

Inspiring Your Child to Learn and Love Math

Implementation Guide



Inspiring Your Child to Learn and Love Math

Workshop Introduction

These guided workshops have been designed to provide the tools and materials to plan and host parent education sessions. Each workshop is self-contained and includes a template for sharing practical, age-specific strategies and resources to encourage mathematics learning at home. The materials for each module include an invitation letter and flyer, an annotated agenda, and Blackline (photocopy) masters for all activities (including solutions).

These workshops have been created to complement each of the five modules in the *Inspiring Your Child to Learn and Love Math Tool Kit*. The workshops require no prior knowledge of mathematics or specialized content—they can be implemented by anyone who has an interest in learning and sharing.

We have made every effort to acknowledge original sources and to comply with copyright law. If there are cases where this has not been done, please notify the author. Errors or omissions will be corrected in a future edition.

Module Five



Intermediate (Grades 7 and 8)

Countless Opportunities



5:45–6:00 p.m.

Welcome

Warmly welcome parents, guardians, and caregivers as they arrive at the door.

Introduce yourself and briefly explain your role in the workshop.

Invite parents to help themselves to coffee and to take copies of the materials available on the resource table, including these handouts: “Making the Right Choice: Mathematics Pathways”; “Career Opportunity Matrix”; “101 Jobs from Math and Science”; “Module Five Fact Sheet.”

6:00–6:15 p.m.

Introduction

Welcome parents and thank them for taking the time to come.

Thank organizers and other key members of the implementation team.

Introduce parents to the C.O.D.E. “*Inspiring Your Child to Learn and Love Math*” and tell them how to get a copy.

Be prepared! Have materials organized and ready on the tables before parents arrive.

Purpose

Explain that the purpose of this workshop is to:

- * Describe the challenges that children face in the grades 7 and 8 “transition years.”
- * Emphasize the importance of keeping doors to the future open and making informed decisions about high school courses.

You can ask school librarians and math resource teachers to help you find school materials to display at these workshops (math books, games, manipulative materials, etc.).

6:15–6:30 p.m.

Icebreaker—Math career match

During the intermediate years, students might start thinking about their future goals, including job and

career opportunities. Many jobs today require knowledge in science, technology, engineering, and mathematics (STEM), so it is very important for parents and children to understand the importance of taking math courses.

- * Distribute the list of Canada's 10 most common jobs ("Do I Really Need Math for That?!" Quiz). Tell parents to indicate with a checkmark ("YES" or "NO") whether they think each job requires STEM skills.
- * Encourage parents to discuss their quiz responses. Instead of taking up the quiz now, tell parents that you will return to the quiz shortly and that the results may be surprising!
- * And yes, all of these jobs require STEM skills. Review with parents the table of "Surprising Requirements for Programs and Careers."

6:30 –7:15 p.m.

PowerPoint slides and video "Inspiring Your Child to Learn and Love Math"

- * Use the PowerPoint slides to guide the session.
- * Use the notes section of each slide to mention materials, invite discussion, and cue the video segments.
- * Introduce the video when you reach slide #5. Explain that this video focuses on the complex world of adolescents during their transition to high school.
- * Explain that the video suggests ways for parents to encourage adolescent children to:
 - * Keep a "positive mathematical mindset."
 - * Believe in their own abilities to grow, achieve, and succeed in math.

Note: As parents watch the video, invite them to record their thoughts on the Reflection Sheet provided. Allow time for discussion after the video.

- * Think about “pathways”—in other words, how to begin with the end in mind. Helping your teen determine their pathway involves setting short and long-term goals and reinforcing why studying math now will create opportunities in the future.
- * After watching the video, return to the PowerPoint slides and distribute fact sheets and other hand-outs. These documents can guide discussion and help parents to think of questions to ask at future sessions, or to ask teachers and administrators.
- * Encourage parents to give the quiz to their teens when they get home.
- * Emphasize the importance of the “Creating Pathways to Success” hand-out. Encourage parents to work through the questions with their teens.
- * Direct parents to their school district’s portal for the secure “Career Cruising” website. “Career Cruising” is an interactive career planning tool designed to help students explore career options, manage course selections, and plan a career path.

7:15 p.m.

Final Activities

Take up the quiz. Ask parents “Would it surprise you to know that all of the jobs on this list require math?” Remind everyone that the list includes just a small sample of possible jobs and career paths.

Recommended Resources

Direct parents to the list of additional resources (including math books, songs, websites, apps, television shows, and games).

