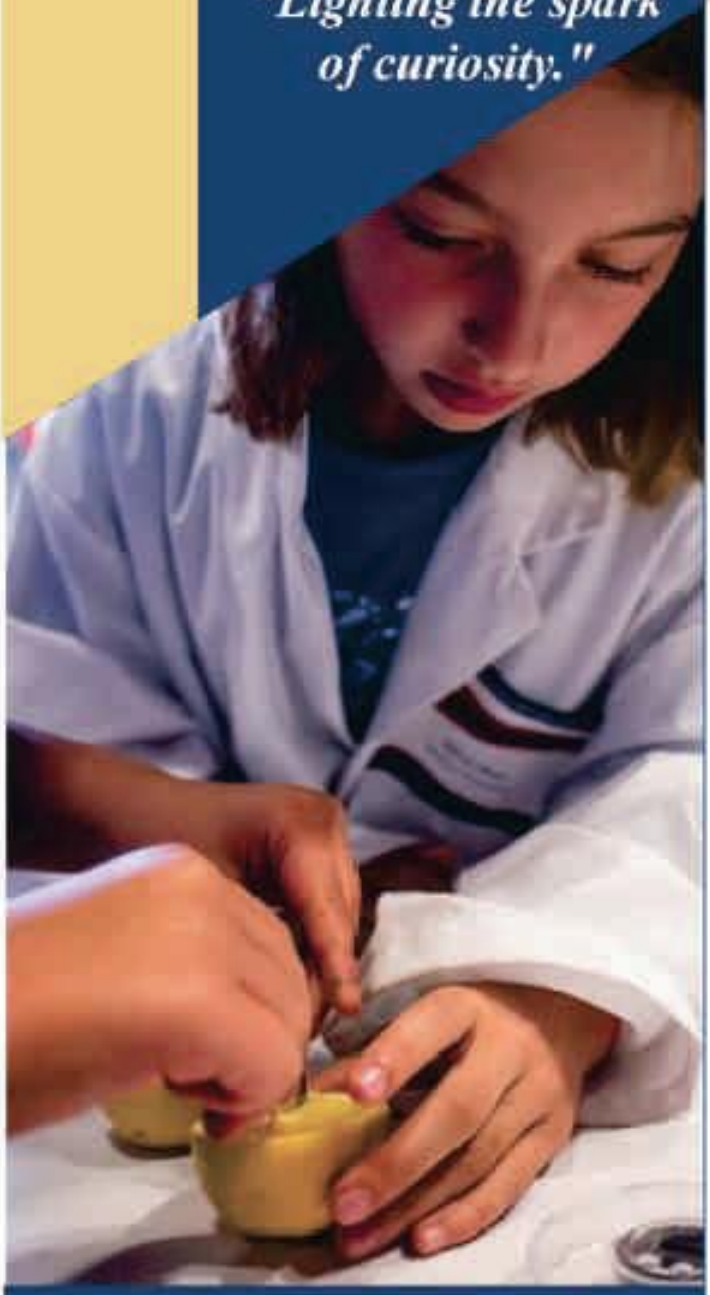
Program & Schedule and Science Experiments to Do at Home!

"Lighting the spark of curiosity."



http://educ.queensu.ca/coc/science-rendezvous

SCIENCE RENDEZVOUS KINGSTON 2017

SCIENCE RENDEZVOUS
WHERE PEOPLE AND SCIENCE MEET

SATURDAY MAY 13, 2017
The Rogers K-ROCK Centre
& The Tragically Hip Way
10:00 A.M. TO 3:00 P.M.

Queen's 175 YEARS

Queens Faculty of Education

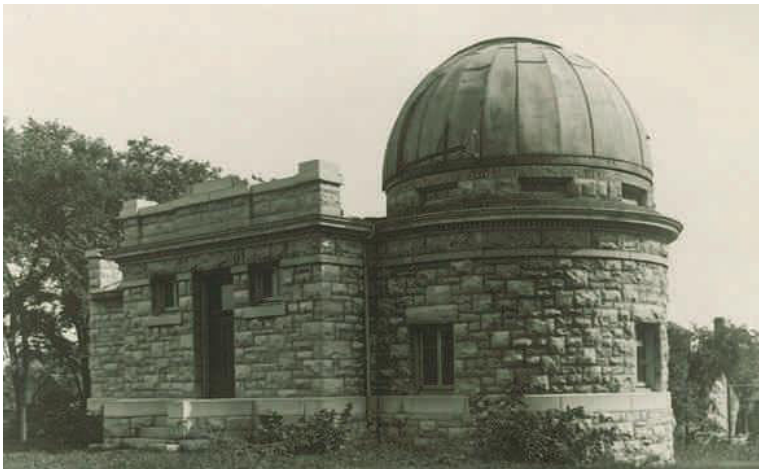
Queens Community Outreach Centre

Welcome to Science Rendezvous Kingston 2017

While this annual "pop-up" science discovery centre is in its infancy compared to Queen's University (celebrating its 175th anniversary year) or Canada (marking its 150th year of confederation) this 2017, we hope to carry on far into the future, and leave a lasting legacy with respect to community engagement and public education.

In the photo above, I am being awarded the 2016 Award for Distinguished Service to Queen's University by Chancellor Jim Leech and Principal Daniel Woolf. The honour was in acknowledgement of a number of contributions to the university and the community, not the least of which was my role as founder and coordinator of *Science Rendezvous Kingston.* The ceremony on November 5, 2016 was likely the highlight of my long career in education and public engagement. I continue to be grateful to my nominators, the adjudication committee and the University Secretariat for this distinction–I promise that I will not rest on my laurels! It is a privilege and pleasure to be able to host this gigantic party for the researchers in science, technology, engineering and mathematics (STEM). From designing, constructing and delivering inexpensive artificial legs and launching mind-boggling paper-thin, foldable cell phones to unlocking the mystery of neutrinos, the fundamental building blocks of nature, our local scientists have worked and continue to work selflessly to advance knowledge and improve our quality of life. And so, this event awards them by inviting the public to see the fruits of their labors first-hand…*Cha-gheill!*

This year, the event is made possible from funding by The Office of the Provost and VP (Academic) and has been supported by all Senior Administrators and Deans at Queen's. Their financial investment in faculty, graduate and undergraduate students from the STEM fields, as well as the greater Kingston community is appreciated and duly acknowledged.



Astronomy has been a part of the Kingston community since as far back as 1855. Given that Queen's has a rich legacy and an auspicious future with respect to research and discovery in science, technology, engineering and mathematics, it was felt that our special features this year needed to reflect both a nod to the past and a salute to the future.

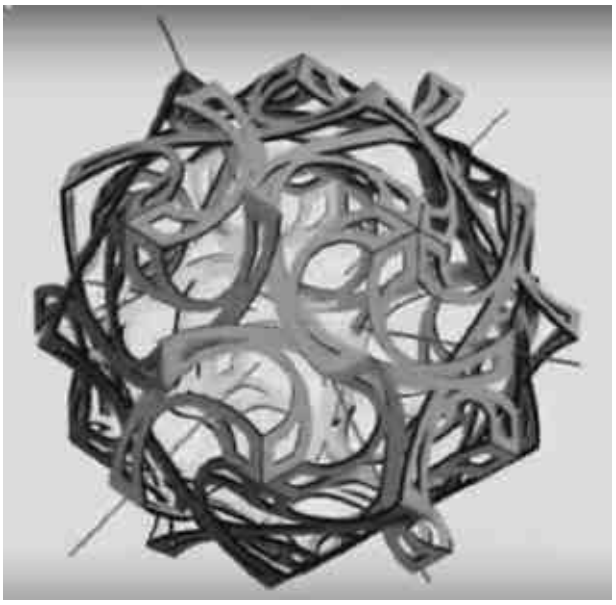
To honour those early Queen's astronomers, members of our current community who enjoy astronomy as a hobby, and local students who dream of one day being an astronomer or astronaut, there is a planetarium at *Science Rendezvous Kingston 2017!* Funded in part by The City of Kingston Cultural Service Department, and presented in collaboration with The Pump House Steam Museum, you will have a unique opportunity to watch the constellations and experience the night sky inside an inflatable dome courtesy of the Royal Ontario Museum. Did you know that Queen's grad Andrew Feustal (PhD '95) is a NASA astronaut and that Karen Lee-Waddell (who discovered a dwarf galaxy while a PhD student at Queen's in 2012) is an astrophysicist in Queensland Australia at the Commonwealth Scientific and Industrial Research Organization? *Aspere ad astra! Reach for the stars.*

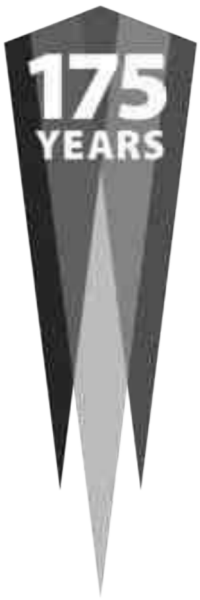
April 9, 2017 marked the 100th *anniversary* of the First World War and the Battle *of Vimy Ridge.* Of the 100 000 Canadian soldiers who poured from trenches, dugouts and tunnels, surged up a slope and conquered an enemy position, 3, 598 were killed and 7004 were wounded that day. Included in the tally were approximately 1,500 Queen's students who participated in WW1 and 187 who died.

At *Science Rendezvous Kingston 2017,* you can fly an historic Sopwith Ship Camel biplane, courtesy of the *Ace Academy,* a flight simulator on loan from the Museum of Aviation and Space in Ottawa. The Sopwith Ship Camel biplane was a single-seater British fighter biplane used by the Royal Naval Air Service and the RAF during the First World War. All you have to do is to move your arms up and down and tilt your body to manoeuver the airplane onscreen.

WELCOME

Last, but not least, it gives me great pleasure to know that the legacy of *Science Rendezvous Kingston 2017* will live on in the form of a beautifully symbolic geometric sculpture commissioned by mathematician and artist George Hart and funded by The Mathematics, Science and Technology Education Group at The Faculty of Education as part of Queen's 175th festivities. This commemorative work of art will be constructed before your eyes at *The Mathematics Midway* by guests and members of the public to celebrate the leading edge research at SnoLab and the 2015 Nobel Prize awarded to Queen's much celebrated professor, Dr. Arthur McDonald. You can be a part of history as this magnificent piece is assembled in preparation for its dedication and installation at Stirling Hall, the home to Queen's physics studies.





Our purpose today is to excite learners of all ages by showcasing the many interesting and important places that STEM education may lead. Each one of our research and citizen scientists is both a mentor and member of our community.

How fortunate are the citizens of Kingston to be treated to the country's largest STEM celebration? In closing, may I take this opportunity, on behalf of the greater Kingston community, to extend a HUGE and SINCERE thank you to the 400 STEM enthusiasts and professionals who are here today to share their passion for and commitment to STEM and plant some seeds of wonder. May those seeds take root, grow and blossom.

Professor, Faculty of Education,
Founder of Science Rendezvous Kingston and
Coordinator, Queen's Education Community Outreach Centre

Queen's University | Community Outreach Centre

Faculty of Education
Duncan McArthur Hall, Room A342
511 Union Street, Queen's University
Kingston, ON K7M 5R7
educ.queensu.ca/coc

SPECIAL THANKS

Lynda Colgan, Science Rendezvous Coordinator, Professor, Faculty of Education, Queen's
Kim Garrett, Science Rendezvous Coordinator, Faculty of Education, Queen's
Chelsea Elliott, Science Rendezvous Coordinator, Manager, Experiential Learning and Partner Relations
Lorena Jessop, Volunteer Care Coordinator, Lecturer, Department of Languages, Queen's
Janelle MacPherson-Kenney, Marketing Coordinator, Queen's University
Jeffrey Wamboldt, Take-Home & Presenter Packages
Kyle Clarke, PhD Candidate, Faculty of Education, Queen's Volunteer Coordinator
Stephen Mueller, MEd Candidate, Faculty of Education, Queen's Volunteer Coordinator
Dustin Garrett, School Partner, Teacher, St. Patrick Catholic School, ALCDSB

Office of the Provost and Vice-Principal (Academic)
Mathematics, Science and Technology Education Group, Faculty of Education, Queen's
Centre for Advanced Computing

Stephen Peck, General Manager
John Noon, Promotions & Web Director

Lynn Carlotto, General Manager
Nick DeLuco, Assistant General Manager
Simon Van Asseldonk, Coordinator Events Services
Matt Pollard, Events Services
Rob Moeys, Operations
Kyle St. Croix, Operations

Paul Robertson, City Curator, Cultural Services, City of Kingston

Scott Love, Gilmore Printing

Rick Mercer, Host of *The Mercer Report*

Erin York, Marketing and Communications Coordinator, Faculty of Education, Queen's

Garrett Elliott, Event Photographer

SCHEDULE OF EVENTS

WHAT?	WHERE?	WHEN?
Green Chemistry Magic Show *Dr. Phillip Jessop and The Queen's Chemistry Graduate Student Society*	Inside the Rogers K-ROCK Centre Mini-Bowl	10:30 a.m., NOON and 1:30 p.m.
Queen's University Baja SAE Design Team *Baja single driver off-road vehicle*	Outside on The Tragically Hip Way (weather permitting)	1:00 p.m.
Kingston Police Force Canine Unit *Officers Jeff Dickson and Zeus & Mark McCreary and Titan*	Outside on The Tragically Hip Way (weather permitting)	2:00 p.m.

SCIENCE RENDEZVOUS KINGSTON 2017

WHAT'S NEW!

Dr. George Hart

In addition to his role as a research professor in the engineering school at the State University of New York in Stony Brook, New York, Dr. Hart is a world-renowned sculptor and the co-founder of North America's only museum of mathematics, *MoMath*, in New York City.

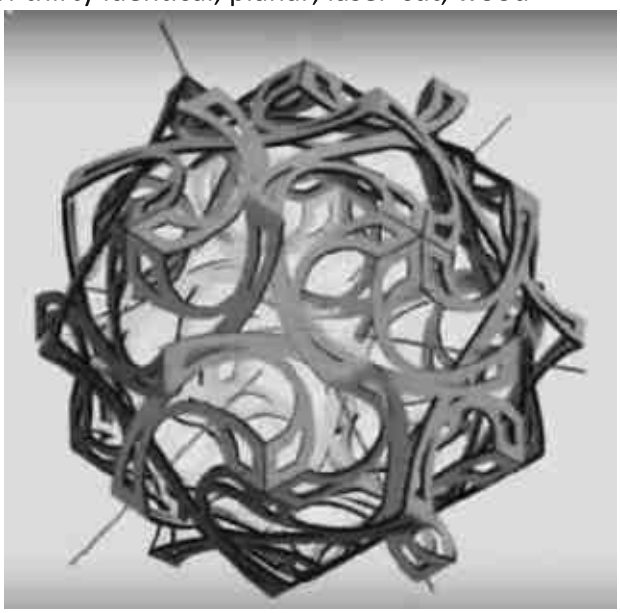
In the morning at *Science Rendezvous Kingston 2017,* George will be leading members of the public in the assembly and disassembly of a mathematical sculpture.

In the afternoon, George will be working with invited guests to build a commissioned sculpture to commemorate the 175th anniversary of Queen's University. The work is inspired by work at the Sudbury Neutrino Observatory (SNOLab), and celebrates the contributions of Professor Arthur McDonald, Queen's Nobel Laureate. He and his team showed that neutrinos generated in the sun can change flavour while traveling to the earth, which is important because it implies that neutrinos have nonzero mass.

Because neutrinos rarely interact with matter, the neutrino detector needed to be huge and well shielded from stray radiation. In an amazing engineering effort, Dr. McDonald's team created a giant sphere of heavy water, held in a 12-metre diameter clear acrylic sphere which sits inside a larger, water-filled geodesic sphere holding the detectors. This all sits in a clean-room in a mine more than a two kilometres below the surface of the Earth. George Hart explains his design: *I see a certain visual symmetry between the start and the end of these solar neutrino's lives. They are created in the core of the sun. As an artist, if I wanted to make a quick visual sketch of the process, I would draw a circle for the sun, an inner circle for the core and a radial line indicating a neutrino's outward path. And to sketch the detector operation, I would again draw a circle in a circle and a radial line indicating a neutrino's inward path. This geometric parallelism between the two endpoints of the neutrino's existence is fascinating to me.*

WHAT'S NEW!

