

SCIENCE RENDEZVOUS KINGSTON 2015



$$E=MC^2$$

$$w=mg$$

$$a^2+b^2=c^2$$

$$v_f = v_i + at$$



A G^xN^sP
C L I Z
D L O K
R T H



SATURDAY MAY 9, 2015
ROGER'S K-ROCK CENTRE
10:00 a.m. – 3:00 p.m.



Welcome



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

Thank you for visiting us today at the 5th annual *Science Rendezvous Kingston* celebration of science; scientists; and, scientific research, hobbies and careers at The Rogers K-ROCK Centre.

Science Rendezvous Kingston is just one of many such events across Canada, but we are proud to say that in five short years, we have grown to be the largest...thanks to our ongoing support and sponsorship and your continued interest and attendance.

Events like *Science Rendezvous Kingston* are very important for many reasons. Did you know that less than 50% of Canadian highschool graduates complete Grade 11 and 12 level mathematics and science courses? Did you know that in general, students without Grade 12 math can expect to be excluded from 40 to 75 per cent of program areas and those without Grade 12 science can expect to be excluded from 30 to 65 per cent of programs at Canadian universities? And that students without Grade 11 or 12 math can also expect to be excluded from half of community college programs?

A new survey* by *Let's Talk Science* shows that a high percentage of Canadian teens like science and believe it is fun. Yet those same students often struggle to recognize how STEM supports the types of roles and careers they value, and can benefit them in any work setting.

*For the full report, please go to <http://www.letstalkscience.ca/research-publications/spotlight-on-science-learning.html>

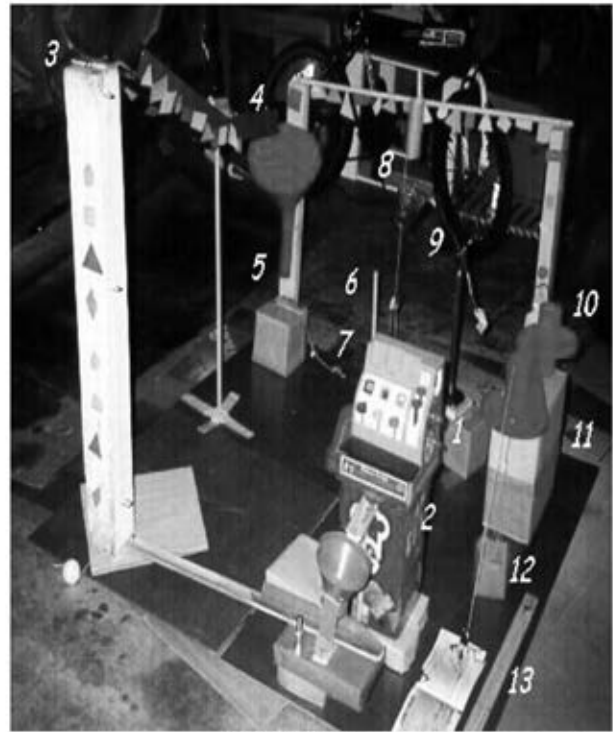
The survey also found that students aren't necessarily drawn to specific jobs, but to a set of interests and values. For example, while 79% of teens say discovering new facts and information happens in science, far less say the same about technology (58%) and engineering (44%). Although most students think science is fun (which should drive interest) and 64 % think science related jobs would offer an interesting work environment, only 56 % say the same about technology jobs and 53 % about engineering-related jobs. They also say they have little interest in science because they don't know where it can lead. Today at *Science Rendezvous Kingston*, we aim to inspire and turn these stats around by featuring science, technology, engineering and mathematics (STEM) superstars aged 10 to >80 years from our community.

Our purpose today is to enthuse 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 is Kingston to be treated to the country's largest STEM celebration—one with representation from every scientific discipline. I know that you will be enriched by the opportunity to meet the 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.

Queen's Education Community Outreach Coordinator

The goal of this Rube Goldberg machine is to turn the page of a book:

1. Turn the handle on a toy cash register to open the drawer.
2. The drawer pushes a golf ball off a platform, into a small blue funnel, and down a ramp.
3. The falling golf ball pulls a string that releases the magic school bus (carrying a picture of Rube Goldberg) down a large blue ramp.
4. Rube's bus hits a rubber ball on a platform, dropping the ball into a large red funnel.
5. The ball lands on a mousetrap (on the orange box) and sets it off.
6. The mousetrap pulls a nail from the yellow stick.
7. The nail allows a weight to drop.
8. The weight pulls a cardboard "cork" from an orange tube.
9. This drops a ball into a cup.
10. The cup tilts a metal scale and raises a wire.
11. The wire releases a ball down a red ramp.
12. The ball falls into a pink paper basket.
13. The basket pulls a string to turn the page of the book!



**THE INCREDIBLE
WORLD OF BUGS**
Featuring John Powers!

THE GIANT COLON
Featuring Dr. Preventino!



Question to Dr. Preventino:

Why do you do this and why should I be interested in participating in this unusual initiative?

Dr. Preventino:

Because colorectal cancer is the second leading cause of cancer death in Canada, but it is also very much preventable.

Because you can learn about all the diseases of the colon and how you can help prevent them by changing your diet and exercise regularly.

Because We want you to know that you can be tested (screened) for colorectal cancer to prevent the disease.

**LOOK
WHAT'S
NEW!**



Meet John Powers, famous for holding the Guinness World Record for owning the largest moth — an Owlet Moth with a 12.16-inch (308 mm) wingspan found in Brazil in 1934. He acquired it from a fellow collector in the early 1960s. "I was nine years old. A man had passed away in his late 80s. The family wanted me to have the insect that I remembered he had," Powers said. "I never forgot that moth because it was that big."

While Powers' world record Owlet Moth is certainly an attraction, his collection also features some of the deadliest spiders and scorpions in the world. He also owns a gynandromorph, a bird-winged butterfly from New Guinea born with both a male and female wing.

Schedule of Events

	WHO?	WHAT?	WHEN?
OUTDOORS ON THE TRAGICALLY HIP WAY	The Colorectal Cancer Association of Canada	The Giant Colon is a multimedia exhibition for all ages that features all of the pathologies that may be found inside the human colon, including colorectal cancer. The Giant Colon exhibit is animated by the CCAC's professor in residence, Dr. Preventino. Captured on 5 video displays, Dr. Preventino will guide you on your tour through the Giant Colon and provide healthy lifestyle tips to keep you and your colon healthy.	10:00 am. – 3:00 p.m. <i>Note: The Giant Colon will be indoors in the event of rain.</i>
	Dr. Karen Lee-Waddell (The Royal Military College of Canada) and local astronomers.	A solar telescope will be available for you to look at the sun. Did you know that Dr. Lee-Waddell discovered her own dwarf galaxy? Ask her how she did it and maybe follow in her footsteps.	10:00 am. – 3:00 p.m. <i>Note: The Astronomy Team will be indoors in the event of rain.</i>
	The Kingston Police Force Canine Unit	We welcome back Constable Jeff Dickson and his canine partner Zeus and Constable Mark McCreary and his partner Titan. The primary task of the Canine Unit – about 70% of their calls, in fact – is for tracking, and the rest is detection work for drugs or firearms. The K9 demonstration will highlight obedience, protection and detection work and criminal apprehension. Only one show, so don't miss it!	1:00 p.m. <i>Note: The demonstration may be subject to cancellation should the unit be called out on a case or in the event of rain.</i>

Schedule of Events

	WHO?	WHAT?	WHEN?
IN THE SHOWCASE MINI-BOWL	The Chemistry Magic Show	The Chemistry magicians will either <i>glow</i> it up or <i>blow</i> it up!	10:30 a.m. 12:30 p.m. 2:15 p.m.
	The REAL Batman	Matt Saunders, a bat expert, will introduce you to the fascinating world of bats.	11:00 a.m.
	Donald Davis	Meet Canadian Naturalist, Donald Davis who has been tagging Monarch Butterflies since 1968. Donald will talk about his involvement with Journey North, Monarch Watch, the Michoacan Reforestation Fund, and the Monarch Teacher-Network Canada.	11:30 a.m.
	John Powers	Meet John Powers, retired Police Officer from Kitchener, A.K.A. "The Bug Man" and Orkin Canada's <i>Bug Showman</i> . Powers, who has been featured on <i>The Discovery Channel</i> and in <i>The National Geographic</i> , has been researching butterflies for over 50 years: an entomologist of sorts since he was 11 years old.	1:45 p.m.
IN THE BOWL	Rube Goldberg Machines	Come and see our three <i>Rube Goldberg</i> machines in action: complicated contraptions that involve outer space, cars, dinosaurs, xylophones, pulleys, buckets and bicycle wheels. Be prepared to laugh and learn about the six simple machines.	ALL DAY 10:00 am – 3:00 pm
	The Incredible World of Bugs	Discover the fascinating world of insects, bugs, butterflies and much more. Meet many different types of creatures and species of all assortments, from rare beetles and giant spiders to brilliant butterflies. Learn all the interesting facts about these tiny bugs and how they contribute to our daily lives and the environment all around us.	
	Robot Competitions	Meet the robots constructed by Kingston's three FIRST Robotics teams: <i>The Cyberfalcons</i> , <i>K-Botics</i> and <i>W.A.F.F.L.E.S.</i> Enjoy the playoffs as the robots engage in the "Recycle Rush": competitions among robots whose task is to stack tote bins and pool noodles.	
	Kingston Police Force Rappel Team	See first-hand why it takes many hours of intense training to reach the level of skill needed to rappel into real world tactical situations.	

SPECIAL THANKS



Lynda Colgan, Coordinator & Kingston *Science Rendezvous* Founder
Kim Garrett, Science Rendezvous Kingston Coordinator

Kyle Clarke, Volunteer Coordinator
Chelsea Elliott, Floor Plan
Adrienne Montgomerie, Social Media & Promotion
Jeffrey Wamboldt, Package Preparation



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



Kevin Eyre
Internal Marketing Manager

John Powers
Presenter



Frank Pitman
Patient and Volunteer Support, CCAC Cancer Coach



Volunteers
Betty Ball Matthew Del Grosso Ashley Hendry
Hugh Langley Carl Levesque
Laurie O'Shea Jeannette Pane



Lyn Carlotto, General Manager
Nick DeLuco, Assistant General Manager
Simon Van Asseldonk, Coordinator Events Services



Rick Mercer, Host of *The Mercer Report*

CBC



Vicky Arnold, Communications Officer, Promotion



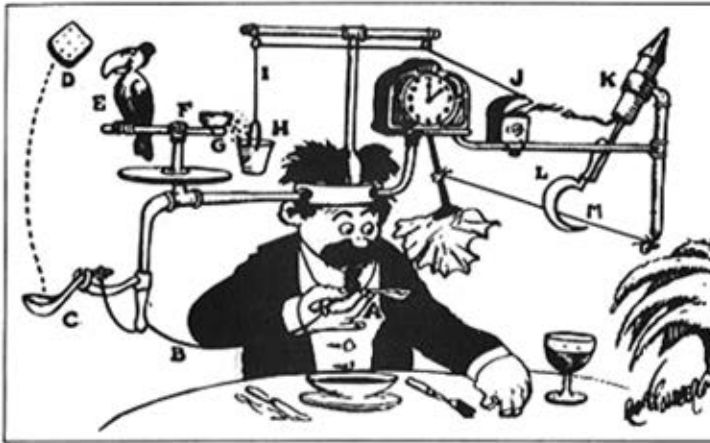
Guillaume Nolet, Event Photographer

Things to do at Science Rendezvous Kingston



Rube Goldberg Machines

Self-Operating Napkin



As you raise a spoon of soup (A) to your mouth, it pulls a string (B), thereby jerking a ladle (C), which throws a cracker (D) past a parrot (E). The parrot jumps after the cracker, and the perch (F) tilts, upsetting seeds (G) into a pail (H). The extra weight in the pail pulls a cord (I), which opens and lights an automatic cigar lighter (J), setting off a sky-rocket (K), which causes a sickle (L) to cut string (M), causing a pendulum with an attached napkin to swing back and forth, wiping off your chin.]

A **Rube Goldberg machine** is a contraption, invention, device or apparatus that is deliberately over-engineered or overdone to perform a very simple task in a very complicated fashion, usually including a chain reaction. The expression is named after American cartoonist and inventor **Rube Goldberg** (1883–1970).

You may have seen examples in cartoons starring *Wily Coyote* and *The Road Runner*.



SET OUR THREE RUBE GOLDBERG MACHINES IN MOTION...

...AND LET THE FUN (Science, Technology and Engineering) BEGIN!

Machines designed and constructed by APPSCI 100 Students in the Faculty of Queen's Engineering & Applied Science, and presented by professional engineers and educators Lise Comartin and Steve Whalley.

The Incredible World Of Bugs



CANADA™

proudly presents



The Incredible World of Bugs®

The John G. Powers Exhibit

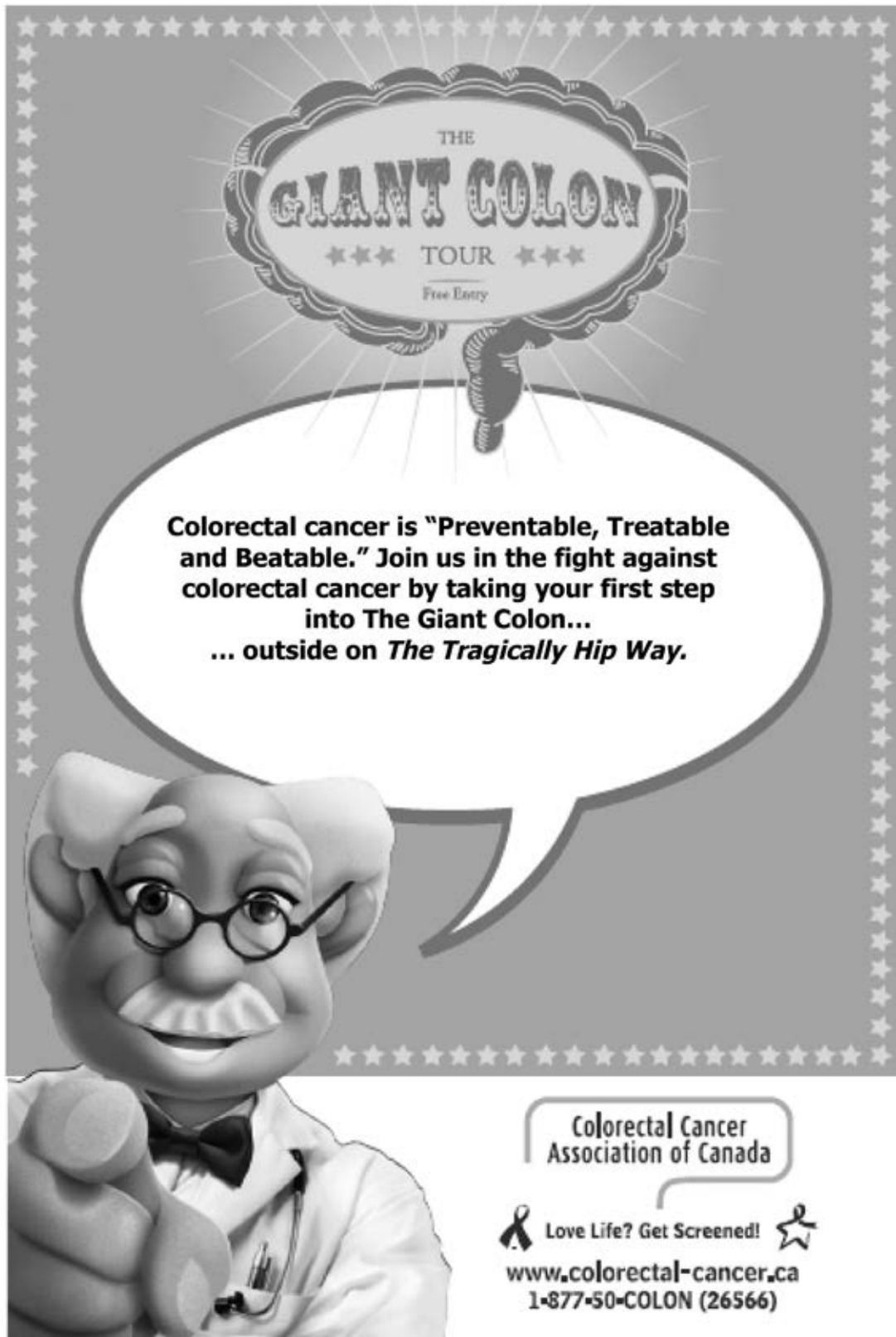
SEE IT! BELIEVE IT!