Wrap Up

- * Ask parents if they have any further questions about the workshop information, or suggestions for future workshops.
- * Tell parents you will be available after the workshop to answer additional questions.
- * Encourage parents to speak with their child's teacher, guidance counsellor, or school principal for further answers and advice.
- * Thank parents for coming and ask them to complete an evaluation form.
- * Distribute fact sheets to parents before they go home.

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!

These resources remind us that:

- Math takes practice.
- Mistakes are part of learning.
- Asking, not telling, is most helpful to children’s learning.
- Math is everywhere!

They also remind us to have fun doing math together!

Math Support

TVO Independent Learning Centre

“Homework Help” is a free online resource for students in grades 7 to 10. Ontario teachers provide free, live, one-on-one tutoring. It is funded by the Ontario government

and administered by TVO's Independent Learning Centre.
homeworkhelp.ilc.org/

Mathies

A website designed for Ontario K–12 students and parents.
mathies.ca

MIT’s MathScore

The MIT students who created these online math games want to “change the world in math education.” The philosophy of the site is “If students develop a strong foundation early, they will never fall behind in the first place.”
mathscore.com/

Ontario-based “gap closing”

ePractice is a series of digital, interactive math activities. Students receive immediate feedback on their work.
oame.on.ca/mathies/additionalSupports.html#eP

Career Support

“Career Cruising”

“Career Cruising” is an online career planning tool that helps students to explore and collect information about career and education options. The site includes interest and skills assessments, career profiles, interviews with real professionals in each occupation, and information about prerequisites for university, college, and apprenticeship programs. Every student at every publicly funded Ontario elementary, middle, and high school has access to the “Career Cruising” website.
careercruising.com

“Making the Right Choice: Mathematics Pathways”

The “Mathematics Pathways” summary, included with this tool kit, describes many typical career pathways.

Math Apprentice

Fun, real-world simulations of math careers.
mathapprentice.com

Let’s Talk Science: SPOTLIGHT ON SCIENCE LEARNING—The High Cost of Dropping Science and Math

letstalkscience.ca/images/Research/Spotlight/LTS_Spotlight2013_Executive_Summary.pdf

Canadian women in STEM careers videos

wiseatlantic.ca/teachers.asp

Mathematics and science career poster

wisecampaign.org.uk/uploads/wise/files/wise-a2-posterv4.pdf

Books

Add great math books to your home library. Whether they are breaking a secret code or solving a crime mystery, your young readers will be using math skills without even knowing it!

The Toothpaste Millionaire, Jean Merrill

Could you become a millionaire by the end of middle school? This is the story of a young man who succeeds by working with other students to make inexpensive toothpaste.

A Gebra Named Al, Wendy Isdell

Julie hates algebra until she meets a gebra named Al and, along with the Periodic horses, travels through the Land of Mathematics. Also available as an ebook.

Chasing Vermeer, Blue Balliett

Two children try to recover a stolen Johannes Vermeer painting. The thief will give the painting back if the community can discover which paintings under Vermeer's name were really painted by the famous artist. The book explores themes of art, chance, coincidence, deception, and problem-solving.

Conned Again, Watson! Cautionary Tales of Logic, Math, and Probability, Colin Bruce

In this series of cautionary tales about greedy gamblers, reckless businessmen, and ruthless con artists, Sherlock Holmes solves crimes using mathematics, logic, data analysis, and probability.

Mind Games, Jeanne Marie Grunwell

Students in Mr. Ennis's "Mad Science Club" use the scientific method, probability, and data analysis to investigate whether ESP actually exists.

The Number Devil: A Mathematical Adventure, Hans Magnus

Enzensberger

The number devil visits a boy while he is dreaming and forever changes the way the boy thinks about math and sleep.

The Cryptoclub: Using Mathematics to Make and Break Secret Codes,

Janet Beissinger and Vera Pless

This book explores the grade 7/8 topic of code cracking. Codes include the classic Caesar and Vigenère ciphers.

Crimes and Mathdemeanors, Leith
Hathout

A 14-year-old math genius helps the local police solve cases. Each chapter is a detective story with a math puzzle at its core. The author invites readers to solve each case on their own before reading about the solutions and math behind them.

ESCHER Step by Step in 35 Sketches,
Mugur Neacsu

This booklet explains the geometric processes used by the famous mathematician/artist, M.C. Escher, to create tessellations and metamorphoses.



