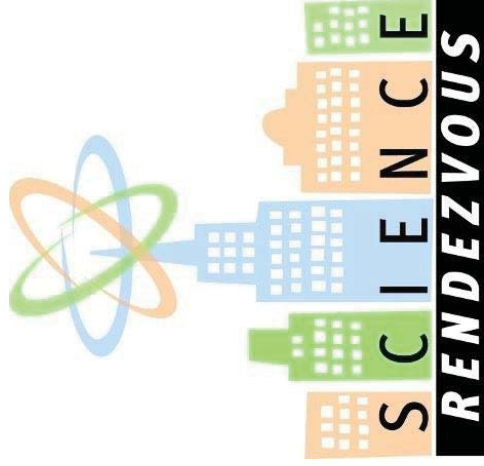


SCIENCE RENDEZVOUS KINGSTON



WHERE PEOPLE AND SCIENCE MEET

Sat May 3, 2014
Rogers K-ROCK Centre

PROGRAM AND TAKE HOME BOOK

SUPPORTERS



SPONSORS



Sat May 3, 2014
Rogers K-ROCK Centre

THANK YOU!!!



SCIENCE RENDEZVOUS KINGSTON 2014
 DR. LYNDA E.C. COLGAN, CO-ORDINATOR

WELCOME

Thank you for joining us today for the 4th annual Science Rendezvous Kingston celebration of science; scientists; and, scientific research, hobbies and careers here at The Rogers K-ROCK Centre.

Across Canada, other Science Rendezvous events are being held to showcase the work of local scientists and provide opportunities for people of all ages to meet the scientists who are working in their community to improve our quality of life by seeking answers to difficult questions about everything from the physical health of our pets and our friends and family members to environmental damage to flora and fauna caused by pollution and climate change.

Here at The Rogers K-ROCK, you can talk to budding scientists who dedicate hours to build robots. You can go into the Ask a Scientist booth and pose any science question that has you puzzled (such as *Why is the sky blue?*, *How does a 3D printer work?* or *What was the highest temperature ever measured on Earth?*). You will get a personal response for a scientist by e-mail, mp3 or video! There will be many chances to see how science is applied to help carpenters, engineers, astronomers, surgeons and police officers to do their important jobs.

I hope that you use this opportunity to visit with the people and organizations in and around Kingston that use science in work and in play. Kingston is a unique community with three post-secondary institutions (Queen's, The Royal Military College of Canada and St. Lawrence College) that have strong science, engineering, technology and math (STEM) programs. Our active community organizations are deeply committed to STEM endeavours ranging from bird banding to maker-spaces. We are fortunate to have a number of STEM-focused museums (The Miller Museum of Geology, The Museum of Health Care, The Pump House Steam Museum and The MacLachlan Woodworking Museum) that host amazing displays and activities to topics such as fossils and paper-making, steam-pump operation and 18th century dentistry.

It is never too soon for children to get involved in STEM clubs, activities, camps and programs. Getting involved in real-world STEM projects, big or small, can lead to hands-on field experiences and internships and co-op placements down the road, and will impact course selection and career choices.

When I was fortunate enough to meet Canadian astronaut Julie Payette, she signed my Convocation program by writing *usque ad astra*, which means reach for the stars! Among us today is engineering physics astronomer Dr. Karen Lee-Waddell, who, as a Queen's PhD student discovered a tidal dwarf galaxy—she took Julie at her word. My hope is that Science Rendezvous Kingston will be the inspiration for another budding STEM scientist to begin reaching for their own star, in their own way. May you be engaged and enthused as you have fun and learn today!



SUPPORTERS



SPONSORS



Sat May 3, 2014
 Rogers K-ROCK Centre

THANK YOU!!!



ROGERS K-ROCK RADIO

ROGERS K-ROCK CENTRE

VIDEO MESSAGES

COORDINATION TEAM

PROMOTION

BOOK PRODUCTION

PHOTOGRAPHER

ROYAL MILITARY COLLEGE OF
CANADA SCIENCE RENDEZVOUS
COORDINATOR

HIGH-SCHOOL VOLUNTEER
COORDINATOR

Sat May 3, 2014
Rogers K-ROCK Centre

SPECIAL THANKS

Danny Kingsbury
James Lighthart

Lynn Carlotto
Nick DeLuco
Simon VanAsseldonk

Rick Mercer, CBC
Ted Hsu, MP, Kingston & The Islands
Mark Gerretson, Mayor of the City of Kingston
Princess Animal Hospital, Kingston

Lynda Colgan, Faculty of Education, Queen's
Nancy Dalgarno, Faculty of Education, Queen's
Kim Garrett, Faculty of Education, Queen's

Vicky Arnold, Communications Coordinator, Faculty of Education, Queen's

Andrew Sutton

Gaillaume Nolet

Neda Bavarian

Kyle Clarke

The Kingston Community appreciates your
on-going support!



SAT MAY 9 2015

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

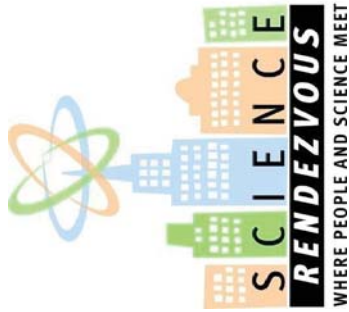


SEE YOU NEXT YEAR!!!



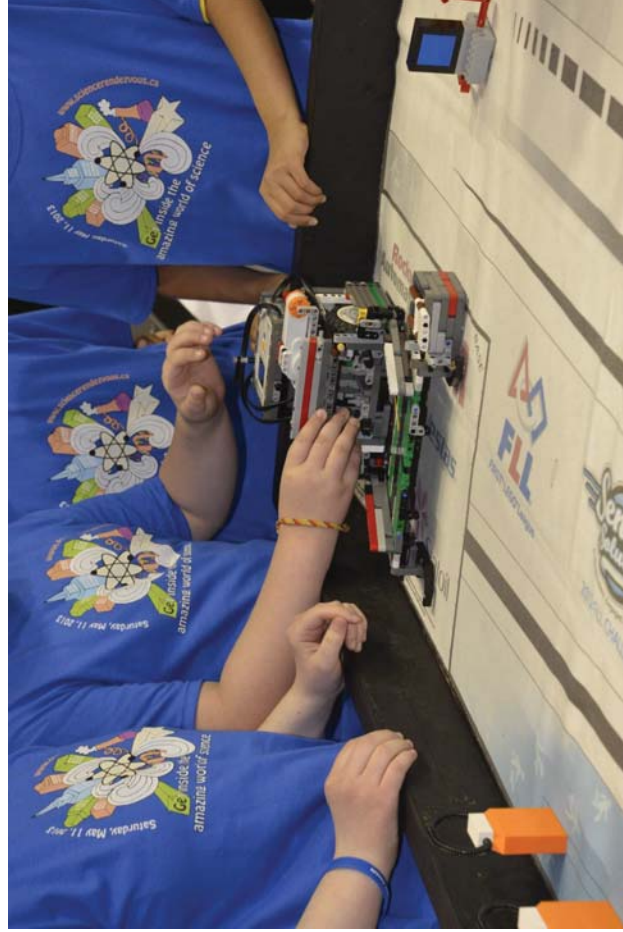
Community
Outreach Centre

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



Community Outreach Centre

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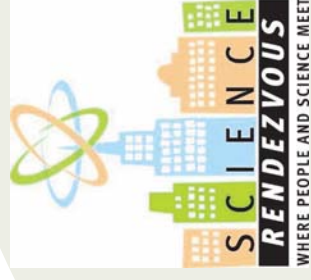


Do you know a person, agency, club, department or school that would be interested in participating in Science Rendezvous Kingston 2015?