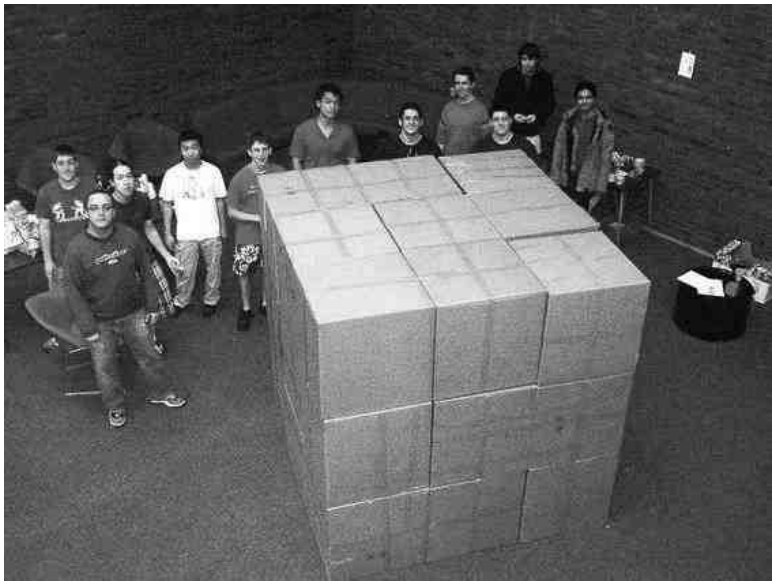
The sculpture will be approximately 1.5 metres in diameter, made of thirty identical, planar, laser-cut, wood components, plus six brass rods. Dr. Hart's vision is that visitors' initial impression will be one of dynamic complexity, drawing in onlookers to examine it more deeply and ask questions. Perhaps the curious viewer making sense of the sculpture goes through a mental process somewhat analogous to a scientist's process of analysis. Just as symmetry is central to the work of particle physicists, so the different symmetries of the sculpture are foundational in its organization.



Dr. Hart adds:

While creating this design, I was struck by the fact that both the mass of the sun and the mass of water in the SNOLab detector are balls of fluids. So the body of the sculpture conveys a sense of fluidity with its swirling 5-fold vortices. A mathematician would characterize the sculpture's symmetry as icosahedral, meaning it has the same set of rotational symmetries as the geodesic framework in the neutrino detector. But the six radial lines of the sculpture show a different symmetry: cubical. Has something changed flavor? The lines are ambiguously evocative of either inward or outward motion. Each passes through two layers of wood, suggestive of a sphere in a sphere. And they allude vaguely to an armillary sphere, making another connection to the astronomical context of the neutrino research.

The collaborative building exercise is an important facet of the commemorative sculpture, as Dr. Hart explains: *Just as the research at SNOLab was the collaborative effort of a great many people, I plan to assemble the sculpture as a group project during Science Rendezvous Kingston 2017. I will bring the pre-cut components and will lead a group of students, faculty, and staff in connecting them with cable ties. Assembling the parts is a challenging puzzle requiring logic, persistence, and careful thought-all skills that will be useful for anyone there aiming someday for their own Nobel Prize.*



WHAT'S NEW!

Ace Academy

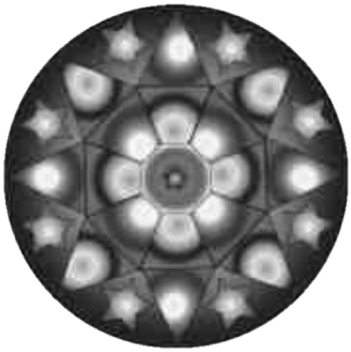
At the Ace Academy, you will enter an immersive environment — facing the screen and standing on the rondel. Next, authentic aircraft imagery takes centre stage as you fly a realistic rendering of the ***Canada Aviation and Space Museum's*** Sopwith Ship Camel biplane. By moving your arms up and down, and tilting your body, you will be able to manoeuver an airplane onscreen.

Optical Magic!

Thank you to Queen's APPSCI 100 first year engineering students for building two unique kaleidocopes and a teleidoscope for you to experiment with the science of light and reflection.

When Sir David Brewster invented the first kaleidoscope in 1816, it was the product of two of his life-long interests: the study of optics and the development of scientific instruments. Brewster's original device was a metallic, hand-held tube, a few centimetres long, resembling a small telescope.

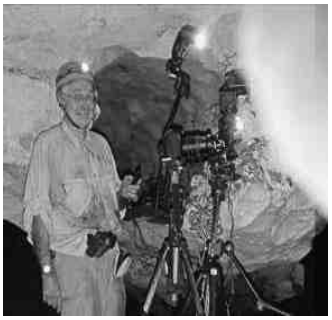
You can learn all about the science behind the magic of kaleidoscopes by looking at the posters near the kaleidoscope display. And…you can learn how to make your own kaleidoscope at home by following the instructions on pages 28-29 in this booklet!



Discover the Wonders of the Universe in the Royal Ontario Museum's Travelling Planetarium!

The Travelling Planetarium is an inflatable dome with a projector that recreates the night sky. Participants enter the dome through an inflated tunnel and sit around a central 360° projector to experience the stars and constellations surrounding them.

Meet Brock Fenton, Canada's "batman," and world-recognized authority on bats!



Dr. Fenton will fascinate you with his encyclopedic knowledge of bats. Learn about bat evolution, their specialized biology, and unique behavior. Find out how you can protect bats and their natural habitats. Dr. Fenton will entertain you with intriguing stories from his field work (that is him below) and research. The bat to the left, the Pallas' long-tongued bat (aka Glossphaga soricina), was photographed in Belize by Dr. Fenton. "Say cheese" when Dr. Brock Fenton is at work. He talks to his subjects the entire time he is working with them!

VOLUNTEER APPRECIATION

SCIENCE RENDEZVOUS KINGSTON IS MADE POSSIBLE BY OVER 400 VOLUNTEERS FROM QUEEN'S, THE ROYAL MILITARY COLLEGE OF CANADA, AND THE GREATER KINGSTON COMMUNITY…
THANK YOU! YOUR EFFORTS ARE APPRECIATED

VOLUNTEER APPRECIATION

Thanks to…	Thanks to…	Thanks to…
APPSCI 100 Kaleidoscope Kathleen Alfredsson Delaney Benoit Lydia Brant Sophie Campbell Evan Cockhill Ashley Elliot Matthew Filipovich Stella Guo Sarah Hatherly Kenzie Judson Cam Khalili Owen Pintar Sam Roper Soulaine Theocharides Henry Wright Kevin Zhang	**BAJA Team** Curtis Metrow	**Biomechanics and Ergonomics Lab** Dr. Pat Costigan Tara Diesbourg Megan McAllister Markus von Hacht
	Bio-Mechatronics and Robotics Laboratory Dr. Qingguo Li JP Martin Michael Shepertycky Jun-tian Zhang	**Centre for Advanced Computing** Don Aldridge Ken Edgecombe Jim Estes Michael Hanlan Shadi Khalifa Amal Khalil Gang Liu Hartmut Schmider Hung Tam Shelley Zhou
	Clinical Simulation Lab Kim Garrison	
Chemistry Graduate Student Society Jasmine Buddingh Lucas Choma Josh Clarke Sarah Ellis Matthias Hermann Lily Huang Morgan Lehtinen Mina Narouz Ryan Yuan	**CNS Center for Neuroscience** Noor Al Dahaan Allen Champagne Laurel Collings Kevin Cross Andrew Dawson Natasha Goumeniouk Chris Griffiths Julia Morris Dayna Scott Chloe Soutar Matt Smorenburg Shelby Thompson	**Department of Chemical Engineering** **Barz Research Group** Dominik Barz Alec Jameson Mahmoud Khademi Ali Khazaeli Sreeman Mypati
Department of Mechanical and Materials Engineering Clinton Bond Carolyn Fisher Josh Galler Lindsay Gibson Adnan El Makdah Cameron McPhaden Dr. David Rival Kaley Sheppard Kai Zhang	**Department of Physics** **Optical Society of America** Kate Fenwick James Godrey Leila Mazaheri	**Department of Physics** **SNOLab Institute Project** Daniel Bartlett Alivine Kamaha Ian Lam Yan Liu Sarah Olson Benjamin Tam Alex Wright
	Elbow Lake Carolyn Bonta	
The GREEN Chemistry Magic Show Zach Ariki Jaddie Ho Philip Jessop David Jessop Ramjee Kandel Jenny McLeod Sarah Piotrkowski Christine Smith Kelsey Viner	**Enrichment Unit** Linda Lamoureux	**Faculty of Engineering and Applied Science Connections** Scott Compeau
Laboratory for Percutaneous Surgery, School of Computing Mark Asselin Zac Baum Ben Church Matthew Holden Hillary Lia Emily Rae Alec Robinson Niyousha Saeidi Thomas Vaughan	**Queen's Genetically Engineered Machine (QGEM)** Sarah Babbitt Eshan Cheema Andrew Grebenisan Deyang Li Sara Stickley Rajiv Tanwani Yifei Wang	**Let's Talk Science** Catherine Dale Ella Dekemp Alexander Fritz Christine Hall Nathan Holwell Michael Stefanuk Erica Tropea Georges Younes

VOLUNTEER APPRECIATION

	Thanks to…	Thanks to…	Thanks to…
	Science Quest Broden Cecic Matt Boulby Tristan Brunet	**Society for Conservation Biology Kingston Chapter** Sasha Main Ange Malevich Brigitte Simmatis	**Space Engineering Team** Graeme Sabiston James Xie
	Psychology (Child and Adolescent Development Group) Caitlin Atkinson Jessica Bullett Kalee DeFrance Rayna Edels Stanka Fitneva Tara Karasewich Beth Kelley Valerie Kuhlmeier Haykaz Mangardich Mark Sabbagh Amy O'Neill Scott Robson Alexandra Tighe Nova Zhao		

	Thanks to…	Thanks to…
	Astronomy and Astrophysics Dhruv Bisaria Stephanie Ciccone Matthew Chequers Susan Gagnon (from RASC) Colin Lewis Ananthan Karunakaran Melissa Munoz	**Biology** Alyssa Eves Logan Morris Adrian Pang Kassandra Yun Barb Zeeb
	Biology Langlois Lab Diana Castañeda Lucie Baillon Tash-Lynn Colson Valerie Langlois Linda Lara Paisley Thomson Sarah Wallace	**Military Psychology and Leadership Department** Eliza Bruce Kassandra Byrne Clare Choi Alexandra Horeczy Justin Kellermann-Thompson Carson MacNeil Hugh Murray Dr. Adelheid Nicol Chelsea-Rose St-Amand
	Civil Engineering Majda El-Jaat Véronique Fournier Dr. Mike Hulley Kristine Mattson	

Did You Know?

The smallest bones in the human body are found in your ear.

Did You Know?

11% of people are left handed!

VOLUNTEER APPRECIATION

	Thanks to…		Thanks to…
The Association of Ontario Land Surveyors	Jean-Francois Dionne Brian Kerr Michael Matthews Kevin Smith	Bricks 4 Kidz – we learn, we build, we play with LEGO® Bricks	Colleen Brick Rosie Gatenby
Ontario Universities – Research Matters	Yvonne Robertson	Firefly Adventures	Walt Sepic
Frontenac, Lennox and Addington Science Fair / Expo-Sciences de Frontenac, Lennox & Addington	Dave Creber Liz Suriyuth And FLASF Committee Members	Heart & Stroke / Queen's University	Kelly Blair-Matuk, Leigh Cameron, Ryan Chow, Kayla Colledanchise, Marnie Girard, Julia Herr, Dr. Amer Johri, Melinda Knox, Kiera Liblik, Laura Mantella, Mike Onesi, Terry Yantian Li, Olivia Yau
Heart & Stroke	Jackie St. Pierre	King's Town School	Caitlin Barton Kate Beattie Roxanne Garwood Bryan Little Katherine Noyes Katie Teepell Amey Wadden
	Dianne Dowling Cate Henderson		
Your Public Library	Graeme Langdon Kimberly Sutherland Mills	Kingston Police	Constable Jeff Dickson & Zeus Constable Mark McCreary & Titan Sgt. Paul Doak
MacLachlan Woodworking Museum	Tom Riddolls	2708 Lake Effect Robotics	Jordan Cohen, Kevin Firth, Adrien Fraser, Sean Green, Katrina Hamburger, Colleen Johnson, Halil Kelebek, Cohen Shipp-Weidersprecher, Tim Lapp, Connor McAllister, Dylan Moore, Savannah Wilson, Lydia North, Spencer Thompson, Kevin Wood
Miller Museum	Mark Badham		
Prince Edward Point Bird Observatory	Cheryl Anderson Rosemary Kent	Bringing Canada's healthcare story to life! Museum of Health Care at Kingston	Sofia Regina Herrera Gonzalez Jenny Stepa
Western Science	Brock Fenton	Pump House Steam Museum	Melissa Cruise Gordon Robinson
RIOT – Research Information Outreach Team; CRI Cancer Research Institute	Kelly Brennan, Catherine Crawford-Brown, Katrina Cristall, Mathieu Crupi, Kate Ding, Stephanie Guy, Dr. Victoria Hoskin, Chelsea Jackson, Sarah Maritan, Max Niit, Sarah Nersesian, Jen Power, Josh Rosen, Zaid Taha, Carrie Wei, Piriya Yoganathan	W.A.F.F.L.E.S. 4479 Community Robotics	Aidan Baksh, Anica Bibic, Brennan Bibic, Christine Bibic, Eden Bibic, Kaley Bibic, Logan Bibic, Sarah Byers, Ryan Cooper, Isaiah Dunham, Krysta Peralto, Lorelei Secrieru, Cole Sequillion, Josh Sequillion, Duncan Stevenson
Rideau Public School Lego Club **The Rhinobots** **"They can who think they can!"**	Wendy Dossett Rideau Lego Club Members	**Did You Know?** Switzerland eats the most chocolate equating to 10 kilos per person per year!	

THINGS TO DO AT SCIENCE RENDEZVOUS KINGSTON

PRESENTATIONS, DEMONSTRATIONS, HANDS-ON ACTIVITIES, MAKE & TAKE WORKSHOPS

Activities by Queen's University Faculty, Students & Staff

Who we are…	What you'll be doing at our station…	Thanks to…
Queen's University | Community Outreach Centre http://educ.queensu.ca/coc	**Learn about the science of kaleidoscopes!** Thank you to Queen's APPSCI 100, first year engineering students for building two unique kaleidocopes and a teleidoscope for you to experiment with the science of light and reflection.	Lydia Brant
 Queen's University BAJA SAE https://engsoc.queensu.ca/get-involved/designteams/baja/	**Come see a jump demo!** Our design team provides students with a variety of hands-on experience in design, project management, business correspondence, and manufacturing. Knowledge is passed down through peer interaction and faculty guidance, which creates a friendly, collaborative learning environment. Baja SAE also introduces students to the competitive nature of the consumer industrial market, professionalism and financial organization. Our members are involved on a voluntary, interest-driven basis and have found that the experience they gain from Baja provides an unparalleled advantage in the job market upon graduation.	Curtis Metrow, Team Captain
SKHS School of Kinesiology and Health Studies Biomechanics Ergonomics Lab http://www.skhs.queensu.ca/ergbio/	**Biomechanics at the Theme Park:** Have you ever wondered what makes a roller coaster so thrilling, and why you don't fall down at the top of the loop? In biomechanics we use special tools that can measure accelerations and forces to determine what makes rides so much fun! Come join the excitement of BIOMECHNIKINGDON, our one of a kind biomechanics theme park	Tara Diesbourg, PhD Candidate

Did you know? The scientific name for "brain freeze" is "sphenopalatine ganglioneuralgia"!

Did you know? Your weight on the moon is 16.5% of your weight on the Earth.

Activities by Queen's University Faculty, Students & Staff

Who we are…	What you'll be doing at our station…	Thanks to…
Bio-Mechantronics and Robotics Laboratory Queen's University http://my.me.queensu.ca/People/Li/BMRL/Index.html	**Human Power Generation Queen's Bio-Mechatronics and Robotics Laboratory:** There will be devices for hands-on, also wearable devices can be worn and walk on treadmill. There will be TV to show some videos on human power generation. There may even be an interesting power generation competition for kids!	Dr. Qingguo Li, Associate Professor
Centre for Advanced Computing http://cac.queensu.ca	**Computer Chips and Potato Chips:** Ever wondered what the inside of a computer looks like? We're bringing in a few of them to let you have a look. Turns out they are full of chips. Dig in and get some out. To see if computers are really as smart as everybody says they are, we're letting them guess your favourite 15lavor of chips (potato, that is, not computer). Come check us out. You can keep the chips (computer and potato).	Dr. Hartmut Schmider, Manager - Scientific Computing Specialist
Queens Chemistry http://faculty.chem.queensu.ca/grad/	**Hands-on Chemistry:** Learn about chemistry, the science of matter, through hands-on activities including ph indicator, silly putty, and bubbles.	Lily Huang, PhD Candidate Joshua Clarke

Did you know? Australia is the only continent in the world that has no volcanoes.

Activities by Queen's University Faculty, Students & Staff

Who we are…	What you'll be doing at our station…	Thanks to…
http://neuroscience.queensu.ca	**Brainy Activities:** Get inside your brain and find out how it works! We are going to have an eye tracker! Come and talk to some neuroscientists and learn about some tools we use to study the brain. From behaviour to cells, come learn how we can take information from our surrounding environment, process information in our brains, and turn that into an appropriate response. Come and see all the fun, hands on activities we have on how to study brain functioning!	Dayna Scott, Research Assistant
http://meds.queensu.ca/education/simulation/	**Be a Medical Student:** Be a medical student for a while and learn how to resuscitate a non-breathing person. See how residents learn how to do laparoscopic surgery.	Kim Garrison, Operations Manager
http://my.me.queensu.ca	**How do Flying and Swimming Animals Operate?** Come on by our booth to meet and interact with engineers, participate in demos, and learn about the operation of flying and swimming animals!	Dr. David Rival, Assistant Professor Department of Mechanical and Materials Engineering Lindsay Gibson, Research Administrator, Mechanical & Materials Engineering

Did You Know? Just like human fingerprints, dogs' nose prints are unique and can be used to identify the identity of dogs!