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.

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TVO Independent Learning Centre
"Homework Help" is a free online resource for students in grades 7 to 10. Ontario teachers provide free, live, one-on-one tutoring.
homeworkhelp.iic.org/

Ontario-based "gap closing" support

ePractice is a series of digital, interactive math activities. Students receive immediate feedback on their work.
edugames.ca/newsite/math/index.html

Mathies, a website designed for Ontario K-12 students and parents.
mathies.ca

Books

A Gebra Named Al, Wendy Isdell

Julie hates algebra until she meets a gebra named Al and, along with the Perfidic horses, travels through the Land of Mathematics.

Chasing Vermeer, Blue Balliett

Two children work together to recover a famous Johannes Vermeer painting. The book explores themes of art, chance, coincidence, deception, and problem-solving.

Career Support

Career Cruising

This career-planning tool includes skills assessments, career profiles, interviews with real professionals, and information about university, college, and apprenticeship programs.
www.careercruising.com

Canadian Women in STEM Careers Videos

This website promotes science and engineering careers for girls.
wiseatlantic.ca/teachers.asp

Module Five

Fact Sheet

Grades 7 and 8

Countless Opportunities

"Young people are in constant motion and tension between **being** and **becoming**. They are in process of **being** themselves in their everyday lives ... However, young people are also in a state of **becoming** young adults."

Kate Tilleczek,
Professor in the Faculty
of Education,
University of Prince
Edward Island

CODE

Council of Ontario Directors of Education

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Handy math facts for the intermediate division

Characteristics of the intermediate division student

Most students in the intermediate division:

- Start thinking about the future.
- Thrive in settings that encourage them to interact with others and to develop strong friendships and close one-to-one relationships.
- Generally have longer attention spans than they used to, and are capable of high levels of abstract thought.
- Want to assert their individuality and independence, but want to conform, too—for example, by dressing and behaving like their peers.
- Can be highly critical of adults, often identifying with only one special adult mentor.
- Experience significant changes that affect them in many ways:
 - Physical changes affect personal appearance and often result in self-consciousness.
 - Psychological and emotional changes can result in mood swings and feeling insecure one minute, then testing limits with a “know it all” attitude the next.
 - Changing sleep patterns and diet can result in low energy levels.

Math milestones for the intermediate division student

By the end of grade 8, your child should be able to:

- Solve multi-step problems involving whole numbers, decimals, and percentages.
- Multiply and divide fractions and integers.
- Apply order of operations in math problems with brackets and exponents.
- Develop circumference and area relationships for a circle, surface-area relationships for cylinders, and angle relationships for parallel and intersecting lines.
- Solve equations involving one unknown—for example $2x + 3 = 11$.
- Display data using various graphs, such as histograms and scatter plots.
- Calculate the probability of complementary events—for example, what are the odds of rolling either an odd (1, 3, 5) or even (2, 4, 6) number with a die?

Supporting your intermediate learner at home

- Be supportive during this period of change in your child's life. Encourage your child to look forward to new friends, experiences, and learning.
- Help your child to look ahead to the future and to set goals.
- Encourage your child to keep doors open by taking math and science courses in secondary school.

- Ask your child to teach you how to use math software that is licensed for Ontario students to use at home, such as “The Geometer’s Sketchpad,” “Tinkerplots,” or “Fathom.”
- Show your child that math is important in everyday life:
 - Use a spreadsheet such as Excel to determine an affordable cell phone plan.
 - Calculate a reasonably priced take-out dinner for the family using coupons or discounts.
 - Review the latest hockey or baseball stats.
- If you believe that your child would benefit from extra help or tutoring:
 - Seek advice from a trusted adviser, such as your child’s teacher or a member of a community outreach program.
 - MIT’s “MathScore” is an example of a high quality remediation program. mathscore.com/mathInterventionRTI.html
- If you believe that your child would benefit from enrichment:
 - Ask your child’s math teacher about *The Gauss* math competition at the University of Waterloo, or challenge your child to try questions from previous years. cemc.math.uwaterloo.ca/contests/past_contests.html
 - Talk to your child’s teacher about the Ontario Mathematics Olympiad in your area, produced by the Ontario Association of Mathematics Education (OAME).
- Encourage your child to believe that success results from effort, determination, and learning from mistakes.

Do I Really Need Math for That?!? Quiz

Take the following quiz to see which of Canada's Top 10 Jobs require STEM (Science, Technology, Engineering, and Math) skills and training.

