STEM FOR DUMMIES

Because Not Everyone is a Scientist!

The Broken Mouse

How STEM started in our school

What is STEM ?

(STEAM)

Goals of STEM

- To promote higher levels of student achievement by supporting all entry points for a STEM-centric pedagogy in all TDSB schools and for a range of career pathways.
- To develop students' creative and innovative thinking in and across disciplines, with a focus on the application of mathematics, science, engineering design and technology.
- To increase students' confidence and engagement in dealing with open-ended and complex problems.
- To challenge the under-representation of historically marginalized communities in STEM fields by removing existing barriers to engagement and achievement.

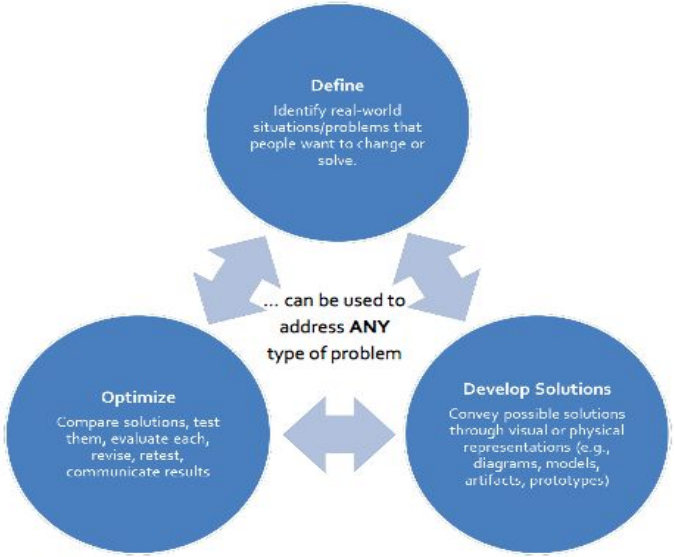
Visit the STEM AW Site:

STEM K-12, Science & Technology
https://aw.tdsb.on.ca/sites/tl/scitech/SiteHome.aspx

Twitter: @TSDB_STEM

Definition: A trans-disciplinary approach to inquiry and problem-based learning that fosters collaboration, creativity, and innovation in all students.

THE ENGINEERING DESIGN PROCESS

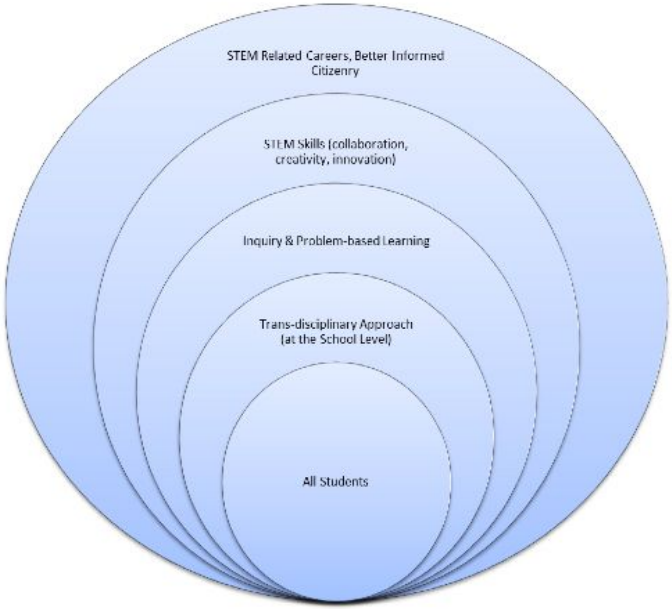


Adapted from:
Truesdell, Pamela. (2014). Engineering Essentials for STEM Instruction. ASCD
https://teachscience4all.files.wordpress.com/2014/06/screen-shot-2014-06-17-at-10-09-57-am.png
http://www.cs.uml.edu/teams-academy/index.php/ATDF2008/EDP

Why is STEM important?

STEM Overview

All Students	STEM education is for all students.
Trans-disciplinary Approach (at the school level)	Moving away from teaching subjects in silos allows for teaching and learning of real world issues.
Inquiry & Problem-based Learning (connecting learning in the school with the real world)	Promoting problem-based learning and STEM skills (e.g., innovation, creativity, collaboration) enables students to stay current, explore, inquire and actively engage in relevant world issues.
STEM Skills (collaboration, creativity, innovation)	Scientific discovery and technological innovation shape how future citizens work collaboratively to provide creative and viable solutions to today's and tomorrow's real-life problems.
STEM Related Careers, Better Informed Citizenry	Exposure to STEM learning provides all students opportunities to explore a variety of STEM related careers in a constantly changing world. Using a STEM focused real-life problem-solving framework promotes life skills, which will ultimately help all citizens be better informed decision-makers.



