely to embrace technology within the classroom, further encouraging student engagement

Choice of Learning Technology: Apple-iOS-the iPad and MacBook

1. Local Student Familiarity-unified user experience
2. Learning for All - Ease of Use
3. Management Features: Technical support
4. Quantities and Quality of Educational Apps: 65,000 and Counting!
 - ✓ Apps at the Apple Store are categorized and classified for age appropriateness and content
 - ✓ Apps at the Apple Store have gone through a quality control and approvals process
 - ☒ whereas Android Apps can be uploaded by anyone (no quality check)
5. Dual Purpose: Productivity and Creativity
 - Allows for both creativity and productivity in the classroom on the same product
6. Cost effective

What Is A TLLP?

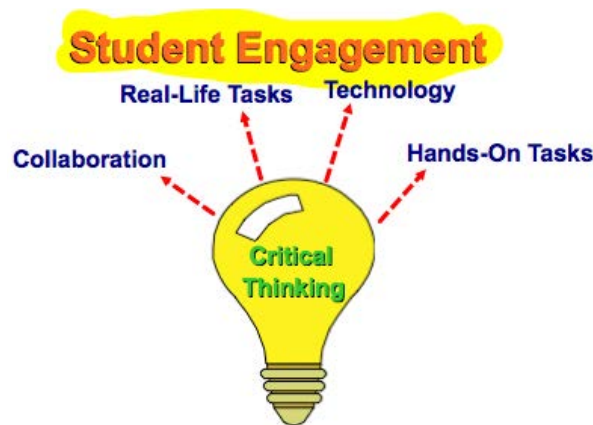
The Teacher Learning and Leadership Program (TLLP) is a project-based activity for selected experienced teachers whose choice of career is the classroom. It is intended to create opportunities for experienced teachers to enhance their professionalism and skills, extend their learning and share their expertise with others for the broader benefit of Ontario's students. Teachers can apply, as individuals or as a group, to undertake a project. The program has three goals:

- Support Teacher Professional Learning;
- Foster Teacher Leadership; and
- Facilitate the Sharing of Exemplary Practice.

The TLLP Ministry Project Rationale: Developing Critical Thinking and Collaboration in the 21st Century Mathematics Classroom

Research tells us that collaboration is an essential tool to develop student understanding and critical thinking. This project will allow our group to explore the two "C's" of 21st Century Learning: collaboration and critical thinking. Our Professional Learning Team will aspire to create a Catholic professional learning cycle (CPLC) to lead both faculty and students alike into the 21st Century Classroom, fostering critical thinking through a collaborative learning model (Catholic Graduate Expectations 5a and 5b).

Given the diverse learning needs of students within the classroom, and the changing nature of the workplace, the use of various technologies would complement and help to foster critical thinking through collaboration. We plan to implement learning through collaboration using Project Based Learning and the iPad as a learning tool.



The Cardinal Ambrozic Math TLLP provides students the avenue to learn through critical thinking within real-life contexts achievable through project-based learning. This encourages students to think reflectively and creatively to evaluate situations and solve problems. This learning pathway is fostered through collaboration, as students learn to respect the rights, responsibilities and contributions of self and others. Through this journey, students will witness the merits of being a responsible citizen in today's social environment. To support this learning environment students will use iPads, which will serve as a learning tool, a collaboration device, a brainstorming tool and an assessment device and a creativity tool.

Finally, the professional learning needs this would address would include forming a CPLT, performing CPLC's, fostering cooperative learning in classes and developing strategies to meet the changing learning needs of

21st century learners. We want to be able to measure the impact that technology has on critical thinking by using collaboration as a model. We will focus specifically on how to implement better collaborative instructional practices in the grade 9 math classrooms which is vital in the transition years of students. In a changing world, instructional practices have to be fluid. As role models of lifelong learners, it is essential that classroom teachers keep pace with the changing needs that will impact student learning and citizenship. Lastly, we want to share our expertise with our family of schools to create a stronger pathway for success during transition to grade 9.

YouTube Link (Rationale Videoscribe File):

https://drive.google.com/file/d/0B_PiK9u6akY3bTE3eWU3aTQ0Q2c/edit?usp=sharing

Project Observations

Once the Ministry accepted our project, our team, after consultation with the Program Department, Family Superintendent and ICT Manager approached the board to order the iPad Mini. Although our project was slated to commence in September 2013, our TLLP team did not receive the class set of iPads until February 2014. Our team was granted approved access to any devices to practice and learn from prior to February 2014. In response, we requested a project extension from the Ministry for another full year.

In the classroom we have observed a drastic change in how the class is setup. We have tables set up as Team Pods, we have a SMART Board central to the classroom and access to the iPads. We have noted that the students are very collaborative while sitting in pods. Students are able to learn from one another and learn new ways to solve problems. This translates to more independence when asked to work individually (i.e. the CPT).

We have also observed that students work best and collaboratively when there is 1 iPad to 2/3 students. This naturally engages students to work together using a single tool. Students are eager to help one another and thus actively engage in the collaboration process.

We also observed that the ability for students to answer open-ended problems independently and with their peers increased as the year progressed, reducing fears and anxieties and increasing student confidence.