Check YES, if you believe the job does require STEM skills, or NO, if you believe the job does not require STEM skills.

Canada's Top Jobs*	YES	NO
Oil and gas drilling supervisor		
Nurse and health care manager		
Petroleum engineer		
Electrical and telecommunications contractor		
School principal and administrator		
Lawyer		
Real estate and financial manager		
Senior government manager		
Chemical engineer		
Aerospace engineer		

* www.canadianbusiness.com "Canada's Top 50 Jobs. 2013 edition." Statistics Canada and Human Resources and Skills Development Canada data and ranked on job growth, projected job demand, median wage, and change in compensation.

FINANCIAL COSTS: THERE'S A BIG PRICE TO PAY

One of the major costs of students disengaging from STEM courses at the secondary school level is the financial cost (to students/parents, taxpayers, post-secondary institutions) of re-engaging, or making up, secondary school level math, science, and technology courses later on.

20,000

The number of Ontario students who return each year for a fifth year of secondary school, after meeting graduation requirements⁴.

Leah, a 19 year-old living in Ontario, had enough credits to graduate from secondary school. She applied for a vet tech program at a community college and learned that she needed a senior level science course for admission. She changed her major to police services and learned that she needed senior math for admission so she returned to do a 'victory lap' and upgrade other courses as well.

Leah represents one of 20,000 Ontario students returning for a fifth year of secondary school after meeting graduation requirements. Had Leah completed secondary school with senior level science and math credits in 4 years, she could have worked full-time for one year to save money to put towards her education and living expenses or she could have started post-secondary studies sooner.

\$2,790

The average cost of one semester of undergraduate university tuition or two semesters of college courses⁵.

Andrea lives in British Columbia where she is the science and medicine manager at Canadian Cycling – but her path to get there was not an easy one. She dropped chemistry after Grade 10 and physics after Grade 11 because she felt science was only taught as 'black and white' and she wanted to be more creative than that. At university, she chose to pursue arts versus sciences for the same reason and spent her first year taking a variety of arts courses. Between first and second year, Andrea discovered scuba diving and decided to pursue sciences instead of arts. Upon returning for her second year,

Andrea enrolled in all science courses trying to make up for the year she had lost. Lacking the necessary science background, Andrea struggled with some of her science courses and as a result had to attend summer school, re-take a few of her courses, and was burdened with an overloaded course schedule. All of which meant additional costs. Andrea believes that if science was taught as the art that it is, rather than as facts to memorize, a lot more bright and creative students would stay in the sciences.

\$6,111 to \$10,800 per student

The institutional cost for each first-year Canadian college or university student who fails to progress to the second year⁶.

Blair from Ontario began her career as an early learning resource teacher. Even though she loved her job, Blair felt unrewarded for her efforts and that she had more to offer. After five years of teaching, Blair decided to switch her career to nursing, where she could continue working with children and be exposed to more job opportunities. Unfortunately, because Blair's high school required only one science course to graduate, she did not have all the necessary prerequisites to enroll into a nursing program.

Blair quit her job and signed up for a one-year pre-nursing college program. She was not accepted as she did not have

enough of a science background. Blair then turned to the States for a similar kind of program, but had to withdraw for the same reason. Two years and \$10,000 later, Blair begins a six-month accelerated PSW program for another \$6,000, in hopes it will give her the practical experience to get into nursing. Blair is currently on the waitlist for a nursing program, with another four years of study and a hefty tuition fee ahead of her. Blair strongly believes that science should be made mandatory in all years of high school, and wishes there was more transparency between educators, students, and community about the kinds of educational programs available.

Creating Pathways to Success

Message to Parents/Guardians

Use these four inquiry questions to have conversations with your child. Encourage them to discover their interests, explore opportunities open to them, create future goals and construct a plan for how to achieve them.