Activities by Queen's University Faculty, Students & Staff

Who we are…	What you'll be doing at our station…	Thanks to…
Faculty of Engineering and Applied Science Chemical Engineering http://www.chemeng.queensu.ca/people/Faculty/DominikBarz/	**Hands-on experience:** 1) Make a battery using two nails and a lemon and measure the voltage. 2) Make an electrolyser to produce hydrogen and oxygen from simple things like two pencils, a battery, water and baking soda. 3) Make a fuel cell which produces electrical power from hydrogen and chlorine using simple things like two pencils, a battery, water and sodium chloride.	Dominik Barz, PhD, Assistant Professor, Chemical and Mechanical Engineering
Queen's University OSA The Optical Society http://www.queensu.ca/physics/home	**Holography:** Have you heard and know about holography? Holography is the science of recording three-dimensional (3D) image of an object, and the media in which the image is encoded is called holo-gram. Come learn about holograms!	Leila Mazaheri, PhD Candidate
SNOLAB http://www.sno.phy.queensu.ca/group/	**Come see what we do at the SNOLAB!** Come squeeze paper so hard it explodes! Learn to make your own submarine out of a straw! Seeing the science of sound and many more!!!	Alvine Kamaha, PhD Candidate
ELBOW LAKE ENVIRONMENTAL EDUCATION CENTRE http://elbowlakecentre.ca/	**Environmental Education:** Not all animals go to bed at the same time that we do. Coyotes and beavers and owls, oh my! Visit our booth for a daytime glimpse of who and what becomes active when the sun goes down, and test your knowledge of the sounds they make and other clues to their presence.	Carolyn Bonta, Manager

Did You Know? 4 is the only number that is composed of the same number of letters (Four).

Activities by Queen's University Faculty, Students & Staff

Who we are…	What you'll be doing at our station…	Thanks to…
ESU enrichment studies unit http://esu.queensu.ca/	**Problem Solving:** Our booth will focus on group and individual problem solving activities that use logical thinking and group work skills. Each activity will begin with a question and children will work together or individually to solve or create the solution.	Linda Lamoureux, Program Coordinator
Queen's University Faculty of Engineering and Applied Science http://engineering.queensu.ca/Outreach/	**Dash and Dot Robots** Come and meet *Dash* and *Dot,* two real robots that teach your kids to code while they play. Learn to code while you make Dash navigate around a map.	Scott Compeau, Outreach Coordinator, EngConnect
Queen's Chemistry JESSOP GROUP QUEEN'S UNIVERSITY http://faculty.chem.queensu.ca/people/faculty/Jessop/	**Green Chemistry:** Chemistry is everywhere! Your body is made of chemicals. Everything you buy is made of chemicals. Choosing the wrong chemicals can hurt the environment, which nobody wants to do. Green chemistry can help us have a nice lifestyle but with less damage to the environment. Come and learn how you can make green choices. Lots of bangs, flashes and fireballs will make it a lively show! 	Dr. Philip Jessop, Professor and Canada Research Chair in Green Chemistry

Did You Know? Your heart beats over 100,000 times a day.

Activities by Queen's University Faculty, Students & Staff

Who we are…	What you'll be doing at our station…	Thanks to…
The Engineering Society of Queen's University *Renowned Spirit, Unrivaled Excellence* https://engsoc.queensu.ca/get-involved/designteams/qgem/	**Interactive Cells:** This year will be QGEM's first Science Rendezvous appearance! The hands-on activity will be a demonstration of cell membrane function using soap bubbles. Children will be allowed to move their hand slowly through the bubble film and watch as the film flexes and reforms as they remove their hand from the film. Our volunteers will also demonstrate binary fission/membrane splitting! we will set up technology station where kids will be allowed to use a VR headset to play an interactive game exploring the inside of a human cell.	Yifei Wang, Co-Director
Laboratory for Percutaneous Surgery http://perk.cs.queensu.ca/	**Demos:** The Mobile Image Overlay System (MIOS) and computer-assisted surgery pig! The MIOS is a demonstration of a medical system that allows a user to perform a complex procedure in relation to a pre-operative MRI/CT image. When a user moves the position of the model skull, the CT image on the screen also moves accordingly. Our computer-assisted surgery pig is a simple demo to show how surgical instruments can be tracked in relation to a patient.	Vinyas Harish, PhD Candidate Hillary Lia, Coordinator
let's talk science inspiring discovery http://outreach.letstalkscience.ca/queensu.html	**Natural History Theme:** Highlighting and celebrating the diverse wildlife you can find in the Kingston area in the spring. We will have samples of common species of birds and wildflowers which we will teach kids to ID. We will then help them make their own 'field guides' by pasting photos of these species into notebooks. We will also bring a variety of wildflower seeds and get them to create their own seed packets for later planting.	Executive Committee: Catherine Dale Ella Dekemp Alexander Fritz Nathan Holwell Michael Stefanuk Georges Younes
SCIENCE Quest https://sciencequest.ca	**Ozobots:** Come explore and discover ozobots! It will be something you will enjoy.	Courtney McGrath, Director Alana Walash, Outreach Coordinator

Did You Know? It is physically impossible for pigs to look up into the sky.

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Who we are…	What you'll be doing at our station…	Thanks to…
Society for Conservation Biology Kingston Chapter http://post.queensu.ca/~scb/chapter.htm	**Society for Conservation Biology**: An interactive activity that focuses on educating children about different species of native Ontario birds and how we can make a difference in protecting them. In this activity, we will be making bird window stickers that the children will be able to cut out/decorate and take home to put on their windows at home. Education will include information about bird collisions, and other conservation threats (such as domestic cats, etc).	Brigitte Simmatis, SCB Co-President
QUEEN'S SPACE ENGINEERING TEAM https://engsoc.queensu.ca/get-involved/designteams/qset/	**Design:** The Queen's Space Engineering Team (QSET) is an independently run space design team. We have participated in various competitions such as: NASA's Lunabotics Mining Competition, CanSat Competition, and the Canadian Satellite Design Challenge (CSDC). We will have a Mars Rover size of a golf cart!	Graeme Sabiston, Project Manager
CHILD and ADOLESCENT DEVELOPMENT Queen's University http://www.queensu.ca/psychology/index.html	**What are you thinking?** Come and play a game some brain games! We will have a variety of brain games that will engage all ages of children!	Valerie Kuhlmeier, Associate Professor, Infant Cognition Group
Heart & Stroke™ Queen's University http://www.heartandstroke.com/	**See the Heart in Action:** Your heart health started before you were born (it starts in the womb!) and having a healthy ticker will be important your whole life! **Come see how an ultrasound machine works**, and watch how the heart pumps blood to provide our bodies with oxygen and nutrients. The Cardiovascular Imaging Network at Queen's University, in partnership with the Heart & Stroke Foundation, will present you with some simple steps to keep your heart healthy, let you explore the inside of a heart with ultrasound, and show you how to make your own paper origami heart to take home.	Kelly Blair-Matuk, Associate Director, Office of the Vice-Principal (Research) Dr. Amer Johri, Director of CINQ, Queen's University School of Medicine

Activities by Faculty, Students & Staff from The Royal Military College of Canada

Who we are…	What you'll be doing at our station…	Thanks to…
http://www.rmc.ca/aca/phy/rdp/ssr-rss-eng.php	**Astronomy and Astrophysics:** Using special solar telescopes, we will safely be able to look at the surface of the sun. If the weather is good, we should be able to see some sunspots and solar prominences!	Colin Lewis, PhD Candidate, Queen's
https://zeeblab.wordpress.com/lab-members/	**Plants:** Attendees will have the chance to learn about what a plant needs to grow and the role that earthworms play in the nutrient cycle for plants and soil. Planting cups will be given to each child with a small amount of soil so that they can plant a pumpkin seed, which they can take home with them. The station will also provide attendees with the opportunity to hold and discover earthworms.	Barbara Zeeb Professor and Canada Research Chair Biotechnologies & Environment
http://langlois-lab.com/?lang=en	**Biology:** There will be four stations educating children about frogs, fish, and turtles and also about the effects of pharmaceuticals on these non-mammalian species. Stations were designed for hands-on educational activities.	Valerie Langlois Assistant Professor
http://www.rmc.ca/aca/ce- gc/index-eng.php	**Augmented Reality Sand Table:** Change the contour of the land to control the direction of water. Make it rain and see how water flows over the land.	Kristine Mattson Environmental Laboratory Technician
https://www.rmcc-cmrc.ca/en/military-psychology-and-leadership/department-military-psychology-and-leadership	**Illusions:** We will present visual illusions, a memory activity, and possibly an odor activity. These are all activities that young children can touch and get involved in. One activity will be a craft that demonstrates a visual illusion.	Dr. Adelheid Nicol, Associate Professor

Activities by Community Organizations & Citizen Scientists

Who we are…	What you'll be doing at our station…	Thanks to…
St. Lawrence College http://www.stlawrencecollege.ca/programs-and-courses/full-time/programs/a_m/energy-systems-engineering-technology/kingston/	**Solar Energy:** See how we size, design, and install solar photovoltaic, solar thermal and other sustainable energy systems, for both grid connected and off-grid applications.	
The Association of Ontario Land Surveyors http://www.aols.org	**Drones:** Please join us to learn about all the cool and exciting things we can do with drones!	Michael Matthews, MTO
Bricks 4 Kidz – we learn, we build, we play with LEGO® Bricks http://www.bricks4kidz.com/	**Bricks 4 Kidz®:** Please join us to learn about our LEGO builds that use motors and battery packs. We teach Science, Technology, Engineering and Math concepts using LEGO bricks in our Camps, PA Day programs, In-School Lunch Hour Programs, Kids Night Out, Birthday Parties and more!	Colleen Brick Manager, Education Programs
Council of Ontario Universities / Conseil des universités de l'Ontario RESEARCH MATTERS http://yourontarioresearch.ca	**Research Matters:** Research Matters is a public outreach initiative that explores how Ontario university research is transforming daily life and improving how people live, work, and play across the province and around the world. Please visit our booth and explore the amazing research coming out of Ontario universities through interactive trivia, digital videos and awesome prizing!	Yvonne Robertson, Project Coordinator
Firefly Adventures http://www.fireflyadv	**Firefly Adventures:** Will be presenting an interactive solar energy display.	Walt Sepic, Environmental Educator

Did You Know? It takes more calories to eat a piece of celery than the celery has in it to begin with.

Did You Know? An elephant is the only mammal that can't jump.

Activities by Community Organizations & Citizen Scientists

Who we are…	What you'll be doing at our station…	Thanks to…
Frontenac, Lennox and Addington Science Fair http://www.flasf.on.ca	**Science Fair:** FLASF is excited to be participating to this year's Science Rendezvous. Meet young scientists from the Kingston Area! Grade 5 to 12 students will be demonstrating and presenting their projects from this year's Frontenac, Lennox and Addington Science Fair. While you are at the FLASF booth, learn more about the Science Fair with hands-on activities.	Dave Creber, Chair FLASF
HEART & STROKE FOUNDATION http://www.heartandstroke.com/	**Healthy Eating:** Do you know how much sugar is in your favourite beverage? If you are an athlete, what drink is best during and after the game? Does you morning cereal have great ingredients? Heart and Stroke Foundation's interactive display will help you better understand how to fuel your body and keep your heart healthy! Sugar and sodium are added to products you eat every day. Why should I consider the amount of sugar I consume on a daily basis? Why is it important to cut down on highly-processed food? Join us – for all the answers, plus - do some research yourself in to **healthy eating** and **maintaining a heart healthy diet**. Become a Heart Healthy Hero and share your knowledge with family and friends!	Jackie St. Pierre, Coordinator
King's Town School http://kingstownschool.ca	**Magnets:** We will be inviting visitors to our booth to use magnets to make patterns and pictures with iron filings that are set within a picture frame. We will then take a photo of their design and print it instantly and/or email for a take home component.	Kate Beattie, Coordinator
Seeds Grow Food www.providence.ca/**seeds**/ seedsgrowfood.org/	**Kingston Area Seed System Initiative:** Did you know that almost all our food relies on SEEDS? Learn how flowers make seeds with our giant interactive flower models by becoming a bee yourself! What IS a seed? Let's find out!"	Cate Henderson, Professional Horticulturalist
Information inspiring imagination KINGSTON FRONTENAC PUBLIC LIBRARY YOUR PUBLIC LIBRARY http://www.kfpl.ca/	**KFPL:** Your library is about much more than books! In addition to having the opportunity to borrow some books to inspire your inner scientists, you are invited to see our 3-D printer in action, code dojo, and drop by the ***Lego Build*** table!	Graeme Langdon Kimberley Sutherland Mills

Activities by Community Organizations & Citizen Scientists

Who we are…	What you'll be doing at our station…	Thanks to…
https://kpf.ca/	Come and meet Constable Jeff Dickson and his canine partner, Zeus and Constable Mark McCreary with his canine partner, Titan. 	The Kingston Police Force
http://lakeeffectrobotics.ca	**Robots:** Want to drive a 50kg competition robot? Want to find out how it works and see it in action? Want to learn about robot design and do some design experiments? Come see ***Lake Effect Robotics***! We are a high school robotics team that competes in the international *FIRST* Robotics Competition (FRC). We accept members from all high schools in the Limestone District School Board. Our mission is to promote Science, Technology, Engineering and Mathematics education and to inspire students to become leaders in the field.	Kevin Wood, Coordinator
http://woodworkingmuseum.ca/	**Rediscovering simple machines:** We are measuring the density of wood based around standard ASTM density tests with some funky homemade Arduino gizmos	Tom Riddolls, Curator

Did You Know? The average person has 10,000 taste buds.

Did You Know? Kevlar in bulletproof vests, fire escapes, windshield wipers, and circular saws were invented by women.

Activities by Community Organizations & Citizen Scientists

Who we are…	What you'll be doing at our station…	Thanks to…
MILLER MUSEUM http://geol.queensu.ca/museum/	**Mapping and Measuring the Earth:** How big is the Earth? How heavy? How round? How high are the mountains and how deep are the oceans? Geologists and physical geographers want to know! See the different ways that we measure and map our planet.	Mark Badham, Curator
Bringing Canada's healthcare story to life! MUSEUM OF HEALTH CARE AT KINGSTON http://www.museumofhealthcare.ca/	**Museum of Healthcare Kingston:** Germ Detectives: Learn all about germs and take a look at your hands in a special black light box to discover how clean they really are!	Jenny Stepa, Museum Manager and Program Director
Prince Edward Point Bird Observatory http://www.peptbo.ca/	**Prince Edward Point Bird Observatory:** Each spring and fall Prince Edward Point Bird Observatory bands 15,000+ songbirds as they fly from breeding grounds in the Boreal Forest to their wintering grounds and back again. The Observatory is located in a globally significant Important Bird and Biodiversity Area (IBA) that is a major stop over for millions of birds. Visit our display and discover some of the marvels of migration by playing the Arrive Alive game, and find out how you can be a part of protecting these fascinating, flying creatures and their habitat.	Peter Fuller **PEPtBO** IBA monitoring coordinator
Pump House STEAM MUSEUM http://steammuseum.ca/	**Planetarium** Come by our station to enter the planetarium! You will enjoy this exciting experience!	Gordon Robinson, Curator Melissa Cruise, Museum Assistant

Did You Know? Clothes dried outside smell better because of a process called "photolysis" (sunlight breaks down compounds that cause odor).

Activities by Community Organizations & Citizen Scientists

Who we are…	What you'll be doing at our station…	Thanks to…
 Rideau Public School Lego Club The Rhinobots	**Discovering Robotic Fun!** Stop by our station to meet our team members, and hear them explain the world of robotics to you!	Wendy Dossett Coach
RIOT Research Information Outreach Team CRI Cancer Research Institute http://torontoriot.com/	**Uncovering the complexities of cancer:** At this station, you will learn about the hallmarks of cancer, current cancer statistics and probability, recent cancer treatment methods, and recent cancer research progress here in Kingston, and nationally in Canada through interactive, hands-on activities.	Piriya Yoganathan PhD Candidate
Western Science http://www.uwo.ca/biology/directory/emeritus/fenton.html	**Batman!** "Let's talk bats" table – stop by for a stimulating discussion and view many pictures of bats!	Brock Fenton, PhD, Professor Emeritus
W.A.F.F.L.E.S. 4479 Community Robotics http://kbotics.ca/ http://wafflesrobotics.com/	FIRST CANADA **Come and meet the members of Kingston's *FIRST ROBOTICS CANADA* teams:** W.A.F.F.L.E.S. The robots will engage in play-offs throughout the day at the centre of the bowl.	Sarah Byers W.A.F.F.L.E.S.

