

"Where is the math?"

Robotics, Coding and Math Games

in
Comprehensive
Math Program

The Learning Commons

Teacher-Librarian Mrs. K. Maggrias



Visit the YRDSB Math website

<https://www.yrdsb.ca/services/cis/mathliteracy/Pages/Default.aspx>

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Comprehensive Math Program Resources
<http://youtube.com/yrdsmath>



The Goal for our students...

To be confident problem solvers who use mathematical knowledge, skills and processes to be contributing members of a changing society.



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Comprehensive Math Program Files
<http://youtube.com/3jmg0lpsrEA>



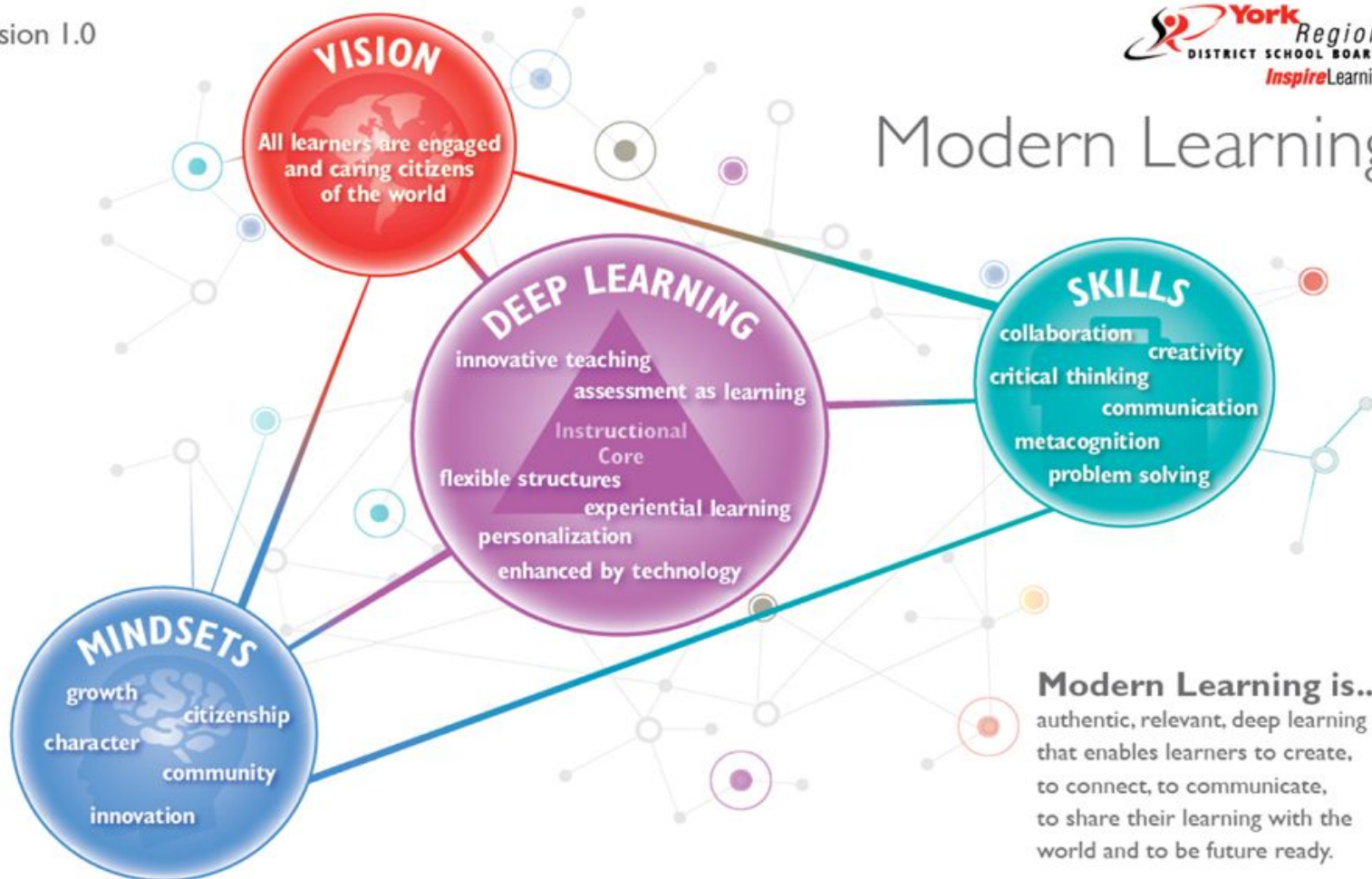
Modern Learning

Modern Learning is...

