

Math in *Motion*

a K–12 resource for system leaders

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A K–12 newsletter fostering mathematics awareness
and successful practices across Ontario school boards

A Forum for Action: Effective Practices in Mathematics Education

Mathematics – like literacy – is considered a “fundamental,” not just for some children but for all. So it is of concern that there has been a small but gradual decline in assessment results for mathematics in English language boards at Grades 3 and 6 over the past five years. Additionally, while gains have been made in Applied Mathematics, the gap between results for students in Grade 9 Academic and Grade 9 Applied remains significant.

Against this backdrop, the Ministry of Education recently designed a two-day conversation to mine the best research evidence and practitioner wisdom on how to improve mathematics teaching and learning in Ontario schools. The forum brought together leading mathematics education researchers, mostly from Ontario universities, with educators representing a small sample of district school boards. Their task was to get the ideas flowing – for consideration, discussion, challenge, reflection and further pursuit of the goal – to improve mathematics outcomes for all Ontario students.

The question they addressed was:

“What has your research revealed about the effective learning or teaching of mathematics?”

Here are several of the key considerations emerging from their discussions:

- Teaching mathematics effectively requires a range of strategies, including the purposeful design of lessons, a careful sequencing of student activities and appropriate interventions and scaffolds for student learning. It also requires knowing students well to work with the strengths, needs and interests they bring to school.
- Spatial reasoning is an important predictor among early learners of later success in mathematics – visual representations are essential for developing spatial reasoning and supporting growth in student understanding of mathematical concepts.
- Manipulatives that help illustrate mathematical functions and computations are excellent and appropriate tools for all student learning K–12 and for teacher and administrator learning as well.
- Mathematics programming needs to involve time for the development of procedural fluency complemented by building strong conceptual understandings.

The forum and researcher reports, as well as the video presentations, will soon be posted at: learnteachlead.ca

Math in Motion is published monthly except during the summer. For more information about this newsletter or to make a comment, email Lavania Batumalai (lavania.batumalai@ontario.ca).

Math in Motion is available each month at EduGains. To access them, visit [here](http://www.edugains.ca).

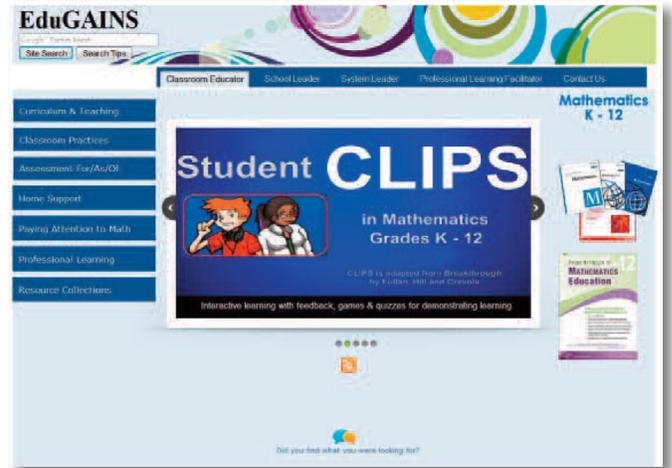
The re-launch of EduGAINS

The launch of the newly redesigned Kindergarten to Grade 12 Mathematics website on EduGAINS is now complete.

For many years, EduGAINS has been a one-stop shop for educators, providing them with resources that support the policies and programs related to improved learning and teaching in Ontario.

The reorganization and upgrading of K to 12 Mathematics on EduGAINS, builds on that commitment by providing an increased number of resources, improving navigation to access the resources, and targeting the specific mathematics learning needs of educators.

The key audiences for the website are the classroom educator, and those in roles with responsibility to support them – school leaders, system leaders and professional learning facilitators. Learning and teaching resources have been organized to address the specific needs of educators in these roles.



Professional Learning about Fractions: The Collaborative Action Research Project is a newly released resource that can be found under the Professional Learning tab. This digital research paper documents the learning journey and lessons learned along the way, as well as the effective practices that will inform the thinking and development of future resources. The digital paper includes brief research summaries, lessons and videos.

Need material for your school newsletter or website?

As school boards and schools know, student achievement improves when parents play an active role in their children's learning. We also know that good schools become better schools when parents are involved. Our collective goal is to engage parents more systematically in understanding the Ontario mathematics curriculum and promoting mathematics achievement.

To support your efforts to inform parents about how they can help their children in the learning of mathematics, a new section is being added to EduGAINS. This section will become a repository

for practical tips, activities, and resources. Principals have permission to include any of the articles in their local school newsletters. The repository is a collation of contributions from the Ministry of Education, boards of education, and math experts. The site is now active and can be accessed **here**.

If you have any resources and/or ideas that you are willing to share with your colleagues across the province, please submit to the editor. All contributions we receive will be acknowledged through mention of your board's name.

Coming Soon!

Spatial Reasoning

The Student Achievement Division Spring 2014 Resource Package will soon arrive at your school. Within this package, look for *Paying Attention to Spatial Reasoning*.