Suggest that they contact community.outreach@queensu.ca to apply to be on the program.



STATION DESCRIPTIONS, LOCATIONS AND VOLUNTEERS





ADVENTURES

Renewable Energy

Participate in solar energy research by experimenting with solar thermal 'boxes'. See a solar hot dog cooker (parabolic reflector) up close, and help set up a solar powered fan to cool yourself off. Learn to make your own solar thermal box.

Station Coordinator:

Walt Sepic



Frontenac, Lennox and Addington Science Fair

YOUNG SCIENTISTS AT WORK

Discover exhibits from this year's FLASF Science Fair and participate in interactive science demonstrations.

Station Coordinators

Linda Lamoureaux, Elizabeth Suriyuth, Mark Labrecque

LOOK FOR WALT OUTSIDE ON THE TRAGICALLY HIP WAY!

CYBERFALCONS IN THE BOWL



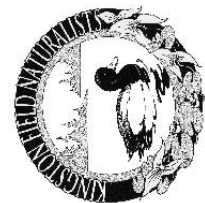
Frontenac \$\$

Come and meet the people behind the Cyber Falcon's Award-winning FIRST Robotics Team.

Station Coordinator

Lydia North

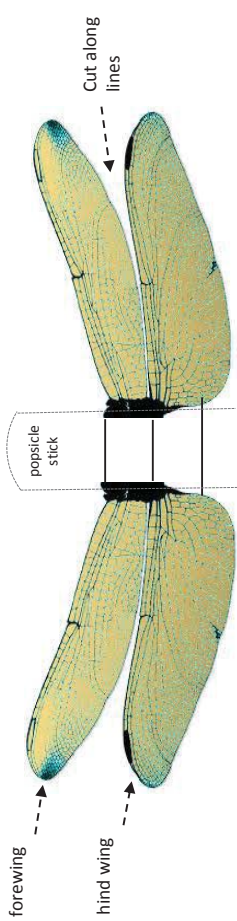
Come & discover... LIFE IN A MARSH...



How citizen science was used in a Queen's Biology study on frogs ... & ... make a damselfly or dragonfly ! !

Supplies:

- 3 pieces of bendable wire (~10 cm) or 3 wire twist ties
- Bamboo skewer, cut into 9 cm lengths for damselfly
- OR, popsicle stick for dragonfly body
- Wire cutters, scissors, white glue
- Markers, green or blue highlighter markers, or glitter glue to decorate



1. **Dragonfly:** cut out the pair of forewings and the pair of hind wings (different shape in dragonflies), leaving the left and right halves attached, glue centre of each wing pair to the bottom side of your popsicle stick, 1 ½ cm from stick end. Decorate body.
2. Cut 3 pieces of wire (or use ~10 cm long twist ties, paper removed), wrap and twist them over the stick in between the forewings and hind wings, bend legs in position.
3. **Damselfly:** cut out 2 pairs of wings (dark wings of same shape), fit one pair into the other, fold and glue them together at the centre.
4. Cut a bamboo skewer to a length of 9 cm, decorate body.
5. Cut three wires ~8 cm long, fold wires in ½ over stick, twist together, bend legs in position.
6. Cut notch in middle of folded wings; glue 1 ½ cm from end of stick and around legs. Head can be out of play dough or a wooden bead.

[http://kingstonfieldnaturalists.org <resources>](http://kingstonfieldnaturalists.org/resources)

Dragonflies & Damselflies of the Kingston Area:

See information and checklists.

★ Dragonfly wings from www.transitionrig.com

This page was put together by S. French.



Ebony Jewelling



with help from our friends at



Squishy Circuits!

adapted from <http://courseweb.stthomas.edu/epthomas/SquishyCircuits/resultingDough.htm>

1 1/2 cup Flour	1/2 cup Sugar
3 Tbsp. Vegetable Oil	1/2 cup Deionized (or Distilled) Water

(Regular tap water can be used, but the resistance of the dough will be lower, so you will have a harder time getting current to flow through your devices!)

Procedure:

- Mix solid ingredients and oil in a pot or large bowl, setting aside 1/4 cup flour to be used later.
- Mix with this mixture a small amount of deionized water (about 1 Tbsp.) and stir.
- Repeat this step until enough water is absorbed by the mixture that you can work it with your hands.
- Now, knead the flour into the dough, until it no longer sticks to your hands while working it.
- Store in an airtight container or plastic bag. While in the bag, water from the dough will create condensation. This is normal. Just knead the dough after removing it from the bag, and it will be as good as new. If stored properly, the dough should keep for several weeks.

Conducting Dough:

adapted from <http://courseweb.stthomas.edu/epthomas/SquishyCircuits/conductiveDough.htm>

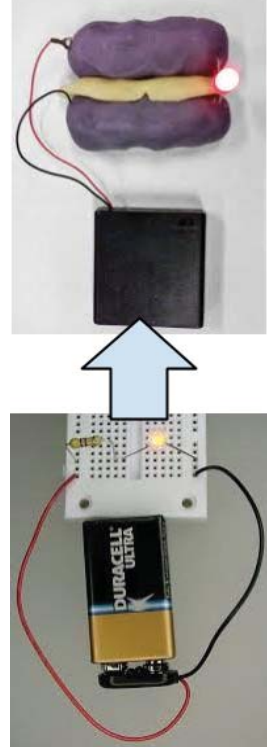
1 cup (regular tap) Water	1 1/2 cups Flour	1/4 cup Salt
3 Tbsp. Cream of Tartar	1 Tbsp. Vegetable Oil	Food Coloring (optional)

Procedure:

- Mix water, 1 cup of flour, salt, cream of tartar, vegetable oil, and food coloring in a medium sized pot.
- Cook over medium heat and stir continuously. The mixture will begin to boil and start to get chunky
- Keep stirring the mixture to try to evenly cook the dough. Eventually none of it will be liquid.
- Once a ball forms, place the ball on a lightly floured surface.
WARNING: The ball will be very hot. We suggest flattening it out and letting it cool for a couple minutes before handling.
- Slowly knead flour into the ball until you've reached a desired consistency.
- Store in an airtight container or plastic bag. While in the bag, water from the dough will create condensation. This is normal. Just knead the dough after removing it from the bag, and it will be as good as new. If stored properly, the dough should keep for several weeks.