EDUCATION AND CAREER/LIFE PLANNING: A FOUR-STEP INQUIRY PROCESS	
Inquiry Question	Area of Learning (Knowledge and Skills)
Who am I?	<p>Knowing Yourself</p> <p>To help answer the question “Who am I?”, students will:</p> <ul style="list-style-type: none"> • identify the characteristics that describe who they are, and create and maintain a personal profile that reflects those characteristics (e.g., interests, strengths, intelligences, accomplishments, values, and skills, including the learning skills and work habits evaluated on the provincial report cards and the Essential Skills described in the Ontario Skills Passport); • identify factors that have shaped who they are and that are likely to shape their profile over time; • reflect on how the characteristics described in their profile influence their thoughts and actions, and how those thoughts and actions may in turn affect their development as a learner, their relationships, and their education and career/life choices.
What are my opportunities?	<p>Exploring Opportunities</p> <p>To help answer the question “What are my opportunities?”, students will:</p> <ul style="list-style-type: none"> • explore the concept of “opportunity” and how the choices they make can open pathways for them; • identify co-curricular and community-based opportunities (e.g., recreational, social, leadership, volunteer, part-time employment); • investigate a variety of fields of work, occupations, and jobs, as well as the potential impact of local and global trends (e.g., demographic, technological, economic, social) on the opportunities available to them; • investigate the preparation required for a variety of co-curricular and community-based opportunities, occupations, and jobs (i.e., acquiring the necessary experience, education/training, and specific skills, including the Essential Skills and work habits documented in the OSP) and how this preparation can be obtained.
Who do I want to become?	<p>Making Decisions and Setting Goals</p> <p>To help answer the question “Who do I want to become?”, students will:</p> <ul style="list-style-type: none"> • identify the demands, rewards, and other features of the various opportunities they have explored, and reflect on the fit between those features and the characteristics they have described in their personal profile; • based on the connections they identify, use a decision-making process to determine personal and interpersonal goals as well as education and career/life goals; • review and revise their goals in light of any changes that may arise in their personal profile and in the opportunities that are available to them.
What is my plan for achieving my goals?	<p>Achieving Goals and Making Transitions</p> <p>To help answer the question “What is my plan for achieving my goals?”, students will:</p> <ul style="list-style-type: none"> • create a plan that identifies in detail the steps required to achieve the goals they have set; • identify the resources required to implement their plan; • identify potential obstacles and challenges they may encounter in implementing their plan, and devise possible solutions.

What's Next?: Your Guide to Education and Career/Life Planning (2013)

This guide was designed by OSCA (Ontario School Counsellors' Association) with the support from the Higher Education Quality Council of Ontario (HEQCO). Visit www.OSCA.ca for an electronic copy.

BOX COLOUR KEY:

	STEM career
	Skilled Trade
	Requires STEM literacy/skills
	STEM background not required, but skills may be beneficial

Table 1:
CAREER OPPORTUNITY MATRIX

1. Top-paying jobs in Canada	2. Top starting salaries	3. Canada's top jobs	4. U.S. top jobs	5. Jobs of the future	6. Career satisfaction	7. Recession-proof careers	8. Most respected occupations
Specialist physicians \$179,514	Doctor \$100,000	Oil and gas drilling supervisor	Dentist	Mining, oil & gas supervisor	Real estate agent	Computer software engineer	Nurses/doctors (tied)
Judge \$178,053	Dentist \$90,000	Head nurse and health care manager	Registered nurse	Pilot	Senior quality assurance engineer	Veterinarian	Farmers
Senior managers – communications, financial and other business services \$162,376	Petroleum engineer \$86,200	Petroleum engineer	Pharmacist	College instructor	Senior sales representative	Financial analyst	Scientists
Senior managers of goods production, construction, utilities, transportation \$160,947	Data security analyst \$83,250	Electrical and telecommunications contractor	Computer systems analyst	Railway & transportation supervisor	Construction superintendent	Database administrator	Veterinarians
General practitioner and family physician \$132,615	Lawyer (first-year associate, large firm) \$81,750	School principal and administrator	Physician	Power systems operator	Senior application developer	Dental hygienist	Dentists
Dentist \$131,552	Website developer/user experience designer \$80,000	Lawyer	Database administrator	Health care managers	Logistics manager	Forensic science technician	Teachers
Senior managers of trade, broadcasting and other services \$124,080	Mobile applications developer \$72,500	Real estate and financial manager	Software developer	Education administrator	Construction manager	Mental health counsellor	Engineers
Lawyer \$123,632	Chemical engineer \$72,407	Senior government manager	Physical therapist	Head nurse	Executive administration assistant	Performance makeup artist	Military officers
Engineering manager \$113,403	Financial controller \$70,000	Chemical engineer	Web Developer	Railway conductor & brakemen/women	Network engineer	Skin care Specialist	Architects
Credit, investment, banking manager \$101,845	Lawyer (first-year associate, midsize firm) \$64,000	Aerospace engineer	Dental hygienist	Dental hygienist	Assistant controller	Personal and home care aide	Police officers