Did You Know? When 2 zebras stand side by side, they usually face each other in opposite directions to keep an eye out for predators.

STEM@HOME

ACTIVITIES, EXPERIMENTS, INFORMATION AND RESOURCES TO TRY AND USE AT HOME

SCIENCE RENDEZVOUS KINGSTON 2017

MAKE YOUR OWN KALEIDOSCOPE

MATERIALS

Empty Pringles potato chip can

Shimmery scrap-book paper or aluminum foil

Hammer and nail

Clear glue

Tissue paper, glitter, and sequins

Clear contact paper

Step 1. Remove chips, rinse, and dry can!

Step 2: Roll a piece of shimmery silver paper and insert it into the can.

Step 3: Decorate the outside of the can with construction paper.

Step 4: **This step must be done by an adult!** Use a hammer and nail to punch an eye hole in the end of the can. Smooth the eyepiece so that no rough edges can touch the user's eye.

Step 5: Mix clear glue with a bit of water and lots of glitter; add sequins, and small tissue paper shapes to the inside of the Pringle's can lid.

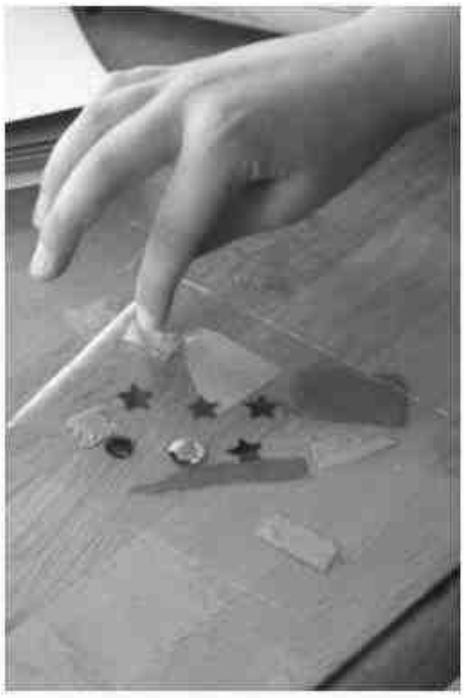
Step 6: Lay a square of clear contact (sticky side up) paper on a table (it may be helpful to tape it at the edges to keep it flat). Add a few more sequins, tissue paper shapes and sparkles.

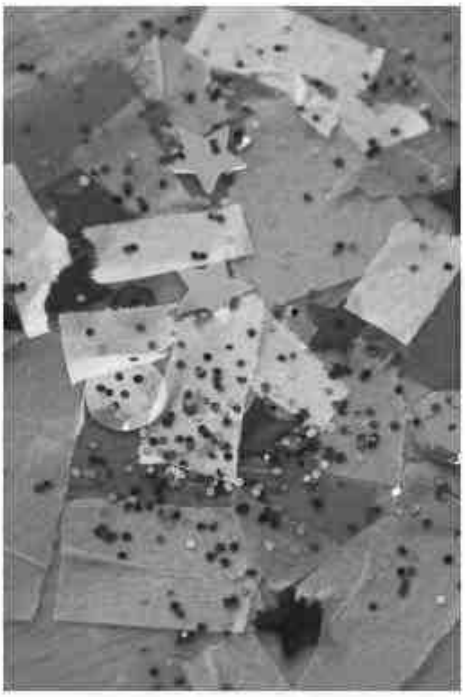
Step 7: Place another piece of contact paper over the top to seal it.

Step 8: Cut to fit can. *You will be putting the lid on over this, so make sure it is a close fit*. Glue to top of can.

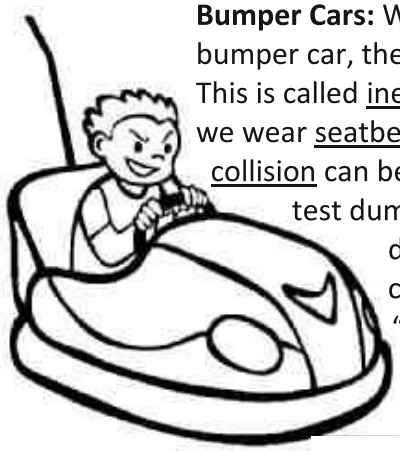
Step 9: When everything is dry, put the lid on your simple kaleidoscope and head outside!

MAKE YOUR OWN KALEIDOSCOPE

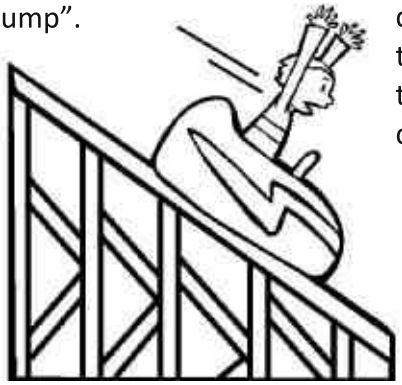




BIOMECHANICS AT THE AMUSEMENT PARK

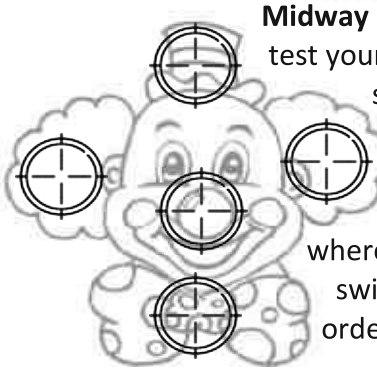


Bumper Cars: When you bump your bumper car, the car stops, but you don't. This is called inertia and is the reason why we wear seatbelts! The force of the collision can be measured using a crash-test dummy. Inside a crash-test dummy is a load cell that can measure the force of the "bump".



Roller Coaster: As you fly down the hill of the roller coaster, you pick up speed. This increase in speed is known as acceleration and is always at a rate of $-9.81 m/s^2$. It is known as "the acceleration due to gravity". Increasing the speed in this way gives the car enough momentum to get through all of the loops and twists of the ride.

Teacup Ride: The faster your teacup spins, the more you feel pushed into the back of your seat. A smaller teacup would be able to spin faster because your weight is closer to the middle of the cup. In a larger teacup, the weight is more spread out, which makes it more difficult for the teacup to spin, and tries to slow you down.

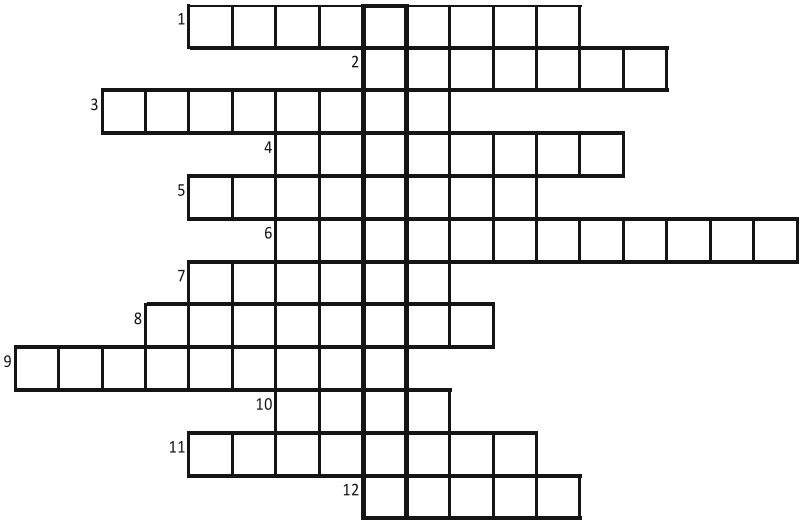


Midway Games: These games test your skill level in areas such as accuracy, power and reaction time. Some games have you aim for a small target, whereas others ask you to swing a heavy object in order to win a prize.

ACROSTIC INSTRUCTIONS: Using the clues and **some** of the underlined words in the descriptions above, fill in the puzzle. The word down the middle (outlined in black) is the **Secret Word!** Can you solve it? **SECRET WORD:** _____

1. When we get in the car, we have to fasten our _____.

2. _____ is an object's resistance to motion (Newton's First Law).



3. For every action, there is an equal and opposite _____ (Newton's Third Law).

4. An object that is moving faster would have a greater _____, making it harder to stop.

5. _____ is the opposite of decrease.

6. A change in velocity is defined as _____.

7. The bathroom scale measures your body _____.

8. If you have better _____, you are more likely to hit the bullseye of a target.

9. A _____ occurs when two cars hit each other.

10. The faster you _____, the dizzier you get!

11. A tool used to measure force.

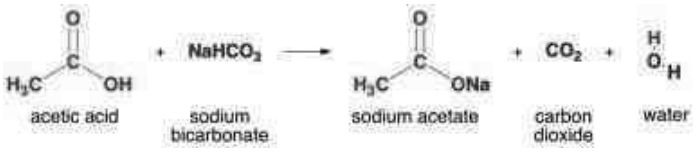
12. You should follow the _____ limit if you don't want to get a ticket.

BIOMECHANICS ERGONOMICS LAB

HOT ICE *

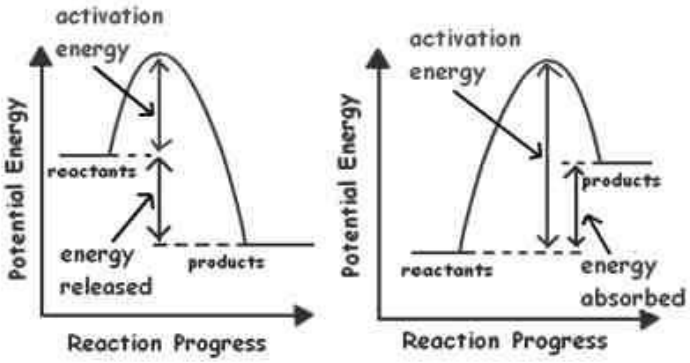
Queens Chemistry

Reaction equation



Enthalpy

Enthalpy is a measure of the total heat in the system and tells us whether a chemical reaction will give off or take in heat. When reactions occur, energy is changed but always conserved by the laws of thermodynamics. The energy stored in chemical bonds is changed when these bonds are made and broken in a chemical reaction. If there is more energy in the bonds in the reactants than the products, the extra energy is released as a form of kinetic energy called heat. This type of reaction is called an **exothermic reaction** (left picture).



When the bonds in the products have more energy than the reactants, the excess energy is taken from the outside environment. This is called an **endothermic reaction** (right picture). A good everyday example is when ice melts, heat is absorbed and you can feel the coolness of the ice.

Making crystals

There are three major phases of matter: solid, liquid, and gas. Crystals or solids are made when molecules stack together in an ordered pattern, with much stronger interactions than in liquids. The shape of the crystal is dependent on the pattern in which the molecules stack.

Sodium acetate trihydrate is a salt with a low melting point. Crystals can be made by supercooling the liquid below its melting point then agitating the solution. This causes nucleation sites to occur, allowing molecules to aggregate and form a solid. The reaction can be made so that you can form sculptures as you pour the hot ice solution by supersaturating the solution. Concentrating the amount of sodium acetate by boiling some of the water out of the solution allows this to happen. The formation of the hot ice is an exothermic reaction, giving hot crystals.

To make hot ice

Materials

- 1 litre clear white vinegar
- 4 tablespoons baking soda
- A saucepan or a beaker
- A stovetop or heating mantle
- Small container

Method

1. In the saucepan or beaker, slowly add the baking soda to the vinegar. The reaction is quick and produces sodium acetate and carbon dioxide and can cause a messy explosion (you will make a baking soda and vinegar volcano!)
2. Boil the solution for about an hour at medium heat until only about 100-150 mL left in the pan or beaker. Discolouration can occur from burning the solution or from impurities but the hot ice will still work.
3. Once the solution has been moved from the heat, pour it into the small container and cover with plastic wrap to prevent further evaporation. There should not be any crystals in your solution. If there is, dissolve with a small amount of water or vinegar, just enough to dissolve the crystals.
4. Place the solution in the refrigerator to chill.
5. Pour the solution on a shallow dish and crystals should form right away.
6. You can reuse the hot ice by heating it up again on the stove or in a microwave.

* Please have adult supervision

Making Your Own Stethoscope


A Real One


Things You'll Need


Your Homemade Stethoscope

Things You'll Need

- Plastic tubing, 2 feet long
- Two small funnels
- Two balloons
- Masking tape (optional – depending upon fit of funnel and tubing)

Instructions

1. Insert the spout end of each of the funnels into the opening on either end of the plastic tubing. Wrap tape around the base of the funnels to attach the tubing to hold the funnels in place.

2. Blow up a balloon to stretch it out and deflate it. Cut the top portion off of the rubber band and stretch it over the opening of one of the funnels. Wrap a rubber band around the base of the balloon and the funnel to hold the balloon in place. This funnel will serve as the piece of the stethoscope that will be placed on the heart.

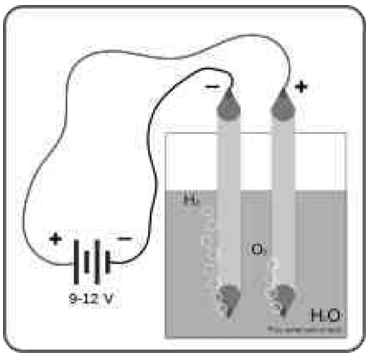
3. Place the non-balloon covered funnel up to a child's ear. Place the balloon covered funnel onto a child's heart. The vibrations from the child's heartbeat will travel through the funnel, down the tubing and out into the other funnel and into the child's ear, allowing the child to hear her heartbeat.

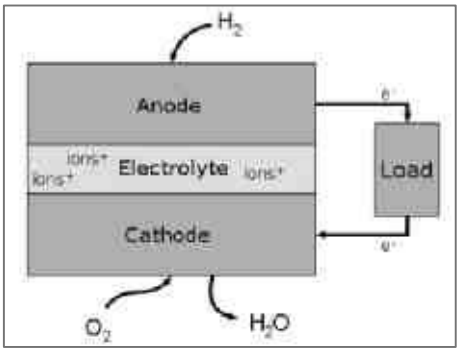
Activity for Using Your Stethoscope

Place the covered funnel of your stethoscope over your heart and listen to count how many times your heart beats while sitting down resting. Then skip, jog or jump up and down for 3 minutes and count how many times it beats in 30 seconds again. What does activity do to your heart rate?

Energy

Do you know that every time you use energy it was produced with a chemical or nuclear process? Energy is produced in power plants which utilize water, coal, uranium, wind, and the sun. The sun and the wind are called alternative or regenerative sources and their use is better for the environment. However, sun and wind are not reliable. We can use hydrogen to store energy and make it available when we need it. Hydrogen is a material with the chemical symbol H. It is the lightest and most abundant chemical substance in the universe.





We can use electrical energy to split water into hydrogen and oxygen in a so-called electrolyser. The hydrogen can be stored in vessels.

We can "burn" hydrogen in a fuel cell to produce energy and water. The coupling of electrolyser and fuel cell along with alternative energy sources may be our future energy economy.

Three experiments:

1) Produce electrical energy from two nails and a lemon.

2) Make an electrolyser to produce hydrogen and oxygen from two pencils, a battery, water and baking soda.

3) Make a fuel cell which produces electrical power from hydrogen and chlorine using two pencils, a battery, water and sodium chloride.

The Barz Lab; Contact: barzd@queensu.ca

Faculty of Engineering and Applied Science
Chemical Engineering

Queen's University

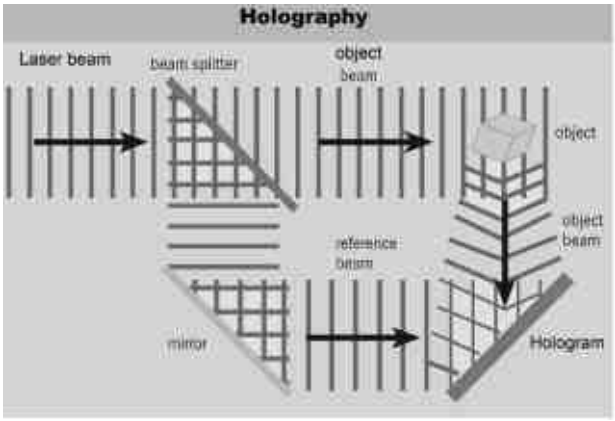
Holography

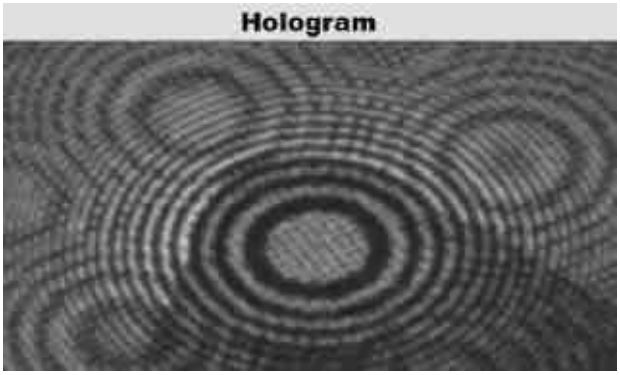
Have you heard about holography? do you know **What is holography?** Holography is the science of recording three-dimensional (3D) image of an object, and the media in which the image is encoded is called hologram.