A spectacular exhibit of hundreds of insects from around the world.

**The rare. The beautiful. The deadly. The unusual...and...
...the GIANTS of the insect world.**

John G. Powers, a native of Cambridge, Ontario, has spent 50 years studying and researching butterflies and insects of the world. During this time he has worked closely with entomologists, research scientists, artists and museum personnel from around the world. His private collection, which consists of thousands of breathtaking specimens, has been shared regularly with the public for over 35 years through travelling exhibits. Orkin Canada is proud to sponsor this incredible exhibit. John has been honoured by being asked to act as a consultant for the International Butterfly Breeders Association. His passion for sharing the world of the butterfly has led him to become a major contributor in the establishment and development of several Butterfly Conservatories, including his own Wings of Paradise® Conservatory/research site and The Naturium® Butterfly Farm and Conservatory in Breslau, Ontario.

The Giant Colon



THE
GIANT COLON
*** TOUR ***
Free Entry






**Colorectal cancer is "Preventable, Treatable and Beatable." Join us in the fight against colorectal cancer by taking your first step into The Giant Colon...
... outside on *The Tragically Hip* Way.**

Colorectal Cancer Association of Canada





Love Life? Get Screened!

www.colorectal-cancer.ca
1-877-50-COLON (26566)

Activities by Queen's University Faculty, Students and Staff

Who we are...	What you'll be doing at our station...	Thanks to...
 <p>http://elbowlakecentre.ca/</p>	<p>The natural world is full of fascinating creatures, waiting to share their amazing stories with you. Sometimes truth is stranger than fiction, and there are aliens among us!</p> 	<p>Carolyn Bonta Manager</p>
  <p>http://www.skhs.queensu.ca/ergbio/</p>	<p>Biomechanics at the Pan/Parapan Am Games: Have you ever wondered what makes elite athletes different from you and me? What do they do differently that allows them to excel in their sport? In biomechanics, we use special equipment that measures an athlete's skills and abilities to determine what makes them great! Come test out your own skills and abilities and see how you stack up. Maybe you could be the next Michael Jordan or Serena Williams!</p>	<p>Tara Diesbourg PhD Candidate</p>
 <p>http://neuroscience.queensu.ca/</p>	<p>Have you ever played a video game that you control with your brain? After you play our special video game, you can learn about the different parts of the brain, and how you sense, think and move. Before you leave, make sure that you find out what little critters (crickets) can teach us about the nervous system.</p>	<p>Dayna Scott Research Assistant</p>

Activities by Queen's University Faculty, Students and Staff

Who we are...	What you'll be doing at our station...	Thanks to...
 <p>http://yourontarioresearch.ca/ http://www.queensu.ca/vpr/home</p>	<p>The Curiosity Shop is a travelling pop-up spot that gives you a chance to ask questions and have them answered by some of the tens of thousands of researchers at Ontario universities. <i>Have you ever wondered why your little sister's hair is curly? or asked yourself where fruit flies come from?</i> Bring your questions and try to stump a scientist.</p>	<p>Melinda Knox Coordinator, Research Activities and Communications</p>
  <p>http://faculty.chem.queensu.ca/grad/OGCS/</p>	<p>Learn about chemistry, the science of matter, through hands-on activities. Visitors will be able to make their own experimental mixtures to explore chemical and physical changes.</p> 	<p>Gillian Mackay PhD Student</p>

Activities by Queen's University Faculty, Students and Staff

Who we are...	What you'll be doing at our station...	Thanks to...
<p data-bbox="175 352 522 562">  Queens Chemistry </p> <p data-bbox="155 588 568 688">  </p> <p data-bbox="120 835 597 903"> http://faculty.chem.queensu.ca/people/faculty/Jessop/ </p>	<p data-bbox="646 352 1234 571"> Dr. Philip Jessop and his team of chemistry magicians will dazzle and amaze you. You'll wonder <i>How did they do that?</i> as you see glowing pickles and Elephant Toothpaste appear before your eyes at The Chemistry Magic Show. </p> 	<p data-bbox="1279 529 1516 730"> Dr. Philip Jessop, Professor and Canada Research Chair in Green Chemistry </p>
<p data-bbox="175 1075 522 1285">  Queens Chemistry </p> <p data-bbox="217 1381 516 1482">  Loock Laser Lab </p> <p data-bbox="120 1591 591 1654"> http://faculty.chem.queensu.ca/people/faculty/loock/ </p>	<p data-bbox="646 991 1247 1167"> What makes laser light special? How is laser light used? What can laser light do? Come and learn about these powerful light sources at our <i>Science Rendezvous Kingston Laserfest!</i> </p>  <p data-bbox="636 1591 1250 1654"> See the 2014 Loock Laser Lab Video at https://www.youtube.com/watch?v=HZW05DEpKvo </p>	<p data-bbox="1286 1297 1510 1369"> Dr. Peter Loock, Professor </p>

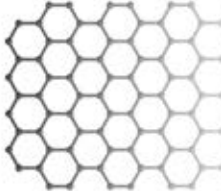


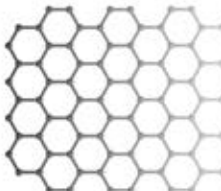


Activities by Queen's University Faculty, Students and Staff

Who we are...	What you'll be doing at our station...	Thanks to...
 <p>http://meds.queensu.ca/education/simulation/</p>	<p>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.</p> 	<p>Kim Garrison, Operations Manager</p>
 <p>http://engineering.queensu.ca/Outreach/</p>	<p>Come and build or modify a device to launch a plastic puck onto a mock curling rink. Will you be the next Brad Gushue or Sandra Schmirler?</p> 	<p>Scott Compeau Outreach Coordinator, EngConnect</p>
 <p>http://geol.queensu.ca/museum/</p>	<p>Did you know that even Canada has a volcano? Although now dormant, the Tseax (Aiyansh) Cone near Terrace, British Columbia last erupted about 250 years ago. Around the world, spectacular and awe-inspiring volcanoes give scientists a glimpse of the forces at work deep within the planet. Come and learn all about the science of volcanoes, how and why they erupt, and what they tell scientists about our world.</p>	<p>Mark Badham Curator</p>

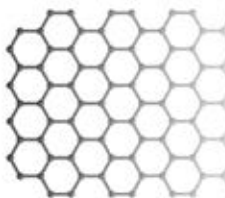


Activities by Queen's University Faculty, Students and Staff

Who we are...	What you'll be doing at our station...	Thanks to...
<p><i>Bringing Canada's healthcare story to life!</i></p>  <p>MUSEUM OF HEALTH CARE AT KINGSTON</p> <p>http://www.museumofhealthcare.ca/</p>	<p>Visit our booth and learn about your brain! The focus of our display will be about understanding the choices we make that affect our brain and, in turn, our overall health, investigating the structure and functions of the brain, and the brain's interaction with the rest of the body.</p>	<p>Ashley Mendes Museum Manager and Program Director</p>
 <p>laboratory for Percutaneous Surgery</p> <p>http://perk.cs.queensu.ca/</p>	<p>Come and see 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.</p>	<p>Vinyas Harish PhD Candidate</p>
 <p>let's talk science inspiring discovery</p> <p>http://outreach.letstalkscience.ca/queensu.html</p>	<p>Do opposites really attract? With the help of Queen's <i>Let's Talk Science</i> volunteers, you can explore the world of electricity and magnetism through hands-on experiments with static electricity, super-strong magnets, and a Tesla coil! Prepare to be shocked!</p>	<p>Sam Yoon and Sean George, Coordinators</p>





Activities by Queen's University Faculty, Students and Staff

Who we are...	What you'll be doing at our station...	Thanks to...
 <p>Department of Physics, Engineering Physics, & Astronomy</p>	<p>Eating delicious ice-cream prepared with liquid nitrogen, yummy bananas, chocolate and strawberries.</p> 	<p>Cara Yin PhD Candidate</p>
 <p>http://www.sno.phy.queensu.ca/group/</p>	<p>We will have two displays: a cloud chamber (which is a particle detector with visible particle tracks) and a demonstration of the Kelvin Water Dropper experiment</p>	<p>Alvine Kamaha PhD Candidate</p>
 <p>Department of Physics, Engineering Physics, & Astronomy</p> <p>http://www.queensu.ca/physics/cmpo</p>	<p>Have you ever wondered how a hologram works? How can a 3D image can be viewed from a 'seemingly' thin (2D) photographic plate? Learn about holography!</p>	<p>Satoko Asahi PhD Candidate</p>
 	<p>Come celebrate the International Year of Light (IYL 2015)! Pick an experiment from the Optics Suitcase developed by the Optical Society of America (OSA) and take instructions home about other experiments to do at home.</p>	




Activities by Queen's University Faculty, Students and Staff

Who we are...	What you'll be doing at our station...	Thanks to...
 <p>Department of Physics, Engineering Physics, & Astronomy</p> <p>http://www.physics.queensu.ca/~jstotz/</p>	<p>Come and make your own graphene. Graphene is one-time million thinner than paper, and it is said to be so strong that "so strong it would take an elephant, balanced on a pencil, to break through a sheet of graphene the thickness of Saran Wrap."</p>	<p>James Stotz Associate Professor</p>
 <p>CHILD and ADOLESCENT DEVELOPMENT Queen's University</p> <p>http://www.queensu.ca/psychology/index.html</p>	<p>What are you thinking? Come and play a game that is only possible by using the frontal lobe of the brain – which is one of the areas that takes the longest to development over childhood and adolescence.</p>	<p>Stanka Fitneva Associate Professor</p>
 <p>https://sciencequest.ca/</p>	<p>Come and do some hands-on experiments in physics, chemistry, biology, technology and robotics and...take instructions home so that you can do much more science in your spare time! Science is happening all around us...and it is exciting!</p>	<p>Alex Gagnon Business Director</p>




Activities by St. Lawrence College Faculty, Students and Staff

Who we are...	What you'll be doing at our station...	Thanks to...
  http://www.stlawrencecollege.ca/	<p>Come and meet "Smartie" - a small, dexterous robot that can pick up individual Smarties candies, identify their colour and sort them accordingly into individual bottles. (CET)</p>	<p>Robert Woudsma Coordinator: Control Engineering Programs</p>
  http://www.stlawrencecollege.ca/	<p>Electric vehicles and charging. A Mitsubishi i-MIEV electric vehicle will be displayed along with a model of a lamppost EV charger. Information poster(s) will highlight Ontario's energy supply mix and especially the large renewable energy component aspect in the Eastern Ontario region. (SEARC)</p>	<p>Gordon McAlary Project Manager: Outdoor Solar Inverter Test Facility (OSITF)</p>
 http://www.stlawrencecollege.ca/	<p>Energy Systems Engineering Technology (ESET)</p> <p>How much power can you produce? Try peddling our recumbent bike and make a light bulb shine!</p>	<p>Dave Athersych</p>



Activities by RMC Faculty, Students and Staff

Who we are...	What you'll be doing at our station...	Thanks to...
 <p>http://www.rmc.ca/aca/phy/rdp/ssr-rss-eng.php</p>	<p>Astronomy and Astrophysics: Local astronomers will answer questions about astronomy and astrophysics. We will provide advice and tools that will assist with observing stars and planets in the night sky. Weather permitting, visitors will be able to observe the sun, sunspots and solar prominences using solar telescopes.</p>	<p>Karen Lee-Waddell Research Assistant</p>
 <p>http://langlois-lab.com/?lang=en</p>	<p>Biology: Visit our 3-D model fish tank to learn how drugs enter the water systems, how they affect fish, and how you can help to protect aquatic ecosystems. Then try to spot the fish/frog/turtle in camouflage activities. Next, learn about turtle, fish, and frog morphology, behavior, and more. Finally, play a trivia frog metamorphosis active game where children will be asked a series of frog-related questions in order to advance to the next stage of frog's metamorphosis.</p>	<p>Valerie Langlois Assistant Professor</p>
 <p>http://zeeb-lab.com/lab-members/</p>	<p>Chemical Engineering: Learn how plants can be used to clean up contaminated sites (phytotechnologies). Everyone will be able to plant their own pumpkin to take home and can learn about the importance of worms as bioindicators.</p>	<p>Barbara Zeeb Professor and Canada Research Chair <i>Biotechnologies & Environment</i></p>

Activities by RMC Faculty, Students and Staff

Who we are...	What you'll be doing at our station...	Thanks to...
 <p>http://www.rmc.ca/aca/cce-cgc/index-eng.php</p>	<p>Chemistry: Chemistry is an exciting science! It helps us learn about many compounds that surround us from toys to paints, plastics and all you can think of. We will explore different concepts of matters and their properties with some exciting hands on activities. Come and boil some liquids in your hands!!! And see special effects (like plumes) as you see chemistry working its magic.</p> <p>Wear some safety glasses and gloves and feel like a real scientist!</p>	<p>Neda Bevarian Chemistry Technologist</p>
 <p>http://www.rmc.ca/aca/cce-cgc/per/scott-jl-eng.php</p>	<p>Chemistry (Inorganic): Learn about <i>environmental remediation</i>...the removal of pollution or contaminants from the soil, groundwater, sediment, or surface water.</p>	<p>Jennifer Scott Assistant Professor</p>
 <p>http://www.rmc.ca/aca/ce-gc/index-eng.php</p>	<p>Civil Engineering: There are three activities for you to do...investigating the effects of loading on bridges; observing how chemicals move through soil; and, creating a landslide or earthquake.</p>	<p>Kristine Mattson Environmental Laboratory Technician</p>