1. www.cric.ca "The Top Highest-Paying Jobs in Canada." 2012 Statistics Canada data of top 10 occupations that earn average salaries amounting to more than \$100,000.
2. www.globeandmail.com "Top 20 starting salaries" August, 2012. Average starting salaries for some of the top-paying jobs in Canada, based on figures from jobsites, Canadian Association of Career Educators and Employers, and industry groups.
3. www.canadianbusiness.com "Canada's top 50 jobs. 2013 edition." Statistics Canada and Human Resources and Skills Development Canada data and ranked on job growth, projected job demand, median wage and change in compensation.
4. www.money.usnews.com "The 100 Best Jobs. 2013." Data from overall best jobs lists and ranked on projected job growth over next 10 years, median salary, job prospects, employment rate, stress level and work-life balance.
5. www.canadianbusiness.com "Canada's top 50 jobs. 2013 edition." Statistics

6. www.forbes.com "The Happiest and Unhappiest Jobs in America." On-line job site Careerbliss.com analysis of employee-generated reviews evaluating 10 factors contributing to workplace happiness: relationship with boss/co-workers, work environment, job resources, compensation, growth opportunities, company culture, company reputation, daily tasks and control over the work on a daily basis.
7. www.businessinsider.com "The Top 10 Recession-Proof Jobs. 2011." Based on US labour market trends, all careers are high-projected growth rates (28-51%) from 2010-2016, ranked here by median pay.
8. www.angus-reid.com "Nurses, Doctors Are Most Respected Jobs in Canada, U.S. and Britain." Public opinion poll of 25 professions conducted in August 2012.

Surprising Stem Requirements for Programs and Careers

Program/Career	Course Requirements/Prerequisites	Also Known As...
Acting for film and television	Introduction to arts and science	Science
	Electronic Media	Computer technology
Dance	Anatomy	Biology
Chef/baker	Nutrition	Biology and chemistry
	Math foundations and hospitality math	Mathematics
	Fermentation theory and application	Mathematics
Carpenter	Estimating and planning	Mathematics
Welder	Trade math	Mathematics
	Production and properties of metals	Chemistry
Esthetician	Anatomy and physiology	Biology
	Diseases/pharmacology	Biology and chemistry
	Epidemiology	Mathematics
	Nutrition	Biology and chemistry
Journalism	Quantitative research methods	Science and mathematics
	Digital design	Computer technology
Fitness/Health promotions	Anatomy of physiology	Biology
	Nutrition	Biology and fitness
	Business management	Mathematics and computer science
Industrial design	2D/3D modeling	Mathematics
	Quantitative research methods	Science and mathematics
	Computer aided design	Computer technology
Crime scene investigator	DNA analysis	Biology and chemistry
Agriculture/agribusiness	Genetics	Biology
	Nutrition	Biology and chemistry
	Plant and soil science	Biology and chemistry
	Farm management	Science, mathematics, and computer technology
Computer animation	Anatomy and biomechanics	Biology and physics
	Computer science	Computer technology
Early childhood education	Health, safety and nutrition	Science
Business administration/ retail management	Mathematics of finance	Mathematics
	Accounting	Mathematics
	Business economics	Mathematics
Weather forecaster	Understanding weather	Science
	Climate change	Science
	Atmospheric chemistry	Chemistry
	Cloud physics	Physics

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Spotlight on Science Learning: The High Cost of Dropping Science and Math

101 Jobs from Math and Science (1 of 2)

- actuary
- aerospace engineer
- analytical chemist
- animal welfare technician
- Antarctic meteorologist
- application engineering manager
- apprentice electrical engineer
- arboriculturist
- astronaut
- biomedical scientist
- bio-process engineer
- biostatistics manager
- botanist
- broadcast engineer
- building services designer
- business analyst
- business strategy consultant
- cartographer
- civil engineer
- clinical embryologist
- clinical research analyst
- community ranger
- computer games designer
- conservation building surveyor
- cosmologist
- design engineer
- design technician
- development chemist
- dietician
- electrical engineer
- emergency medical technician
- energy efficiency installer
- environmental manager
- environmental physicist
- environmental services engineer
- epidemiologist
- exhibition content developer
- fashion designer
- fingerprint officer
- fisheries officer
- flood risk manager
- forensic computer analyst
- fragrance manager
- furniture making apprentice
- geneticist
- gas quality technician
- geotechnical engineer
- home energy adviser
- ice modeller
- ingredients scientist
- IT manager
- IT supply chain specialist
- lab technician
- landscape architect