What is difference between a photo captured by a regular camera and a hologram? Camera pictures are two-dimensional (2D); a flat image of front view of an object. You cannot see the depth or different sides of the object in a flat image once it is captured.We all are 3D creatures, it means that we have width, length and depth. When you look at your friend's face, if you walk around him, you can see different sides of his head. But once you capture a photo of his face, you would just see his face. Holography gives us the ability to record 3D image.

Now the question is **How the hologram is made?** For making a hologram we need **laser** light. So, first let's see what is difference between laser and usual light? Have you ever seen a parade of soldiers? Every soldier is moving at a specific distance from another one and they move with constant speed in same direction. That makes the parade look so aligned and ordered. Well, Laser light looks like a parade. In fact, light is made of small soldiers called photons. In laser, photons move aligned and ordered, but in usual light they move randomly. In photography, object is shined with usual light and the reflected light captured on a material which is sensitive to the intensity of the light. Depending on the amount of light that each point of the light sensitive material gets, the color of that point will change. However in holography, as I said we need laser light. In a typical arrangement, the laser beam split into two beams, object beam and reference beam. The object beam illuminate the object and the scattered light from the object is focused onto the holographic plate. Whereas, the reference beam is focused directly onto the hologram. The two beams would then interfere on the surface of the hologram and produce an interference pattern on it. This pattern gives us information about distance that each light originates from the object, because the path of the object beam is compared with respect to the reference beam. Hence, not only the intensity of the reflected light get stored but also the path difference of each ray also get stored. This give information about the depth of the object.

How to observe a hologram? If you look at the hologram, you will not be able to see the image itself. You will just see the interference pattern, like the one in the figure below. It looks like the wave patterns on a lake. Throw two stones at the same time into a quiet lake, and you will see how the emerging circular waves will eventually overlap and create an interference pattern. To see the hologram made, we need to use a similar laser. Recently, another kind of hologram is made where one can see the image with usual light, but you need to look at them at certain angle.





Grade 7-12 students get The University Experience when they attend any of the exciting programs offered by the Enrichment Studies Unit at Queen's University. Whether they aspire to a career in healthcare, construction, law or law enforcement, technology, the arts, or business… we have the perfect course.

Join Us for Programs in May and August!

IT TAKES TEAMWORK!

Marble Run

Work with your team to move a marble from one place to other place using pipes or paper rolls.

Materials

A marble and 1 or 2 pieces of pvc pipe (or substitute with paper/cardboard tubing) for each team member.

Directions

Give each team member a piece or two of pipe. They will use the pipe as a conduit to move the marble from the start line to the finish line. The marble is not allowed to stop moving and they are not to walk with the marble or touch the marble while it is moving. Everyone needs to work as a team to place the pieces of pipe next to each other in a line. When done correctly, the marble will roll inside each subsequent team member's piece of pipe until it reaches the finish line.

Ramp It Up!

Instead of having a finish line, see how far the marble can go without being dropped.

Number Race

A race to 10, if you have a good memory.

Materials

2 sets of cards numbered 1 to 10.

Directions

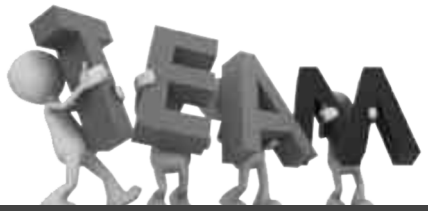
Spilt the group into two teams. In two different places across the room, randomly lay each set of cards upside down. The teams must race to find the card marked number 1, then tag the next player. Team members take turns to find the next number in the sequence. Every card turned over and not picked up must be replaced upside down. The first team to pick up all ten cards in order wins.

Ramp It Up!

Use cards with mathematical equations. The answers to those equations will be the number in the sequence, i.e. 1, 2…10.

WHAT IS A TEAM?

A group of people working together and listening to each other as they work toward a common goal and success.



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Connections
QUEEN'S ENGINEERING EXPERIENCE PROGRAM

Connections is Queen's Faculty of Engineering and Applied Science Outreach Program that provides opportunities to raise awareness of the Engineering profession. For more information about the programs and upcoming events, please visit www.engineering.queensu.ca/about-us/educational-outreach/

Make Your Own Lip Balm!

Materials needed:

- 1 part beeswax,
- 2 parts baby oil,
- 1 vitamin E capsule,
- 2-3 drops honey (optional),
- lipstick (optional),
- film canister,
- label sticker,
- hotplate or stove

Safety Issues:

Hot plates or stoves should be monitored closely to ensure students don't touch or turn up too high. Hot wax is also dangerous.

Activity Steps:

1. Melt the beeswax in a pot over low heat on the hotplate/stove. If the wax is in a block, grate it using cheese grater to melt faster.
2. If you want colour and gloss, add a small chuck of lipstick.
3. Add the baby oil and vitamin E capsule. Allow them to mix with beeswax. The vitamin capsule aids sore and cracked lips.
4. Add honey.
5. Take the mixture off the heat and let it cool slightly.
6. Before it hardens, pour into a film canister.
7. Make your own title for the lip balm flavor and design a label to stick onto the canister.

Things to think about?

1. *If you need to make your lip balm glossier, what would you do?*
2. *Why did we use beeswax? What does it do?*

Engineering Connection

Chemical Engineers/Engineering Chemists design devices, products, and procedures that solve related problems and help people. One area that engineers are involved with is beauty products such as body lotion. Congratulations on designing your own lip balm beauty product!

SCIENCE RENDEZVOUS
WHERE PEOPLE AND SCIENCE MEET

@QEngConnection

Connections - Queen's Engineering Experience Program

Queen's UNIVERSITY
FACULTY OF ENGINEERING AND APPLIED SCIENCE

The Engineering Society of Queen's University

Renowned Spirit, Unrivaled Excellence

Soap Membrane

grades 5-9

WHAT ARE THE PROPERTIES OF A CELL MEMBRANE?

time: 60 minutes

Learning Objectives

Learn about the properties of cell membranes through soap bubbles! The following properties will be covered:

1. Cell membranes are fluid and flexible. They can reform when broken.
2. Channel proteins float in the cell membrane. Channel proteins provide channels through the membrane.
3. Organelles are membrane-bound.
4. Binary fission.

Materials

- Corn Syrup
- Water
- Trays/Pans
- Bendable Straws
- Thread
- String/Twine

Procedure

Bend the straws, and crimp the short ends. Arrange them in a square to make the bubble frame. Tie thread in a small loop. Make bubble solution with 900mL water, 100mL dish soap, and 25mL corn syrup. To demonstrate each objective:

1. Dip bubble frame in solution. Move wet hand slowly through the soap film, watch as the film flexes and reforms when you take your hand out.
2. Put the thread loop in the bubble frame, and pop the part of the bubble inside the loop to represent a channel protein. Move the 'channel' around.
3. Use a straw to blow bubbles inside other bubbles.
4. Use the twine to split bubbles on the tray into multiple bubbles.

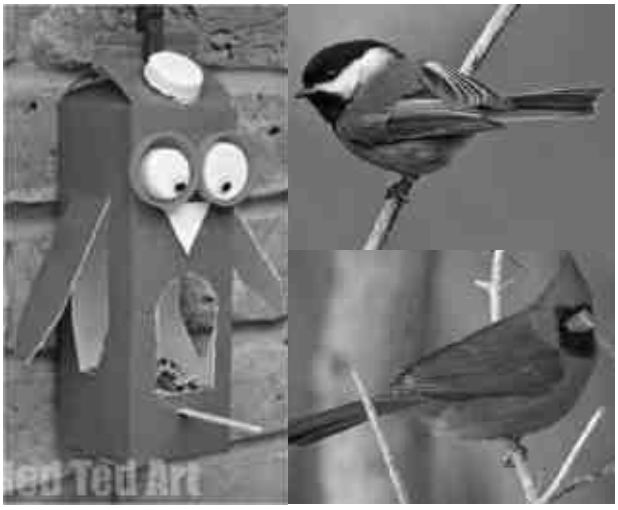
Approximate Cost: $5 for 25 students

Juice Carton Owl Bird Feeder – Home Activity

Want to be an ecologist and experience nature up close and personal? Look no farther than your own backyard! Lots of fascinating, colourful bird species can be found in eastern Ontario – both during the summer and year round. With this activity, make your own cute owl bird feeder and then hang it in your backyard to see who comes to visit!

What You Will Need:

- Empty, clean juice (or milk) carton
- Paint (enamel paints are best; they're meant for outside)
- 4 plastic bottle lids (2 large and 2 small)
- Googly eyes
- Popsicle stick
- String
- Scissors or an exacto knife
- Glue gun or strong craft glue



Step-by-Step Procedure:

1. Paint the juice carton and let it dry.
2. Use scissors or a knife, cut a "tummy and wings" into the bottom half of your carton. For the tummy, cut a hole the shape of an arch. Make sure to keep the bit you cut out to make the beak later! For the wings, keep the "flaps" attached, as they will keep the seeds somewhat sheltered.
3. Glue on the 2 large bottle lids for the base of the eyes. Glue the 2 smaller bottle lids inside, then add the googly eyes on top. Cut a triangle from the bit of carton you removed from the tummy to use as the beak, and glue it below the eyes.
4. Poke a small hole half an inch below the tummy opening and insert the popsicle stick to form a perch for birds.
5. Poke a hole in the top of your carton and thread some string through. Use this string to hang your bird feeder from a tree outside.
6. Fill your feeder with seed and watch the action unfold!

Scientific Questions:

- What bird species come to your feeder?
- Do the birds share the feeder or compete for space? Does one species usually win?
- Do more birds come at certain times of day?
- Try filling the feeder with different kinds of seed. Do you get different species?

Let's Talk Science, 2017. Adapted from http://www.redtedart.com/juice-carton-crafts-owl-bird-feeder/

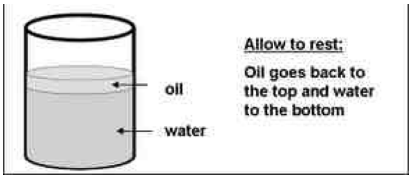
Home-Made Lava Lamps

Background

Have you ever wondered how lava lamps work? In reality, they all rely on density- this how-to will outline how to make a home-made lava lamp as well as how a real lava lamp works!

This is a lesson on density- what happens when you pour water and vegetable oil into the same container? Vegetable oil is less **dense** than water, which means that oil is lighter than water. Oil is also **hydrophobic**, meaning that it refuses to mix with water!

The result is that when you try to mix oil and water in a container, they will not mix together and will eventually settle with oil in the top layer and water on the bottom.



In our homemade Lava Lamps, we will pour salt into an oil and water "mixture". The salt is heavy, so it will sink to the bottom of the container and bring some tiny oil droplets down with it.

Once the oil droplets reach the bottom of the container with the salt, they will start to blob together and eventually will rise to the top of the container (since oil always wants to be above water!). The result is oil bubbles rising to the top of the container for a few minutes after the salt is poured into the container, just like a lava-lamp!

Materials

• 1 plastic water/pop bottle with cap • Water • Vegetable oil • Measuring cups	• Funnel • Table salt • Food colouring • Flashlight

Safety Considerations

- Take care when pouring oil, water and salt to not spill and clean up spills immediately
- Make sure to screw the cap on tightly after all materials have been added

Procedure

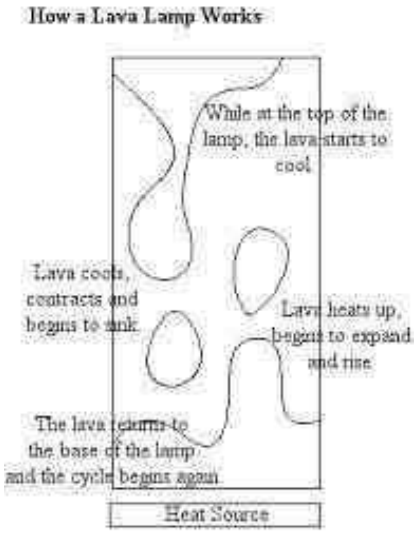
1. Fill a plastic water bottle ¾ full with water (about 1 cup) using a funnel so you don't spill.
2. Add a few drops of food colouring to the water.
3. Pour oil into the water bottle using a funnel until it is almost full (about ¼ cup).
4. Add 1-2 heaping spoonfuls of salt to the water bottle
5. Put the cap on the water bottle to prevent spills

6. Shine a flashlight underneath the bottle and enjoy the effect!
7. The oil bubbles will stop rising after a few minutes. To repeat the effect, just add more salt to the container.

FAQ

1. How does a real Lava Lamp work?

In a real lava lamp, there is a heavy liquid (the "lava") and a light liquid (the "water"). At the beginning, the lava is at the bottom of the lamp and a lightbulb starts to heat it up. At the lava heats up, it **expands** and becomes **less dense** than the water. The hot lava starts to leave the bottom in bubbles and rises to the top of the lamp. BUT, it's cold at the top of the lamp! After a few minutes, the lava that rose begins to cool down, **contract**, and become **more dense** than the water. It will now sink to the bottom of the lamp, where the cycle begins all over again.



Sources

http://science.howstuffworks.com/innovation/science-questions/question36.htm

http://kids.nationalgeographic.com/explore/science/make-a-groovy-lava-lamp/

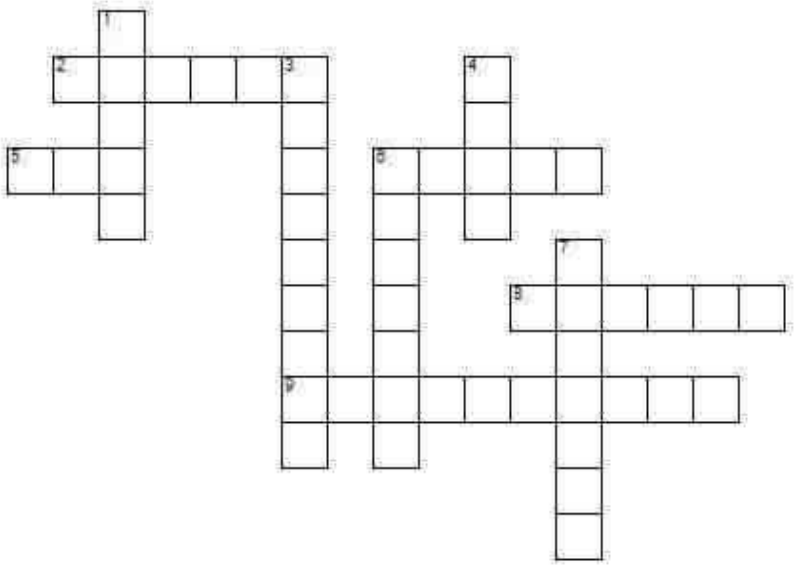
About Science Quest

Science Quest is a STEM organization located in Kingston that strives to inspire youth in science, technology, engineering, and math! We run classroom workshops for K-8 in May and June, summer camp in July and August at Queen's University for grades 1-8, and Saturday sessions during the school-year for grades 4-8.

Be sure to check out www.sciencequest.ca for more information on Science Quest's programs!

Society for Conservation Biology
Kingston Chapter

Birds of Ontario



ACROSS
2 One of the world's fastest animals, the Peregrine _____
5 Can hunt at night because of their good hearing, the Barn _____
6 Prefers to roost in chimneys and other man-made structures, the Chimney _____
8 A predator that hunts insects, birds, lizards, and small mammals, the Loggerhead _____
9 Has special beaks to drill holes in wood, the Red-Headed _____

DOWN
1 Has a wingspan over two metres, the Golden _____
3 Has specialised eyes to see in low light, the Common _____
4 Males present crabs and crayfish to females during mating, the King ____
6 Nests in burrows, on the bank of rivers and lakes, the Bank _____
7 Ground-dwelling, lives in tall grass prairies, the Greater Prairie-_____

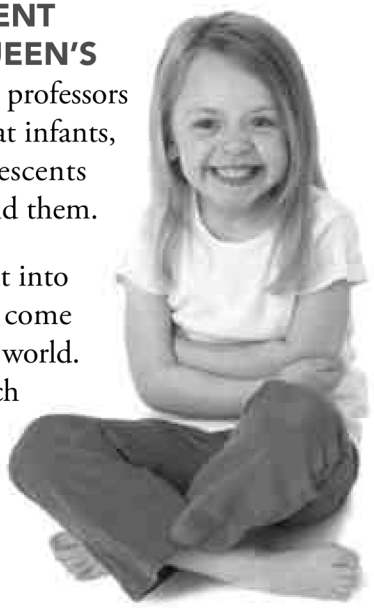
1. Eagle 2. Falcon 3. Nighthawk 4. Rail 5. Owl 6. Swift 7. Chicken 8. Shrike 9. Woodpecker

CHILD and ADOLESCENT DEVELOPMENT

Queen's University

CHILD AND ADOLESCENT DEVELOPMENT AT QUEEN'S

We are team of students and professors interested in finding out what infants, toddlers, children and adolescents know about the world around them.