The teachers involved in the project observed a more interactive and engaged classroom. Teachers also observed that when students are given a task or purpose using technology, they are engaged and focused with the task at hand. Another observation is based on open ended tasks and projects. Initially, there was a need to scaffold the problems, but as the year progressed, less scaffolding was required. Our final problem was left entirely open ended and the students faired well. Student teams were able to independently determine and choose the necessary tools required to solve the problem.

Finally, we observed that when technology is easy to use and implement, teachers are more likely to embrace technology within the classroom, further encouraging student engagement. We also observed that if teachers are limited in what (device), how (i.e. apps, email, the ability for students to share) and when (availability of devices) the technology might be used within the classroom, the use of technology becomes problematic and may not be used.

Professional Learning

Our team was willing to take risks within the classroom, going beyond our comfort zone. Our view of technology within the classroom has evolved. Aside from productivity, we have utilized technology in many different ways: assessment, a vehicle for collaborating and communicating, student creativity and fostering student engagement.

We have discovered the potential of utilizing different technologies in the classroom affecting how we view education in the 21st century, influencing how we teach and assess learning. The technology allowed for assessment to take on a variety of forms in a non-threatening, enjoyable manner where the focus is on learning, and not the grades.

The technology allowed students to express themselves in a way they could not previously. When students were able to take risks and contribute freely in a small-group setting, student engagement was augmented.

Expected Outcomes of the TLLP

The following outlines the TLLP Team's expectations:

When educators foster collaborative learning through the use of technology, student engagement will become more evident and the critical thinking process becomes more apparent. Students will learn to guide and take greater responsibility for their own learning. The teacher's role has now become one of a facilitator of collaborative learning. As a result, differentiated instruction will be nurtured by default, giving students the ability to choose different mediums to present their evidence of learning.

Employing the use of various technologies enhances learning in three main ways:

- 1) Improving student engagement using technology and Web 2.0 tools (measure by better attendance, fewer lates, student questionnaires)
- 2) Improved collaboration (teacher is facilitator of learning, students become more independent learners)
- 3) Improved critical thinking (teachers ask more open questions, students communicate and think more effectively)

Data Analysis: Pre and Post Outcomes

Our team worked collaboratively with the Board's researcher to determine the needs of the students and the classroom. The results from the initial survey are briefly summarized below:

- Academic students liked math more
- Academic students believed that they were good at math
- Academic math students felt they had been more successful with math over time
- Applied math students believed math was hard
- Applied students did not see the connection between math and the real world
- Applied students were surprised when they got a difficult math problem correct (self-efficacy)
- Academic math students preferred to explore math concepts more in depth and work alone
- Applied students have never liked math and do not believe they ever will

We also asked what they wanted in an ultimate math classroom. Here are some of their responses:

- Majority of students asked for more opportunities for technology in math class
- An ultimate math class would differentiate teaching styles to learning styles
- Math should be fun and more interactive
- See the connections between class and the real world
- Choose our own math partners or if they prefer, to work alone
- The classroom would have necessary materials posted, posters and charts to help students, and to help remember what's important

We are in the midst of finalizing the data from the exit survey. We wanted to see if efficacy has improved and if students work best collaboratively with real-life activities. We captured the student voice through video dialogue with applied students. The video file can be found below:

Student Voice Video: <http://youtu.be/yllMgr5sysU>

Changes To Practice

As a result of our work on the TLLP, our teaching practices have evolved to include more inquiry and project-based learning. We have become more reflective on how our practices impact student learning. Things we now consider more critically include the learning environment, assessment practices (not always assigning a grade and more opportunities for feedback) and the multiple ways in which technology can be implemented (i.e. SAMR Model).

In the classroom, students have become more confident in their learning with the ability to express themselves creatively. Students recognize that they have a voice and that their contributions are valued. They are aware that working collaboratively offers them a safe environment, allowing them to be self-directed in their learning. As well, students gained a greater appreciation of the impact that technology has on their learning.

Our TLLP has sparked a sense of curiosity among members of our school community, teachers from neighbouring schools, as well as Board officials. Our project has encouraged greater dialogue among our parent community. This has been fostered through various items such as our "Grade 9 Math Parent Night", our periodic newsletters and our Twitter account.

The Project Template Model

Introduction

When our team received notice of being accepted for the TLLP in February 2013, we were excited and eager to learn and explore ways to apply our newly acquired knowledge within the classroom environment. This project has caused us to think reflectively on our current teaching practices and has allowed us to explore 21st century skills in the classroom.

Our team implemented facets of the TLLP beginning in September 2013, however it took some time to acquire the hardware that was critical in implementing the necessary change in pedagogy to enhance collaboration and critical thinking.