TDSB's Strategic Directions:

- Make every school an effective school
- Build leadership within a culture of adaptability, openness, and resilience
- Form strong and effective relationships and partnerships
- Build environmentally sustainable schools that inspire teaching and learning
- Identify disadvantage and intervene effectively

Science Curriculum

Kids are naturally curious.

Elementary Science and Technology Curriculum Overview				
	Understanding Life Systems	Understanding Structures and Mechanisms	Understanding Matter and Energy	Understanding Earth and Space Systems
Grade 1	Needs and Characteristics of Living Things	Materials, Objects, and Everyday Structures	Energy in Our Lives	Daily and Seasonal Changes
Grade 2	Growth and Changes in Animals	Movement	Properties of Liquids and Solids	Air and Water in the Environment
Grade 3	Growth and Changes in Plants	Strong and Stable Structures	Forces Causing Movement	Soils in the Environment
Grade 4	Habitats and Communities	Pulleys and Gears	Light and Sound	Rocks and Minerals
Grade 5	Human Organ Systems	Forces Acting on Structures and Mechanisms	Properties of and Changes in Matter	Conservation of Energy and Resources
Grade 6	Biodiversity	Flight	Electricity and Electrical Devices	Space
Grade 7	Interactions in the Environment	Form and Function	Pure Substances and Mixtures	Heat in the Environment
Grade 8	Cells	Systems in Action	Fluids	Water Systems

Science Curriculum

CONTINUUM FOR SCIENTIFIC INQUIRY/RESEARCH SKILLS*

Beginning →	Exploring →	Emerging →	Competent →	Proficient
Initiating and Planning				
The student:				
asks questions that demonstrate curiosity about the world around him or her	asks questions that could lead to investigations, and chooses one that will be the basis for an investigation	asks questions that could lead to investigations, and formulates a specific question that will be the basis for an investigation	asks questions that arise from practical problems and issues, and formulates a specific question that will be the basis for an investigation	
	uses a teacher-prepared organizational system for gathering and organizing information	plans an organizational system for gathering and organizing information, using a variety of graphic organizers (e.g., Venn diagram) and organizational patterns (e.g., cause and effect)	plans an organizational system for gathering and organizing information, using a variety of strategies (e.g., sketchboard outlines of a series of events) and organizational patterns (e.g., order of importance)	
	with support, selects print and multimedia resources from those provided by the teacher	independently selects print, multimedia, and electronic resources from those provided by the teacher	independently selects print, multimedia, and electronic resources	

STEM activities we've tried

and you can try too!

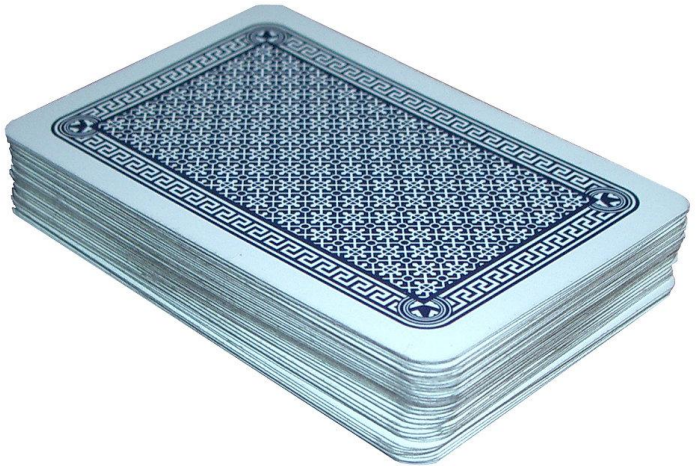
Discovery Zone: Plants

Math Centres

Math games
- cards (multiplication, memory, addition)