Our research provides insight into how people grow, learn and come to interact successfully in the world. The findings from our research have important implications for how best to educate children and how to help children with special needs.

HOW DO I PARTICIPATE?

- Contact us to make an appointment.
- Come to Queen's University to participate in our fun and interactive studies.
- Parking is provided and siblings are always welcome.

CONTACT US:

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Humphrey and Craine Halls
Queen's University
62 Arch Street, Kingston, ON K7L 3N6

Queen's University

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child.studies@queensu.ca
www.queensu.ca/psychology/developmental-participate

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SCIENCE AT HOME

How your brain helps you follow rules

Brain Development & Cognitive Control

The largest area of the human brain, and the one that takes the longest to develop, is in the front of our brains: the frontal lobes.

The frontal lobes are important when we need to follow rules and control how we move. It is hard to follow rules when the rules go against things that we usually want to do. But, as our frontal lobes develop from childhood through adolescence, we get better at following rules, even in challenging circumstances.

These two games give our frontal lobes a workout. See how well you do! For each game, you will need a friend, parent, brother, sister…anyone!

FREEZE DANCE GAME (Good for younger children!)

Materials Needed

- Music you can dance to
- Drawings of body poses (for example, standing with your hands on your hips)

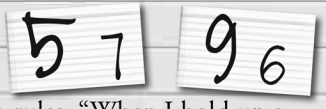
Instructions

(1) Show your partner the image of a body pose.
(2) Explain the rules: "While the music is playing, you can dance, but when it stops, you have to stop dancing and stand in this freeze pose."
(3) Start and stop the music many times. After a while, show your partner a new freeze pose. Each time you stop the music, observe whether your partner stops dancing when the music stops and remembers the freeze pose.

NUMBER STROOP GAME

Materials Needed

- 30 index cards. On each card, write two different numbers, but make one of the numbers larger in size than the other. For some pairs, make the higher value number smaller in size than the lower value number, and for some pairs, do the opposite.



Instructions

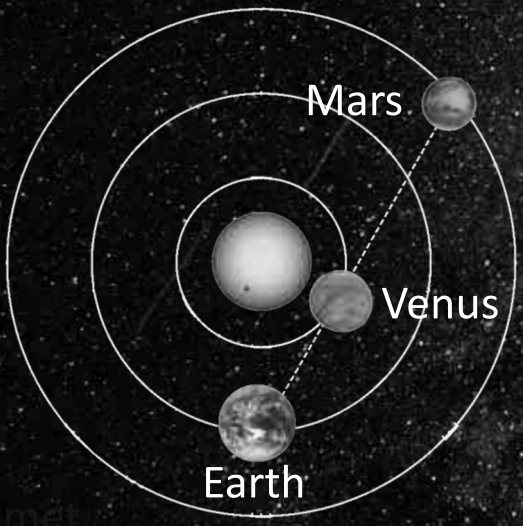
(1) Give your partner one of two rules: "When I hold up a card, tell me as fast as you can which number is larger in size" or "When I hold up a card, tell me…which number is higher in value"
(2) Switch between the rules every 10 trials. What makes the game hard for your partner and what makes it easy? Why?
What other rules can you come up with for the game?

Royal Military College of Canada

Astronomy and Astrophysics presents:

Conjunctions & Meteor Showers

The planets in our solar system are all very far apart, but sometimes they look close together in the sky. When this happens it is called a **conjunction.**



Conjunctions with bright planets in the next year:

October 5: Venus & Mars
November 13: Venus & Jupiter

When Earth passes through a comet's orbit, bits of material released from the comet fall through Earth's atmosphere as a meteor shower

Meteor showers that will be visible in the next year:

eta Aquariids: Apr 24-May 19
Perseids: Jul 13-Aug 26
Geminids: Nov 30-Dec 17

Image credits: NASA

Rainbow

Did you know that our soils can become polluted? This happens when harmful, unwanted chemicals and materials are dumped into the environment. Some examples are paints, insecticides, fertilizers, or garbage! These are called **contaminants** and if left in the soil, they negatively affect living organisms like plants, animals, and even humans**!** One thing we can do to clean these up is use special plants to remove contaminants from soil (and water too)! This process is known as **phytoremediation**. Environmental scientists use phytoremediation to clean up soil and make it healthy again after it has been polluted. Be just like an environmental scientist and complete this experiment to better understand how phytoremediation works!

What you will need:

(see image below for setup)

- White flowers
- Small containers
- Water
- Food colouring

Experimental Setup

Instructions

1. Gather all of your materials and label your containers with colours of the rainbow.
2. Add ½ cup of water to each container.
3. Add 10 drops of food colouring to the corresponding containers. Pretend that the food colouring are different contaminants!
4. Cut the stems of your flowers at an angle and place one in each container.
5. Place the containers in a safe location with lots of sun, like a kitchen windowsill!
6. Write down observations and take pictures of your flowers over the next few hours/days.
7. Notice what happens to the flowers. How is this related to phytoremediation?

Results and Discussion

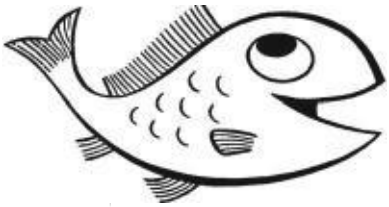
- What happened to the petals of the flowers?
- How long did it take for the experiment to conclude?
- Try this with flowers that are planted in soil and water them using water mixed with food colouring!

Think About It…

Imagine that the food colouring is polluting the water and soil. The white flowers help remove the contaminants. Once the contaminants are secured in the plant, they can be removed and disposed of properly. Not all of the contaminant has been removed from the water, so you can see how the process of phytoremediation can take a really long time. It's hard work to clean up the soil and water to make our environment healthy!

How can we help save aquatic animals?

Can you help the fish get back to the pond safely?



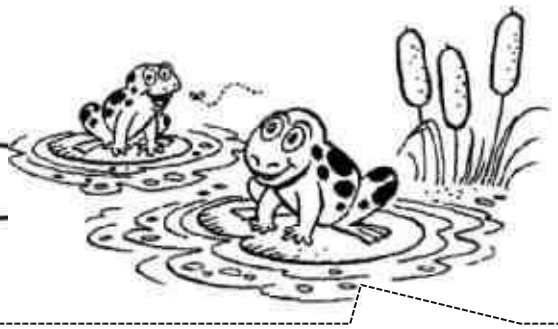
Oops! Fish breathe through their gills so they are continuously uptake chemicals from water.

Good idea! Ride your bike.

Oops! Frogs and fish are becoming increasingly endangered due to human pollution.

Oops! Storm drains lead to the lake.

Good idea! Return unused medication to the doctor.



Good idea! Keep our water clean!
Frogs and fish are good indicator species meaning by studying them we can learn about the conditions of the aquatic environment.

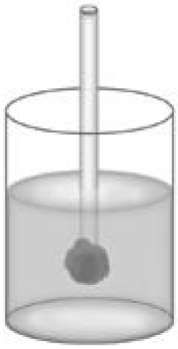
***Langlois Lab*,**
Department of Chemistry and Chemical Engineering,
Royal Military College of Canada

Environmental Toxicology and Endocrinology Laboratory

THE DEPARTMENT OF CIVIL ENGINEERING AT THE ROYAL MILITARY COLLEGE

Make your own Hydrometer

A hydrometer is a tool that is used to measure the density of a fluid as it compares to pure water such as maple syrup or fuel. Civil Engineers use hydrometers to help them determine the grain size of silts and clays. A small sample of soil is mixed with pure water and placed in a 1000 mL graduated cylinder. A hydrometer is placed in the soil water mixture and readings are taken off of the hydrometer as the soil settles. Settling or sedimentation is the settling out of solid particles from suspension in water. The velocity of settling depends on the size, shape, and density of the particles, and on the viscosity of the water. The settling rate of the soil is used to determine the size of the soil particles.



Supplies

- Tall narrow glass
- Large straw
- modelling clay
- Teaspoon
- Permanent marker
- ruler
- Water
- Paper and pencil
- Salt

Instructions

1. Collect all of the supplies on the list.
2. Plug the end of the straw with the modelling clay. Make sure you use enough so that water does not enter the straw.
3. Fill the glass ¾ full with tap water.
4. Place the plugged end of the straw into the water in the glass. You want the straw to float straight upwards and not sink to the bottom. Adjust the amount of clay so that it floats nicely.
5. Once you are satisfied with the behaviour of your floating straw make a mark on the straw, with the permanent marker, where the top of the water meets the side of the straw.
6. Remove your hydrometer from the glass.
7. Add ½ teaspoon of salt to the water in the glass and stir it until dissolved.
8. Place your hydrometer back in the glass and make a new mark where the water meets the side of the straw. Repeat steps 5 to 7 as many times as you like.
9. Try placing your hydrometer in different fluids and compare it to the tap water mark. Make sure to ask a parent for help. Try fluids like cooking oil or rubbing alcohol.

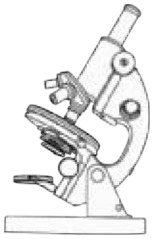
Further Thinking

Engineers use Stokes' equation for the terminal velocity of the falling soil particles. Learn about Stokes' Law here:
http://www.schoolphysics.co.uk/age16-19/Properties%20of%20matter/Viscosity/text/Stokes_law/index.html

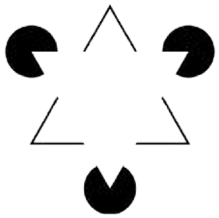
Sources: http://www.wikihow.com/Build-a-Hydrometer
http://www.schoolphysics.co.uk/age16-19/Properties%20of%20matter/Viscosity/text/Stokes_law/index.html

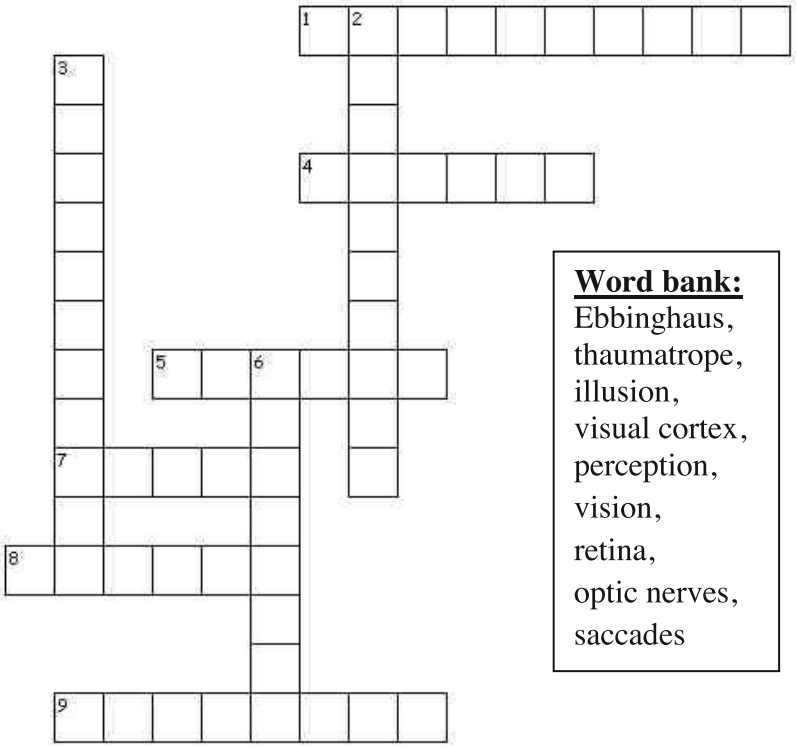
Military Psychology and Leadership Department

Who are psychologists?
Psychologists study the different aspect of peoples' thoughts and behaviours, and look for possible reasons why they act that way.
What kind of research do psychologists do?
We examine survey and experimental data, analyse correlations and patterns, and make conclusions about how these observations impact the larger population.
For example, we might study why people see illusions, what makes us sad or happy, and what motivates people to do certain things.



The Visual System

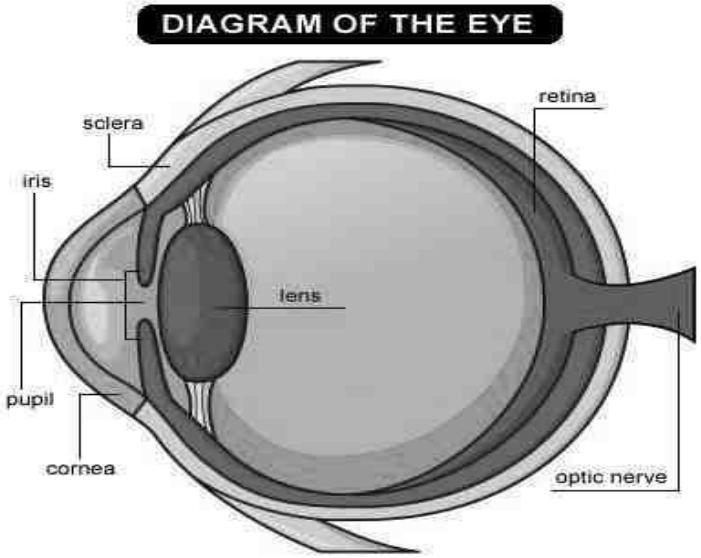


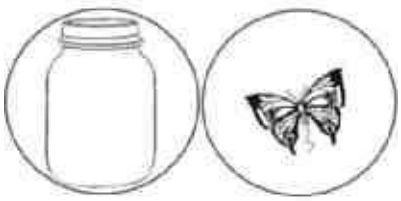


Word bank:
Ebbinghaus,
thaumatrope,
illusion,
visual cortex,
perception,
vision,
retina,
optic nerves,
saccades

Across
1. The ability to use the senses to understand environmental stimuli
4. The ability to see
5. cortex: receives and processes sensory nerve impulses from the eyes within the cerebral cortex
7. nerves: transmits brain impulses from the retina at the back of the eye
8. The part of the eye containing light-sensitive cells, signals to the brain to form a visual image
9. An image that tricks the perceptions between the eye and brain

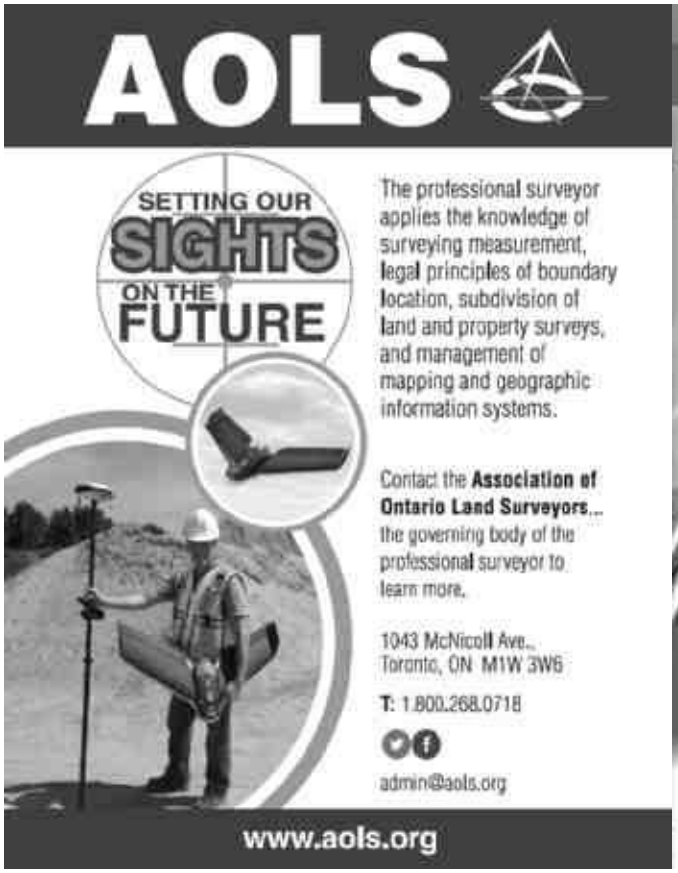
Down
2. An illusion that shows the importance of context as the brain makes judgements about the size of an object based on what surrounds it
3. An optical toy; when spun, two images blur into one due to persistence of vision
6. Rapid eye movements





<u>Explore the World of Surveying</u> by getting "hands-on" experience

with the various data, tools and technologies used by today's Surveying professionals



The Association of Ontario Land Surveyors (AOLS) is excited to be introducing the *<u>SHSM Surveying Certification program</u>*** to Ontario's School Boards in September 2017. The AOLS will be sharing more information with you about the SHSM program and Careers in Surveying.**

Explore our website and see our SHSM Surveying Certification program video at
http://www.aols.org/students/surveying-careers

….and find out who the local Surveyors are in your area.

- Go to: http://www.aols.org/find_a_surveyor
- In the "Define Search" area, type in the name of the nearest City where you live, click "Search" and view the Map and results for local Surveyors.
- Then Type in your last name in the Search box, click "Search" and see if any Ontario Land Surveyors share your last name and where they work in Ontario. If none pop up, perhaps **YOU** will be the first in Ontario with your last name to have a lifelong and rewarding career in Surveying!!!