authentic, relevant, deep learning that enables learners to create, to connect, to communicate and to share their learning with the world and to be future ready.

Modern Learning is...
learning that enables learners to create, to connect, to communicate, to share their learning with the world and to be future ready.

Modern Learning



Modern Learning is...

authentic, relevant, deep learning that enables learners to create, to connect, to communicate, to share their learning with the world and to be future ready.



We are all mathematicians



Growth mindset towards math



Mistakes help learning



Space to collaborate



Learn from and with each other



Ideas are valued

MATHEMATICS GOAL

Students will be confident problem solvers who use mathematical knowledge, skills and processes to be contributing members of a changing society



Mini-lessons

- Know who they are?
- Where they are?
- What is going to excite/engage them?



Games, Puzzles and Purposeful Practice



Problem Solving is central to learning mathematics.



Meaningful Problems



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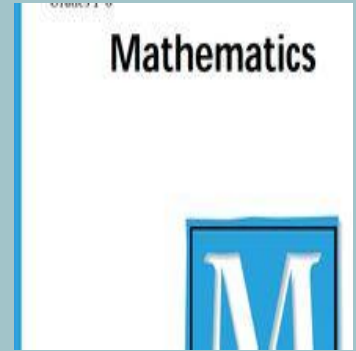
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Comprehensive Math Program Video
<http://youtube.com/SjmoqMpsrEA>



The Achievement Chart



KNOWLEDGE/UNDERSTANDING

- subject-specific content
- comprehension of meaning/significance

	Level 2	Level 3	Level 4
Knowledge/Understanding <i>Use of mathematical terms, procedural skills, use of tools)</i>	knowledge of content	some knowledge of content	knowledge of content
Understanding of mathematical concepts	- demonstrates limited understanding of concepts	- demonstrates some understanding of concepts	- demonstrates thorough knowledge of content
Thinking <i>The use of critical and creative thinking skills and/or processes*</i>			
The student:			
Use of planning skills - understanding the problem (e.g., formulating and interpreting the problem, making conjectures) - making a plan for solving	- uses planning skills with limited effectiveness	- uses planning skills with some effectiveness	- demonstrates considerable knowledge of content
			- demonstrates thorough understanding of concepts
			- demonstrates considerable understanding of concepts
			- demonstrates thorough understanding of concepts
			- uses planning skills with a high degree of effectiveness

COMMUNICATION
conveying of meaning through specific forms

APPLICATION
Use of knowledge and skills to make connections within and between contexts

THINKING

Use of critical/creative skills and processes

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The Mathematical Processes Expectations