Making Circuits:

When making a circuit, remember that the conductive dough functions as your wires, and the insulating dough should be used to prevent short circuits. You should look for example circuits that use wires, LEDs, resistors, and batteries, and just replace the wires with a dinosaur/astronaut/flower/etc sculpted out of dough!



K.C.V.I. K-BOTICS TEAM

Come and meet the people who make up the K-Botics team and see their robot in action

Station Coordinator
Kevin Wood



Books to inspire young scientists

Get your hands on some of our best books for kids. Be sure to bring your library card, because if you see something you like, you can sign it out at The Roger's K-ROCK Centre.

Station Coordinator
Kimberly Sutherland-Mills

Station Volunteer
Alison Dunn
Brianna Peters
Annie Pilgrim
Huda Shaltry

K-BOTICS AT CENTRE BOWL!

DEMOS ON THE TRAGICALLY HIP WAY

MINI-LIBRARY IN THE CONCOURSE

LOOK FOR THE DISPLAY OUTSIDE ALL DAY ON THE TRAGICALLY HIP WAY



Canine Units

Come and meet Constable Jeff Dickson and his canine partner, Zeus and Constable Mark McCreary with his canine partner, Titan.

Special guest appearances by members of the Ottawa Police Services Canine Unit.

Station Coordinators
Jeff Dickson and Mark McCreary

Emergency Response Team

Come and see the special equipment and technology used by the Emergency Response Team and meet some members of the team.

Station Coordinator
Sergeant Darren Keuhl



Life in a Marsh!

Come and make your favourite damselfly or dragonfly. See how beavers are adapted to life in a marsh. See how frogs leap into action over climate change (or not). And of course, see some live aquatic bugs!

Station Coordinator
Shirley French

Station Volunteer
Mark Read
William Porter

IN THE BOWL!

IN THE BOWL!



Buzzz: Making Motors! At this station, you will be able to make a motor to take home!

Station Coordinator
Elizabeth Turcke

Station Volunteers
Eden Bibic
Carly Hills
Pete Galbraith
Ryan Mdver
Emily Kate Taylor
Hana Turcke
Isla Turcke



You've seen electricity carried over wires, created by lemons, and reanimating monsters, but have you seen electrical play dough? Join us to muck around and make doughy creations that light up and spin, or just stop by to take a look at our showcase of other little projects.

Station Coordinator
Ryan D'Eon

Station Volunteer
Crystal Wilson

IN THE CONCOURSE!

SCIENCE RENDEZVOUS MEMORIES



Robots Rock!

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

Find the words below in our word search.

AUTONOMOUS BUILDING COMPUTERS
DESIGNING ELECTRONICS ENGINEERING
FUN GEARS LEGO
MACHINES MECHANICAL MEMORY
METAL POWER PROGRAMMING
PROTOTYPING SENSORS SIGNAL
SPROCKETS WHEELS WIRES

Activity: Robots often use sensors to navigate the world around them much like how people use their five senses. Try moving around the room with your eyes closed. Is it hard? What senses do you rely on to replace your sense of sight? Robots can use sensors to tell when they touch something. What do you use to tell if you are touching something? Try mapping a path around the room by counting your steps. This is similar to how a robot might count wheel or motor rotations to navigate. What other sensors might a robot find useful?

Robots can be very helpful. If you were to build your own robot what would it do for you? Use your imagination to design your own robot and draw a picture of it below.

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

Jr. FIRST LEGO League—ages 6-9

FIRST LEGO League—ages 9-14

FIRST Robotics Competition and VEX—high school

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





MP Ted Hsu Talks Science



Did you know that your Member of Parliament is also a Scientist?

- Ted has a PhD in Physics
- Ted has published 25 research papers
- Ted worked at Atomic Energy of Canada's Chalk River Laboratories
- Ted was elected Member for Parliament for Kingston and the Islands in 2011 and continues to pursue his interest in science through his work in Parliament

Make your own LAVA LAMP

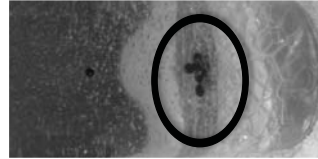
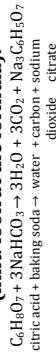
Materials needed:

- Empty, clear bottle (i.e. 1L bottle of pop)
- Regular vegetable oil (corn and olive oil will work)
- Water, food coloring and Alka-Seltzer

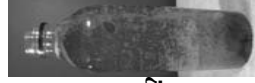
1. Pour oil into the plastic bottle (fill to 7/8)
2. Fill up the rest of the bottle with water
3. Add 10-12 drops of food colouring
4. Add a tablet of Alka-Seltzer
5. Let it settle and try it again

Why is the food colouring not mixing with the oil? (hint: think of the polarity)

What gas do you think is being released? (hint: look at the formula).



Cool FACT!
Did you know that water is polar? Polar molecules can dissolve in other polar molecules, but nonpolar molecules can not. That is why oil and water don't mix! Oil is nonpolar.



Smart Phone Microscopes

Turn your smart phone into a working microscope! Come discover a whole new world of science with nothing but simple household materials.

Station Coordinator

Marc Li and Haixia Jin

Station Volunteers

Aaron Trotman-Grant
Elizabeth
Sean George

IN THE BOWL!

IN THE BOWL!



Come and launch a bottle rocket using Archimedes' Law of the Lever

Station Coordinator

Nicholas Vlachopoulos

Station Volunteer

Chantal Chiddle
Doug Hamilton
Brendan MacKimon
Jeffrey Oke



Station Coordinator

Tom Riddolls

IN THE CONCOURSE!

IN THE CONCOURSE!



Come discover a world of colour with demonstrations on how light affects your daily life. Learn how light is used to explore the universe, from the smallest microbe to most distant stars.

Station Coordinator

Mitchell Anderson

Station Volunteers

Faleh Altal
Chris Galbraith
Mohsen Kamandar
Nishan Singh Mann

Pump House STEAM MUSEUM



Queen's University
BAJA SAE

Water Works!

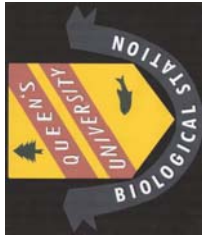
Build your own water pump and discover the power of water.

Station Coordinator
Gordon Robinson

Station Volunteer
Melissa Cruise

IN THE BOWL!

IN THE CONCOURSE!



Queen's University Biological Station

Come see our display of biological specimens and learn about the amazing biodiversity and research discoveries at Canada's largest inland biology station!

Station Coordinator
Carolyn Bonta

Station Volunteer
Danielle Porter

Queen's Department of Mechanical and Materials
Engineering SAE Team

We are a student run team that designs, builds, and races a single-seat off-road vehicle at three SAE sanctioned events across North America.

Station Coordinator
Connor Scullion

Station Volunteers
Matt Pearson
Chris Carrick

ON THE TRAGICALLY HIP WAY!

IN THE BOWL!