Activities by RMC Faculty, Students and Staff

Who we are...	What you'll be doing at our station...	Thanks to....
 <p>http://www.environmentalciencesgroup.ca/</p> <p>http://www.weberwetlandlab</p>	<p>Environmental Sciences Group: Natural and constructed wetlands can act as a natural filter for removing contaminants from water. At our station, you will see how a constructed wetland can be used to treat acid mine drainage. Many other examples of how wetlands are being used today to remediate water. Our display will include hydroponics and mock wetland with a hands on experiment to showcase real-time the removal of contaminants by wetlands.</p> <p>You can also learn about bioremediation: the use of plant material (phytoremediation) or other organisms to uptake or transform contaminants. See our demonstration of hydroponically grown vegetables to study the uptake of contaminants and a demonstration of mushrooms grown to study transformation of contaminants.</p>	<p>Kela Weber Assistant Professor</p> <p>Dean Morrow Project Leader</p>
 <p>http://www.rmc.ca/aca/cce-cgc/per/ss-ps/nielsen-ks-eng.php</p>	<p>The "SLOWPOKE-2" nuclear reactor at the Royal Military College of Canada (RMCC) became critical in the fall of 1985. The Facility housing the reactor is located in the Department of Chemistry and Chemical Engineering at RMCC. The reactor and associated laboratory equipment are used for the education of undergraduate and postgraduate students, for research and analytical applications, and for training and support of Canadian Armed Forces personnel. Specific capabilities include neutron activation analysis, neutron radioscopy and tomography, gamma spectroscopy, delayed neutron counting and liquid scintillation counting.</p> <p>Staff at RMCC will demonstrate radiation shielding, detection and survey. A model and the use of SLOWPOKE will be presented. A computer game on reactor operation will also be available.</p>	<p>Katherine Neilson Director of Slowpoke Facility</p>

Activities by Community Organizations and Citizen Scientists

Who we are...	What you'll be doing at our station...	Thanks to...
 <p>Community Foundation for Kingston & Area</p> <p>http://www.cfka.org/</p>	<p>Come and learn about The Community Foundation for Kingston & Area: an independent, local charitable organization, founded in 1995. We strengthen our community by connecting charitable giving to community needs. The Foundation encourages individuals and organizations to establish and help grow permanent endowments, which allow us to invest in our community in perpetuity.</p>	<p>Chrystal Wilson</p>
 <p>THE EPILEPSY AND SEIZURE DISORDER RESOURCE CENTRE OF SOUTH EASTERN ONTARIO</p> <p>http://www.epilepsyresource.org/</p>	<p>OUR BRAIN—THE CONTROL CENTRE: <i>Play some hands-on brain games. Learn more about our brain, the "control centre" of our entire body and what happens if its messages get mixed-up.</i></p>	<p>Claire Notman Education Coordinator</p>
 <p>3710 CYBER FALCONS KINGSTON ONTARIO</p> <p>http://www.cyberfalcons.com/</p> <p>http://kbotics.ca/</p> <p>http://wafflesrobotics.com/</p>	 <p>Come and meet the members of Kingston's three <i>FIRST ROBOTICS CANADA</i> teams: FRONTENAC CYBERFALCONS, THE KCVI K-BOTICS, and W.A.F.F.L.E.S. The robots will engage in play-offs throughout the day at the centre of the bowl.</p>	<p>Lydia North Cyberfalcons</p> <p>Kevin Wood K-Botics</p> <p>Christine Bibic W.A.F.F.L.E.S.</p>
 <p>Frontenac, Lennox and Addington Science Fair</p> <p>http://www.flasf.on.ca</p>	<p>Hide and Go Beak: Learn how to create your very own science fair project! Check out real science investigations designed by kid scientists, just like you! Plus, learn about the importance of species diversity and competition through a hands-on, cooperative activity.</p>	<p>Laura Sullivan</p>




Activities by Community Organizations and Citizen Scientists

Who we are...	What you'll be doing at our station...	Thanks to...
 <p>Seeds Grow Food Kingston Area Seed System Initiative</p>  <p>Heirloom Seed Sanctuary Kingston, ON</p> <p>www.providence.ca/seeds/</p> <p>seedsgrowfood.org/</p>	<p><i>Kingston Area Seed System Initiative:</i> Did you know that 90% of our food relies on seeds? How do seeds grow food? Why do plants make seeds? Come pollinate a flower yourself to see how they do it, and take some seeds home to plant! Learn about the Heirloom Seed Sanctuary and its over 300 varieties of vegetables, including approximately 100 varieties of tomatoes! Find out why plants make seeds and why seeds are important to humans.</p>	<p>Cate Henderson Diane Dowling</p>
 <p>The REAL Batman</p>	<p>Planet Earth's second biggest order of mammals - bats - can't help but amaze and astound us. Bats range in size from the world's smallest mammal - weighing in at 1.8 grams - to a bat with a 2 meter wingspan. Bats live in almost every habitat on Earth and they come in an incredible array of colours, shapes and sizes. Ontario is home to 10 different species. Visit the Bat Booth to discover lots about Kingston's bats, where to find them, what to do if you have one in your house and to test your bat knowledge. You can either build a bat house or take home a bat house kit for only \$10. You're sure to find something batty at the bat booth.</p>	<p>Matt Saunders Bat Expert and Head of Science K.C.V.I.</p>

Activities by Community Organizations and Citizen Scientists

 <p>MONARCH BUTTERFLY FUND Conserving the Migration</p> <p>http://www.monarchbutterflyfund.org/node/141</p>	<p>Meet Donald Davis, legendary Monarch Butterfly tagger who has been dedicated to Monarch tagging, research and conservation since 1967. Don is still recognized by the <i>Guinness Book of Records</i> for recording the longest migration by a butterfly.</p>	<p>Donald Davis</p>
 <p>YOUR PUBLIC LIBRARY</p> <p>http://www.kfpl.ca/</p>	<p>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, play a fruit piano and drop by the Lego Build table..</p>	<p>Emma Alls Children's Programming</p>
 <p>https://kpf.ca/</p>	<p>Come and meet Constable Jeff Dickson and his canine partner, Zeus and Constable Mark McCreary with his canine partner, Titan.</p> 	<p>Paul Doak Emergency Response Team</p>
 <p>https://kpf.ca/</p>	<p>Come and see the special equipment and technology used by the Emergency Response Team and meet some members of the team. Look up! You'll be surprised to see who is rappelling from the roof of The Rogers K-ROCK Centre?</p>	


Activities by Community Organizations and Citizen Scientists

Who we are...	What you'll be doing at our station...	Thanks to...
 <p>http://kingstonfieldnaturalists.org/</p>	<p>Grassland Birds...Species at Risk? Discover why Kingston is such an important area for grassland birds and learn what you can do to help them.</p>	<p>Mark Read Leader</p>
 <p>http://www.leahurstcollege.ca/</p>	<p>Leahurst College will be demonstrating static electricity and building small electric motors. Come on over and feel the <i>energy!</i></p>	<p>Elizabeth Turcke, Founder and Head</p>
 <p>http://woodworkingmuseum.ca/</p>	<p>How strong are snakes? Get up close and personal with one of our local snake species – the Black Rat snake. Come by our booth and see one of our resident snakes and test your own grip strength against the power of this little constrictor. Then find out more about this summer's exciting reptilian events at the museum, all part of this year's temporary exhibit which investigates biodiversity with the ROM's travelling exhibit, <i>Hands-on Nature</i>. We will be hosting several local species that are both common and rare!</p>	<p>Tom Riddolls, Curator</p>


Activities by Community Organizations and Citizen Scientists


Who we are...	What you'll be doing at our station...	Thanks to...
 <p>Professional Engineers Ontario Kingston Chapter</p> <p>http://kingston.peo.on.ca/wordpress/</p>	<p>Come and build a newspaper bridge! The goal of the activity is to construct the lightest possible bridge with only newspaper and tape (provided). Your bridge must span 30 cm and must be able to take the weight of the "car."</p>	<p>Nicholas Vlachopoulos, Assistant Professor RMC</p>
<p>Pump House STEAM MUSEUM</p> <p>http://steammuseum.ca/</p>	<p>Discover the Nile! Have fun with our water table and learn all about the Nile River and why floods aren't always a bad thing—especially in Egypt!</p>	<p>Gordon Robinson, Curator</p>
 <p>http://www.peptbo.ca/</p>	<p>Migration Matters! What can migrating birds tell us about the health of our environment? Find out how we get up close and personal with our feathered friends as they migrate through Eastern Ontario each spring and fall. Test your identification skills for some common and not so common visitors and try to guess where they go when they leave us. Learn about Species at Risk and how you can contribute to the conservation of bird populations.</p>	<p>Peter Fuller PEPtBO IBA monitoring coordinator</p>

Volunteer Appreciation















	Thanks to...	Thanks to...
	Chemistry Graduate Student Society Gillian Mackey Lily Huang Katie Flynn Tia Anderlini Lucas Choma Megahan McIlwain Kyle Bachus Nakkiran Arulmozhi Lili Mats Jason Rygus	Chemistry Magic Show Josh Clarke Edi Cieplechowicz Tamara deWinter David Jessop Michael Jessop Michael MacLean Nina Narouz Christine Smith
	Department of Chemistry Loock Laser Lab Nic Andrews Sogol Borjian Sean Chen Jeff Crouse Annica Freytag Amy MacLean Yoany Rodriguez-Garcia Rachel Ross Connor Sanders John Saunders Michaela Thomas	Department of Physics SNOLab Institute Project Alivine Kamaha Ian Lam Yan Liu Caleb Miller Joshua E Bonatt Ted Zhao Satako Asahi
		Department of Physics (Liquid Nitrogen Ice Cream) Allison Sibley
	Department of Physics Optics Jordan Kanko Nishan Mann Sanyasi Bobbara Leila Mazaheri	Department of Physics (Graphene) Edward Muzar Parvin Navaeipour Eric Simpson
	Psychology (Child and Adolescent Development Group) Elizabeth Kelly Kathleen Merwin Mark Sabbagh	Faculty of Engineering and Applied Science (EngConnect) Richard Elliot David Waller Kristian Zanetti
	Biomechanical and Ergonomics Lab (School of Kinesiology) Chris Bailey Pat Costigan Amara Epp-Stobbe Steve Fischer Rebecca Lau Kim Moull Liz Price Peter Sheahan	Office of The Vice-Principal (Research) Kelly Blair-Matuk
		Let's Talk Science Rebecca Kirby Robin Millott Rebecca Radzinski Madeline Tong

Volunteer Appreciation

	Thanks to...	Thanks to...
	Chemistry Sarah Creber Trevor Reid Johanna Whitehead Gordon Wong	Inorganic Chemistry Jaden Rook Kevin Pathinather
	Biology (Zeeb Phytoremediation Lab) Carolina Dehmer Kaitlyn McSorley Amanda Mellon	Environmental Sciences Group Dean Morrow Daniela Looock
	Slowpoke Christy Bruce Paul Chan Mohammed Hussein Tim Nash Dylan Pierce Bob Whitehead	Astronomy and Astrophysics Alexandre David-Uraz Lindsay Holmes Colin Lewis James Sikora
		Langlois Lab Sean Chisnel Tash-Lynn Colson Christina Emerton Barry Madison Stephanie Salvador Sarah Wallace Jing Zhang

	Thanks to...	Thanks to...
	Energy Systems Engineering Technology (ESET) David Athersych	Sustainable Energy Applied Research Centre (SEARC) Cedric Pepelea
	Control Engineering Programs (CET) Jason Murduck	

Volunteer Appreciation

	Thanks to...		Thanks to...			
	Michael Bell		Liz Moss Susan Harrison			
	Mike Bird Rhonda Bird Jori Bird Riley Brennan Carter Garrah Dylan Neves James Spencer Aaron Spindler Brian Rasquinha	 	Kathy Rothermel Sister Alda Brady Annie Richard			
	Alison Dunn Anthony Fragomeni Margi McKay Meredith Westcott		Constable Jeff Dickson Zeus Constable Mark McCreary Titan Constable Chris Gowan Constable Chris Hardy			
	Polly Aiken Janis Grant		Eila Bergeron Hannah Christie Catia Farquharson Brad Pronovost Jen Rees Josh Sequillion Cole Sequillion Ahmed Shalaby Hana Turcke Isla Turke			
	Brad Badham		Kelly Buckholtz Diana Gore			
	Jeff Oke		Melissa Cruise Dana Jones Miranda Riley			
	Michael Allen Sarah Byers Wesley Dossett	Aidan Baksh Ryan Cooper Krysta Peralto	Anica Bibic Mikerah Quintyne-Collins Cole Sequillion	Eden Bibic Josh Sequillion	Goran Bibic Arjun Devnani Ben Tripp	Logan Bibic



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

How habitat loss affects biodiversity

This summer we are all about biodiversity at the MacLachlan! One major factor that affects the health of our biodiversity is the stability of our landscapes. When habitats change plants and animals suffer while new species take hold. In this activity create a model of an evolving landscape and record what species disappear and which ones thrive.

You will create a “pond” that supports life, and then watch as the pond dries up and new species are introduced.

Concept explored:

Examine the factors that affect the survival and equilibrium of populations in an ecosystem

Materials:

- one large jar (the larger the better)
- water
- soil (regular garden soil will work)
- aquatic plant (found in stream or lake)
- mix of seeds (packet of meadow grass, wildflowers, beans)

Procedure:

1. Fill the jar 1/3 full of dirt
2. Fill jar ½ with water and add aquatic plant
3. Place jar on window sill – DO NOT COVER!
4. Record your daily observations as the water slowly evaporates from your pond.
5. As the water level drops start to sprinkle a few seeds in each week.
6. Once the water dries up add a little each day to represent rain fall.
7. After a few weeks stop adding water.
8. Continue to record the changes and the new plants begin to die off.

Things to think about:

Did some species survive the changing environment longer than others?

What change had the greatest impact on the most species?

If this was a real pond – what could you have done to help maintain biodiversity?



TORONTO 2015
Pan Am/Parapan Am

BIOMECHANICS at the 2015 Pan Am Games

#TO2015 #WeArePanAm

WITH THE QUEEN'S BIOMECHANICS AND ERGONOMICS LAB!

Weightlifters use their muscles to lift and lower heavy weights. In our lab, we can see what their muscles are doing using **electromyography!** It measures the electrical activity in your **muscle**, or the **voltage** from your **brain** that tells your muscle what to do!



Rowers use their whole body to push the boat through the water. They push on their feet and the force they produce transfers through to their hands. To measure the **force** that moves the boat, a **load cell** can be used to see how hard the rower is pulling!