	Kindergarten	Primary	Junior	Intermediate	Senior
Problem Solving	develop and apply problem-solving strategies, and persevere when solving problems and conducting mathematical investigations	apply developing problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding	develop, select, and apply problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding	develop, select, apply and compare a variety of problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding	develop, select, apply, compare, and adapt a variety of problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding
Reasoning & Proving	apply developing reasoning skills (e.g., pattern recognition, classification) to create and investigate possibilities (e.g., through talk and through models provided by the teacher and sometimes by other children)	apply developing reasoning skills (e.g., pattern recognition, classification) to make and investigate conjectures (e.g., through discussion with others)	develop and apply reasoning skills (e.g., classification, recognition of relationships, use of counter-examples) to make and investigate conjectures and construct and defend arguments	develop and apply reasoning skills (e.g., recognition of relationships, generalization through inductive reasoning, use of counter-examples) to make mathematical conjectures, assess conjectures and justify conclusions, and plan and construct organized mathematical arguments	develop and apply reasoning skills (e.g., use of inductive reasoning, deductive reasoning, and counter-examples; construction of proofs) to make mathematical conjectures, and justify conclusions, and plan and construct organized mathematical arguments
Reflecting	demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem (e.g., explain to others how they solved their problem)	demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem (e.g., by explaining to others why they think their solution is correct)	demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem (e.g., by comparing and adjusting strategies used, by explaining why they think their results are reasonable, by recording their thinking in a math journal)	demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem (e.g., by assessing the effectiveness of strategies and processes used, by proposing alternative approaches, by judging the reasonableness of results, by verifying solutions)	demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem (e.g., by assessing the effectiveness of strategies and processes used, by proposing alternative approaches, by judging the reasonableness of results, by verifying solutions)
Selecting Tools & Computational Strategies	select and use a variety of concrete, visual, and electronic learning tools and appropriate strategies to investigate mathematical ideas and to solve problems	select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems	select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems	select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems	select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems
Connecting	begin to make connections among mathematical concepts and notice examples of mathematics in their everyday life	make connections among mathematical concepts and procedures, and relate mathematical ideas to situations drawn from everyday contexts	make connections among mathematical concepts and procedures, and relate mathematical ideas to situations or phenomena drawn from other contexts (e.g., other curriculum areas, daily life, sports)	make connections among mathematical concepts and procedures, and relate mathematical ideas to situations or phenomena drawn from other contexts (e.g., other curriculum areas, daily life, current events, art and culture, sports)	make connections among mathematical concepts and procedures, and relate mathematical ideas to situations or phenomena drawn from other contexts (e.g., other curriculum areas, daily life, current events, art and culture, sports)
Representing	create basic representations of simple mathematical ideas (e.g., use concrete materials; physical actions, such as hopping or clapping; pictures; numbers; diagrams; dramatization; invented symbols), make connections among them, and apply them to solve problems	create basic representations of simple mathematical ideas (e.g., using concrete materials, physical actions, such as hopping or clapping; pictures; numbers; diagrams; dramatization; invented symbols), make connections among them, and apply them to solve problems	create a variety of representations of mathematical ideas (e.g., by using physical models, pictures, numbers, variables, diagrams, graphs, onscreen dynamic representations), make connections among them, and apply them to solve problems	create a variety of representations of mathematical ideas (e.g., numeric, geometric, algebraic, graphical, pictorial, onscreen dynamic representations), connect and compare them and select and apply the appropriate representations to solve problems	create a variety of representations of mathematical ideas (e.g., numeric, geometric, algebraic, graphical, pictorial representations; onscreen dynamic representations), connect and compare them, and select and apply the appropriate representations to solve problems
Communicating	communicate mathematical thinking orally and visually, using everyday language, an emerging mathematical vocabulary, and variety of representations (e.g., constructions, pictures, dramatizations)	communicate mathematical thinking orally, visually, and in writing, using everyday language, a developing mathematical vocabulary, and a variety of representations	communicate mathematical thinking orally, visually, and in writing, using everyday language, a basic mathematical vocabulary, and a variety of representations, and observing basic mathematical conventions	communicate mathematical thinking orally, visually, and in writing, using mathematical vocabulary and a variety of appropriate representations, and observing mathematical conventions	communicate mathematical thinking orally, visually, and in writing, using precise mathematical vocabulary and a variety of appropriate representations, and observing mathematical conventions

MATH GAMES

- Math games and puzzles are a meaningful and enjoyable way for your child to do math.
- While playing, your child will deepen his/her understanding, develop new strategies, and carry out procedures in flexible, accurate and efficient ways.
- Support conceptual understanding
- Allow practice of skills and procedures
- Build confidence and a positive disposition towards



mathematics

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WHERE IS THE MATH?

- Throughout the learning commons there are stations to explore;
 - LEGO EV3 ROBOTICS
 - WE DO LEGO ROBOTICS
 - CODING THROUGH DASH AND DOT
 - Maze game
 - Geometry Angles
 - Fractions and Number Line Race
 - MATH GAMES
 - Tenzies
 - Mobi
 - Tangrams
 - Osmo
 - UNO

Throughout these activities we ask you to think about,

“where is the math?”