They'll think it's **COOL.**

You'll know it's **EDUCATIONAL.**

At **Bricks 4 Kidz®**, we believe it's important to tap into a child's potential by ***encouraging their curiosity and creativity.*** Our fun-filled model plans, which are designed by engineers and architects, provide an engaging platform that teaches children to learn with **LEGO®** Bricks. With our theme based project kits, we playfully motivate children by reinforcing S.T.E.M. based principles. And at the same time, we ***enhance self-esteem, improve fine-motor skills,*** and teach important classroom lessons such as ***organization*** and ***following directions.***

Bricks 4 Kidz®

we learn, we build, we play with ***LEGO®*** Bricks

ENROLL YOUR CHILD **TODAY!!**

- **AFTER SCHOOL PROGRAMS**
- **IN-SCHOOL FIELD TRIPS**
- **BIRTHDAY PARTIES**

BRICKS 4 KIDZ LOCATION:

1. **Creativity Centre 1300 Bath Rd**
   (inside the Boys and Girls Club)

www.bricks4kidz.com/kingston-canada
kingston@bricks4kidz.com
613-542-3306

Bricks4KidzCorp @Bricks4KidzCorp

BRICKS4KIDZ.COM

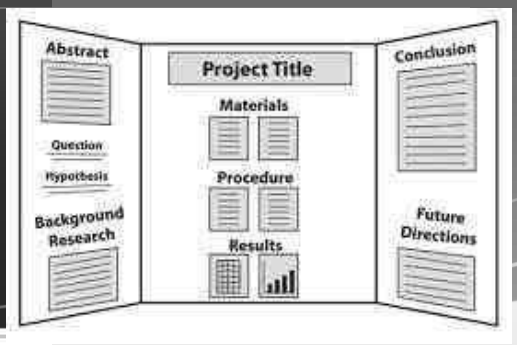
Garbage Bag Hot Air Balloon

This works well on a sunny calm day. Have an adult help you with all cutting operations. Use no more than 3 meters of line and keep the balloon away from obstacles.

1. Acquire 2 very thin (inexpensive) black or dark green garbage bags.
2. Cut the closed end open on one of them, which will turn it into a tube.
3. If the open ends are not straight, trim off the 'wings' to make the open ends straight.
4. Using very thin clear tape, tape two open ends together to make one long garbage bag, twice as long as one. This is best done indoors on the floor.
5. Grasp the remaining open end and holding it open, walk quickly or carefully run to fill it with air.
6. When the long garbage bag is filled with air, quickly close the open end and tie it, keeping as much air in it as possible. At this point, you may blow into the open end to add more air.
7. Tie some very light string, or better, fishing line to the tied off end.
8. Position the inflated garbage bag on the ground so that the sun will shine on one whole side.
9. You will see the bag start to fill more and the 'skin' of the bag become tight.
10. If you're lucky, and conditions are right, one end of the bag will very slowly start to rise, and then the whole bag.
11. Hold on to the fishing line and don't let the balloon get too high. Keep the line to a maximum length of 10 meters.

Frontenac, Lennox and Addington Science Fair

FLASF Regional Science Fair is an opportunity for students Grades 5-12 to explore hands-on science investigation, create science projects based on inquiry and present to professional scientist judges!



Can't Keep a Good Ball Down!

Introduction: Density is a property of matter measured by its mass per unit volume (how much space it takes up). Two objects of equal size may have different densities depending on their masses. A very dense object tends to fall down through less dense particles.

Question: How do two objects of the same size but different densities act when placed in a medium that has an intermediate density?

Materials: Large glass jar, bag of dried pinto beans, Ping-Pong ball, metal ball or glass marble (same size as Ping-Pong ball)

Methods:

1. Place the Ping-Pong ball in the bottom of the glass jar.
2. Pour the pinto beans into the jar so the Ping-Pong ball is completely covered.
3. Place the metal ball or marble on the top of the pinto beans.
4. Gently shake the jar from side to side and watch what happens.

Science Fair Projects

Question	Your question can be big or small and will help you investigate something of interest to you!
Hypothesis	What do you think the answer is? Why?
Method	What steps will you take to perform your experiment? What materials do you require?
Results	Present your findings visually in graphs or tables. What answers did you discover?
Discussion	What do you results mean? Was your hypothesis proven or not proven?

Visit www.flasf.on.ca for more information on experiments, our regional science fair and more!

Exploring Magnetism

DID YOU KNOW?

- Magnets are objects that produce an area of magnetic force called a magnetic field.
- Magnets only attract certain types of metals. Other materials such as glass, plastic and wood aren't attracted to magnets. These materials are called non-magnetic.
- Magnets have a magnetic north pole and a magnetic south pole. If the same poles of two magnets are placed near each other they will push away (repel), while if different poles are placed near each other they will pull together (attract).
- The **tesla** (symbol **T**) is a unit of measurement of the strength of a magnetic field.

TRY THIS AT HOME!

An introduction to magnetism; activities for early learners.

Fishing

1. Fill a shallow bin or tray with small objects from around the house – some containing metal and some without. Items may include paper clips, erasers, pencils, teaspoons, scissors etc.
2. Secure a magnet on the end of a stick or use a magnetic wand.
3. Talk about which objects may be magnetic then fish for the object to see if it sticks to the magnet.
4. Sort the materials into magnetic and non-magnetic categories.
5. If an object has both magnetic and non-magnetic parts, such as a pair of scissors with a plastic handle, discuss the object. Which part is magnetic? Why?
6. Experiment further with different items and with magnets of different strengths.

Discovery Bottles

1. Fill an empty clear plastic bottle with pipe cleaners cut to 1-2 inch lengths.
2. Use a magnet to explore how the pipe cleaners behave when the magnet is moved along the outside of the bottle.
3. What happens as the magnet is moved further away?
4. Try using different objects in the bottle such as paper clips, washers, screws etc.

Interesting Fact! The biggest magnet in the world can be found at Los Alamos National Laboratory in New Mexico. This magnet can reach 100 tesla; by comparison, a junkyard magnet that can lift a car is about 2 tesla.

KING'S TOWN SCHOOL

What's the **Scoop** about Seeds?

Inside each and every seed is a tiny baby plant called an embryo. Each seed contains enough food and nutrients to support the plant as it begins to grow. Seeds can 'sleep' or stay dormant for many weeks, months, or even years until conditions of warmth, moisture, and light are just right to awaken the growth of the seedling.

Flower Power:

Plants make flowers in order to produce seeds. When you grow plants in your own garden, you can save the seeds to grow again next year by following some simple steps.

Saving Bean and Pea Seeds:

1. **Planting** – beans will cross with other beans, and peas with other peas, so you should plant different varieties away from each other to make sure you know what type of seeds your plant will produce. It's okay to plant bean and pea varieties next to each other; they will not cross!
2. **Growing –** Sow peas in early spring because they prefer cool temperatures. Sow beans after the last frost. During the growing season, dig out any sick-looking plants to make sure disease doesn't spread in your garden.
3. **Harvesting –** Only harvest pods from healthy plants. Don't remove the pods from the plants until they are brown and dry. Green pods are still growing and the seeds are not yet ready. For beans, either pick the dry pods by hand as they are ready, or cut the plant off at the base and dry whole. For peas, wait until the leaves have died before picking the dry seed pods.
4. **Threshing –** You can tell if seeds are ready to save by biting on them. If it feels hard like a stone, it's ready! If it's still soft, put it in a cool, dry place to dry longer. Threshing means removing the dry pod material from the seeds. You can do this by hand, using your fingers to pick the seeds out. If you are doing a larger number, you can lay out all of the pods on a tarp and smash them with a piece of wood. The dry pods are brittle and will break easily. You can then remove the seeds by shaking the tarp, and clean them further using a screen or pouring them between two buckets with a fan to blow away the pod material.
5. **Saving –** Label your seeds carefully with the variety name, and the year you harvested. Store in a cool, dry, dark place until you are ready to replant!

Seed-tivities!

Let there be Light

Inquiry: Do seeds need light in order to grow? Let's answer this question with an experiment.

Activity: Place seed on a wet paper towel, and then put into a sandwich bag (don't seal). Place one bag in a place that gets lots of light, like on a window sill. Place another in a dark place, like inside a cupboard. Check back in about a week to see what has happened to your seeds.

Extension: Plant your seeds in the garden, and watch how they grow. Do they grow differently?

Seed Dissection

Inquiry: Are all seeds the same? What are the different parts of a seed?

Activity: Gather different types and varieties of seeds (beans, peas, lentils, sunflower seeds, etc). Trace around the seed twice, so you have two outlines. Soak the seeds briefly in water. In one of your outlines, draw what you think you'll see inside the seed. Remove the seeds from the water, and carefully pull the seed open (or ask an adult to help you carefully cut it open). Draw what you actually see inside the see, and compare your drawings. Use a magnifying glass to see details.

Extension: Find a seed diagram on the internet or in a book. Make your drawing larger and label it.

Information inspiring imagination

KINGSTON
FRONTENAC
PUBLIC LIBRARY

YOUR PUBLIC LIBRARY

Design a 3D object! Consider all the angles as you sketch it below.

Top	Bottom
Left Side	Right Side
Back	Front

kfpl.labs

Bring your design to life! Learn all about 3D design using Lynda.com at **http://www.kfpl.ca/online-learning/lyndacom**. Once you have your digital design ready, visit us at **www.kfpl.ca/library-services/3d-printing** to learn about using our 3D printers.

Queen's University

Make your own

3D Icosahedral Earth Model

Make your own 3D model of the Earth that shows satellite imagery of all the continents.

Instructions:

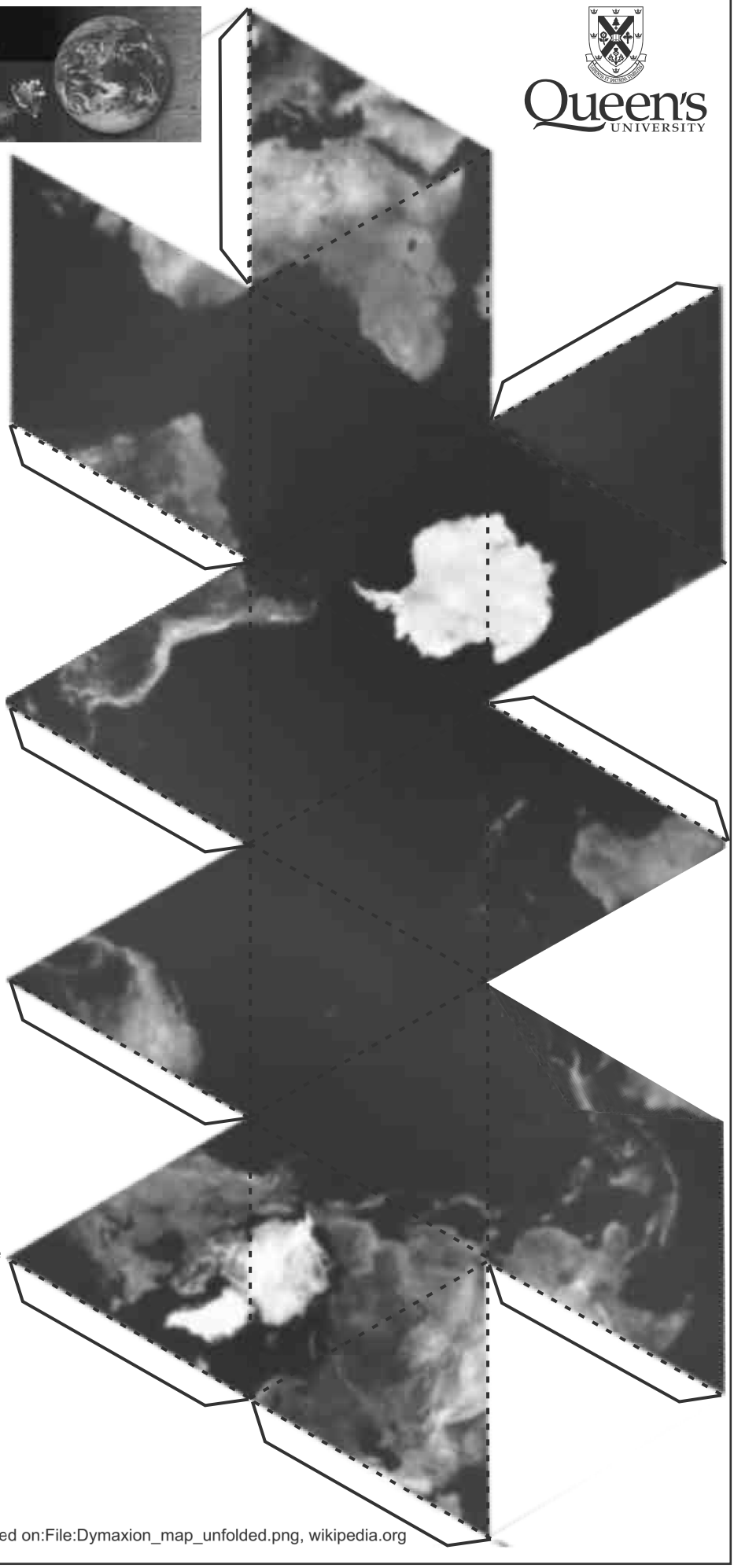
1. Cut out the Earth image to the right along **the edges of the map**, and along the **solid lines** of the tabs.

2. Pre-fold the cutout along **every dashed line** in preparation for taping or gluing the model together along the tabs.

3. Start at one end, and fold up the model so that a tab ends up under the next closest map triangle. Fasten each joint as you fold it (step 4).

4. Either use glue stick applied to the white tab portion, or clear “invisible” tape on the outside at the joint between each triangle map section to hold the model together.

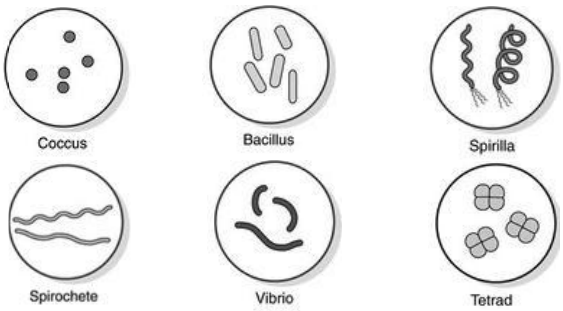
The last few joins are a bit of challenge to fasten together. The resulting shape is called an **icosahdron** because it has 20 triangular-shaped faces.



Based on:File:Dymaxion_map_unfolded.png, wikipedia.org

Be a Germ Detective

Try drawing bacteria on this petri dish!



Here are some examples of bacterial shapes!

Did you know that there are organisms so small you need magnification to see them? They are called microorganisms.

In the late 19th century, it was discovered that some infectious diseases are caused by microorganisms. This is called germ theory.

Check out this online activity!

Go to:
museumofhealthcare.ca/explore/exhibits/glass/

can you match the microorganisms?

1. 

2. 

3. 

A. Bacteria are single-celled spherical, spiral, or rod shaped organisms. They can reproduce on their own, and are most abundant where they have food, moisture, and the right temperature for their growth. Most are not harmful! In fact, the average person has about 2 kg of beneficial bacteria in their body that help to digest food, make vitamins, and compete with the harmful microorganisms. Others, however, are harmful: bacterial waterborne diseases include Salmonella, E-coli and Cholera.

B. Protozoa are single-celled organisms that are more complex that bacteria. They can reproduce on their own, and are much larger than bacteria (a few are big enough to be seen without a microscope). Most are not harmful! A well-known protozoan waterborne disease is called Giardia, also known as beaver fever.

C. Viruses are not cells; they are parasites, which means they can only survive inside the cells of other living things! Viruses are the smallest type of microorganism and can only be seen with a very powerful microscope. Viral waterborne diseases include norovirus and rotavirus

Answers
1B
2A
3C

Bringing Canada's healthcare story to life!

ANN BAILLIE BUILDING NATIONAL HISTORIC SITE
32 GEORGE STREET, KINGSTON, ON K7L 2V7
Phone: (613) 548-2419 ● www.museumofhealthcare.ca

MUSEUM OF HEALTH CARE AT KINGSTON

Photo: Bruce Parker

JUNE 10-11
BIOBLITZ

What is a BioBlitz?

Community volunteers of all ages (-it's family friendly!) join scientists and experts to record all the living species in an area.

When and where?

MILLER FAMILY NATURE PRESERVE (noon till noon June 10-11), Hilltop Road east of Brewers Road, Prince Edward County

- **Go on guided walks led by experts**
- **Discover a new dragonfly or beetle for the County**
- **See Butterflies up close**
- **Track breeding evidence for birds**
- **Look for clues of mammals, insects and reptiles**
- **Identify plants you've always wondered about**

Come for all or part of the event

Registration - $5 (children accompanied by adults - free) Registration begins at 11 AM Saturday and continues throughout the event

---

Includes dinner on Saturday evening and Wrap-up BBQ on Sunday

It's fun, exciting and close by! Learn about biodiversity, help preserve our natural world, and contribute to scientific research!