When **basketball** players jump high to score a basket, **gravity** pulls them back down to the ground. **Force plates** can measure how hard you **push** against the floor to act against gravity and reach that basket. This force is

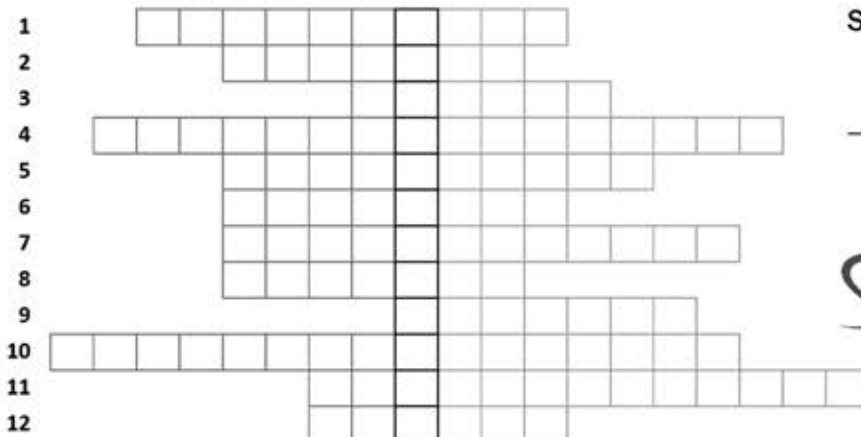
measured in **Newtons**, which is your **body weight** times gravity!

Wheelchair tennis players can move their arms really quickly to hit the ball during a serve. To see how **fast** they move their racquets, we can measure the acceleration of their arms using an **accelerometer**.



ACROSTIC INSTRUCTIONS: Using the clues and **some** of the bolded 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?

- If you shoot, dunk or pass, you play _____.
- The force that is always pulling us down.
- These athletes race on water in singles, pairs or teams.
- Biomechanists use this to measure the activity of muscles.
- This tool measures how hard athletes push off of, or land on the ground.
- This tool measures pulling forces (2 words).
- These athletes raise heavy weights over their heads
- Electrical activity is measured in _____
- Force is measured in _____
- This Parapan Am Games sport uses racquets and a net and is played on outdoor courts (2 words)
- A tool used to measure the speed and direction of something or someone
- _____ makes our body move



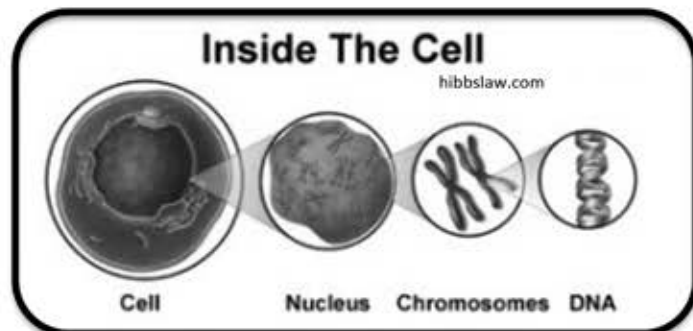
Secret Word:



Using Chemistry to Separate DNA from Strawberries

What is DNA?

If you have ever watched a detective show, you know that DNA makes everyone unique! DNA molecules are made of two long chains connected in a spiral and held in the nucleus at the centre of the cell. DNA contains all the coded instructions for the cell to work, all neatly packed as chromosomes.



Why separate strawberry DNA?

So why are we using strawberries for this experiment? Strawberries are easy to squish, which is important since we need to mush the fruit to extract the DNA. They also contain more DNA than any other type of fruit as they are octoploid, meaning they have 8 copies of each chromosome. In comparison, humans are diploids, meaning we only have 2 copies!

How does chemistry help us separate DNA?

A layer called the cell membrane protects the outside of each cell. This layer is made of phospholipids, which are molecules with two different ends: one that is like an oil molecule and one that is like a water molecule.

In chemistry, there is a saying that "like dissolves like" so we need something that has the same construction as a phospholipid to break up the membrane. Luckily for us, we have a very similar chemical at home: dish soap! If we mix a few drops of soap with cells, we should be able to break apart the cell membrane(s), allowing us to release the DNA.

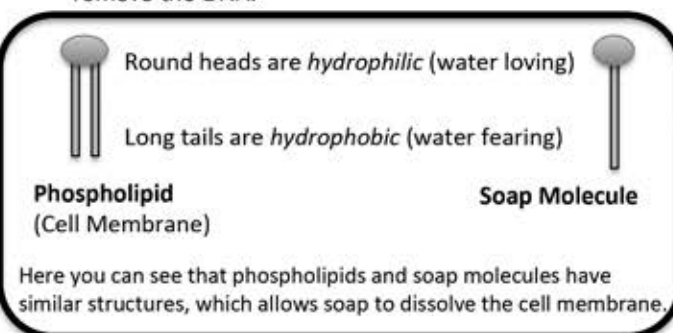
In order to see our DNA strands, we need them to precipitate, which means "stop being dissolved." To do this, we want to use a liquid that the DNA doesn't like to swim in very much. Isopropyl alcohol (rubbing alcohol) is perfect for this because it does not dissolve DNA well.

Materials

- 4 Strawberries
- 1 teaspoon of isopropyl alcohol (rubbing alcohol)
- 2 teaspoons of dish soap
- ¼ teaspoon of salt
- Large Ziploc bag
- Sieve (or coffee filter)
- Measuring cups and spoons
- Water (90mL)
- Clean glass containers
- Tweezers or toothpick
- Spoon

Method

1. Place a bottle of rubbing alcohol in the freezer. You can measure out what you need later since alcohol won't freeze at that temperature.
2. Measure 90mL of water into a glass container, add 2 teaspoons of dish soap, and add ¼ teaspoon of salt. Mix it up and you've got a DNA extraction solution!
3. Place strawberries into the Ziploc bag.
4. Pour some of your extraction solution into the bag, remove as much air from the bag as possible and seal it (make sure there aren't any leaks!).
5. Now mush up your strawberries until they form slush.
6. Pour your strawberry slush through a sieve or the coffee filter and into another glass container. You want to remove all the pulp.
7. Use a spoon to press the pulp against the sieve to push out more solution.
8. Carefully pour 1 teaspoon of chilled isopropyl alcohol on top of the strawberry solution. Do not move the solution and white strands will appear on top of the strawberry solution. These white strands are your DNA!
9. Using a toothpick or tweezers, carefully twirl and remove the DNA.



Rubber Bones Experiment

Purpose

To demonstrate the importance of calcium for maintaining strong bones.

Additional information

Calcium, as many of your parents or teachers may have told you, is vital for maintaining healthy and strong bones. Weighing in at number 20 on the atomic scale, Calcium (or Ca for those who prefer our element symbols), is the lightest of alkaline metals with a density of only 1.55 g/cm. This soft gray earth metal is the 5th most abundant in the human body, not surprising since it's a vital structural element of healthy bones. Drink your milk and keep those bones strong!

Required materials

- Large empty jar with a lid
- Several chicken bones, preferably a leg bone or drumstick
- Vinegar

Estimated Experiment Time

Only about 10 minutes to set-up and several days (3 to 5) for the bone(s) to become rubbery.

Step-By-Step Procedure

1. Make sure your bones for this experiment are thoroughly cleansed, with any meat removed from the bones. Try washing the bones with warm water mixed with a little salt.
2. Take a bone and try bending it before placing it in the jar. Notice how hard the bone is before it's placed in the jar.
3. Place the bones in the jar.
4. Fill the jar with vinegar, just enough so that it completely submerges the bones.
5. Place the lid on the jar and secure tightly.
6. Leave the bones to soak in the jar for at least 3 to 5 days.
7. After several days have passed, open the jar and drain the vinegar. Remove the bones from the jar and rinse under water for a few seconds.
8. Try bending the bones now and compare it to when you tried bending the bones in the beginning of the experiment.

Note

Both red wine vinegar and white vinegar will work, but you may want to stick with the white to avoid any chance of staining your clothes or anything around you.

Observation

Why do you think the bone is hard before you place it in the jar? What mineral makes the bone that way? What happens if that mineral that makes the bone hard is extracted? What will happen to the bone? What could you use instead of vinegar to get the same effect? What if you used a bone from a different animal? Try it with a left over pork or beef rib.

Result

The vinegar in the jar, which is a mild acid, breaks down the calcium in the chicken bones. When the calcium dissolves, there is nothing left to keep the bone hard. The soft tissue of the bone is all that remains, which is why it takes on a rubbery nature.

EngQconnect

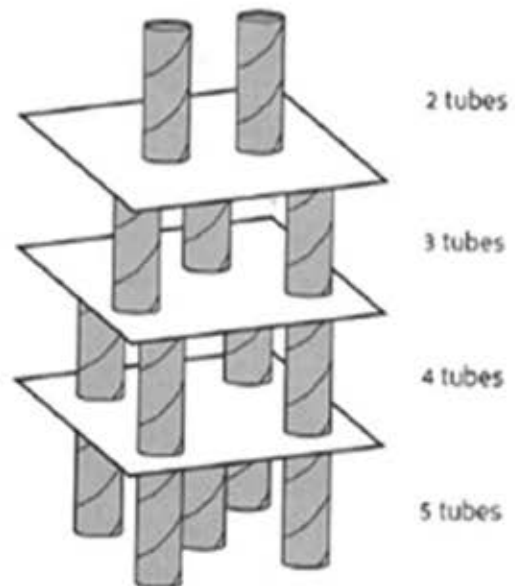
EngQconnect is Queen's Faculty of Applied Science and Engineering Educational Outreach Program that provides Queen's Engineering students with the opportunity to raise awareness of Engineering as a career choice among kids, youth, teachers and the community. For more information about the program, please visit www.appsci.queensu.ca/Outreach

Tumbling Towers Activity:

How do engineers prevent tall buildings from falling?

Activity Steps:

1. Use 14 empty toilet paper tubes of the same length and 3 cardboard squares (1ft by 1ft) to build this tower.
2. Following the rules below, take turns removing one tube at a time from the tower without letting the 3 cardboard platforms fall.
 - i. You may use both hands
 - ii. You may touch the cardboard platforms only when removing or moving a tube
 - iii. You may change the position of the remaining tubes



What steps did you take to keep the tower from tumbling?

Why did the tower eventually fall?

Engineering Connection

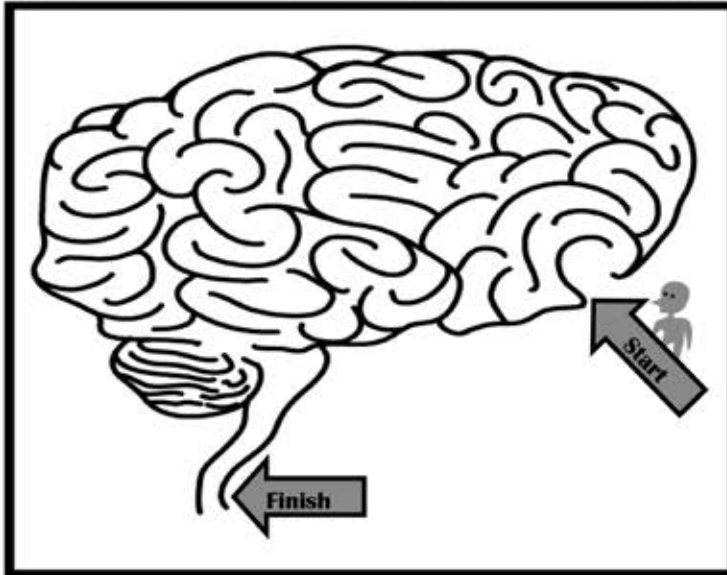
Engineers often test a structure's strength until it fails and then try to figure out why that failure happened. The weight a structure supports is called its load. In order for a structure to be stable, the load must be balanced. If a structure is changed, the load may need to be rebalanced to maintain stability.



* This activity was adapted from the 3-2-1 Contact teacher's Guide, Season II, 1983 Sesame Workshop *



Help the nerve cells in the brain find a path to send messages to other parts of the body.



Your brain is made up of tiny nerve cells (neurons). These cells send message to each other and to other parts of your body. Nerve cells in different areas of the brain control different parts of the body.

Your brain sends the message for your foot to kick the ball when you are playing soccer, for your hand to go up when you want to answer a question at school, and for you to smile when you meet a friend.

If you have epilepsy, the nerve cells sometimes become too active and they send mixed-up messages that you don't want. When this happens, you have a seizure.

Having a seizure is a bit like getting confused in a maze. Once in a while, the nerves cells in your brain become a bit confused or too active for a brief moment and send the wrong message to the other parts of your body.

True or False

There are many myths about epilepsy.

Which of these statements are true and which are false?

Put a T or an F in each balloon.

Check your answers at the bottom of the page.

A. People with epilepsy look like everyone else.

C. People with epilepsy shouldn't play sports.

F. When someone is having a seizure their brain is sending mixed-up messages.

B. People with epilepsy aren't very smart.

D. All people with epilepsy should avoid flashing lights.

E. Epilepsy is contagious. You can catch it.

A. True B. False C. False D. False (Only 5% of those with epilepsy) E. False F. True



Missing!

Have you seen these Grassland Birds?



Grassland birds are under threat, mainly due to loss of suitable habitat. Next time you are out at a local grassland such as Lemoine Point Conservation Area, or perhaps even Wolfe or Amherst Island, try looking for these two grassland species.



The **Bobolink** is now classified as 'threatened' under Ontario's Endangered Species Act (ESA). The Kingston area is one of the best places in Ontario to still see them. Watch for the males launching from tall grasses to sing their bubbling song. Females are harder to see as they are brown with black streaks.

Main Threats: Loss of suitable habitat (hay fields) and the cutting of hay before the young have left the nest. Bobolinks are useful as they eat insect pests.

The **Eastern Meadowlark** is also classified as 'threatened' in Ontario. It can often be seen perched on top of small isolated shrubs and posts, though it is often more shy than the Bobolink. The males and females look alike, both having bright yellow throats and chests with a black necklace.



Main Threats: The loss of suitable habitat due to changing farming practices, the use of pesticides, and predation by small animals. They have declined by 65%.

Keep a Checklist!

A good idea when you are out is to keep a checklist of all the wildlife you see. Use the following list to also help you solve the word search. Hint: the bird names are split, so Northern Harrier is 2 words!

Species	Location	Date
Northern Harrier		
Short-eared Owl		
American Kestrel		
Eastern Kingbird		
Loggerhead Shrike		
Barn Swallow		
Vesper Sparrow		
Savannah Sparrow		
Grasshopper Sparrow		
Henslow's Sparrow		
Bobolink		
Eastern Meadowlark		

D E R A E T R O H S B T A A E
 O V N J R N A C I R E M A P G
 W N D W A W P G L G E B V H R
 L Y A O J A P S B E O P U M R
 L D E R G B Q T Q B R L B E D
 Y R H R H A R R I E R T P G N
 S I R A W Z N N P B H S S N R
 W B E P S R Q P O E E N P E O
 A G G S A Z O B N V H C L K K
 L N G B Y H O S A V A N N A H
 L I O P S L L E A S T E R N B
 O K L S I O M P D X Q Q L B H
 W W A N W N R E H T R O N N F
 O R K S R S H R I K E J J G J
 G B T M E A D O W L A R K L E

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Word search created using <http://www.theteacherscorner.net/>



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!