101 Jobs from Math and Science (2 of 2)

- laser fusion scientist
- measurement and control technician
- mechanical engineer apprentice
- medical photographer
- microbiologist
- molecular geneticist
- motorsport engineer
- neurophysiologist
- network engineer
- oceanographer
- operational research consultant
- patent attorney
- phlebotamist
- physiologist
- physiotherapy apprentice
- planetary scientist
- plumber
- process engineer
- procurement officer
- product development engineer
- quality technician
- quantity surveyor
- radiographer
- reactor system health engineer
- research scientist
- respiratory physiologist
- science communicator
- shader writer
- software engineer
- sound engineer
- space scientist
- special effects supervisor
- sports and exercise scientist
- stage lighting engineer
- statistician
- sterile services technician
- structural engineer
- technology consultant
- toxicologist
- TV technologist
- vehicle maintenance apprentice
- veterinary nurse
- volcanologist
- weather forecaster
- wood machinist (apprentice)
- yacht surveyor
- zoologist

SOME SUGGESTED PATHWAYS

One of your first big decisions prior to grade 9 will be to decide which mathematics program you are best suited for.

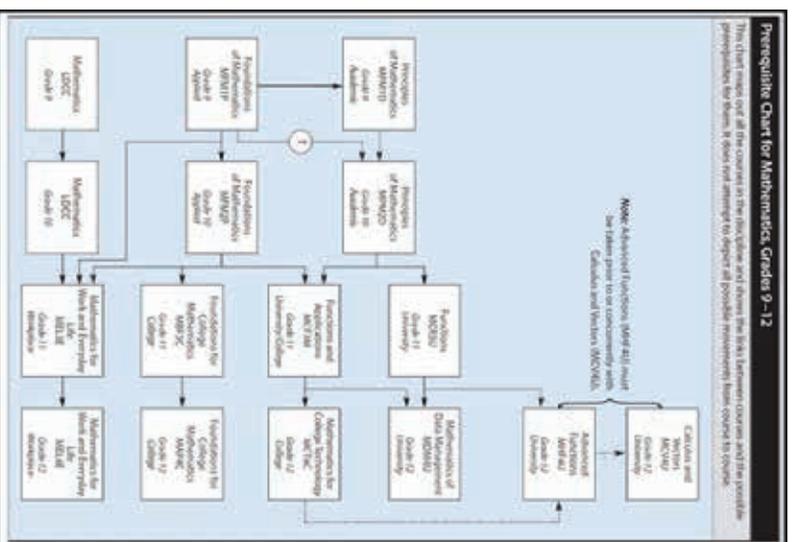
There are 3 choices in Grade 9 Mathematics:

- MPM 1D - Principles of Mathematics (Academic)
- MFM 1P - Foundations of Mathematics (Applied)
- MAT 1L - Locally Developed (Essential)

Most students choose between Applied and Academic. While both courses have roughly the same mathematical content, the teaching approaches diverge quite quickly.

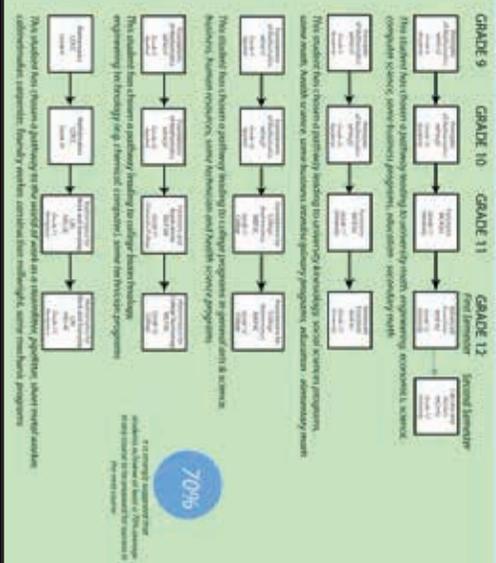
In grade 9, a Locally Developed Credit Course (LDCC) is also offered. This course is designed for students who have significant gaps in their mathematics learning from grade 8, or who have modified programs.

Making the correct choice now will enhance your chances of being successful in math, and make your time in High School much more enjoyable.



T A transfer course is offered for students who start to move from Grade 9 Applied to Grade 10 Academic. It is strongly suggested that a student find late in Grade 9 Academic to be adequately prepared for the Grade 10 Academic Course.