In-Class Process

With each new “Problem” (formally referred to as “unit”), students are placed in new “teams”. The activities/math concepts needed to solve the “Problem” (learning goals) are now referred to as “tools”. Below is the process involved in working through each “Problem”:

Step 1: Formation of Teams

Step 2: Introduction to Problem

Step 3: Brainstorming “Student Learning Goals”

Step 4: Learning the “Tools”

Step 5: Collaborative Hands On Task

Step 6: Evidence of Learning – Student Reflection: The Final Project Product

We captured the essence of each problem through a “fly-on the wall” approach video. The videos below illustrate a sequential progression of several problems by capturing 1) students’ initial exposure to the problem, 2) brainstorming the tools required to solve the problem (learning goals), 3) the learning of the tools, 4) working collaboratively through the problem/project and finally 5) evidence of learning – the final product.

Fly-On-The-Wall Video Overview: *Problem 1: Counting Balloons in the Movie “Up”*

<https://youtu.be/bj6dMfy6CvA>

Fly-On-The-Wall Video Overview: *Problem 2: Designing A Kite*

<https://youtu.be/co3pFQWJrOO>

Fly-On-The-Wall Video Overview: *Problem 3/4: Walking In Jesus’ Footsteps*

<https://youtu.be/FGznximORI>

Fly-On-The-Wall Video Overview: *Problem 5: What Makes An Ideal Drinking Box?*

<http://youtu.be/u8tdCtYNYyo>

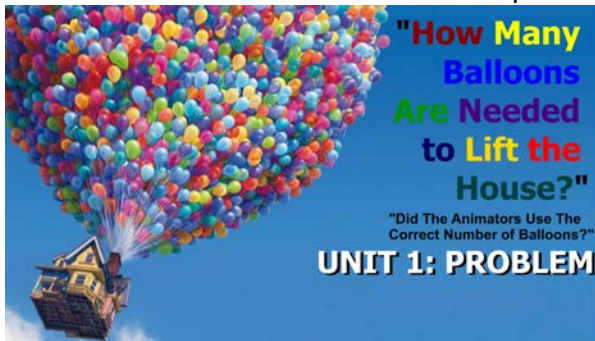
Fly-On-The-Wall Video Overview: *Problem 6: Designing The Better Bridge*

<http://youtu.be/CmznEZNS9mc>

SAMR Model and The TLLP Project: *SAMR In The Math Classroom*

<http://youtu.be/4qtrwnYXprU>

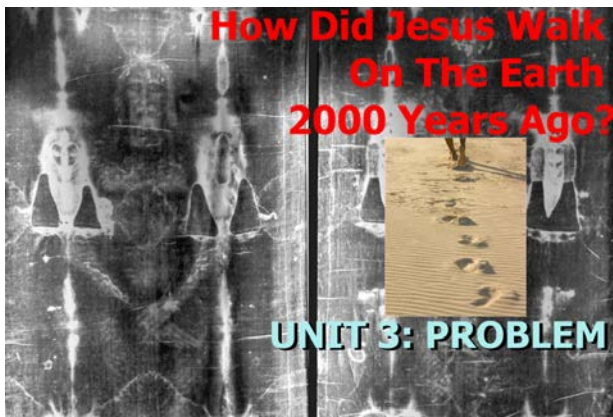
Problem 1: Are the animators using the correct number of balloons in the movie "Up"?



Problem 2: How can you build a kite?



Problem 3: How did Jesus walk 2000 years ago?



Problem 4: CSI Brampton: who stole Cardie?

CSI BRAMPTON: Who Stole Our Mascot Cardie The RiverHawk?

Suspect 1: "Laughing" Lucy	Suspect 2: Harold "Horn Head"	Suspect 3: "Razor Head" Ramone	Suspect 4: "Dirt Chin" Charlie	Suspect 5: Frankie "Four Eyes"
Height: 195 cm Forearm: 30 cm Arm Span: 190 cm	Height: 175 cm Forearm: 35 cm Arm Span: 140 cm	Height: 175 cm Forearm: 30 cm Arm Span: 140 cm	Height: 195 cm Forearm: 35 cm Arm Span: 190 cm	Height: 195 cm Forearm: 35 cm Arm Span: 140 cm

UNIT 4: PROBLEM

Evidence: Foot Print, Hand Print, Walking Stride

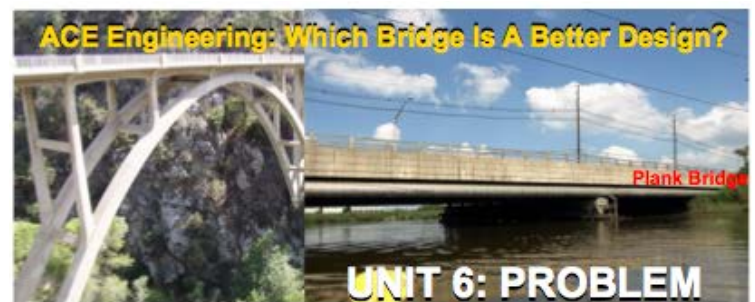
Problem 5: Can you design a drinking box?

UNIT 5: PROBLEM

Creating A Comic Strip or Infographic Poster

What Drinking Box Design Is Most Efficient?

Problem 6: Which Bridge is a better design?