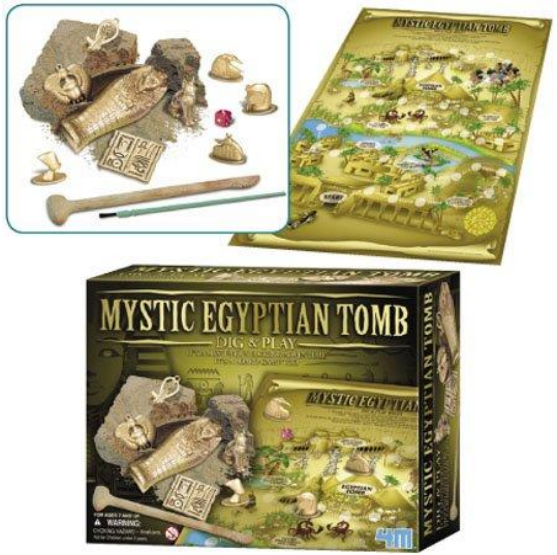
Puzzles
Logic Games
Sudoko
Crosswords

Magic Games/Magic Tricks



Ancient Civilizations/Archeology

- Archeology dig
- Fossils, dinosaurs, rocks
- Paleontologists
- Archeologists
- Structures
- History, Culture

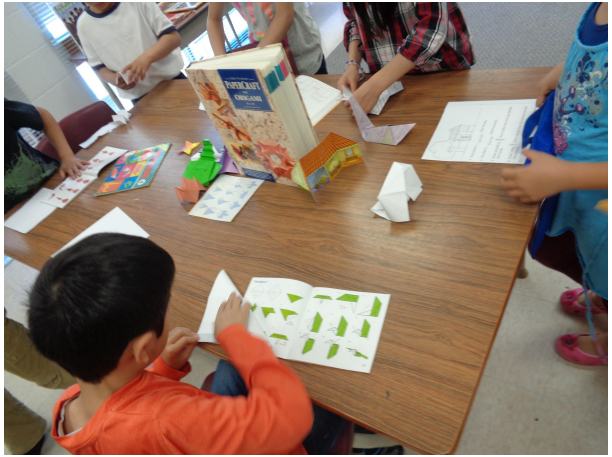


Maker Space Zone

Let’s make stuff!

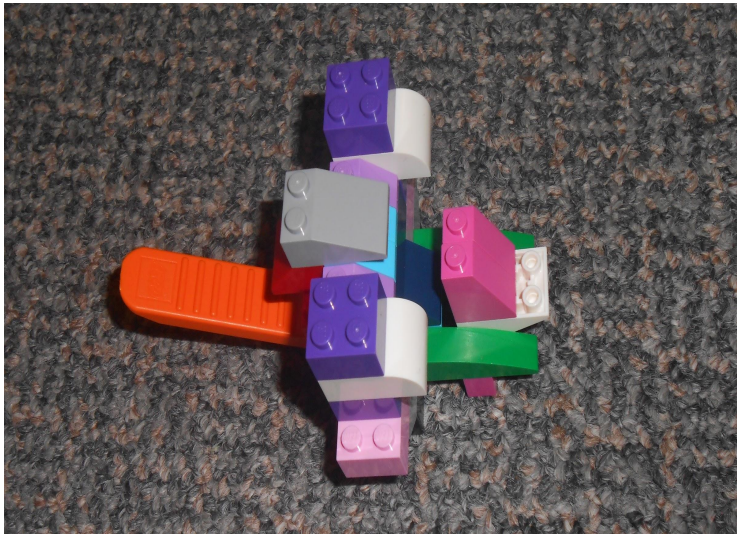
Origami, Kirigami and Paper Airplanes

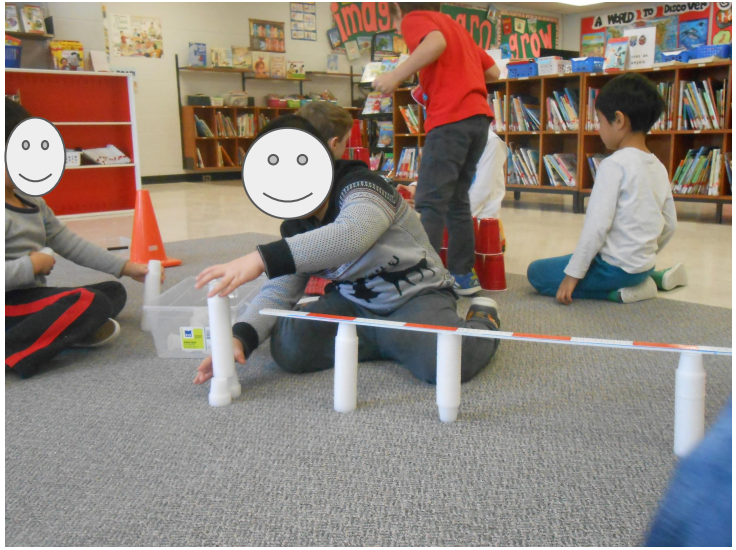
- Art
- Math
- Engineering
- Fine Motor skills
- Following Step by Step Instructions