For the Birds!

Introduction: Birdfeeders attract many interesting species around our community! This experiment will allow you to study the behavior of these visitors over time. You will be able to change the abundance and richness of animals in your backyard!

Question: Does the abundance of animals using the birdfeeder change with location, time of day, height or type of birdseed?

Materials: egg carton, scissors, yarn, hole-punch, birdseed, observation chart, ruler

Methods:

1. Construct a simple bird feeder by carefully cutting off the top of a recycled egg carton. Punch a hole in each corner and attach yarn for hanging.
2. Identify the location, height and birdseed type that you want to test for your first trial.
3. Make observations daily and record results.
4. Make changes to your criteria and observe what happens.

Create Your Own Science Fair Project- It's Easy!

- 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?
- Methods** 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 your results mean? Was your hypothesis proven or not proven?



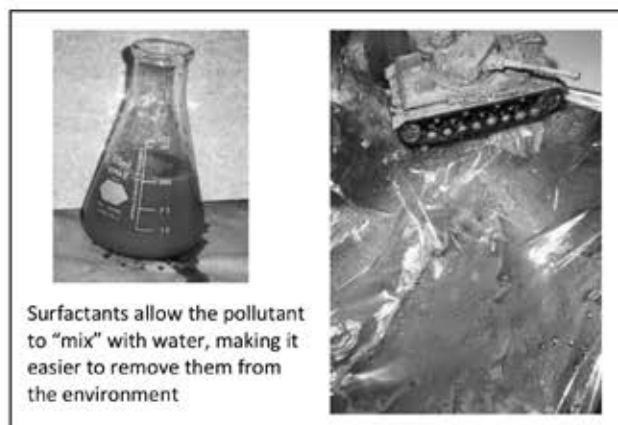
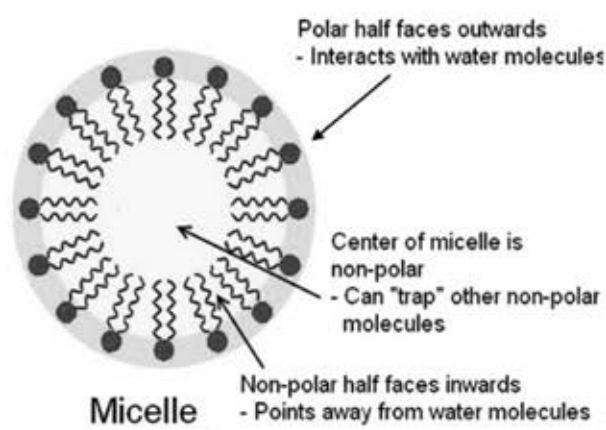
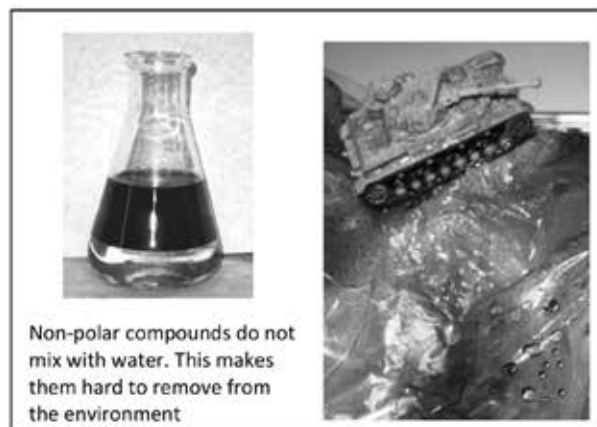
Visit www.flasf.on.ca for more information on experiments, our regional science fair and more!

Cleaning up the Environment using Chemistry!

Environmental remediation is the process by which pollutants and contaminants such as oil, pesticides and industrial wastes are removed from the environment.

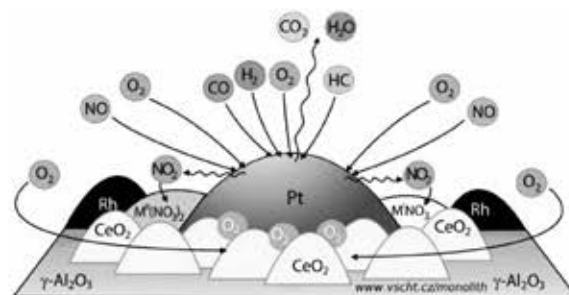
Unfortunately, many pollutants and contaminants such as Agent Orange (chemical warfare agent) and DDT (pesticide) are non-polar. This means that they cannot mix with water, making it hard for them to wash away.

Surfactants can be used to help remove pollutants from the environment. Surfactant molecules form micelles (shown below), which can "trap" non-polar pollutants inside. The entire micelle (including the pollutant) can be washed away with water.



Did you know: you probably use surfactants at home every day! Dish soap and laundry detergent are examples of surfactants. This allows them to dissolve and remove grease and dirt from your dishes and clothes!

Another way to remove contaminants from the environment is to use oxidizing agents and catalysts to help break down the pollutants into less harmful compounds. Catalysts can also be found in your car, where they remove harmful pollutants from the exhaust gas.



This module brought to you by the Queens University Faculty of Education and the Royal Military College Dept. of Chemistry and Chemical Engineering.

Special thanks to Dr. Jennifer Scott and Dr. Kela Weber (RMC) for their individual support

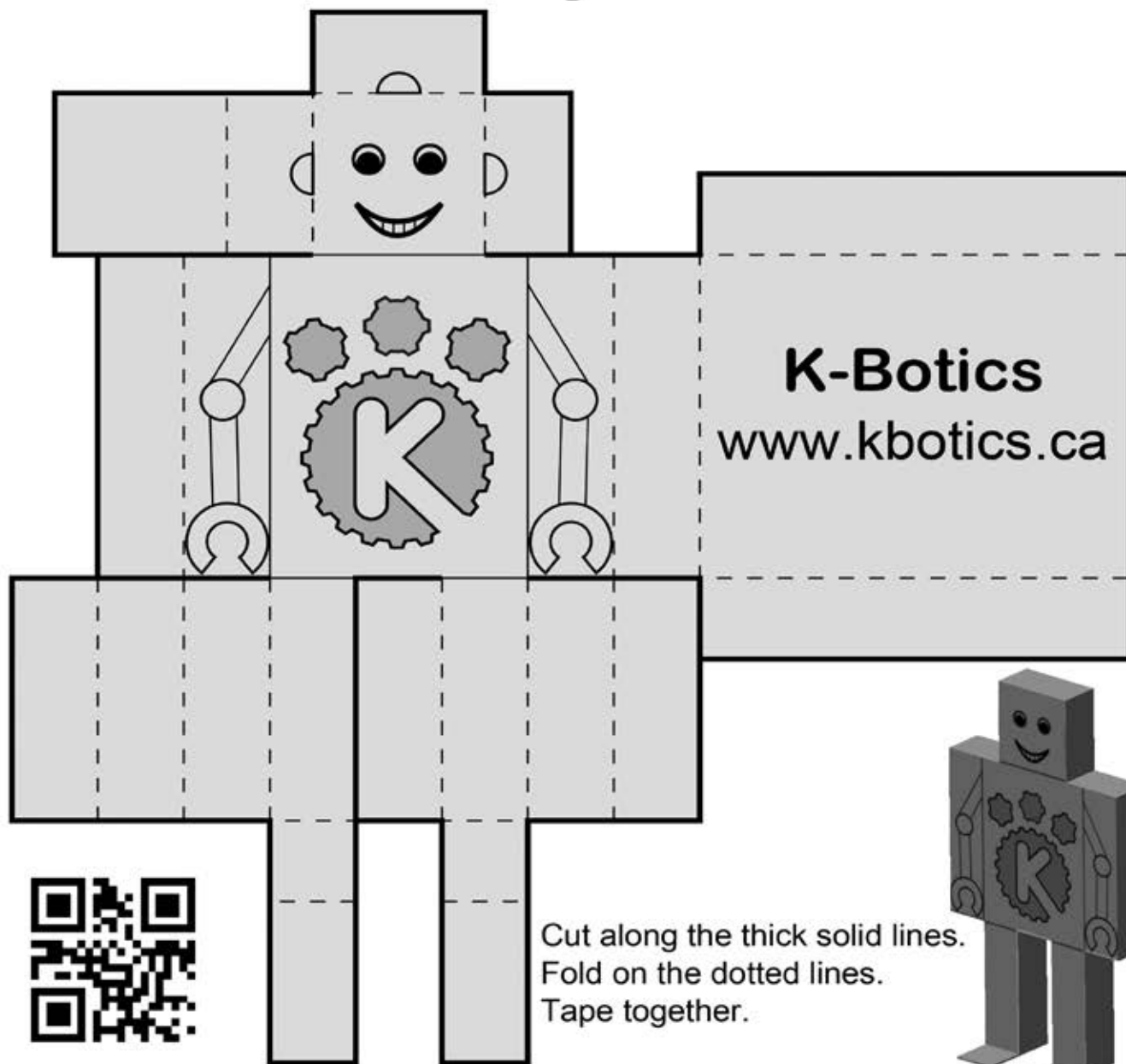




K.C.V.I. Robotics



Make Kasey the Robot!



Cut along the thick solid lines.
Fold on the dotted lines.
Tape together.

Full STEAM Ahead

with the Kingston Frontenac Public Library

The Kingston Frontenac Public Library (KFPL) has tons of fabulous science books, from totally gross to interestingly cool. But did you know you can access a range of databases (great for homework!) from home using your KFPL Library card? Join us on this online scavenger hunt for your chance to win a prize!

To begin, visit www.kfpl.ca and click the 'Kids' page. On the right hand side, click 'Homework Help' to select the database, 'PebbleGo'. To complete the questions, click 'Earth and Space'. Hints are italicized.

1	What is the name of the scale used to measure <i>earthquakes</i> ?	2	What is the definition of a <i>hot weather</i> heat wave?
3	What color of <i>stars</i> are the warmest?	4	What was the date of the <i>first moon landing</i> ?
5			In the <i>Spring</i> , how many flowers does a bee visit each time it leaves the hive?

Email your answers by **May 23** to bpeters@kfpl.ca for your chance to win a book gift set. Winner will be randomly drawn from all entries.

For more science based suggested reads, visit our Pinterest page @<http://www.pinterest.com/kfpl/science-rendezvous/>

3D Printing 101



Drop in at any time over the course of this informal two-hour session. Get a general overview of 3D printing, be introduced to tools that will help you design your own objects, check out some examples and see an object being printed. All ages. Drop in.

Monday, May 25 at 5:30 p.m. @ Isabel Turner Branch

Each 3D Printing 101 Info Drop-In session is designed to introduce you to some of the concepts and technologies associated with three-dimensional printing. You must have a valid library membership with Internet permission in order to use the computers in these sessions.



Materials Needed:

- Clear plastic bottle
- Flashlight
- Laser pointer (Less than \$10 in many stores)
- Large nail

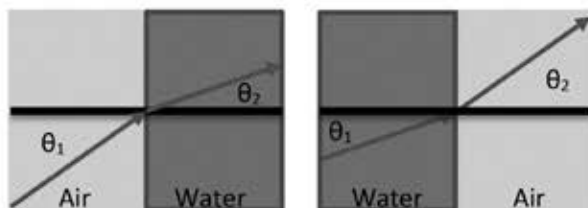
Caution: This experiment requires the use of lasers, lasers should be used with the assistance of a parent and never shone at anyone, especially in the eye.

Refraction and Reflection:

Have you ever noticed that a water surface sometimes looks like a mirror (for example at sunset) while other times you can see through to the bottom (a bathtub)? When light travels through solid objects, it travels much slower than it does in a vacuum. The ratio of these two speeds is known as refractive index, n .

$$n = \frac{c_{object}}{c_{air}}$$

When light moves from water (high n) into air (low n) it will bend, or refract.



The change in angle is described by Snell's law.

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

At very large angles instead of bending the light, light is reflected almost entirely, by a process known as total internal reflection. This is the reason why objects under water can become invisible and you only see the reflection from the water surface.



Experiment 1 – Refraction of Light

To see the refraction of light, first fill a glass with water and place a pen or pencil into the glass. What do you observe?

The pen appears to be broken where it enters the water. This is because the light that comes from below the water surface is bent ("refracted").

Experiment 2 – Total Internal Reflection:



For the next experiment, half fill a clear plastic bottle with water. Now, shine a laser pointer at the water surface from below at different angles. At steep angles you should see the laser beam refracted into the air but at "glancing" angles, the light is entirely

reflected by the water. You can even try to measure the minimum angle at which all the light is reflected. This is known as the "critical angle".

Experiment 3 – Fountain of Light:

With the help of a parent, use a nail to punch a 3-5 mm wide hole about 5 cm from the bottom of the plastic bottle. If you are able to heat the nail in a flame (a parent's job!) you can melt the plastic and make a smoother hole. Place the bottle in a large basin or sink. Cover the hole with tape or your finger and fill the bottle with water. Add a few drops of milk to help scatter the light. From the side opposite the hole, shine the laser pointer at the hole. When you remove your finger, the light should follow the path of the water out of the bottle. This may be a little messy. Don't blame us if you or a parent gets wet...!

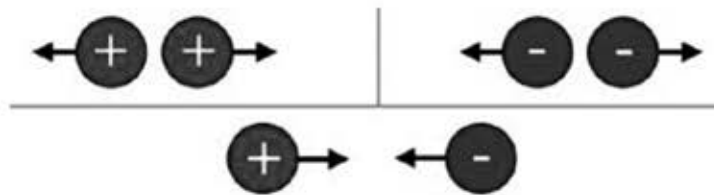
Make sure to visit our laser booth at Science Rendezvous 2015!



Let's Talk Science – Static Electricity Take-Home Activity

Levitating Orbs

When an object gains a static charge, it is attracted to objects with the opposite charge, and repelled by objects with the same charge:



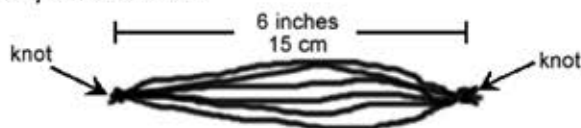
Let's take a look at how we can use the repulsion between static charges to levitate an object!