Linear Equations

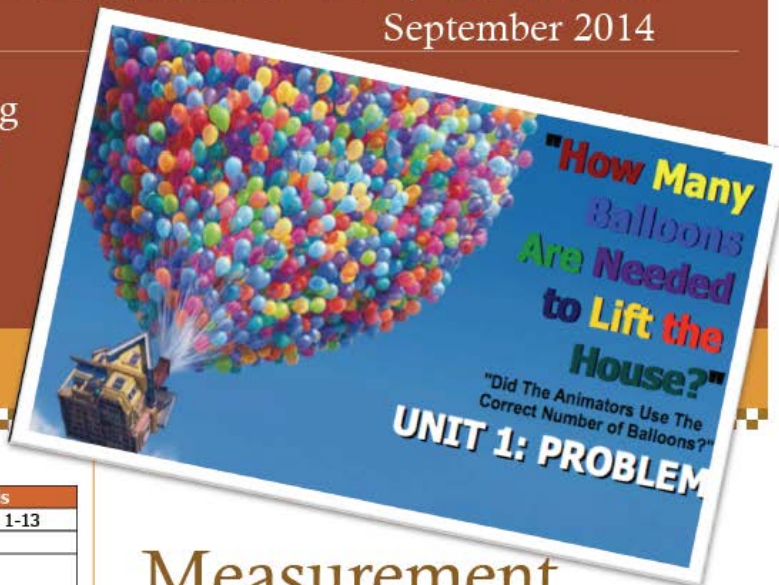


Gr.9 Math News

September 2014

Problem 1: Is Pixar Using
The Correct Number of
Balloons In The Movie
Up?

Unit Practice



Lesson Title & Topics	Practice of Tools
Proportional Reasoning	Workbook pages 1-11 to 1-13
The Pythagorean Theorem	p. 423-424, #1-10
Perimeter and Area Of Composite Figures	Worksheet 2, 3 Pg. 432 # 1-4, 16a, 17
Volume of Prisms, Pyramids, Cones, Cylinders and Spheres Part I	8.3 #4, 6, 9, 14a
Volume of Prisms, Pyramids, Cones, Cylinders and Spheres Part II	8.3 #2, 8, 11 8.5 #1cd, 5, 8 8.7 #1c, 5, 7
Surface Area I	8.3 #1a, 2b, 3b, 11 8.4 #2, 3, 4, 6, 9, 10 8.6 #3, 4, 7
Surface Area II	8.7 #7, 8, 9, 11, 14
Assessment Break	p.472 Chapter 8: Practice Test #1-5,6,9,10
Optimization	Complete Graph and Table on 1.6 9.2 # 2-6, 8, 9
Review	Chapter 8 Review #1,3, 5b, 7, 8, 10, 13, 15 Chapter 9: -Review #3, 4 -Practice Test #1

Measurement

Throughout the course of “Problem 1”, students will extend their understandings from Grade 8 to include the measurement of composite two-dimensional shapes and the development of formulas for, and applications of, additional three-dimensional figures. Students will solve problems involving Perimeter, Area, Surface Area and Volume. Students will investigate the optimal size of shapes by examining the effect of varying dimensions (length & width).

Recently, a letter of permission was sent home with your son/daughter requesting your permission to video the students during various activities in our Math classes. The experiences captured in video may be shared with staff within our school, as well as with educators across the Board. Please ensure that you have reviewed/signed the letter and ask your son/daughter to return it to his/her Math teacher. If you have any questions or concerns, please feel free to contact Mr. Attanasio, Department Head of Mathematics.

Problem 1 Checklist of Assessment Items

Completion of Homework Help Online Assignment	Completion of Concept Map/Mind Map of Tools	Completion of Problem Practice of ALL tools	Completion of Team Problem Task	Completion of Test
Early Oct.	Sept.	Everyday	Late Sept.	Early Oct.

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<http://www.dpcdsb.org/AMBRO> &



Twitter: @ambromath9

NOVEMBER 2014

Gr.9 Math News

Problem 2: How Do You Build A Kite?

Problem 2: Geometry Focus

We have now completed our first Problem (Measurement) and students have applied all the various tools acquired to determine how many balloons it takes to lift a house. (Pixar Film "UP") Students collaborated in teams to brainstorm and solve this problem.

During "Problem 2" students will extend their understanding of Geometry from Elementary and continue to investigate various Geometry Relationships. Interactive investigations will be conducted with the use of geometry software such as Geogebra and Geometer's Sketchpad using iPads. Students can access such programs at home to reinforce concepts learned in class. Visit the class website under My Resources→Problem 2 link for more information (see below for website link).

By the end of this Problem, students will be able to describe the properties and relationships of various polygons, and apply the results to problems involving angles and side lengths of polygons. Students are looking forward to constructing kites as a summative task to this problem. Materials will be provided, however students are encouraged to find unique items to personalize their kites.



Information Items

Math Information Night

We look forward to sharing some of our students' projects with you at our upcoming Grade 9 Math Parent Night. Date: December 4th, 2014 at 7 PM.

Parent-Teacher Interviews

We will be holding the midterm interviews early January. We offer these interviews for students not meeting Ministry Standards first. Stay tuned for more information.

iBook Problem 2

Students are encouraged to download the interactive iBook for Problem 2. To Download this book, please visit:

<http://goo.gl/obawFZ>



Save the Date!