Superhero Biomechanics

Learn to measure how people move, and how this knowledge is used in research, sports, and in movies that feature your favourite superheroes. Come and get a glimpse at how your muscles work to beat your friends in an arm wrestling match. Look beneath the skin at the muscles of your arm!

Station Coordinator
Tara Diesbourg

Station Volunteer
Chris Bailey
Dr. Pat Costigan
Paul Makhoul

SAVE THE SALAMANDERS



The decline in salamander species is extremely significant. Around half of all the world's salamander species are listed as Threatened by the International Union for Conservation of Nature (IUCN).

These species are all facing a high risk of extinction. A further 62 species have been designated as Near-Threatened with populations that are dwindling. This means they are quickly getting closer to Threatened Status and to the brink of extinction.

Sadly for some salamanders it is already too late, as both the Yunnan Lake Newt (*Cynops wolterstorffi*) and Ainsworth's Salamander (*Plethodon ainsworthi*) have already gone extinct; completely exterminated by the callous hands of humans. Salamanders have been on the earth for over 160 million years, and the terrible state that they now find themselves in is due to the detrimental acts of humans. Find out how you can help at the link below!



www.savethesalamanders.com





How can we help save aquatic animals?



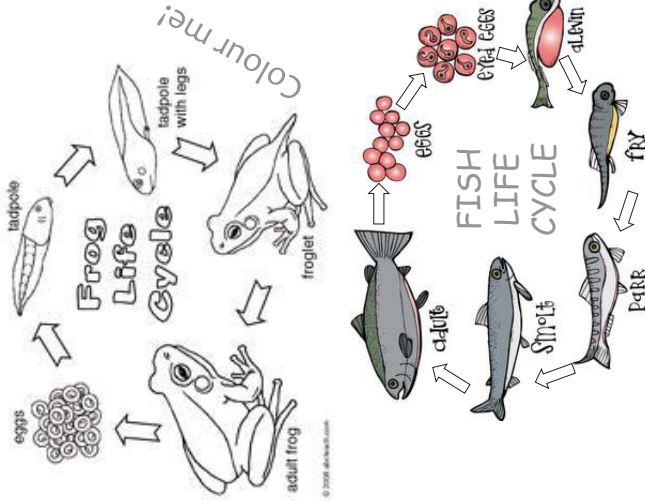
Why are fish and frogs so important?

- Because the growth of fish and frogs depends so heavily on the environment in which they live, they are a good **indicator species** of the conditions of our ecosystems
- Unfortunately, destruction of habitat due to human pollution has increased and has **caused a decrease** in the number of fish and frogs

Help find these words:

frog habitat lake
fish pond fry
ecosystem egg tadpole

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



What YOU can do to help save the aquatic animals!

- Do not use pesticides
- Bring expired drugs back to the pharmacy instead of flushing down the drain
- Build a small pond behind your home or school



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



Queen's Centre for Neuroscience: Get inside your brain and find out how your brain works!

Challenge a friend to a video game that you control with your brain! Learn about the parts of the brain, and how you sense, think and move. Come and see what little critters can do to teach us About the nervous system!

Station Coordinator

Angela Luedke

Station Volunteers

Benedict Chang
Noor AlDahhan
Ethan Heming
Angelina Paolozza
Ashley Parr
Stephen Sincin

IN THE BOWL!

IN THE BOWL!



Laser Light Show

Station Coordinator

Peter Loock

Station Volunteers

Nic Andrews
Jeff Crouse
Amy MacLean
Michaela Thomas
John Saunders
Michaela Thomas



Queen's Chemistry Graduate Student Society

Learn about the science of chemistry through hands-on experiments! Make your own slime to take home and try out other cool chemistry fool!

Station Coordinator

Gillian Mackey

Station Volunteers

Tham Adhikari
Mona Ashrafkhorasani
Brian Bestvater
Lily Huang
Lili Mats
Lisa Saunders
David Simon

IN THE BOWL!

IN THE BOWL!



Chemistry Magic Show

Three Shows: 10:15a.m., Noon and 2:15 p.m.

Station Coordinator

Michael Mambourquette

Station Volunteers

Prashant Agrawal
Marie Barnes
Nausheen Sadig
Christine Smith
Samantha Voht



What are you thinking? Developmental Psychology at Queen's.

We'll be playing a game that is only possible through the working of the frontal lobe of the brain – which is one of the brain areas that takes the longest to develop over childhood and adolescence.

Station Coordinator
Valerie Kuhlmeier

- Station Volunteers**
- Samantha Drover
 - Stanka Fineva
 - Ruxandra Filip
 - Jessica Ho
 - Jessica Loughheed
 - Ani Macy
 - Kathleen Merwin

IN THE BOWL!

IN THE BOWL!



Station Coordinator
Maria Lahiffe

- Station Volunteers**
- Khawaja Ali
 - Adrian Rochford



Queen's School of Computing

Learn how to get fit by playing video games. The EQUIS Lab at Queen's University is presenting *Liberi*, a video game that allows groups of people to get together from their own homes in a physically active virtual world. Come and try out our biking games, and discuss with us how to design games that are fun, motivational, social, and beneficial for your health.

Station Coordinator
Dr. Nicholas Graham

- Station Volunteers**
- Chris Bortoloso
 - Shelley Bursick
 - Mallory Ketcheson
 - Matt Oskamp
 - Chad Richards
 - Cheryl Savery

IN THE BOWL!

IN THE BOWL!



Healthy Lungs

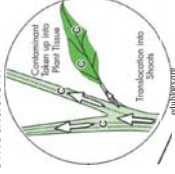
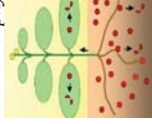
Take a deep breath and measure your lung volume!

Station Coordinator
Jenny Stepa

- Station Volunteers**
- Yan Ding
 - Isis Elagraa

How Does Salt Affect Plant Growth?

Plants have tiny tubes in them that run along the length of their stems. These little tubes allow the plants to take up water and important nutrients that they need to grow. In addition to taking up nutrients, the plants can also take up pollutants that are present in the soil and, in this way, they can help to clean up soils. Using plants to clean up contaminated soils is called *phytoremediation*.



This experiment will show you what happens when a plant tries to grow in salt!

Sometimes, there are things present in the soil that make it hard for plants to draw out nutrients and pollutants. One of these things is actually something that you like to eat...

SALTY!

Procedure:

- In both glasses of water put 2-3 drops of red food coloring
- In one of the glasses put 1 tsp of salt. Label the glass with salt in it.
- Cut the bottom inch of the celery stalks off and place a celery stick in each glass
- Put the glasses in the sunlight
- Observe the two glasses for the rest of the day and into the next day, taking notes

What you will need:

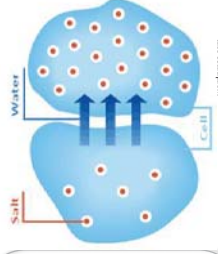
- 2 celery stalks
- 2 glasses of water (1/4 full)
- Red food coloring
- 1 tsp of salt
- Notebook and pen
- Sunlight

Results & Discussion:

- What is different between the two celery sticks? Do they look the same?
- Was one celery stick better at taking the red food coloring out of the water than the other?