SOME TYPICAL PATHWAYS... and possible careers to follow



MAKING THE RIGHT CHOICE

Mathematics Pathways

To graduate from High School in Ontario, students must successfully complete at least three courses in Mathematics, with at least one of these courses at the Grade 11 or Grade 12 level.

Please refer to the charts on the back of this brochure that show the many different courses and pathways students may take. The arrows indicate potential pathways though these courses.



For more information, visit us online at www.wedcsb.on.ca

CHOOSING A GRADE 9 COURSE

If the following describes you, then you should select:

Grade 9 Academic Math: MPM 1D

- I want thorough coverage of the material and need little repetition
- I learn from reading and traditional approaches, and am ready for abstract reasoning
- I enjoy new problems in a variety of contexts
- I am a deductive thinker and I am able to apply and extend concepts
- I appreciate the difference between a hypothesis and a conclusion
- I need to know why rather than just how to do something
- I use technology to learn, apply, and extend thinking ... not just to get an answer



If the following describes you, then you should consider taking

Grade 9 Applied Math: MFM 1P

- I need more repetition, hands-on activities, manipulatives and visuals
- I want to know how ... not necessarily why
- I need familiar contexts to understand problems or help along the way
- I need to use a calculator to perform basic operations
- I am an inductive thinker – discover through experiments - rather than reading or listening
- I like to focus on fewer main ideas and on basic skills & concepts
- I do not enjoy abstract reasoning

WHAT TYPE OF LEARNER ARE YOU ?

Grade 9 Academic (MPM 1D)

Who should choose this course?

- Students achieving at least 70%, Level 3 or Level 4, in Grade 8
- Students who are comfortable with open-ended, multi-step problems
- The fast pace of this course requires that students in this course have a firm understanding across all strands of the Grade 8 curriculum

Sample Grade 9 ACADEMIC Problem

Each of the containers below holds approximately the same amount of liquid. How much can each hold and which one requires the least amount of material to make ?



Grade 9 Applied (MFM 1P)

Who should choose this course?

- Students achieving between 55% and 70%, Level 2, in Grade 8
- Students who are more concrete in their thinking... more hands-on in their approach to problem-solving
- Students who are still developing proportional reasoning skills

Sample Grade 9 APPLIED Problem

The soccer ball shown has diameter 25 cm
a) Find the volume of the soccer ball.
b) Find the volume of the box.
c) If the soccer ball was placed in the box, how much empty space would be left in the box ?



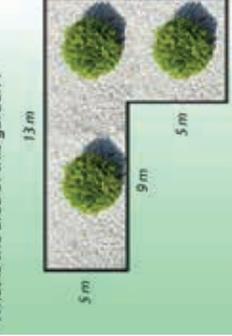
Grade 9 Locally Developed (LDCC)

Who should choose this course?

- Students achieving below 55%, Level 1, in Grade 8
- Students with gaps in their mathematical knowledge & understanding
- Students whose program has been modified (i.e. working below grade level)

Sample Grade 9 LDCC Problem

What is the area of this garden ?



Of course, it is expected that all students develop strong Learning Skills to be successful in any course: Organization, Listening & Note-taking skills, Initiative & Self-Advocacy, Leadership, and Work Habits.

What if you make the 'wrong' choice?

A few students switch from one level to another in their Grade 9 year, but sometimes changes are not possible because of timetabling issues. It is more difficult to switch from grade 9 Academic to Grade 10 Applied in grade 10. That students take the grade 9 Academic course first (sometimes at summer school). However, consider the following when making choices:

- Grade 9 Academic Math will prepare students better for grade 10 Academic Math,
- Grade 9 Applied Math will prepare students better for grade 10 Applied Math.
- These courses diverge even more and lead to a variety of destinations in University or College. It is important that you consider destinations before making a course selection.
- Students taking the Essential Level in Grade 9 who are interested in switching levels, must 'start over' with either the Grade 9 Applied or the Grade 9 Academic. The LDCC is dramatically different from either of these courses. Hopefully, this will assist you with your long term planning. If you have more questions, please consult one of the Mathematics teachers at your school.

Solution:

The volume of both containers is about 523 mL. The shorter container requires 420.6 cm³ of material to make, the taller container only 360.7 cm³.

Solution:

The empty space in the box will be about 9394.77 m³

Solution:

The area of the garden shown is 85 m²

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Council of Ontario Directors of Education

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