Math Info Night Thurs. Dec. 4th 7PM	Reassessment End of November - Early December	Parent Interview Early Jan. 2015 7 PM
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Website
<http://www.dpcdsb.org/AMBRO>
Password: cardinal2013



Twitter
[@ambromath9](https://twitter.com/ambromath9)

JANUARY 2015

GR.9 AMBROZIC MATH NEWS

Problem 3 & 4 Edition



Linear Relationships Focus

Problem 3 & 4: Linear Relationships Focus

Our students have now completed their second major project of the school year. Teams used Measurement and Geometry concepts to build a kite and create a video of their accomplishments. Please follow the website to see some samples of student work.

During "Problem 3" students will develop a deeper understanding of linear relationships by developing concrete models (patterns and table of values) and graphical models of relations. This will then extend through abstract algebraic representations.

By then end of this unit, students will use various tools from linear relationships and proportional reasoning to determine how Jesus walked the Earth by investigating relationships from the Shroud of Turin.

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Website

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Password: cardinal2013



Twitter

@ambromath9



Apple iBook



Parent Interviews

Midterm parent-teacher interviews will be held on Tuesday January 13th at 7 PM in the cafeteria. We encourage parents to attend if your child is achieving below a level 3.

Program Change

Jan. 20 is the last day for your son/daughter to change program. Students must consult with their teachers and parents before changing program.

Exam Information

Exams begin Jan. 21. There will be an in class assessment task during the Math – Science examination date. All students are expected to attend.

Problem 1 Test Reassessment

Students below a level 3 on test 1 will have an opportunity for reassessment on Mon. January 12th at 3 PM in room 223.

Math Aid

Math Aid is available for all students seeking extra help. It is available from 3 to 4 PM Tuesday to Thursday in room 224.



Manufacturers of consumer goods require extensive knowledge of mathematics to deal with numerous tasks ranging from finance, to design to packaging

Ambrosic Math News

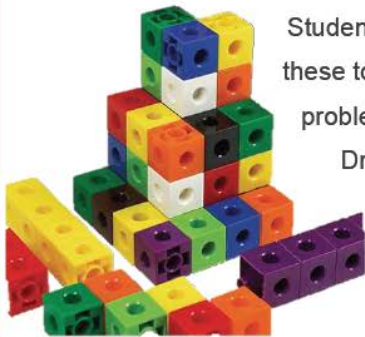
Problem 5 Edition: Algebra Focus

April 2015

Problem 5: Algebra Focus

Now that students have a deeper understanding of relationships models we continue to focus on the Algebraic Model to help students solve problems and make decisions.

During "Problem 5" students will learn and develop tools that will assist them to solve more abstract algebraic models. Some of the tools that will be explored are: Laws of Exponents, Polynomials, and Simplifying Polynomial Expressions.



Students will learn how to use these tools in the context of the problem: Designing A Drinking Box.

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Website

<http://www.dpcdsb.org/AMBRO>
Password: cardinal2013



Twitter

@ambromath9

EQAO: June 2015

EQAO will run for two days in June (dates to be determined). Students are expected to attend both EQAO writing days as the test will be included in your son/daughter's final grade.

Practice

Students are encouraged to do their practice daily, as outlined in their Problem 6 Package. Please encourage your children to practice, review and come ask their teacher for assistance when needed.

Math Aid

Math Aid is available for ALL students from Tuesday to Thursday after school in room 224. Encourage your child to attend so they may receive assistance with their practice. Math Aid is NOT a substitute for the classroom.

Homework Help

Homework help is available to every student in grades 9 and 10. This online service allows students to get assistance with their practice after school hours. Please visit:
<https://homeworkhelp.ilc.org>

S P R I N G 2 0 1 5

Ambrozic Math News

Problem 6 Edition: Solving Linear Equations Focus



Which Bridge Is Better?

Now having completed Problem 5 (Algebra Focus), students should have a deeper understanding of relationships, models and algebraic tools. We continue to focus on the Algebraic Model to help students solve problems and make decisions.

During “Problem 6”, students will learn, develop and select tools that will assist them in solving abstract algebraic models more effectively. They will develop methods for solving linear equations using various tools.

Students will then use these tools in the context of solving the problem: “Determine Which Bridge Is Better”.

Below are some of the tools students will be exposed to:

1. Solving single step linear equations
2. Solving multi-step equations
3. Solving equations with fractions
4. Choosing an appropriate method for solving equations

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WEBSITE

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PASSWORD: CARDINAL2013



TWITTER

@AMBROMATH9

Save the Date!

EQAO Math Aid: May 2015
After School EQAO Math Aid available to all students. These afterschool modules will allow students to practice mathematics while getting ready for EQAO

EQAO: June 2015
EQAO will run for two days in June (dates to be determined). Students are expected to attend both EQAO writing days as the test will be included in your son/daughter’s final grade.

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Students are encouraged to do their practice daily, as outlined in their Problem 6 Package. Please encourage your children to practice, review and come ask their teacher for assistance when needed.