The Science of Osmosis

In this experiment, you were able to see how water flows into and out of plants! Water moves by *diffusing* (flowing through) plant cells. Water flows out when there is a lot of salt outside of the plant compared to inside the plant, so it flows out of the plant. This is why the celery stalk in the salt water went limp. Water always diffuses from an area of low salt concentration to an area of high salt concentration. Only the celery stalk in the normal water was able to take up the red food coloring (pollutant).





Chemistry you can do at home: What is the pH of common household liquids?

Measuring the pH of water found in the environment is an important step in determining the movement of possible contaminants within the ground. The pH value can help in selecting organisms for bioremediation to clean up the environment. For example, emerging bioremediation strategies are using acid loving bacteria, or acidophiles to remove iron from acid mine drainage.

The pH value determines if a solution is acidic or basic. It is found by measuring the concentration of hydrogen (H^+) ions in a solution. The pH values range from 0 to 14, with 7 being a neutral solution, for example water. An acidic solution will have pH values from 0 to 6 and a greater amount of H^+ ions. A basic solution will have pH values from 8 to 14 and has less H^+ ions.

To measure pH you can use pH strips which change colour based on the pH value, or you can make your own pH strips using red cabbage. The instructions for making your own red cabbage pH paper can be found at: <http://chemistry.about.com/od/chemistryhowto/guide/ht/makepHpaper.htm>.

Experiment: Determine the pH of various liquids around your home.

Equipment:

pH strips (come by the ESG booth to pick up a few strips or make your own at home)
 Various liquids (milk, tap water, rain water, snow, lemon juice, coffee, tea, orange juice, soapy water, egg yolks, baking soda solution, soda pop, vinegar, etc.)
 Small bowls
 Pen and paper to record your results
 Paper/Towels to clean up any spills

Instructions:

Pour small amounts of each liquid into a separate bowl.
 Dip the pH strip into the liquid until a colour change is observed (1-10 minutes).
 Compare the colour on the pH strip to the instructions.
 Record the name of the liquid, and the pH on a sheet of paper. Determine based on the pH if the liquid is acidic, neutral or alkaline.

Table of Results:

Liquid	pH	Acidic, neutral, alkaline



The Magic of Steam

Explore the three phases of water: ice, water and steam. Blow the whistle and catch the piston from a steam launcher. See how the very first steam engine in history worked and what happens when steam fills a balloon.

Station Coordinator

Henk Wevers, Professor Emeritus, Queen's Mechanical Engineering



From Isolated Atoms to Amazing! The Formation of Crystals

From microscopic to massive, come and see the beautiful, perfectly formed natural mineral crystals on display from the Miller Museum of Geology at Queen's. Hands on activities and demonstrations will outline crystal properties, and show how they form from isolated atoms into beautiful crystal structures.

Station Coordinator

Mark Badham

Station Volunteer

Brod Badham

LISTEN FOR THE TRAIN WHISTLE IN THE BOWL!

SCIENCE RENDEZVOUS MEMORIES

IN THE CONCOURSE

SCIENCE RENDEZVOUS MEMORIES





Queen's University, School of Computing:
Electromagnetic Tracking for Surgical Navigation
 Play with a surgical toy (similar to The Operation Game) equipped with electromagnetic position tracking for computerized navigation.

Station Coordinator
 Ryan Anderson

Station Volunteers
 Manjunath Anand
 Matthew Holden
 Franklin King
 Tamas Ungi

IN THE BOWL

ON THE TRAGICALLY HIP WAY!



Solar Powered Lego Cars!

Science Rendezvous attendees can build their own Lego cars and race them, powered by solar PV.

Station Coordinator
 Graham Calvin

Station Volunteers
 Bailey Piggott



Station Coordinator
 Alvine Kamaha

Station Volunteer
 Satoko Asahi
 Joshua Bonart
 Ben Broerman
 Paradorn Pasuthip
 Ian Lam Wheng-Kit

IN THE CONOURSE

IN THE CONOURSE



Queen's University, School of Medicine:

Patient Welfare First

Interact with the display of partial trainers used to train doctors, nurses and therapists in a simulated environment. You can try a laparoscopic surgery trainer and an airway trainer with the help of nurses to provide guidance and supervision.

Station Coordinator
 Kim Garrison

Station Volunteers
 Maggie Hulbert
 Emily Klassen
 Michelle Lammes
 Andy Song

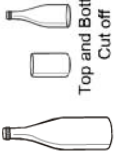
THE DEPARTMENT OF CIVIL ENGINEERING AT THE ROYAL MILITARY COLLEGE

A Model Water Treatment Plant to Clean Dirty Water

Civil Engineers design water treatment plants that clean the water you drink at home. You can make a model water treatment plant at home. **Do not drink the water** at any time because there may be some bacteria in your water that could make you sick. This experiment only mimics the treatment process.

1. Cut just the bottom off one of the 2L bottles (this is the filter bottle) and the top off 2 of the others. See Photo under Supplies
2. Using your bucket collect some smelly dirty water from outside, swampy water works well but make sure you are with an adult if you go near any bodies of water. If you can't find any dirty water make your own by adding a cup of dirt from the garden to 2 liters of water in the bucket.
3. Pour about 1 L of the dirty water into the unaltered 2 L bottle put on the cap and shake it up for 2 minutes. This is the first step in the water treatment process it is called **aeration**. It helps to remove the smelly gases that are trapped in the water and adds oxygen to the water. Pour the aerated water into a 2 L bottle with the top cut off.
4. Add 2 tablespoons of Alum to the aerated water and stir quickly for about 30 seconds. Continue to stir the mixture very slowly, about one turn every 5 seconds for 2 minutes. The Alum attracts the dirt particles and small particles called **floc** start to form in the water. This part of the water treatment process is called **coagulation**. The Alum helps to separate the dirt from the water.
5. Stop stirring the water. The particles of floc will start to settle to the bottom of the container. Allow the water to settle for about 20 minutes. You can watch to see how the water near the top starts to look clearer. This part of the treatment process is called **sedimentation**.
6. Construct a filter by tightly securing the Coffee Filter, using the Rubber Band, to the outside of the top of the filter bottle. Turn the bottle upside down and place it into one of the bottles which has the top cut off. Pour the clear pebbles into the filter bottle. Pour the coarse sand on top of the pebbles. Pour the fine sand on top of the coarse sand. Next, slowly pour the settled water into the filter bottle; be careful not to disturb the fine sand. This part of the water treatment process is called **filtration**.
7. The last step in the water treatment process is called **disinfection**. This process uses chemicals to kill any organisms or bacteria that are in the water. You did not do any disinfection; therefore **do not drink** your water.