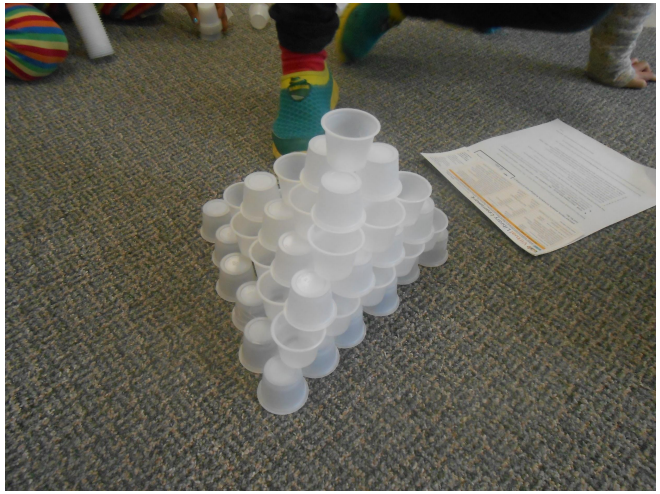


Lego/Structures

- Art
- Math
- Engineering
- Following direction



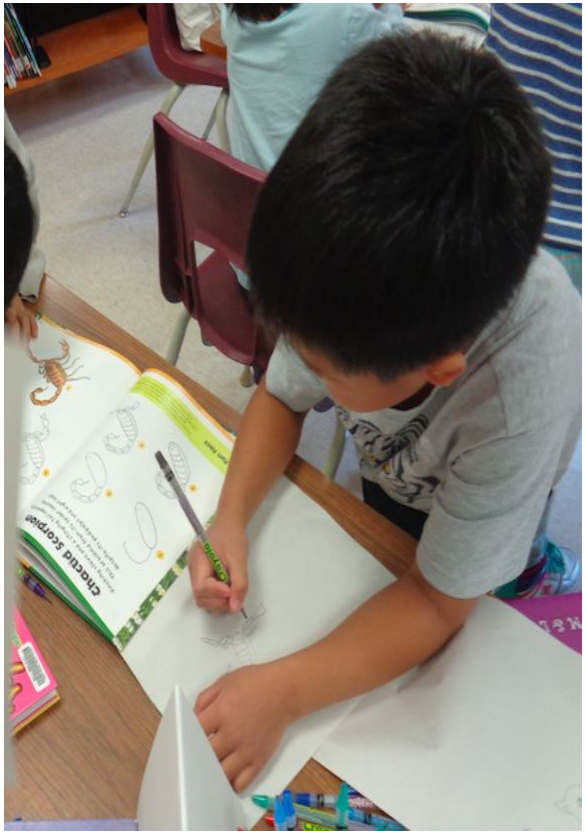




Drawing , Cartooning

kindergarten to grade 6

Math: symmetry
following instructions
shapes/geometry



Forces and Magnets

- Walk around the library and find things that are magnetic
- Why does it attract/repel?
- Sort the objects that are magnetic
- How are magnets used in your daily life? Look around your home, classroom, outside?

Currently in our MakerSpace right now: Marble Run

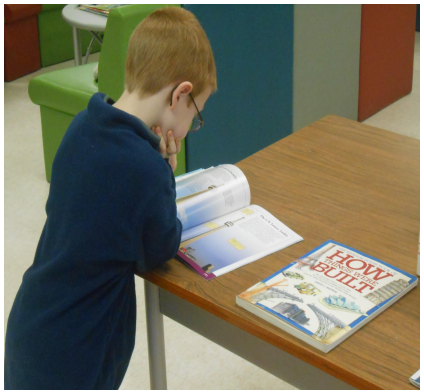
We asked the students to get the marble from the top of the wall into a cup.

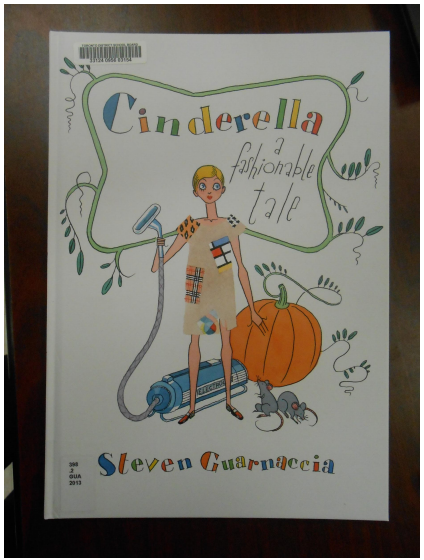
*Challenge!!!! Make a LOOP in your marble run.