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Sharing and Learning: Provincial Knowledge Exchange

Meeting With Ron Lancaster – September 16, 2013

Ron Lancaster is a Senior Lecturer at the University of Toronto that engages hundreds of teacher candidates each year. He is a lead in mathematics education, provincially and nationally. Ron shared his iPad expertise with our Cardinal Ambrozic CSS Math Department.



OAME 2014 – May 8 to 10, 2014

Our TLLP Team presented our project at the provincial OAME Mathematics Conference. In attendance were Supervisory Officers, Principals, Vice Principals, consultants and teachers.



DPCDSB @2030 Conference – May 30, 2015

This event was organized by the Program Department to share technological initiatives at DPCDSB. We are one team among 8 others sharing what we had accomplished with our TLLP project. Supervisory Officers, Principals, Vice Principals, CIO and teachers were all present.

DPCDSB Ministry Audit – May 30, 2015

Our TLLP Team, along with three other school teams, presented our learning initiatives. Present were Principals, Ministry representatives, Supervisory Officers and teachers. This was a Ministry Audit PD session held in the afternoon 12 noon to 3 PM

Cardinal Ambrozic CSS Math Information Parent Night – December 4th, 2014

Our TLLP team presented our Math initiative to the parents (the TLLP's vision). Parents were introduced to authentic in class videos, problems and student voice.



Association of Educational Researchers of Ontario Conference – December 5th, 2014

WHICH DATA MATTERS? USING DATA AND EVIDENCE TO ENHANCE STUDENT SUCCESS AND WELL-BEING. We were invited to present our TLLP project to a group of Ontario Educational Researchers. The main focus of this day was how to measure growth mindset and student efficacy.

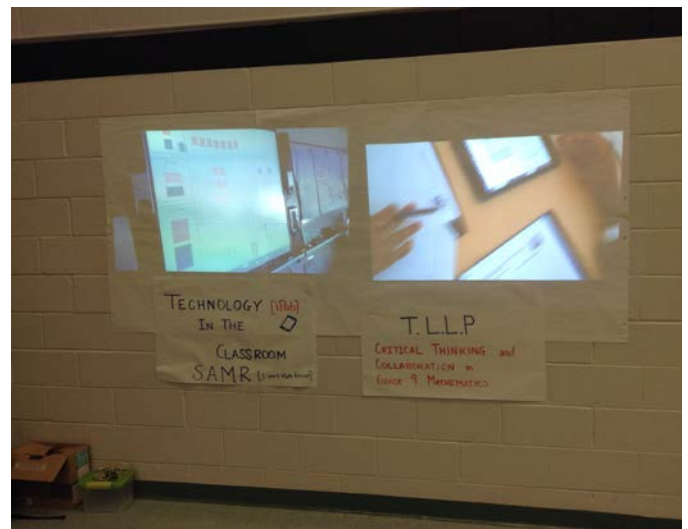
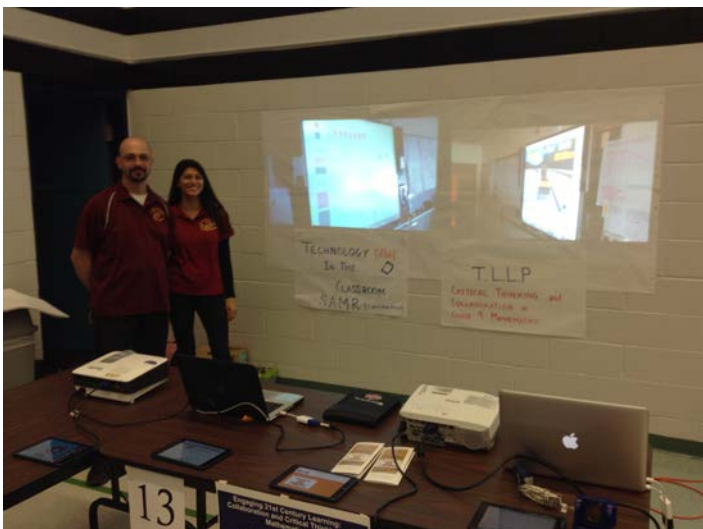


Transitions and Cardinal Ambrozic Math Initiative - Collaboration and Critical Thinking – February 20, 2015

The grade 7 and 8 teachers came for a visit at our school. They wanted to experience a grade 9 Applied and 9 Academic classrooms. They experienced the use of Nearpod and Smart Response VE. We then had an opportunity to discuss our TLLP project as a group.

DPCDSB @2030 Developing Critical Thinking and Collaboration in the 21st Century Mathematics Classroom – March 5th, 2015

This event was run by the Program Department to demonstrate technological initiatives at DPCDSB. We were one team of among 18 others sharing what we had accomplished with our project. Supervisory Officers, Principals, Vice Principals, CIO and teachers were all present.



Australian Educators Visit Cardinal Ambrozic CSS Grade 9 Mathematics Classroom (Gregory Whitby) – April 14, 2015

Gregory Whitby, the director of Diocese of Parramatta, visited the grade 9 classroom and witnessed or TLLP in action. They observed Problem 5 in action where students were solving this unit problem using technology to capture their thoughts. After the visit, we discussed the TLLP project and our mathematics model at Cardinal Ambrozic CSS.