Supplies

- 2 L Dirty water
 - Bucket
 - 4 x 2 L Clear Plastic bottles
- 
- Large spoon for stirring
 - Table spoon
 - Alum (a pickling spice)
 - Coffee Filter
 - Rubber Band
 - 1 cup Clean Pebbles
 - 1 1/2 cup Coarse Sand
 - 1 1/2 cup Fine Sand



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.

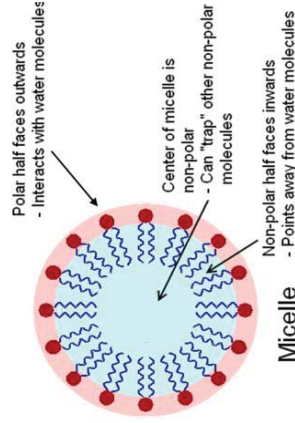
Surfactants can be used to help remove pollutants from the environment. Surfactant molecules form micelles (shown below), which can "trap" non-polar pollutants inside. The entire micelle (including the pollutant) can be washed away with water.



Surfactants allow the pollutant to "mix" with water, making it easier to remove them from the environment

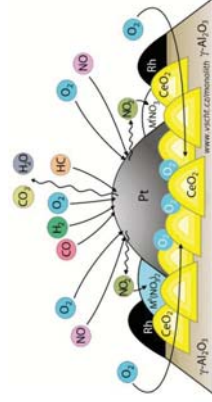


Non-polar compounds do not mix with water. This makes them hard to remove from the environment



Micelle

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

RESEARCH MATTERS

Council of Ontario Universities: Research Matters Curiosity Shop

Have you ever wondered why snow is white? Or why ostriches can't fly? These are questions Ontario university researchers can answer for you. Come visit our interactive shop and you can tell us what you are curious about. You can write your question down, or we will take a fun photo or video of you asking your question.

Station Coordinator
Melinda Knox

Station Volunteers
Erin Clow
Saba Farbodkia

IN THE BOWL

IN THE CONCOURSE

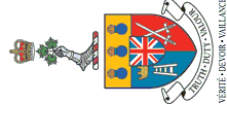


RMCC Inorganic Chemistry: Environmental Remediation

Learn how surfactants are used in environmental remediation.

Station Coordinator
Dr. Jennifer Scott

Station Volunteers
Paul Goff
Sam McNeil
Kyle Naylor
Nicholas Saulnier



Astronomy and Astrophysics: Solar Observing

Hands-on use of a solar telescope (weather permitting) with an informative display about "backyard astronomy."

Station Coordinator
Dr. Karen Lee-Waddell

Station Volunteers
Alexandre David-Uraz
Lindsay Holmes
Collin Lewis
James Sikora

ON THE TRAGICALLY HIP WAY

IN THE CONCOURSE



RMCC Civil Engineering

Be a detective and learn about bridges, transparent soil, well contamination and much more.

Station Coordinator
Dr. Kristine Mattson

Station Volunteers
Maxime Bosse
Martin Douglas
Laura Locklin
Yazan Qasrawi
Lee-Ann Sills



RMCC BIOLOGY

Fish and Frog Centre

Come discover the life cycles of fish and frogs and how we can save them from pollution.

Station Coordinator
Sarah Wallace

Station Volunteers
Sonja Bissegger
Tash-Lynn Colson
Christina Emerton
Laura Gibson
Dr. Valerie Langlois
Jing Zhang



RMCC CHEMISTRY

WHAT IS THE MATTER?

We will describe the states of matter and melting, boiling and freezing process using water, ice, liquid and solid freezies.

Station Coordinator
Bob Whitehead

Station Volunteers
Kristen Avarmac
Mayur Mundhwa
Kyle Naylor
Arman Poonja
Joannah Whitehead

IN THE CONCOURSE

SCIENCE RENDEZVOUS MEMORIES



IN THE BOWL

SCIENCE RENDEZVOUS MEMORIES



Royal Military College of Canada
Astronomy and Astrophysics presents:

Backyard Time Travel

The light from stars takes many years to reach us on Earth so looking up at the night sky is actually looking back in time!

You don't need expensive equipment to experience this cosmic form of time travel. Items that may help are:

- a **star finder**
- a **red flashlight** (you can cover a regular flashlight with red cellophane)
- **binoculars** (if you want a "zoomed-in" view)



Your best observing will be on dark, clear nights. Try to find a location that is away from city lights. Using your star finder (under red light), you should be able to locate constellations and major stars.

Upcoming 2014/15 Sky Events:

- May 5-6: Eta Aquarids Meteor Shower
- Jul. 28-29: Delta Aquarids Meteor Shower
- Aug. 12-13: Perseids Meteor Shower
- Aug. 18: Conjunction of Venus and Jupiter
- Oct. 8: Total Lunar Eclipse
- Oct. 21-22: Orionids Meteor Shower
- Oct. 23: Partial Solar Eclipse
- Nov. 17-18: Leonids Meteor Shower
- Dec. 13-14: Geminids Meteor Shower
- Jan. 2-3: Quadrantids Meteor Shower.
- Apr. 4: Total Lunar Eclipse
- Apr. 21-22: Lyrids Meteor Shower



For more information check out these websites:
ras.ca, star-finder.ca, spaceplace.nasa.gov and
astronomy-world.com/sky-events.html

RESEARCH MATTERS

The Curiosity Shop Booth

Research Matters is a joint project among Ontario's 21 publicly assisted universities to build new bridges between university researchers and the broader public. It is a multi-platform endeavour that involves a website and blog, social media, and public events – all designed to give Ontarians unprecedented access to the wealth of ideas and innovations happening at Ontario universities.

CAMPAIGN GOALS

- **Public accountability and transparency** – Research Matters aims to instill a sense of ownership and pride in Ontario university research.
- **Public engagement with research** – Research Matters also aims to help Ontarians think about Ontario university research in new ways by showing its impact where they live, work, and play.
- **Long-term commitment** – The campaign is a multi-year venture, involving sustained efforts to broaden and deepen the public's understanding – and experience – of why research matters.

We Hope that you will join us at our Kingston “WHAT MATTERS NOW” EVENT

What Matters Now is a fast-paced, lively and friendly competition among researchers from diverse backgrounds and different institutions. The series features five events in five Ontario cities, each featuring five researchers. Each researcher is given 7 minutes to make a pitch about why their research matters to Ontario, Canada and the world right now.