Materials

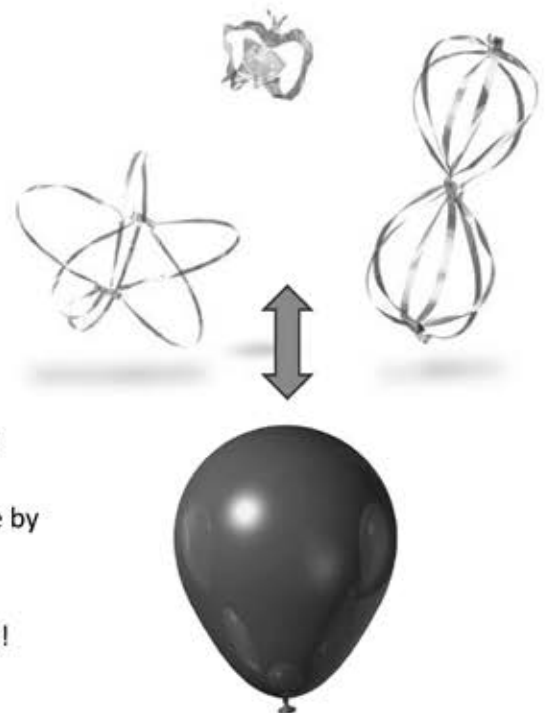
- 6 Strands of tinsel (Free at the Let's Talk Science booth!)
- Balloon
- Scissors

Step-by-step Procedure

1. Gather the strands of tinsel together and tie a knot in each end
2. Cut off any excess tinsel



3. Blow up the balloon, and charge it by rubbing on your hair
4. Drop the tinsel on the balloon. It should touch the balloon and fly back into the air!
 - If the tinsel sticks to the balloon, charge the balloon more by rubbing on your head
5. Keep practicing!! Eventually you will be a levitation expert!
6. Once you've mastered the orb, explore different sizes and shapes!



Static Electricity – It's Shocking!

EXPLORING THE WORLD OF NEUROSCIENCE

What is a Neuron?

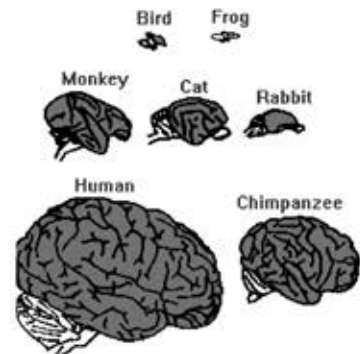
The cells in the nervous system are called neurons. Neurons communicate through sending electrochemical signals. The brain is made up of approximately 100 billion neurons!



How big is my brain?

The adult human brain weighs between 1300 g and 1400 g (approximately 3 lbs). For comparison:

- Elephant brain = 6,000 g
- Chimpanzee brain = 420 g
- Rhesus monkey brain = 95 g
- Beagle dog brain = 72 g
- Cat brain = 30 g
- Rat brain = 2 g

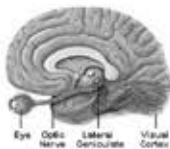


How do you become a Neuroscientist?

1. First, you have to finish high school.
2. Second, you get a university degree in the sciences.
3. Third, you go to graduate school for a PhD.

Then you are a bona-fide neuroscience researcher!

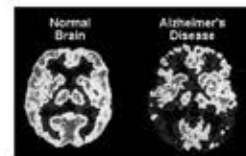
What do neuroscientists study?



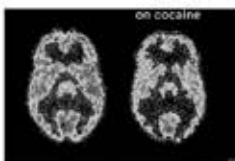
The Senses



Genes



Diseases/Injury



Drugs and Medicine



Cognition and Behaviour



YOU DECIDE!

The following has been adapted from the Optics Suitcase booklet. You should have been provided with either of the two packages labelled *Rainbow Peephole* and *Magic Stripes*.

Rainbow Peephole: Colour by Redirecting (Diffraction)

- Remove the flashlight and the peephole from your packet. Hold the peephole up and look at the flashlight through it (CAUTION: Never look through the peephole directly at the sun!).
- Ask yourself, “Where does the colour come from?” (Many children will answer that the colours comes from the peephole. In fact, the colour comes from the white light in the flashlight.)
- You can ask yourself some or all of the following questions:
 - Do you see a regular pattern? Describe it.
 - Identify all of the colours. Are they the same in each spot?
 - Does the pattern change if the flashlight is close or far away?
 - Do you see colours from the room lights?
- Hold up the packet and look at the included picture. This is a highly magnified photograph of the surface of one side of the clear plastic in the peephole. It is taken with an instrument called an atomic force microscope. (Optical engineers develop instruments like this.)
- Note that the scale is in microns, that a human hair is 30 to 80 microns wide, and that the plastic has a regular array of small bumps across it that are only 2 microns high—too small to be seen or felt.
- The bumps are packed so closely together that about fifty could fit inside a human hair. These bumps are responsible for breaking up the light coming into the peephole, depending on its colour. This is called “diffraction.” It occurs when light travels through small apertures (e.g., holes or slits). Notice the similarity between the regular array of bumps in the picture and the pattern seen through the peephole.
- These days, almost everyone has a cell phone. Telecommunications uses fibres and lasers to divide light from one beam into many, each with a different colour much in the same way you have just done. This is the key to unlimited numbers of conversations and text messages all over the world at the same time. (Optical engineers do this stuff.)

Magic Stripes: Colour by Polarized Transmission (Polariscope)

Additional Materials Required: Slinky, Cellphone flashlight.

The part with the slinky requires two people.

- Give the other person one end of the slinky and ask her (him) to hold this end steady at midchest level. Stand 4 feet away and begin to vibrate your end up and down and in a circle.
- In addition to colour, light has a wave nature. The slinky represents a light wave. This motion represents unpolarized light - light without a preferred vibration direction.
- Stop the circular motion and vibrate only vertically (up and down).
- Now the light is “polarized” when it vibrates in one direction—vertical or (switch hand motion) horizontal. Linearly polarized light is light whose vibration direction is in a plane. Put the slinky away.
- Now remove everything from the packet and place the 5 items on your workspace. Please check that you have two dark pieces of plastic, one transparent piece of plastic with writing on it, a fork, and a plastic vial.
- Take your two pieces of dark plastic (called a *polarizer*) and hold them up, one in each hand. Combine them about one foot in front of your face such that you can see through both polarizers. Now rotate one polarizer relative to the other and observe the behaviour. You should find that for certain rotations, the light is almost completely blocked and you cannot see through the polarizers anymore.
- Each polarizer piece of dark plastic has a secret code on its surface in the form of small lines. Combining the two plastics so that the lines are parallel makes it possible to see through them. Combining them with lines that are perpendicular, or “crossed,” blocks the light. These plastics are called *linear* polarizers. One piece of plastic held up to the room lights causes the unpolarized white light to become linearly polarized. Once the light is linearly polarized, it vibrates in one plane, and it is either transmitted or absorbed by the second plastic polarizer. Polarized sunglasses are made of this plastic.
- Now turn on your cellphone flashlight and place one polarizer on top. With the other polarizer in your hand, rotate it until the light coming from the flashlight is dimmed. The polarizers are now crossed and congratulations, you have just made yourself a *polariscope*. With your other hand, take the plastic piece with writing on it (“Yipes! Stripes!”) and bring it in between the two polarizers. Now rotate it and you should see coloured stripes appear and disappear. Repeat this step with the other two pieces of plastic. Where do you think the colour comes from?
- The stresses inside transparent materials degrade the quality of linearly polarized light coming through the polariscope, causing various colours to show up. With a polariscope, geologists identify certain crystals and mineral structures. Civil engineers examine stresses inside structures made out of transparent plastic to understand how to build them better. Photonics technicians evaluate the quality of laser glasses and laser crystals with polariscopes.



What is Cloud Chamber?

Cloud chambers are an early form of particle detectors, originally designed in 1911. The cloud chamber consists of a sealed chamber filled with water or alcohol vapour, with just a little less than is needed to cause condensation. When a charged particle, such as an electron, passes through the chamber it passes some charge to the surrounding vapour and allows the vapour to condense. This results in a trail of mist through the chamber similar to the jet stream a plane leaves behind. Different particles can be identified by the size and length of the mist trail they leave.

Materials: vapour source (any alcohol will work), container, absorbent material, dry ice, black base for container, light source, styrofoam **!! Dry ice should be handled very carefully. It can burn unprotected skin !!**

Instructions

- 1) Prepare the base by filling it with dry ice. Having styrofoam beneath the base will allow for extended viewing.
- 2) Insert what you are using to absorb the alcohol into the viewing container. Soak it thoroughly with alcohol.
- 3) Put the two pieces together, sealing as you can and place it in dark room.
- 4) Shine your light through the side of the container, adjusting to get the best view.
- 5) Wait and be patient, allowing for the alcohol to saturate the container's air.
- 6) Enjoy watching cloud contrails in the container!

Reference/Useful Links <https://www.youtube.com/watch?v=400xfGmSlqQ>

<http://www.fromquarkstoquasars.com/make-a-cosmic-ray-detector-at-home-and-test-relativity/>

※ | <http://www.nrc.gov/reading-rm/basic-ref/teachers/unit.1.html>

The SLOWPOKE-2 Facility at the Royal Military College of Canada (RMCC)

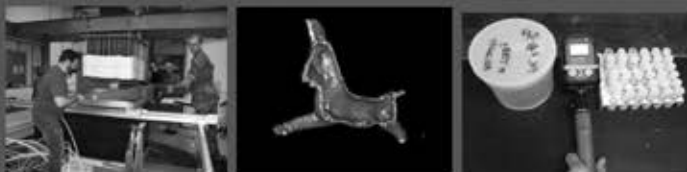


The "SLOWPOKE-2" nuclear reactor at RMCC became critical in the fall of 1985. The Facility housing the reactor is located in the Department of Chemistry and Chemical Engineering at RMCC. The Facility is owned by the Crown and falls under the responsibilities of the Minister of National Defence. The reactor and associated laboratory equipment are used for the education of undergraduate and postgraduate students, for research and analytical applications, and for training and support of Canadian Armed Forces personnel. Specific capabilities include neutron activation analysis, neutron radioscopy and tomography, gamma spectroscopy, delayed neutron counting and liquid scintillation counting.



General Information

The SLOWPOKE-2 nuclear reactor was the first reactor of its kind with fuel elements based on 19.89%-enriched UO_2 pellets. It is estimated that this fuel will permit the operation of the reactor until 2020 before refueling is necessary. The SLOWPOKE research reactor is one of the very smallest operating reactors. For the past 26 years the reactor has been running on the original one kilogram of fuel. The reactor facility is equipped with a neutron radioscopy system based on an in-house designed neutron beam tube. This system is used for the periodic non-destructive examination of military aircraft components and ancient artifacts. Sample irradiations are done both inside the reactor container close to the reactor core and in the pool. Larger samples can be accommodated in the open pool. The SLOWPOKE-2 Facility has many kinds of detectors that measure different types of radiation for the purposes of research and also for ensuring worker safety.



Common Radiation Doses

Source	Dose μSv
Eating one banana	0.1
One dental x-ray	5
Normal <u>daily</u> background dose in North America	11
One Airplane flight from New York to LA	40
Living in a brick, stone or concrete building for one <u>year</u>	70
Normal <u>yearly</u> background dose in North America	4000
One Chest CT scan	7000

Do you have these at your house?



Brazil Nuts

Potassium 40 and Radium 226



Bananas

Potassium 40



Garden Soil

Natural Radiation and Cesium 137 from man-made sources



Smoke Detector

Americium 241



Granite Counter Tops

Natural Uranium

Contact Information

The SLOWPOKE-2 Facility at the Royal Military College of Canada

Who to contact: Kathy Nielsen,
SLOWPOKE-2 Director

613-541-6000 ext. 6385

©2012 The SLOWPOKE-2 Facility at RMCC

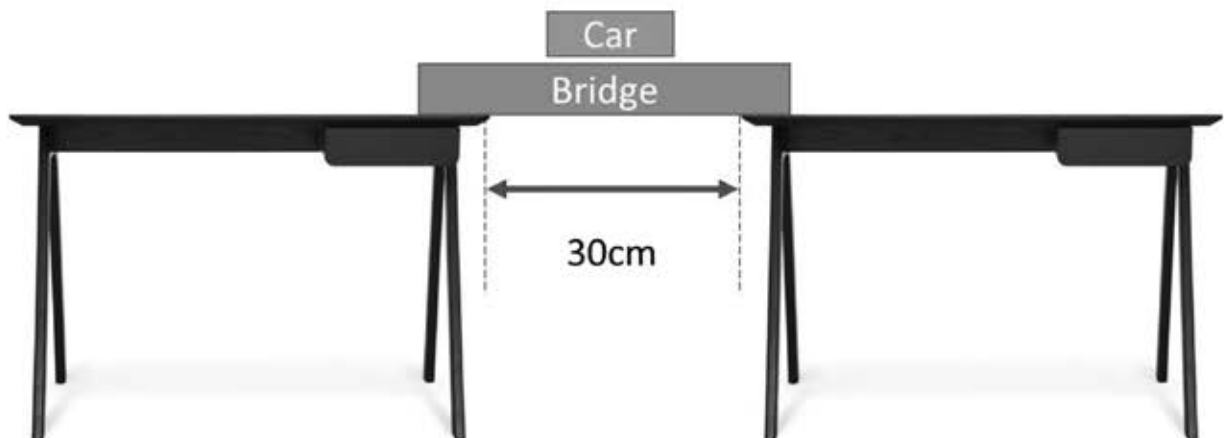
PEO Newspaper Bridge

Professional Engineers Ontario (PEO), Kingston Branch

The goal of the activity is to construct the lightest possible bridge with only newspaper and tape (provided). This is a hands-on activity in order to get students engaged and thinking of the aspects that may allow them to create the lightest structure that does not break. The bridge must span 30cm and must be able to take the weight of the "car".

Testing the launch pads:

1. The bridge will be weighed
2. The bridge will be placed on two desks that are spaced 30cm apart
3. The "car" will be placed on top of the bridge
4. The bridge must be able to hold the "car" for 10 secs.



How light were you able to make your bridge?



PRINCE EDWARD POINT BIRD OBSERVATORY

7 WAYS YOU CAN HELP CONSERVE BIRDS

- 1. Put a leash on!** Unleashed dogs and outdoor cats can harm birds by disturbing, chasing, and even killing them.
- 2. Leave Fledglings Where You Find Them!** Young fledglings may spend several days on the ground before they are able to fly. You can help by keeping people and pets away.
- 3. Clean Your Bird Feeders!** Dirty feeders can spread disease. Disinfect and clean out old seed from feeders frequently and put fresh water in your bird bath every few days.
- 4. Buy Bird Friendly Products!** You can help preserve bird habitat in Mexico, Central and South America by buying shade-grown coffee and chocolate. Coffee grown in shade farms imitate native forests and have many more bird species than sun coffee farms.
- 5. Be a Citizen Scientist!** Many projects need helpers to gather data on birds and their habitat. Contact PEPTBO or your local Field Naturalist club.
- 6. Plant Native!** Native plants provide food, nest sites, and cover for birds.
- 7. Keep Your Distance!** Birds need space for feeding, nesting, and other daily activities. Approaching too closely may cause them to become nervous and deplete much-needed energy reserves. During the nesting season, it may even result in loss of eggs or young to predators.



SPRING BIRDING FESTIVAL

MAY 16 – 24, 2015

Guided walks, Workshops, Special Events

COME VISIT US!