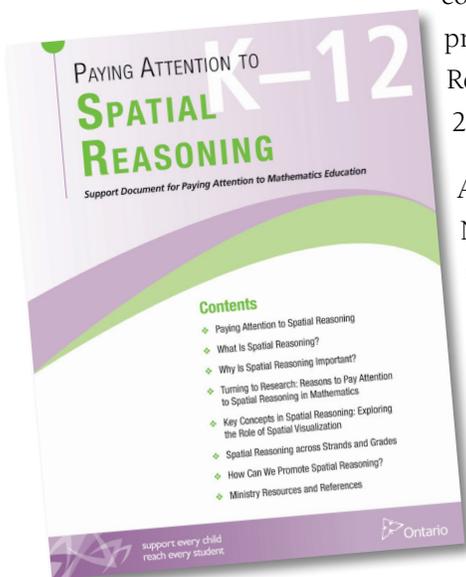
Spatial thinking, or reasoning, involves the location and movement of objects and oneself, either mentally or physically, in space. It is not a single ability or process, but actually refers to a considerable number of

concepts, tools and processes (National Research Council, 2006).

According to the National Research Council (2006), spatial thinking involves three components: “concepts of space, tools of representation, and processes of reasoning.”

It involves understanding relationships within and between spatial structures and, through a wide variety of possible representations (from drawings to computer models), involves the means to communicate about them. When a child rotates a rectangular prism to fit into the castle she is building at the block centre, she is employing spatial reasoning, as is the student who uses a diagram of a rectangle to prove that the formula for finding the area of a triangle is $\frac{1}{2} b \times h$.

Spatial reasoning vitally informs our ability to investigate and solve problems, especially non-routine or novel problems, in mathematics.



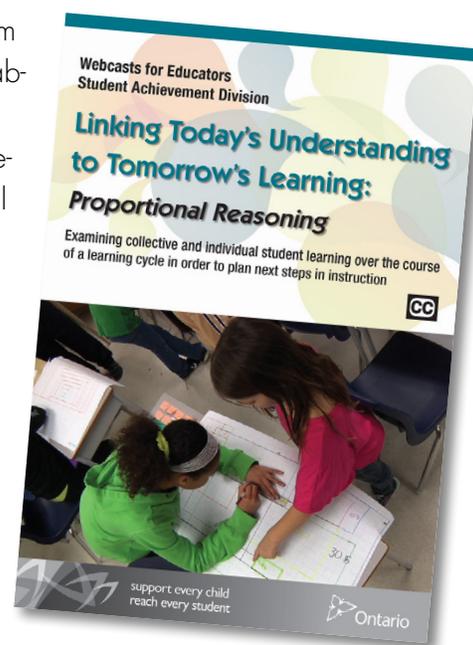
Coming Soon!

Proportional Reasoning Webcast

Look for the *Proportional Reasoning* webcast in the Student Achievement Division Spring 2014 Resource Package. The webcast makes connections to the corresponding monograph, '*Paying Attention to Proportional Reasoning*.'

This resource features a series of interconnected learning experiences focused on developing proportional reasoning. It follows student learning over several days of lessons and tasks co-planned and co-taught by a Grade 6/7 classroom teacher and the school's Special Education Resource Centre teacher.

To support and enhance your professional learning, selected portions of the monograph *Paying Attention to Proportional Reasoning: K-12* (digital version) are provided to support each segment. They have been chosen because they connect to the mathematics that students will experience, with key proportional reasoning concepts highlighted and explained. The video highlights the work of students in an integrated classroom setting as they collaboratively engage in exploring and representing proportional relationships using concrete materials, drawings and ratio tables.



Small and Northern Boards Learning Session

The Small and Northern Boards Initiative supports the hiring of numeracy facilitators, who assist teachers, principals, and supervisory officers in the use of practices that increase student learning and achievement in mathematics.

Recently the Literacy and Numeracy Secretariat facilitated a hands-on networked learning session designed in response to the learning needs identified by the Small and Northern Boards facilitators.

Small and Northern Boards numeracy facilitators were encouraged to bring a representative from their district school board (e.g., SWST, supervisory officer, principal of program, etc.) so that conversations and learning from this session would continue to inform discussions back at the respective district school board.

Student Achievement Officers, who work directly with the teams, also participated in the learning to further strengthen collegial relationships and to provide enhanced support for the work being done at the board level. On the first day, our Ontario-based educators were joined by a contingent from California. The delegation was in Ontario to observe and learn more about education models that support local engagement, decision-making, and capacity building.

The goals of the two day session were to share effective practices for professional learning in mathematics (pedagogical content knowledge), refine understanding of the role of the Small and Northern Board numeracy facilitators, and build capacity to monitor progress and impact of the initiative.

Participants had the opportunity to consider, discuss and reflect on messages from the recent math forum (see page 1). They explored content matter in the area of spatial reasoning. For resources connected to spatial reasoning see page 3.

Many of the Small and Northern Board communities have many First Nations, Metis and Inuit students, parents and community members. The Curriculum and Assessment Policy Branch shared the insights gleaned from a research project being conducted in the Anishinaabe Agindaasowin community. Initial findings highlight the critical role of a culturally responsive education that is rooted in strong community connections prior to embarking on an exploration of mathematics.

Small and Northern Board numeracy facilitators were also provided with time, space and opportunity to share, discuss and refine their 2013-2014 work plans.

The goals of the two day session were to share effective practices for professional learning in mathematics (pedagogical content knowledge), refine understanding of the role of the Small and Northern Board numeracy facilitators, and build capacity to monitor progress and impact of the initiative.