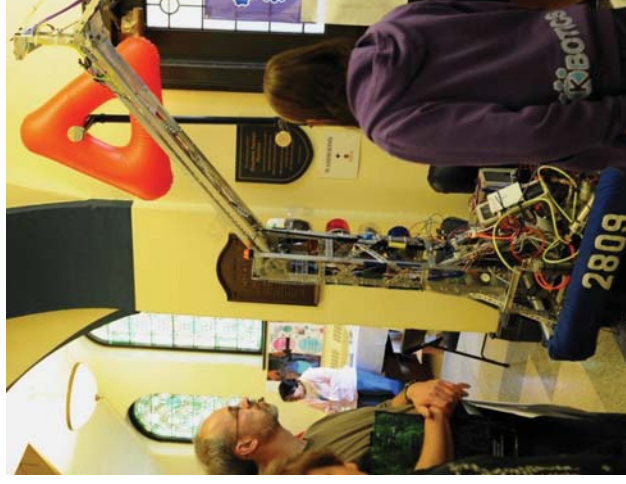
Location	Date	Venue	Researchers
Kingston	May 21, 2014 6:30-9:00	Memorial Hall, City Hall <i>Admission is free</i>	<ul style="list-style-type: none"> • Thomas Merritt, Laurentian • Warren Mabee, Queen's • Chris Furgal, Trent • Stéphane Lévesque, Ottawa • TBC, RMCC

For more information, please visit:

- www.yourontarioresearch.ca
- <https://twitter.com/OntarioResearch>
- www.facebook.com/YourOntarioResearch

Follow the discussion on Twitter:

#whatmattersnow



RMCC Environmental Sciences Group

Constructed Wetlands

Natural and constructed wetlands can act as a natural filter for removing contaminants from water. Demonstration of how a constructed wetland can be used to treat acid mine drainage. Many other examples of how wetlands are being used today to remediate contaminated water.

Bioremediation – The uptake and transformation of contaminants

Bioremediation is the use of plant material (phytoremediation) or other organisms to uptake or transform contaminants. Demonstration of hydroponically grown vegetables to study the uptake of contaminants and a demonstration of mushrooms grown to study transformation of contaminants.

Green roofs

Living organisms like plants can be used as an alternative for standard technology in sustainable development. Demonstration and a chance to measure how plants can be used to build green roofs to control temperature in buildings.

Station Coordinator

Dean Morrow

Station Volunteers

Mark Button
Katryn Cosway
Kim House
Sheila Johnston
Daniela Looch
Megan Lord-Hoyle
Michelle Nearing
Shari Reed
Dr. Kela Weber

IN THE CONCOURSE

SCIENCE RENDEZVOUS MEMORIES



RMCC Biology: Phytoremediation Group

Planting

Learn how soil invertebrates help maintain a healthy soil environment for plants. Investigate how changes in soil health can affect plant growth, and how pumpkin plants can improve soil health by extracting contaminants. Plant your very own pumpkin seed and take it home with you!

Station Coordinator
Dr. Barb Zeeb

Station Volunteers
Kaitlyn McSorley
Mackenzie Denyes
Michele Parisien

IN THE CONCOURSE

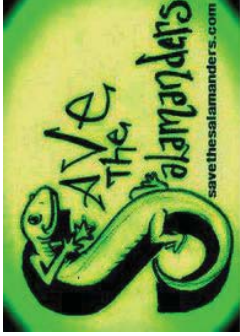
IN THE CONCOURSE



Control Engineering Technology

Come and meet Smarty the Robot and learn about the many ways that control engineers and technicians improve our lives.

Station Coordinator
Jason Murduck



Save the Salamanders

Learn about the conservation and protection of salamanders. At this station you will see many species of live salamanders and receive informative hand-outs.

Station Coordinator
Matt Ellerbeck

Station Volunteer
Clint Alexander

IN THE BOWL

IN THE CONCOURSE



Energy Systems Engineering Technology

What are energy systems? Learn how Engineers and Technologists work with architects, sustainable energy design/install companies, hospitals, municipalities and researchers to utilize energy efficiency and sustainable energy in their operations.

Station Coordinator
Dave Athersych

Queen's Solar Design Team

What is Solar Energy?

There are two main types of solar cells- photovoltaic cells (PV) and concentration solar thermal (CST). Let's take a quick look at each!

Photovoltaic cells are the ones you see on roof tops, but they are often commonly used to power gadgets such as watches and calculators. They convert sunlight directly into electricity, using a special material called a 'semi-conductor'. These semi-conductors absorb the sunlight that hits the cell, knocking electrons loose and causing them to flow. This creates a current - or useful electricity that can be used for power.

A solar thermal cell indirectly produces electricity. It works by collecting heat from sunlight, which is used to heat a fluid. This hot fluid produces steam, which is used to power generators that produce electricity. How cool is that?



Why use Solar Energy?

The better question is why NOT use solar energy? Check out some of these awesome facts!

- The sun produces enough energy in an hour to satisfy the global energy needs for a year.
- It is an inexhaustible fuel source, and it can be used ANYWHERE!
- It is pollution free and noise free.
- Solar electricity is immune to the dreaded electricity blackouts.
- Once installed, the energy is free! Think of the savings!



To learn more about solar energy, check out our website at www.qsdt.ca

Queen's Solar Design Team, 1151 Beamish Munro Hall, 45 Union Street, Kingston, ON (613)-533-6682.



Queen's Solar Design Team

What is Solar Energy?

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To learn more about solar energy, check out our website at www.qsdt.ca



Queen's Solar Design Team, 1151 Beamish Munro Hall, 45 Union Street, Kingston, ON, (613)-533-6682.



ST. LAWRENCE COLLEGE
SUSTAINABLE ENERGY
 APPLIED RESEARCH CENTRE

SEARC's mission is to provide applied research services to small and medium-sized enterprises in the renewable energy industry within the Eastern Ontario region. Research activities such as new product development, product improvement, prototype development, field testing, process improvement and commercialization of new products are within the scope of our work at SEARC. The research centre leverages the resources of St. Lawrence College: faculty, staff, students and equipment to assist small and medium enterprises(SMEs) to become more profitable.

Station Coordinator

Gordon McAlary

IN THE CONCOURSE

IN THE CONCOURSE



The Widget Workshop



Come and make a widget or two! These special objects illustrate important scientific concepts and are fun to play and experiment with.

Station Coordinator

Brittany Walker

Ted Hsu, MP

MP Ted Hsu Talks Science

Kids will have an opportunity to answer skill-testing questions and speak to Ted about science and his work in parliament. Kids will also be able to participate in a small science demonstration.

Station Coordinator

Ted Hsu

Station Volunteers

Dasvinder Kambo
 Katherine Dearborn
 Lucas Brehaut
 Amy Blaser
 Jean Holloway

IN THE BOWL

IN THE BOWL



Come and meet the people and robots who are members of W.A.F.F.L.E.S. Talk to them about their experience at the World Championships!

Station Coordinators

Christine and Goran Bibic

Station Volunteers

Michael Allen
 Anica Bibic
 Kaley Bibic
 Leanne Baksh
 Ryan Cooper
 Rebecca Austin
 Eden Bibic
 Aidan Baks
 Theo Collins
 Antonio Pereira
 Breman Bibic
 Logan Bibic
 Sarah Byers
 Andrew North



Homemade ferromagnetic fluid

What is it? a liquid that get attracted to magnet!!!

This experiment will be a fun and easy way to learn about magnet and magnetism!!!

