Toronto District School Board

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TEACHING MATH IN THE GARDEN

Teaching Math in the Garden

The warmer weather in April, May and June offers opportunities to use math skills outside beyond the classroom walls and improve student achievement by providing learning experiences that promote active, meaningful, real world mathematical learning. School gardens in particular enhance STEM learning by integrating mathematics with inquiry in science and technology, social studies, geography and environmental education. A garden helps to make math learning accessible to all students regardless of their background, talents or language proficiency. When students plan, plant, care for and analyze their gardens, they also are making connections to how nature works and how our choices can make a difference.

Here are some activities and resources that you may find useful for teaching math concepts outdoors:

Early Years Math Resources

Create a **Garden in a Glove** for science observation and discovery, and measure the growth activity in their glove.

Open Up to Outdoor Mathematics: Support your students developing mathematics skills and concepts through good use of natural and manufactured materials found in and around gardens using this 30 page booklet full of ideas and tested examples.

Math Outdoors: Experiment and investigate with natural materials to learn geometry, number sense, and patterns through Juliet Robinson's wealth of ideas and examples.

Learn how to plan experiences for students to develop mathematical thinking and learn mathematical skills as part of their outdoor play through this article called **The Outdoor Mathematician**

Elementary Math Resources

Birds in the Garden: Track bird sightings and behaviours in your garden and school grounds using this lesson plan from NRICH maths. Analyze the data you have collected for patterns. Do the birds in your area behave randomly or can you explain the patterns you discovered? How can you increase the number of bird species coming to your garden?

Worm Survey: Survey worms in your garden and school grounds using the resources provided by the National Stem Centre. This lesson provides tools to identify different kinds of worms and also how to bring worms to the surface. Collect and analyze your data to determine what kinds of earthworms live in your community and what requirements do each species have, as well as spark inquiry about the importance of worms in your garden.

Collecting Data Outdoors: Make connections between mathematical concepts by collecting data on local and real world events in the school garden. In her article Collecting Data Outdoors, Carol G. Basile outlines the process of collecting data with young children and how data can uncover science misconceptions as well as build on prior math concepts of number, size, shape and pattern. Use your data for citizen science to improve the diversity or health of your school ground ecosystem.

Outdoor Maths: Provide real examples of how math concepts can be develop and applied by taking your math lessons outdoors. Learning Through Landscapes's article on Outdoor Maths provides tips and ideas for using natural spaces but also brick walls and sports area for invoking inquiry and problem solving skills.

Intermediate/Senior Math Resources

Investigate plant adaptations by unpacking patterns in nature with these resources from NRICH enriching mathematics. Create your own transparent golden ratio section finder to locate real world examples in your school yard and community.

Pattern Recognition: Discover when does a pattern start to exhibit structure? Can you crack the code used by the computer

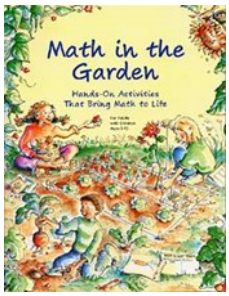
Spiroflowers: Analyse these repeating patterns. Decide on the conditions for a periodic pattern to occur and when the pattern extends to infinity.

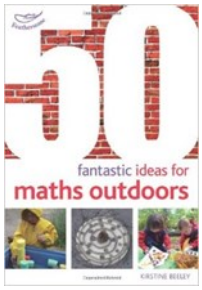
Patterns in Nature: Discover and investigate the properties of the Golden Ratio and Fibonacci numbers through a sequence of challenges exploring their properties.

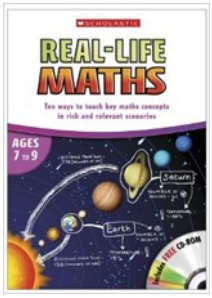
Use a **Golden Ratio Finder** as a lens through which students can find proportional "perfection" in their surroundings. Draw your own or explore your own rotation fraction here to learn how plants minimize gaps as they grow.

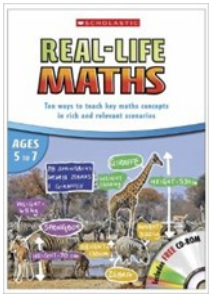
From the TDSB Professional Library

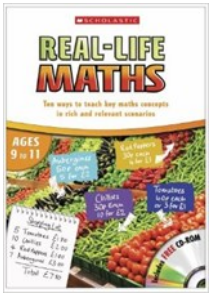
Books for elementary math learning:



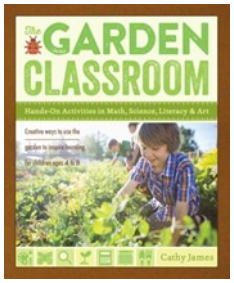


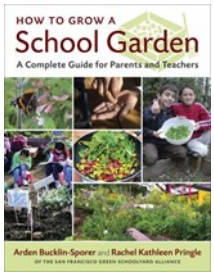


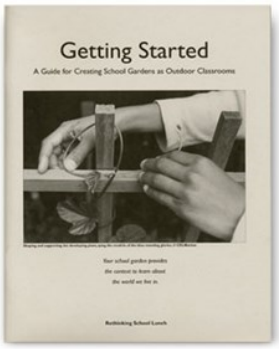




Books for starting gardens:

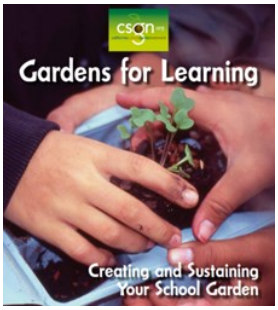






Getting Started: A Guide for Starting a School Garden

This 50-page guide answers most questions you need to consider for creating an outdoor classroom garden. Items covered include your garden's purpose; school staff, volunteers, and students; connecting with curriculum; site selection and design; theme gardens; fund-raising; public awareness; and more. This publication is available free as a PDF download



Gardens for Learning: The National Gardening Association collaborated with the California School Garden Network to develop the book Gardens for Learning which provides very detailed instructions about how to create and maintain a sustainable youth garden program. The book can be downloaded as a pdf for free.