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<http://youtube.com/Synog11psrEA>



Problem Solving

Number sense

Ordering

Logical thinking

LEGO WE DO/LEGO ROBOTICS

MATH GAMES

Reasoning and Proving

Sequences

Counting

MATHEMATICS GOAL

Communicating

Number sense

Patterning

Representing

Geometry

Doubling

- Building capacity to empower students to participate actively in:
 - understanding the mathematical ideas, skills, and thinking processes needed for complex problem-solving
 - explaining their understanding in different ways, and
 - demonstrating persistence, resilience, and confidence in ability

Number Sense

Patterning

Geometry

MAKERSPACE ACTIVITIES

CODING

Sequence

- Where they are?
- What is going to excite/engage them?

Seconds/Time

Building

Reasoning

Games, Puzzles and Purposeful Practice

Problem Solving is central to learning mathematics.

Rotation

Counting

Problem Solving

Speed (cm)

Direction



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Graphing

be/SjmoqTlpsrEA



SUPPORTING MATH AT HOME

Helpful sites

- <http://www.edugains.ca/newsite/math/homesupport.html>
- <https://mpower.tv.org/>
- <https://homeworkhelp.ilc.org/>

Online Coding and Math games

- <http://www.Code.org>
- <https://www.codecademy.com/>
- <http://www.mathies.ca/>
- <http://illuminations.nctm.org/>
- <https://scratch.mit.edu/>
- <https://www.raspberrypi.org/>

Math games in stores

- Monopoly
- Spot it
- Tenzi
- Mobi
- Uno card game

APPS

- Daisy the Dino
- Cargo-bot
- Scratch jr.
- Geoboard

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You are their idol. They look up to you. They don't do a good job listening to you, but they do a fantastic job imitating you.

– Karl Subban, retired Toronto school principal and father of three

Calculating Time Children Spend at Home vs. School (Birth–Age 18)

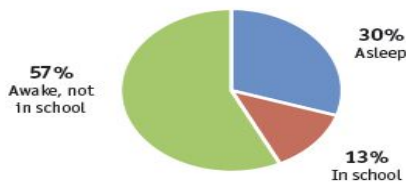
If a child sleeps for 8 hours in each 24-hour day:

- 8 hours asleep and 16 hours awake
- 365 days/year x 18 years = 6,570 days
- 6,570 days x 16 waking hours/day = 105,120 waking hours at age 18
- Average 6 hours/day at school
- Average 180 school days/year
- 180 school days/year x 6 hours/school day = 1,080 hours/school year
- 1,080 hours/school year x 13 school years [Kindergarten + 12 years through high school] = 14,040 school hours
- 14,040 school hours ÷ 105,120 waking hours = .13356

OR

Just 13.36% of all waking hours by age 18 have been spent in school!

How children really spend their time (Birth–18 years)



Recommended Resources

There is a wealth of information on the internet in addition to the links and other resources listed below. For an up-to-date list, please check our website.

- *Family Math Canada*
familymathcanada.org
- *Doing Mathematics with Your Child, Kindergarten to Grade 6, A Parent Guide* (Ontario Ministry of Education, 2014)
edu.gov.on.ca/eng/literacynumeracy/parentGuideNumEn.pdf
- *Parent Resources* (Education, Quality and Accountability Office)
eqao.com/Parents/parents.aspx?Lang=E
- *Mathies*, a website designed for Ontario K–12 students and parents
mathies.ca
- *TVOParents* resources to support math learning at home.
tvoparents.tvoo.org/topic/school-learning#/1185/math
- *TVOKids* shows about math for children aged 6 to 11.
tvoparents.tvoo.org/article/tvokids-shows-ages-6-11-teaching-math
- *Family Resources* (NCTM)
old.nctm.org/resources/content.aspx?id=7928
- *Calculation Nation* (NCTM)
calculationnation.nctm.org
- *Illuminations Games, PreK-Gr 12* (NCTM)
illuminations.nctm.org/allgames.aspx
- *Mathfrog*
cemc2.math.uwaterloo.ca/mathfrog

Module One

Fact Sheet



Fred Varley P.S. Math Night
April 5th, 2017

General Overview

Count Yourself In

CODE

Council of Ontario Directors of Education

Funded By: Ontario

1123 Glenashton Drive
Oakville, Ontario L6H 5M1
Tel: 905.845.4254
Fax: 905.845.2044



Did you know?