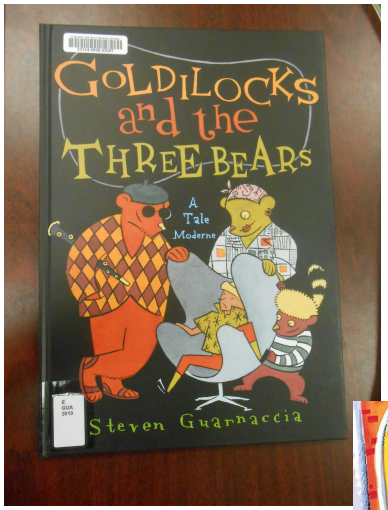
- cardboard
- masking tape
- toilet paper and paper towel rolls
- marble/cup

Teamwork! Design Create! **Build**

Books that promote STEM







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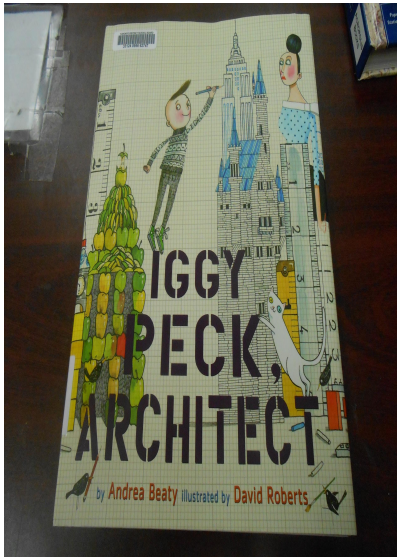

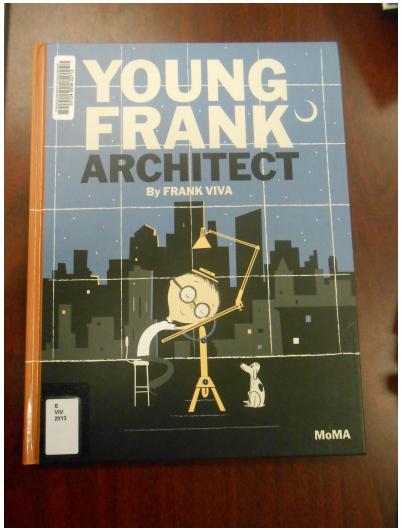

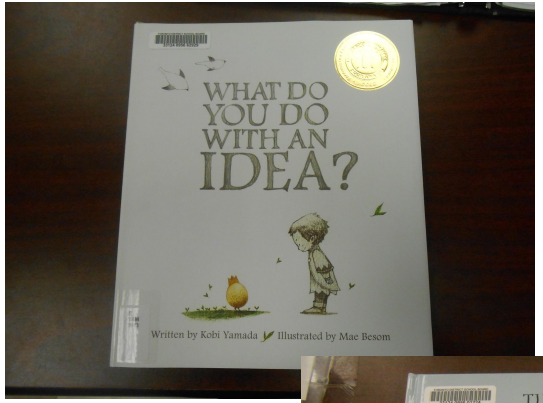

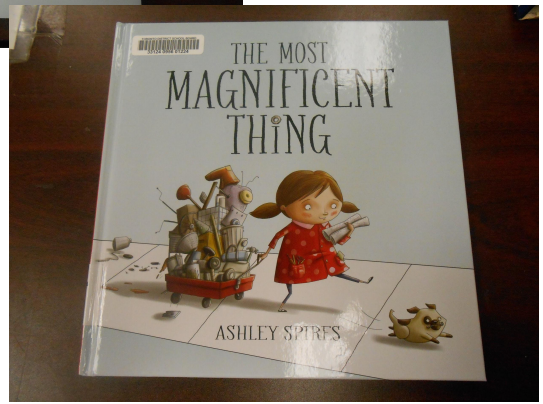

Time to Discover!

Suggestions for further learning

- How would you change/adapt this MakerSpace or Discovery Zone to suit your library's needs?
- What other challenges or activities could you suggest for your own learning centers?

Now we’d like to hear from you!

After participating in a variety of STEM activities, participants in the workshop had these ideas to share for others!

More Ideas from Participants!

Thank you for attending our workshop!

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