We're located at the south-eastern tip of Prince Edward County, about 20 minutes southeast of Picton, Ontario in a National Wildlife Area

- Spring migration banding (Apr 16-May 30)
- Fall migration banding (Aug. 15 to Oct. 31)

**HAVE FUN IDENTIFYING BIRDS and
THEIR SONGS**

www.allaboutbirds.org/



www.peptbo.ca

Prince Edward Point Bird Observatory
PO Box 6043
Picton, ON K0K 2T0



Discover
the

NILE

Create a model of
the Nile River! What
you need:

- Foil Pan
- Soil
- Pebbles
- Tin Foil
- Grass Seed
- Mini crocadiles or
other 'river
creatures'
- Large Cup
- Water



Instructions:

1. Spread soil into foil pan
2. Add tin foil into the
centre for the river bed
and line with pebbles
3. Add grass seed, to
grow 'reeds' along your
Nile River
4. Add crocadiles and
other 'river creatures'
5. Flood the Nile by
pouring water onto the
pebbles and tin foil
6. Carefully put your Nile
River in a safe place
7. Watch the grass or
'reeds' grow!



After one week you
should have some
sprouting 'reeds', its great
fun to 'flood' the Nile
River each week!

PumpHouse
STEAM MUSEUM



Royal Military College of Canada
Astronomy and Astrophysics presents:

Wandering Stars

The word “planet” comes from the Greek term for “wanderer”

Ancient astronomers noticed that the planets move across the sky (i.e. wander), whereas stars appear fixed to the celestial sphere



Including the Earth, there are eight planets in our solar system, five of which can be visible to the unaided eye:

- Mercury and Venus can be observed just after sunset or just before sunrise as they orbit close to the Sun
- Mars appears red and is at its brightest when it is in opposition
- Jupiter and Saturn are further away but can reflect enough sunlight to be amongst the brightest objects in the night sky

Planets at Opposition:

May 23/15 - Saturn
Mar 8/16 - Jupiter
May 22/16 - Mars

Planetary Transit Across Sun:

May 9/16 - Mercury

Planetary Conjunctions:

Jul 1/15 - Venus and Jupiter
Oct 26/15 - Venus and Jupiter
Oct 28/15 - Venus, Mars and Jupiter
Dec 7/15 - Moon and Venus

THE DEPARTMENT OF CIVIL ENGINEERING AT THE ROYAL MILITARY COLLEGE

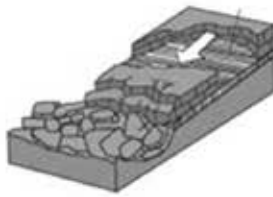
Landslide Demonstration

Did you know...

- Landslides are when soil and rocks slide down a slope.
- Landslides can be small or very big.
- Rain often causes the landslide to start by making the soil heavier and slippery.
- Landslides can also occur if the bottom of the slope is weakened by flowing water.
- Landslides can move at speeds of about 300 km/hr.
- Landslides can move enough soil to cover a building.



Rotational landslide



Block slide



Creep



Translational landslide

Instructions

1. Place the rock or brick on the flat board and tilt gently. Stop tilting when the rock slides and note the height of the board.
2. Tape the sandpaper to the bottom of the brick and repeat step 1 noting if the height at which the brick slides changes.
3. Now, remove the sandpaper and tape the smooth plastic sheet to the bottom of the brick and repeat step 1, again, noting if the height at which the brick slides changes.

Think of other materials that you can tape to the bottom of the brick. How does the texture of material affect the height at which the brick begins to slide? Think of other ways you can prevent the brick from sliding down the board. Check out the websites below. How do your ideas compare ones that engineers use.

Supplies

- Flat board
- Brick
- Coarse sandpaper
- Smooth plastic sheet
- String
- Duct tape

Additional Information

You can find more information about landslides here:
<http://www.kidsgeo.com/geology-for-kids/0071-landslides.php>
<http://pubs.usgs.gov/fs/2004/3072/pdf/fs2004-3072.pdf>

You can also interact with this demonstration to see what affects landslides:
<http://elearning.niu.edu/simulations/Landslide.html>



How can we help save aquatic animals?

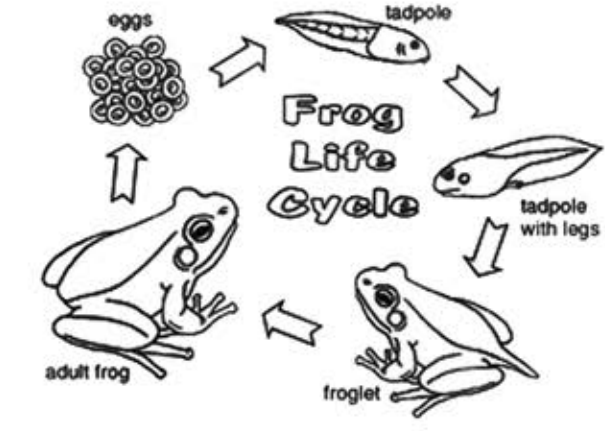


Why are frogs, fish and turtles so important?

Fish and frog growth relies heavily on the environment in which they live, they are good indicator species of the conditions of the environment.

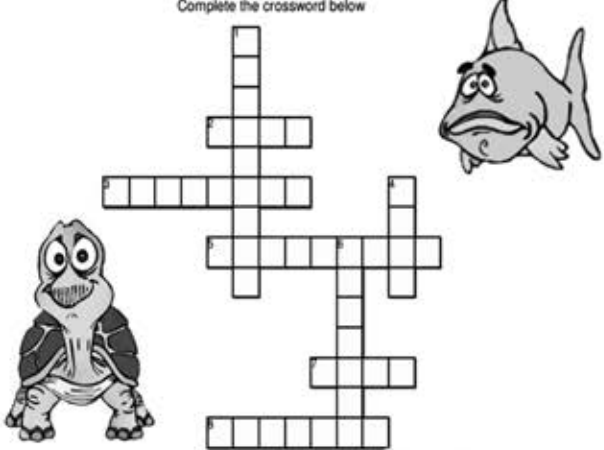
Turtles can live for very a long time, (up to 80 years). Their long life span increases the time they are exposed to harmful chemicals found in their environment.

Unfortunately, frogs, fish and turtles are becoming increasingly endangered through the destruction of their habitat due to human pollution.



- What YOU can do to help save the aquatic animals!**
- Do not use pesticides
 - Bring expired drugs back to the pharmacy instead of flushing them down the drain
 - Build a small pond behind your home or school.

How Can We Save The Aquatic Animals?
Complete the crossword below



The crossword puzzle grid is positioned between two illustrations: a turtle on the left and a fish on the right. The grid consists of white squares for letters and black squares for empty space.

Connect the dots to find out what animal this is!



- Across**
- They breath through their gills?
 - Where should you bring your expired drug?
 - What is causing the endangement of frogs, fish and turtles?
 - What can you build in your backyard to help the fish, frogs and turtles?
 - What animal can live up to 80 years?
- Down**
- Frogs and fish are good _____ species?
 - This is an amphibian.
 - What is the second stage of a frog's life cycle?

Discovering the Secret Mud World

Phytotechnologies Lab | Royal Military College of Canada

Our world is made of many different worlds, the animal, plant, and THE MUD world. The mud world is full of microorganism, called bacteria. We can't really see them, but they are there. Do you believe me? Do you want proof? There is a way to prove the presence of microorganism and it's based on their preference of food sources. Some bacteria can get their food from sunlight like plants while others feed from mineral elements, such as sulphur. Some can even feed off pollutants, helping us clean the environment. This experiment will show you how microbial communities organize themselves based in their favourite meal.

What you will need:

- A pond
- 1 tall glass or plastic bottle
- Shovel
- Bucket
- Shredded newspaper (carbon source)
- 1 Raw egg yolk (sulphur source)
- Stick for stirring
- Sunlight
- Camera or cellphone

Directions:

1. Head out to your closest pond with a bucket and shovel. Collect enough mud and pond water to fill your tall container. Try not to get sticks or rocks.
2. Grab a small bowl and mix a couple of scoops of pond mud with the newspaper and raw egg yolk. Mix thoroughly, this should be a milkshake consistency, add pond or tap water if necessary.
3. Add the mud to the bottle, make sure there are no air bubbles, you can use the stick to pack the material in the bottom of the column. Add some pond or tap water to the top, but make sure you leave enough space for air above the surface of the water. Cover the bottle with plastic wrap and elastic or a very loose lid.
4. Place in a sunny location, but not in direct sunlight, and wait 4-8 weeks to see the colour change. Take a picture of your experiment every week to register the colour change.



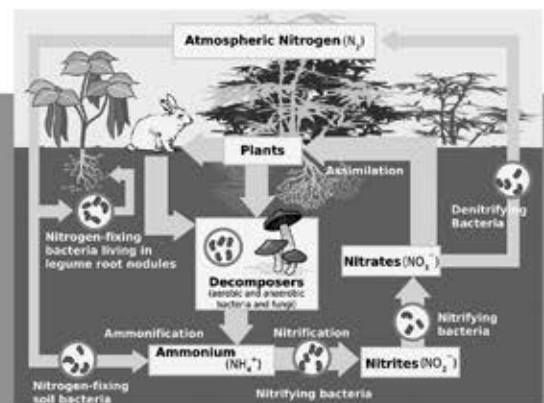
source: http://depar1ment.monm.edu/biology/godde/courses/MicrobialNutrition_files/slides015b_image042.jpg (Modified)

Results & Discussion:

- Do you see any colour change in the mud?
- How long took for the first change to be noticeable?
- Where the bacteria that need sunlight are living? In the top? Bottom?
- Where do you think that the bacteria that don't need air for living are? In the top or bottom?

Fun fact!

Nitrogen: from bacteria to plants to us. Nitrogen is essential for all plants and animals. There is a lot of nitrogen in the atmosphere but we can't use it because it is in the wrong form. Bacteria that live in the soil are able to help us as they change atmospheric nitrogen into the proper form. Plants then take up the nitrogen providing a source for animals and humans.



http://upload.wikimedia.org/wikipedia/commons/thumb/1/1e/Nitrogen_Cycle.svg/2000px-Nitrogen_Cycle.svg.png



CLEANING UP OIL SPILLS AT HOME



Purpose

To replicate the effects of oil spill and apply an effective system to clean it up.

Additional information

An oil spill occurs when liquid petroleum hydrocarbon is released into the environment due to equipment failure or human error. This form of pollution can be devastating to both the environment where it is released and the ecosystem which functions in that environment. Depending on the magnitude of the spill it can take months, even years to effectively clean from the environment.

There are several methods currently available to clean up oil spills. Including:

- Skimmers designed specifically for skimming oil from water surfaces
- Dispersants or Surfactants that work like a detergent to help break up oil so that bacteria and other natural organisms in the ocean can digest it
- Burning off the oil (which in itself leads to other environmental concerns)
- Sorbents that are used to soak up the oil

The following experiment allows you to mimic an ocean oil spill at home and get an idea of how difficult cleaning these spills up can be!

Required materials

- Small piece of aluminum foil
- Vegetable oil (or other suitable cooking oil)
- Deep baking dish
- Water
- Several cotton balls

Step-By-Step Procedure

1. Pour water into the baking dish so it's about 1/2 full
2. Shape the piece of foil into a small canoe or boat, roughly the size of your thumb.
3. Fill your canoe with the cooking oil and place it on top of the water in the baking dish
4. When you want to create your "oil spill", tip the canoe over
5. Wait a few minutes as the oil contaminates the water and begins to spread
6. Now it's time to clean up the mess. Use your cotton balls to soak up the oil by placing the cotton over the contaminated areas.

Note

You'll find it will take a LOT of cotton balls to soak up that small amount of oil that was spilled into the water. Imagine the effect of millions of litres of oil being spilled into the ocean or onto the ground and how much effort would be required to "absorb" it all.

What happens to the oil when you add some dish soap to the water? This will simulate another clean up method that uses dispersants and surfactants.

Reference: <http://www.epa.gov/students/teachers.html>

Royal Military College of Canada

Fun with Chemistry?

What is the "Matter"? Liquid, Solid or Gas?

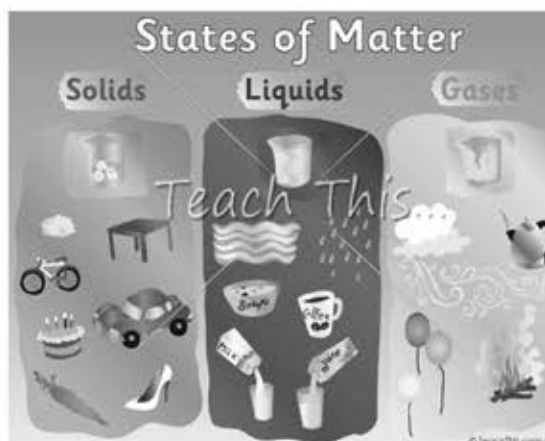


What Do We Have and What Do You See At this Station?

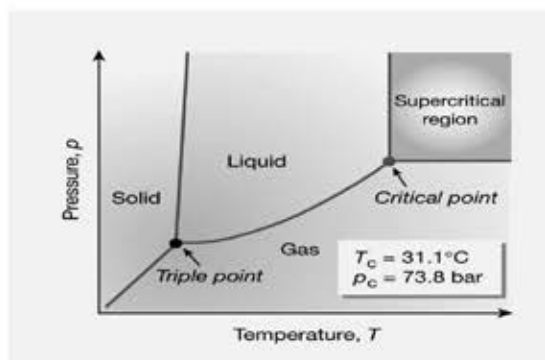
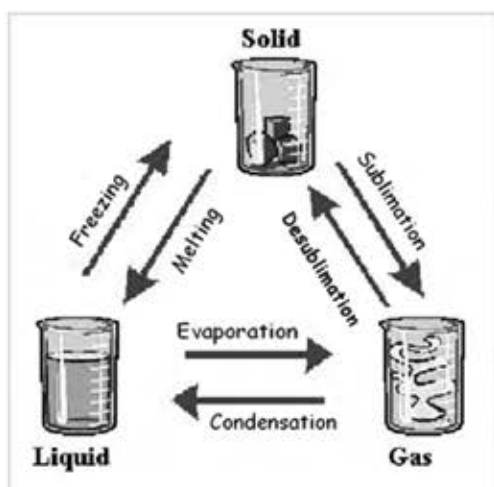
There are so many different compounds, objects and materials with different shapes and forms. Some of them are runny like water, maple syrup, and orange juice. You can't really hold them in your hands as they pour through your fingers. They take the shape of the glass or the container they are in and have no special shape. **These compounds are in liquid State.**

If you look around you, you will see so many objects that have nice and beautiful shapes. They stand by themselves nice and strong, and they form all sorts of geometrical shapes. **These are called solid compounds.** Sometimes solids can change to liquid. If you don't believe me buy an ice cream scoop in a cone and take your time eating it and see how soon ice cream is dripping everywhere on your fingers and your clothes 😊, this is called melting.