PRINCE EDWARD POINT BIRD OBSERVATORY

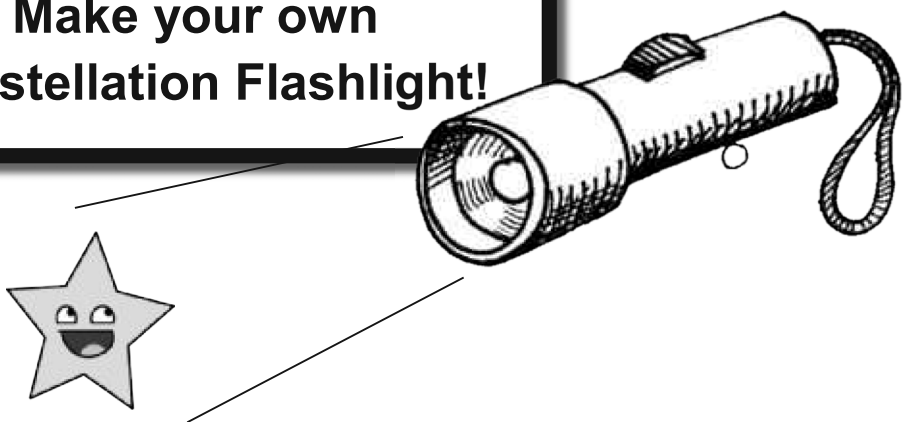
www.peptbo.ca/bioblitz-2017.php

Hastings Prince Edward Land Trust

PRINCE EDWARD COUNTY FIELD NATURALISTS
Passionate about nature!

Prince Edward Point Bird Observatory

Make your own Constellation Flashlight!



What you need:
(Don't forge ask an adult for help)

- Black paper or card stock
- Scissors
- Flashlight
- Sharp pencil
- Black paint

Instructions:

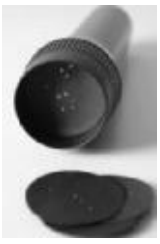
1- First off, to make sure the discs work you'll need to remove or paint over the silver shiny part on the inside of the flashlight. Make sure you don't paint over the light bulb!

2- While you are waiting for the paint to dry, take the top part of the flashlight and trace a circle on black card stock. You'll need one circle for each constellation.

3- This might be the trickiest part! Take the scissors and carefully cut as close to the tracings as you can. The closer you are the better they will fit!

4- Now comes the really fun part. Pick your favorite constellations and mark the dots onto the card stock circles. I suggest picking ones that have fun stories to match.

5- Take a sharp pencil and poke the holes through the marked dots. (Ask an adult to help)



6- Assemble your new flashlight, place the discs over the end of the flashlight, and have fun! It works best in a dark room.

Pump House
STEAM MUSEUM

Science Rendezvous RIOT Team Booth
May 13, 2017

Canadian Cancer Society | R.I.O.T.
Research Information Outreach Team

Cancer Therapy Activity

GOALS

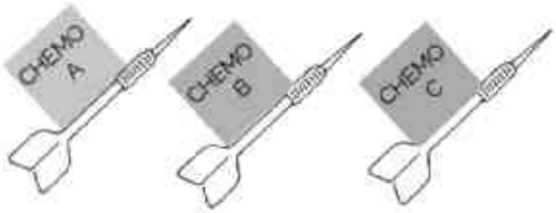
This activity will introduce children to cancer treatment and research in a fun way! Kids will be introduced to terms that include chemotherapeutics, tumor and DNA mutations.

Board design will be small circular envelopes representing cells covered with laminate to allow nerf guns to stick with DNA underneath with several copies of DNA which is either healthy DNA or mutated DNA – this will determine if they killed a healthy or cancerous cell

Board set up!

STEPS

1) Kids will be able to dress up as a scientist with **goggles** and a **lab coat**
2) RIOT member will introduce what cancer is to them – uncontrolled growth of cells – have a **poster** to describe the definitions and point of activity
3) They can pick a **nerf gun** they would like to use which represents different chemotherapies – a RIOT representative will briefly explain what a chemotherapy is and how it works talk about how some work better that others or for different cancers – talk about how chemotherapies are targeting any rapidly dividing cell so because cancer cells divide so quickly it kills them but it also harms other healthy cells
4) Kids will then shoot the board– with as many tries as it takes for them to hit a cell
5) Place **DNA images** behind the cells entire DNA vs. mutated DNA
   Depending on what they pop they will be given the DNA and will have to decide whether its healthy DNA or damaged DNA by comparing to examples that are provided
6) Kids are then given a **jr. cancer researcher card**

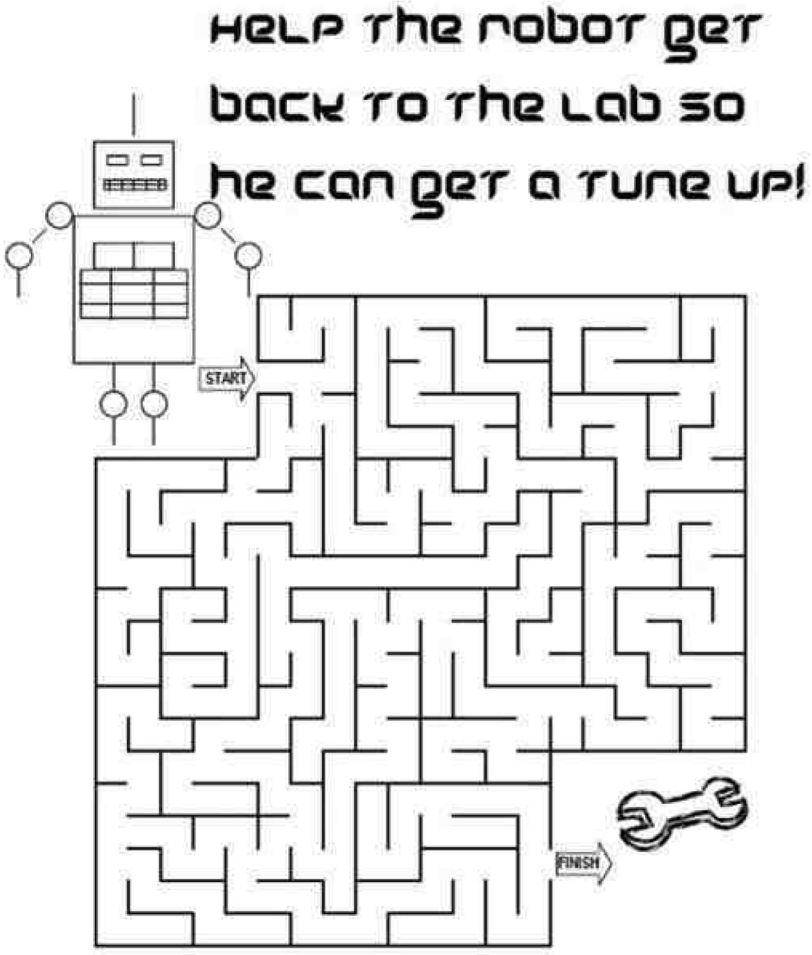


What are Robots?
- Machines that can sense, plan and act

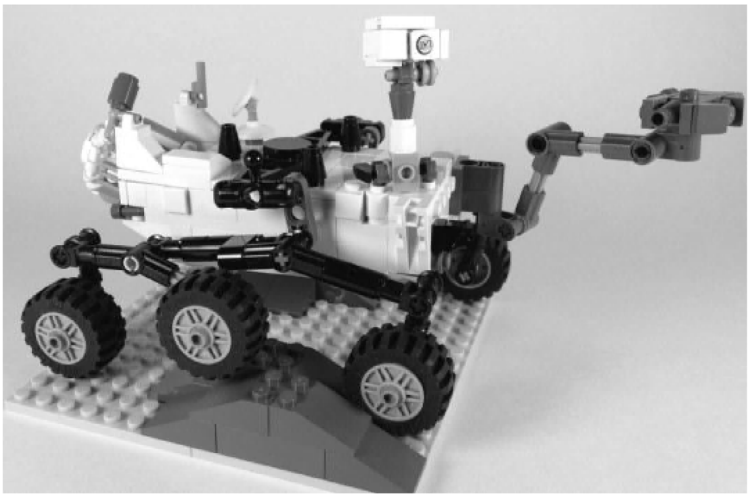
How do Robots sense?
- Use sensors such as touch, sound, light, motion

How do Robots plan?
- They are programmed to follow instructions

How do Robots act?... They move by:
- Rolling
- Rotating
- Walking
- Swimming
- Flying



Most robots get around by rolling
- Wheels and tread provide the most stability and multiple points of contact
- Walking is hard as it requires balancing
- Swimming only works in water
- Flying requires speed and lots of energy



What are actuators?
- These are the muscles of the robot

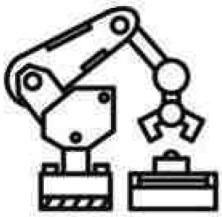
What are controllers?
- They get instructions from the computer and tell the muscles how to move.

W.A.F.F.L.E.S

4476
Community Robotics

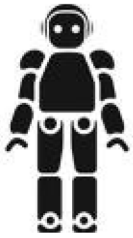
TYPES OF ROBOTS

Robotic Arms
- Work in factories



Robot Vehicles
- Mars rover

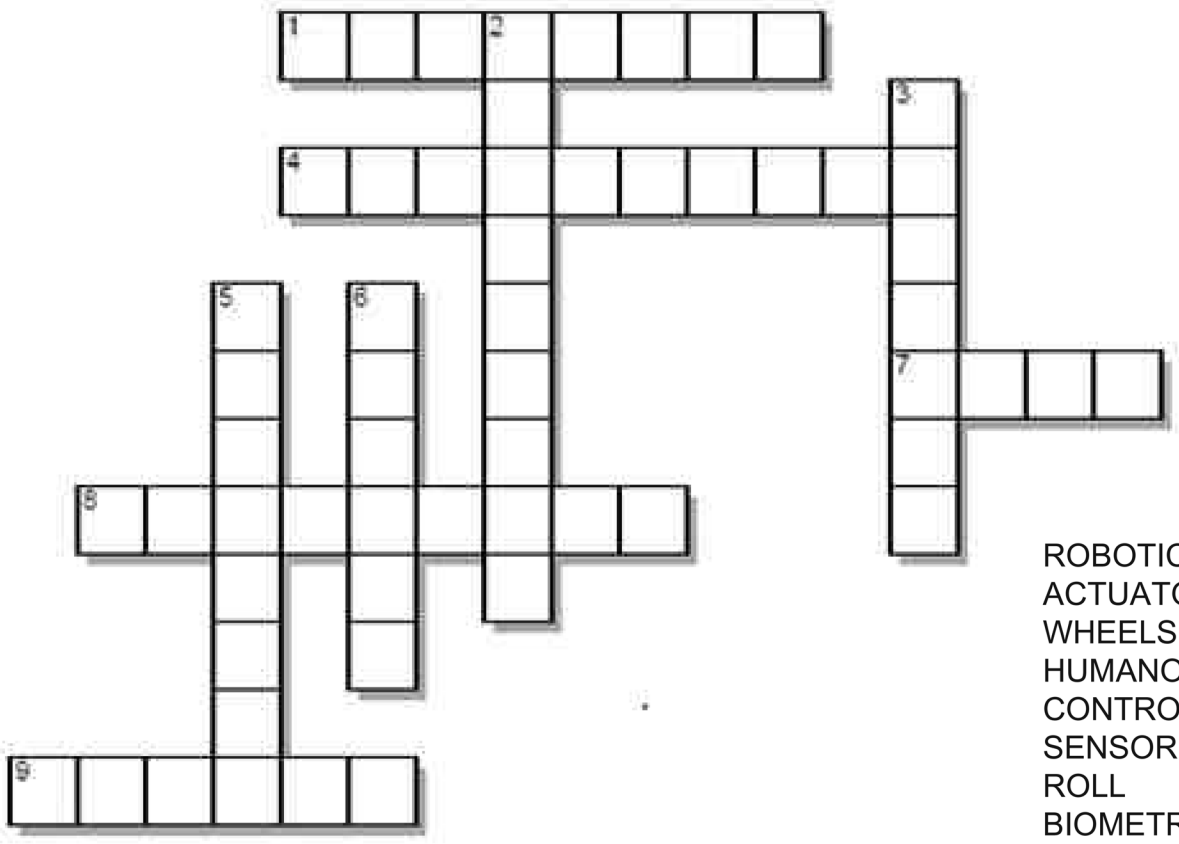
Humanoid Robots
- Walk upright on 2 legs



Biometric Robots
- Mimic wildlife

Visit Boston Dynamics on YouTube to see cool robots!

CAN YOU FILL IN THE ROBOT WORDS?



ROBOTICS
ACTUATORS
WHEELS
HUMANOID
CONTROLLER
SENSOR
ROLL
BIOMETRIC
PROGRAM

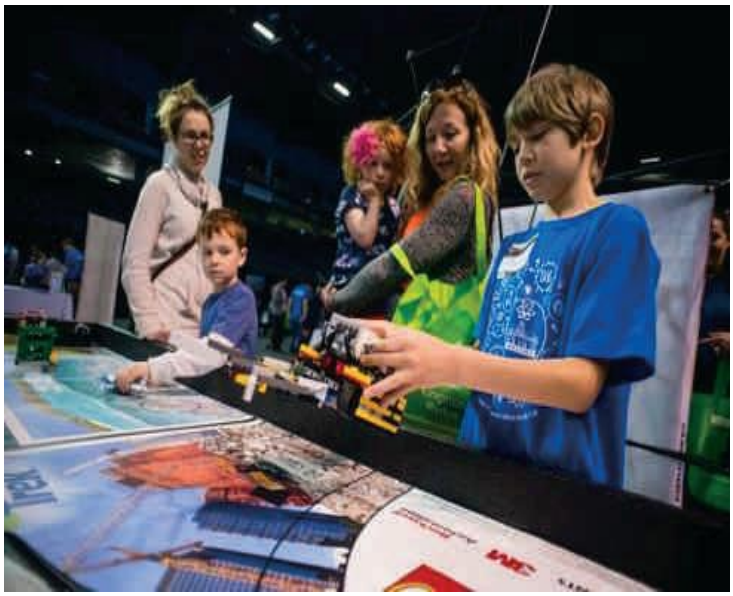
Students can learn about robots… and much more participating in our community based robotics programs.

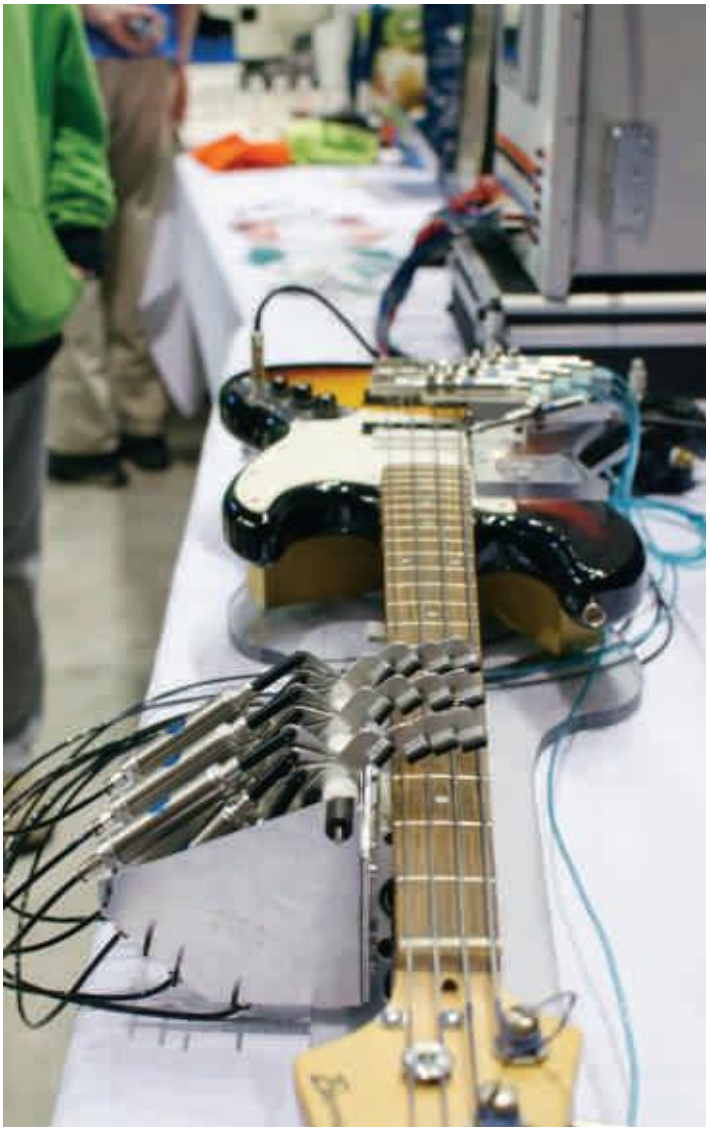
Jr. FIRST LEGO League – ages 6-9
FIRST LEGO League – ages 9-14
FIRST Robotics Competition and VEX – high school

Visit wafflesrobotics.com for more information on joining a team or starting your own.

MEMORIES...

MEMORIES…





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