- Research shows that early math literacy helps children to succeed in school and improves their future career prospects.
- 70 percent of Canada's top jobs require science, technology, engineering, and math (STEM) education. This includes careers we may not expect, such as culinary arts, animation, and fitness.
- When children are positively engaged and successful, they are more likely to stick with an activity and keep searching for a solution to a problem.
- Early success in problem-solving will build your child's confidence.

Why "Mathitude" Matters

Positive thinking

Students who are encouraged to have a positive attitude about math from an early age will develop positive feelings about the subject.

Keep them engaged

Students who are engaged in the learning process will learn more and be open to further learning.

Motivation

Students who believe that math is important for their future will be more motivated to learn math.

Build confidence

Students who feel confident in their own ability to do well in math will be more likely to perform well.

Yes, you can really help your child succeed in math!

Parent involvement and math achievement

"How can I help?"

Be positive

Choose your words carefully. When parents (and other adults) say they aren't good at math—sometimes to make children feel better—they may be giving children permission to stop learning.

Avoid math anxiety

Math anxiety (unproductive tension and stress) is real and occurs in children as well as adults. Pressure from timed tests and the risk of failure are major sources of math anxiety. Try not to over-react when your child makes a mistake. Making mistakes is an important part of learning!

Learn from mistakes

Homework time can be a more positive experience if you help your children learn from mistakes: praise their efforts, ask them to explain their answer, ask them to think about why the mistake happened, and encourage them to try again.

Help set the tone

Be relaxed and engaged as your child does math homework. You are not expected to be an expert, but you can offer support and ask questions: "How did you do that?"; "Why did you do that?"; "How do you know if you are right or wrong?"; and "Would you teach me how to do another question like this one?"

Be patient and build confidence

If your child becomes frustrated, stop. Remind them of things that they have already learned how to do successfully, such as riding a bicycle or playing a musical instrument.

Ask a teacher

Ask your child's teacher or other member of the teaching team for strategies to use at home. If your child asks for help and you do not know the answer, be honest and say, "I don't know but let's figure it out

together. If we can't, we'll ask your teacher for help together so we can both learn."

Make math part of everyday life!

"What are some math activities I can do to support my child's math learning at home?"

Math games

On no-homework days, quiet evenings, and during vacations, play math games. Math puzzles and games can show that math is fun. They also require trial-and-error thinking, enhance numeracy and logical thinking, and promote discussion. Many mathematicians say a love of puzzles and games inspired their math abilities.

Math on TV

Watch educational television programs. Many offer websites with activities to do together, including free games, apps, math crafts, and songs.

Math at the grocery store

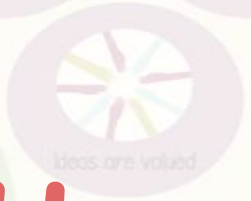
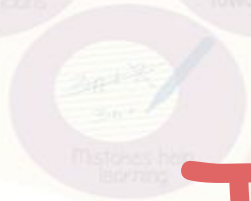
Take your child grocery shopping. The grocery store is full of great math opportunities. You can talk to your child about how to weigh fruit on a scale or how to estimate the total cost of items as you fill your cart.

Math in computer games

If your children enjoy playing on the computer, introduce them to fun and educational web-based games, such as "Mathfrog" and "Calculation Nation."



Thank you



MATHEMATICS GOAL

- Building capacity to empower students to participate actively in understanding the mathematical concepts, skills, and thinking processes needed for complex problem-solving.
- Articulating their understanding in different ways, and
- developing the characteristics of perseverance, resilience and imaginative thinking.

- Know who they are?
- Where they are?
- What is going to excite/engage them?



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