Now take a good deep breath, yes, breathe in and breathe out! Better yet, take a balloon and blow in it. It is growing, bigger and bigger as you blow in your balloon. What is happening? Is there anything in the balloon? It may not have color and it may not smell but there is air in your balloon. Air is a mixture of different gases. **They are not solid or liquid but they are special state of matter called gas.** Sometimes you can heat the liquids and turn them to gas! This is called boiling.



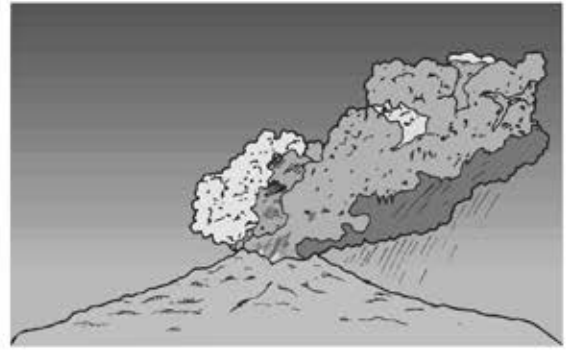
Chemistry is an exciting science! It helps us to learn about the many compounds that surround us, from paints and plastics to foods and medicines. We will explore different aspects of chemistry and matters with some exciting hands-on activities!



This picture is called phase diagram and shows how a compound could change from solid to liquid to gas through changes of temperature and pressure.



Why Do Volcanoes Erupt?



Volcanoes erupt because the molten magma formed deep underground is less dense than the rocks or liquids around them where they form. The bubbles of melted rock rise up through the Earth for the same reason that a hot air balloon rises up into the air. The air in the balloon is warmer and less dense than the air around it, and it is pushed upwards by the resulting buoyant force. The less dense magma inside of the Earth also is forced to "float" up to the surface.

Do this experiment at home to see that when you mix two liquids of different density, the less dense liquid floats to the top.

Material List

1. clear liquid soap (dish soap or Murphy's oil soap)
2. cooking oil
3. clear jar
4. drinking straw



Less dense cooking oil floats on top of the more dense liquid soap.

Step 1:

Pour the liquid soap into the clear jar



Step 2:

Put the drinking straw into the cooking oil and seal the top end of the straw with your thumb.



Step 3:

Keep your thumb over the end of the straw and put it in the soap to the bottom of the jar.



Step 4:

Use your other hand to squeeze the straw, forcing a small bubble of cooking oil out into the soap.



Step 5:

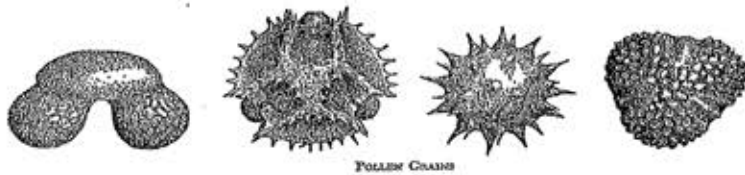
Watch your bubble of less dense "magma" rise to the surface of the Earth!

Try using oils with different densities (or blow an air bubble into the soap!) to see if they move faster or slower to the surface. Which "magmas" would rise faster, more dense or less dense ones?



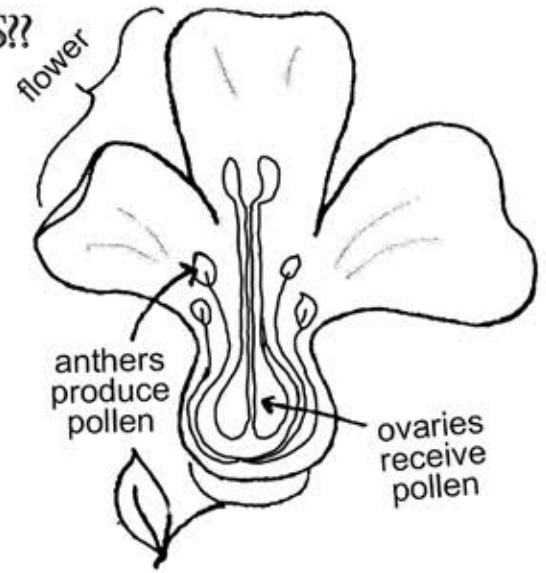
HOW DO PLANTS MAKE NEW PLANTS??

First you need some "pollen" and some "ovaries"...



Pollination involves the transfer of pollen from the anther (male part of the flower) to the stigma (female part of the flower).

↑ Tiny pollen grains magnified! ↑

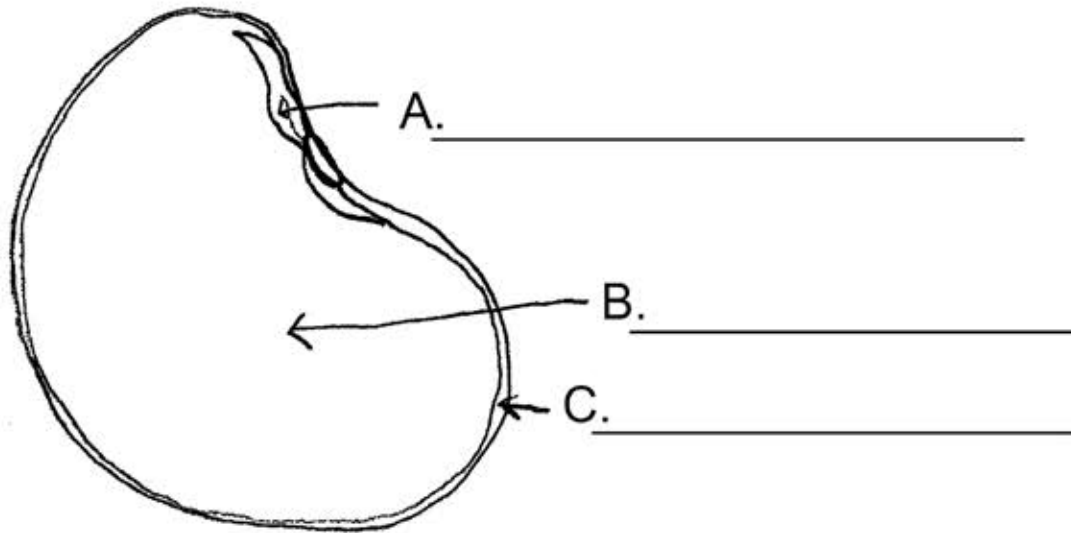


Some flowers have only stigma and ovaries (female) and some have only stamens and pollen (male)

But some have both!!

Once the plant is pollinated it makes a seed...

WHAT IS A SEED??



A. Embryo B. Endosperm C. Seed Coat

IT'S A LIVING, BABY _____ !

So why do WE humans need SEEDS?

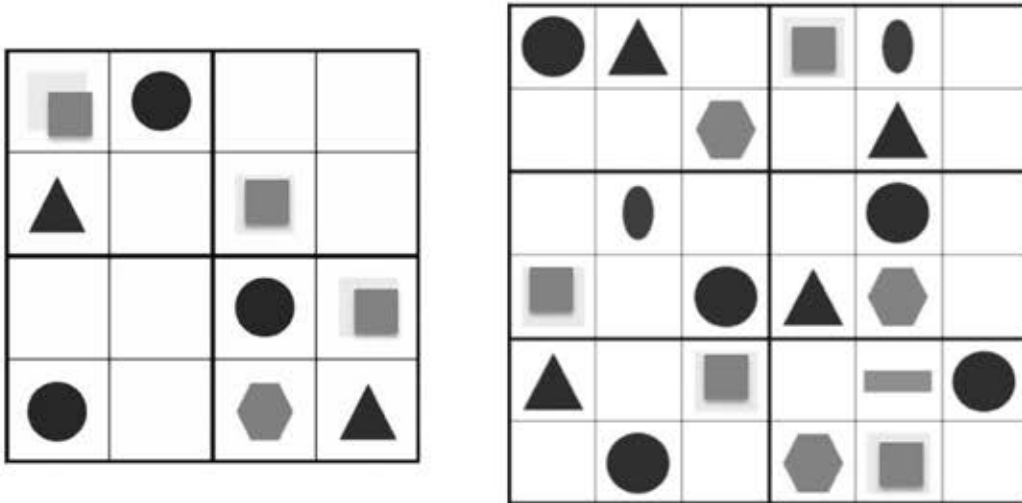
- 1.
- 2.
- 3.

Exercise Your Brain!

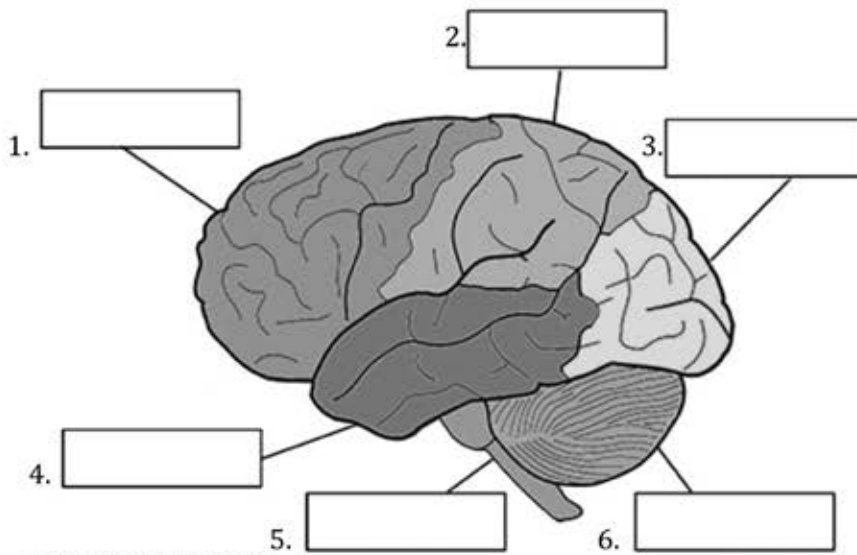


Try the following brain activities to keep your brain strong and healthy!

Sudoku helps your brain practice patterns. In the following puzzles make sure each row (up and down as well as right to left) has one of each symbol in it without any doubles.



Label the parts of the brain on the picture below with the word bank:



Parietal Lobe: language and touch

Frontal Lobe: thinking, memory, behavior, movement

Brain Stem: breathing, heart rate, temperature

Cerebellum: balance and coordination

Temporal Lobe: hearing, learning and feelings

Occipital Lobe: sight

Solution: 1. Frontal lobe, 2. Parietal lobe, 3. Occipital lobe, 4. Temporal lobe, 5. Brain stem, 6. Cerebellum

www.FileFolderFun.com
Image © iStock.com/Chris Jones

Visit www.museumofhealthcare.ca to learn more about how your body works!!

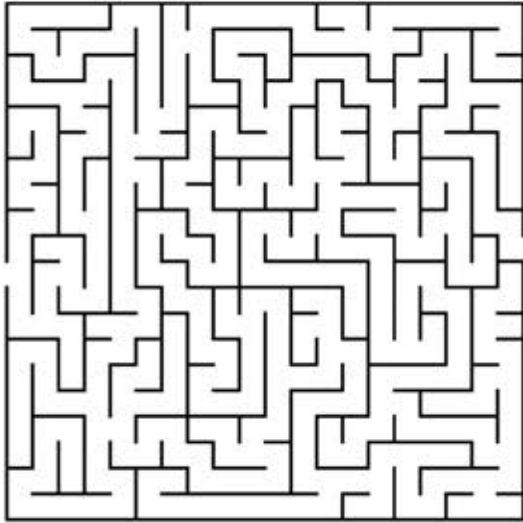




Jr. FIRST LEGO League (ages 6-9)
FIRST LEGO League (ages 9-14)
FIRST Robotics Competition & VEX Robotics Competition (high school)

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FIRST
LEGO
League
(FLL)



FIRST
Robotics
Competition
(FRC)



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wafflesrobotics.com



Draw your Own Robot: We've given you the base, now let your imagination run wild!

Wave nature of Light

Light is an Electromagnetic Wave, but also known to have a particle-like behaviour called Photon.

Let's study the wave nature of light!

So how would you have felt if the light waves were as big as a wave in an ocean? You would be oscillating with the crests and troughs and probably be pushed forward, right? But do you feel that when you are exposed to beam of light?

Here we will demonstrate the property an entity with wave nature should exhibit. They are known as **Diffraction** and **Interference**. The experiment described below is called **Young's double-slit Experiment**.

What you need?

1) transparent glass slide 2) Tape(preferably black) 3) Colored light emitting diode(LEDs) 4) 2 AA battery(i.e $2 \times 1.5 = 3V$ voltage supply source) 4) Sharp blade 5) Ruler

Procedure:

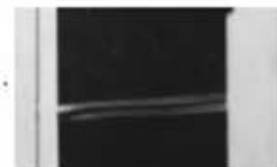
a) Take a piece of black tape and stick it onto the transparent glass slide.

b) With the help of the ruler, use the sharp blade to make two slits as close as possible, preferably less than half a millimeter as shown in the picture. **Caution** with the sharp blade, if not careful, you might injure yourselves!

c) Press your thumbs against the tape on either side of the two slits and push them outside along the surface of the glass slide, until you see a tiny gap of less than half a millimeter in each slit. You should be able to see the two fine slits when seen through against a light source. **Remember**, the finer and closer, the better is the interference pattern!

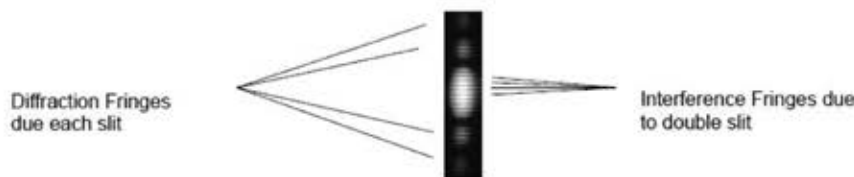
d) Connect the colored LEDs to the 3V battery. Green or red LEDs are preferred as your eyes have better sensitivity in this color range. You may have to switch the battery terminals to LEDs if they are not glowing.

e) Voila! Your set up is ready. Now put the glass slide with the two slits close to your eye and try to look at the glowing LED. Make sure you perform this experiment in a **dark room**. What do you see?



Observation:

You must be able to see alternating dark and bright fringes as shown below depending upon the color of LED you choose. The image is not to the scale. The fringes are much tinier and takes some patience to locate them. If noticed carefully, there are two kinds of fringes.



The picture below gives the correlation between the fringes you saw above and the wave nature of light.

Image courtesy:<http://sharkphysics.weebly.com/interference-and-diffraction.html>

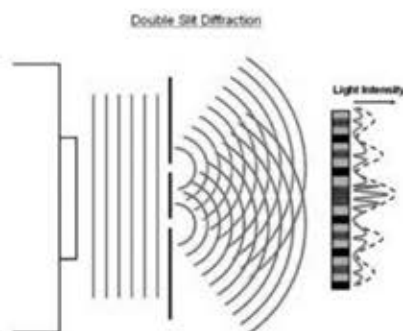


Image courtesy:<http://sharkphysics.weebly.com/interference-and-diffraction.html>

Save the date ... See you next year!

SATURDAY MAY 7, 2015

MAY 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				



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