Peter Atkinson Consultant Visit – March 27, 2015

Peter came to visit a grade 9 applied class in action. Students used the Algebra Tile app and reflected to the entire class to share their models. They were also exposed to Nearpod.

St. Thomas Aquinas Math Visit – March 27, 2015

Teachers from St. Thomas Aquinas and Mark Bouwmeester (Dufferin Peel Math Consultant) came to visit our TLLP team. They wanted to see what the project was about and how we ran it with the grade 9 classes.

Learning Tool Rationale: Why iPad?

Choice of Learning Tool: Why iPads?

1. Student Familiarity

Apple products are the technologies with which many of our teenaged students are familiar. In a recent survey at Cardinal Ambrozic C.S.S., we determined that

- 71% own a mobile device
- 72% who own a mobile device own an Apple product

2. Learning for All – Ease of Use

Out of all the mobile technology available, the iPad is a stable and an intuitive platform.

<http://www.pcadvisor.co.uk/buying-advice/broadband/3452563/best-mobile-platform-for-working-on-move/>.

3. Management Features

It is important for educators to use a device that is stable and intuitive if we want to establish the use of mobile technology in the classroom.

The iPad's management control system allows teachers to control the device. As a result, it directs students to use only the tools selected by the teacher. This feature also supports students with diverse learning needs. For example, students dealing with physical disabilities can an active participant from their seat.

4. Number of Educational Apps: 65,000 and Counting!

<http://www.apple.com/ca/education/ipad/apps-books-and-more/>

A. Why Native Apps and Not Mobile Apps

The apps presented on the Apple Store have gone through a quality control process. This removes any apps that may cause damage to the device and ensures quality. These apps are designed with student engagement in mind.

<http://www.mdgadvertising.com/blog/wp-content/uploads/2013/06/should-you-build-a-mobile-app-or-mobile-website.png>

The main difference between native and web-based apps is that native apps do not require Internet connectivity, whereas mobile web apps do. Native apps may or may not have a cost associated with them, but they typically offer a better user experience due to the fact that they allow for more personalization and customization. The only downside is that they cannot be used on all devices. An app that is native to iOS can be used only on iPhones, iPads, and iPods, just as an app native to Android can be used only on Android devices.

Mobile web-based apps, on the other hand, cannot match the interactivity of native apps and require constant Wi-Fi access in order to be usable.

B. Why iPad Apps?

We explored iPads, Android Tablets, and Blackberry Playbooks. Although the hardware of each device is comparable to iPads, what sets iPads ahead of the other devices is the vast repertoire of educational Apps.

- Apps at the Apple Store have gone through a quality control and approvals process
- As an educational institution we qualify for Apple Volume Purchasing (AVP) – this streamlines the purchasing and distribution of Apps to multiple devices and generates “redeem codes” so the Apps can be securely downloaded to each device. Apps are often available for a significant discount via AVP (e.g. through AVP QuickOffice costs \$9.99 whereas purchasing it individually costs \$14.99 in the App Store and on Android) – here’s the AVP link for Canadian Education - <http://www.apple.com/ca/education/volume-purchase-program>.

C. Exclusive iPad Educational Apps

Many of the educational apps that are part of the math curriculum can only be found on the iPad:

Some iPad Exclusive Apps

1. **Geometer’s Sketchpad**-Sketchpad has been used for years in mathematics. The app version allows students to interact with Sketchpad files. The familiarity of sketchpad makes the transition to tablets easy
2. **TI Nspire App** – These calculators are currently used in the math classroom. The app is a fraction of the cost of the actual hardware (not to mention the cost of battery replacement).
3. **eClicker** – an app that works as the SMART Response Student Assessment System. It allows you to upload images where other online services do not
4. **iMovie** – A creativity app that allows students to redefine the way of thinking and communicating through the use of video.

iPad Exclusive Apps – SMART Board Apps

Cardinal Ambrozic currently has SMART Boards installed in every classroom. The iPad is the only tablet that allows one to install SMART Notebook on a mobile device. This makes sharing and interacting of classroom activities that would normally be done on Smart Board seamless.

1. **SMART Notebook**-Our schools are familiar with this technology and software
2. **SMART Bridgit**-A SMART App that allows iPads to directly collaborate in real-time on any teacher SMART Notebook file

In addition to the apps listed above, there are also thousands of apps that support many of the expectations in our curriculum. Also, much of the research on tablets in the classroom is centered on the iPad (i.e. OAME 2014)

D. Dual Purpose: Productivity and Creativity

The dual nature of the iPad allows this tool to be used for traditional productivity in the form of word processing and spreadsheets while allowing for 21st-century collaboration, communication and critical thinking via the large number and quality of educational apps available. <http://appsineducation.blogspot.ca>

5. Cost

A. Other Cost Saving Items

The iPad offers several cost saving benefits:

Item	Description	Traditional Cost (Class set of 30)	iPad Classroom (Class set of 30)
TI-Nspire App (Graphing Calculator)	The iPad can act as a TI-Nspire Graphing Calculator for FREE using the DESMOS app.	TI-Nspire Cost: \$150x30 = \$4500 (Plus Batteries)	FREE
SMART Response Units	The iPad can eliminate the cost of using a set of clickers in the classroom	SRS Class Set: \$2000 (Plus Batteries)	eClicker App =\$15
Textbooks	The iPad can eliminate the textbook. We currently developed an iBook Chapter for our course for FREE	Textbooks: \$80 x 30 = \$2400	iBook on E2CL: FREE
Photocopies	The iPad can eliminate the need for much paper (Students would sync their notes on the cloud)	Photocopies: 30(students) x 30 pages X 7 units x \$0.025/page = \$157/yr per class =\$2200 for an entire grade per year!	FREE
Manipulatives	The iPad has native apps the substitute the current math manipulatives	Algebra Tiles = \$208 Geoboards = \$115 Fraction Strips = \$411 Linking Cubes = \$70	Algebra Tiles App = FREE Geoboard App = FREE Fractions App = FREE Think 3D App = FREE
Batteries	The iPad syncs to a cart and keeps it charge for at least 10 hours of continuous use.	Batteries used for graphing calculator and clicker: Approx. \$200/yr	Minimal Expense
Computer Lab	The iPads free up computer lab spaces and hence the school saves money from not purchasing domain computers	Software License Cost Damage Costs Network Costs Etc..	Many Apps are FREE including the comparable "Office Suite" such as: Pages (Like Word) Keynote (Like Powerpoint) Numbers (Like Excel) GarageBand (Free creativity tool) iMove (Free creativity tool)
	Total Cost iPads, Laptop, Protectors, Apps	\$10,000 + year costs (photocopies and batteries)	Class Set of iPads Mini: 30*299 = \$9000 Computer: \$999

Technology and Pedagogy

The tool we chose to ensure a high level of collaboration and critical thinking was the iPad mini. Dr. Ruben R. Puentedura¹, states, if technology is considered a worthy learning tool it must follow the SAMR Model (Substitution, Augmentation, Modification and Redefinition). Below are just a few apps that have been organized into the SAMR model.

1. Substitution

For technology to be a suitable learning tool, it must act as a direct tool substitute, with no functional change. The iPad can substitute several mathematic tools in the classroom. It can replace the following classroom tools:

- TI-Nspire Graphing Calculator
- SMART Notebook – Students can use most of the notebook features with a touch of their fingers WITHOUT the need of WiFi
- Geoboards – Again, students can change the geoboard as they would a real one
- SMART Board – the iPad instantly becomes a portable SMART Board with the same functionality
- eClicker – removes the need of the SRS units and has improved performance
- Geometer's Sketchpad

2. Augmentation

Augmentation states that technology acts as a direct tool substitute, with functional improvement. With the iPad, students are able to **collaborate** in real-time. This tool allows students to communicate while at the same time recording and storing an individual portfolio.

- Algebra Tiles – Unlike a laptop, students can touch and manipulate the tiles on screen
- SMART Response VE – Works like the current “clickers” but with benefits. Students can view all the questions of their screen at their own pace. They can pinch zoom to read questions more clearly.
- MyScript Calculator – An app that allows students to use a calculator by scribing the question

3. Modification

Technology must allow for significant task redesign. **Critical Thinking** allows for students to make the most well informed decision based on the given information.

- Inspiration– A mind mapping app that allows students to collaborate and brainstorm ideas
- Algebra Touch – An app that is able to reinforce mathematical concepts in a student familiar setting

4. Redefinition

Technology allows for the creation of new tasks, previously inconceivable. Apps such as *iMovie* allow students to get creative while using images, video and audio. This is truly mobile allowing students to capture video and audio in real-time.

- iMovie – Students capture video and photos to create movies or video clips to describe concepts or to explain their solution process in a creative manner
- ExplainEverything – An app that allows students to communicate and describe their thought process

¹ Dr. Puentedura's is the Founder and President of Hippasus, an educational consulting firm focusing on transformative applications of information technologies to education. The basis for Hippasus is to be found in Dr. Puentedura's eighteen years of work in educational research and reform

TLLP Video Journey Summary

TLLP Rational Videoscribe File

https://drive.google.com/file/d/0B_PiK9u6akY3bTE3eWU3aTQ0Q2c/edit?usp=sharing

Project Fly-On-The-Wall Video Overview

Problem 1: Counting Balloons in the Movie "Up"

<https://youtu.be/bj6dMfy6CvA>

Problem 2: Designing A Kite

<https://youtu.be/co3pFQWJrO0>

Problem 3/4: Walking In Jesus' Footsteps

<https://youtu.be/FGznxim0RI>

Problem 5: What Makes An Ideal Drinking Box?

<http://youtu.be/u8tdCtYNXyo>

Problem 6: Designing The Better Bridge

<http://youtu.be/CmznEZNS9mc>

SAMR In The Math Classroom

<http://youtu.be/4qtrwnYXprU>

Student Voice Video

<http://youtu.be/yllMgr5sysU>

Grade 9 Mathematics Information Parent Night Video

<http://youtu.be/cmEvl4GXYqE>