Materials:

- 1) Laser printer toner powder
- 2) Neodymium magnet
- 3) cooking oil (vegetable oil)
- 4) Mixing bowl and stick
- 5) Balloon
- 6) glass plate
- 7) A bottle filled with water (3/4)

Instructions

- 1) Pour the ink into the mixing bowl and add a small amount of vegetable oil. Stir up the mixture with the stick. The oil should be added carefully to get the correct concentration for your solution that should not be too diluted. Your ferromagnetic fluid is now ready and it's time to do some tricks:
- 2) Pour some of the mixture into the glass plate. Place the Neodymium magnet beneath the plate and move it around. Your fluid will move as you move the magnet. It follows the magnetic field created by the magnet.
- 3) You can also move your magnet directly above the fluid and collect some of it on your magnet. However, if you do not want it on your magnet, place the magnet into a balloon and swirl it above your fluid. The mixture will get attracted to the magnet inside the balloon and some of it will stick to the outside of the balloon. To remove what got stuck to the balloon, just remove the magnet from the balloon and collect the mixture back into the plate
- 4) Pour a small amount of your fluid into a bottle filled with water (3/4), put the lid back on the bottle and bring your magnet close to it. You will observe how your fluid still follows the motion of the Neodymium magnet.

Explanation

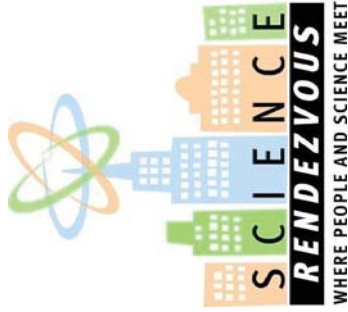
The toner powder used in laser printers contains ferromagnetic nanoparticles (fine iron oxide dusts). These particles are responsible for making the mixture (toner powder + oil) ferromagnetic and cause it to get attracted to the Neodymium magnet.

Reference:

<http://mylespower.co.uk/2012/02/21/fun-with-ferrofluid/>

<http://www.youtube.com/watch?v=sYehOJCWp-k>

2013 Memories





Homemade Non-Newtonian fluid

What is it? A fluid that becomes a solid when pressure is applied to it!!!

This will be a fun way to learn about viscosity (the resistance of a fluid to flow) and pressure.

Materials

- 1) Dry corn starch (about 1 cup)
- 2) Newspaper
- 3) Mixing bowl
- 4) Water (about 1 cup)
- 5) A table spoon

Instructions

- 1) Place the newspaper on the table and put the mixing bowl on top of it. This is to cover the table and avoid mess on it.
- 2) Pour 1 cup of corn starch into the mixing bowl and add 1/2 cup of water. Mix them slowly with your hands and add water progressively to the mixture until it becomes liquid but is not too diluted (It should feel like a stiff liquid when you stir it slowly with your finger). As an additional test of the texture of your solution, tap on it with the table spoon. If it does not splash but feels hard as you tap on it then ***you made your first non Newtonian fluid!!!*** if it splashes, add more corn starch and stir again.
- 3) Fetch some of it into your palm and start to rub your fingers to make a ball. As you keep rubbing your fingers (ie exerting pressure on the fluid) it will become harder and harder but as soon as you stop rubbing your fingers, it will return to the liquid state and drip into the bowl.
- 4) You could make more of the mixture and pour it into a large plastic tray and get ready to walk on your fluid! The trick is to walk quickly and to not stop. By walking, you apply pressure on the liquid that becomes solid and will remain so if you keep walking. Once you stop, it changes into liquid again and your feet will sink into the fluid .

Explanation

The corn starch mixture contains microscopic solid corn starch particles floating in the liquid. Moving the mixture slowly with your finger causes these particles to move out of the way and facilitate the fluid flow. But hitting on the mixture will make the particles collide on each other but will not get them out of the way. It will therefore feel like a solid.

Examples of Newtonian fluid: water and Honey . Their viscosity only depend on temperature.

Examples of non Newtonian fluid: Ketchup and Quicksand. Their viscosity depend not only on temperature but also on pressure.



ACTIVITIES, EXPERIMENTS, INFORMATION AND RESOURCES TO TRY AT HOME





ADVENTURES

An activity suggestion from Walt Sepic!

Shoe Box Solar Collector

Follow these steps to make your own solar collector.

Items you will need: shoe box, scissors, dark flat paint, paint brush, tape, thermometer, clear plastic (like cling wrap)

1. Paint the inside of the lid a dark flat colour. (not shiny).
2. Cut and remove the bottom of the box.
3. Paint the inside of the box the same colour you used on the lid.
4. Carefully cover the bottom of the box (the part you cut away) with clear plastic and tape this in place on the outside of the box.
5. Make a hole in the side of the box just big enough for the thermometer to slide in and out. Make sure the thermometer is not exposed directly to sunlight. This will give false high temperatures. Find a way to shade it with some cardboard and tape.
6. Tape the lid to the box. Your box is now ready to use!
7. Take your collector outside on a day when it is not raining. Do not face it to the sun yet.
8. After a few minutes, read and record the outside temperature.
9. Then turn your box with the clear plastic to face the sun, or the brightest part of the sky. Make sure there are no shadows on the painted lid.
10. Every minute, for 15 minutes, record the temperature in the box. You will notice an increase in temperature, especially on sunny days. Open the box and feel the lid! You'll notice how warm it is, especially on cold days.

The Magic of Steam

You Know Thomas the Steam Engine...But how does it work?

The body of the steam locomotive is the **boiler** where water is heated with a **coal fire**, the water is kept on a boil and the **vapor or steam** is further heated to a high **pressure**, the steam has not lots of **energy** that is given up and can do work when the steam **expands**. The steam goes to the **cylinder** of the steam engine, on each side at the front of the locomotive, were the wheels are. The steam is let into the cylinder with **valves** opening and closing and that makes the steam push a **piston** back and forward. The pistons are connected to the wheels with a **crank**, like the pedals on your bicycle, and that turns the **wheels** and moves the locomotive. Presto, now you know a lot of engineering! Steam locomotives are still used in parts of India, China and, did you know: the jet planes that take off from an aircraft carrier are **catapulted** in the air with a steam driven piston! Look at the figure below and try to point to the parts we talked about...



Magic of Steam Experiments You Can Do at Home... Always ask an adult to be present and help you.

Experiment 1: Take an ice cube from the freezer and notice the water is **solid**. This is one of three **states** or **phases** water can be in. The others are **liquid**, the water you drink from the tap, and **vapor or steam** which is a gas... The locomotive uses the **potential energy** that is part of the vapor state, we swim and dive into the liquid state and we skate on its solid state. Now put the ice cube in a glass of water: it floats. That means the solid cube is lighter than the liquid water. When water freezes into ice it **expands**, therefore a unit volume of ice is lighter than the same unit volume of water, and that is why ice floats in water! That is great news for the fish and turtles and all other animals that live in the water so they can survive the winter...

Experiment 2: Take a glass of water from the tap and heat it in the microwave oven set at 10 minutes and on high power. Measure the time to boil with a watch or stopwatch; depending on the oven it may take 2 minutes more or less. The water boils when you can see the bubbles rising in the liquid and steam escaping from the surface of the water.

Empty the glass and let it cool. Fill the glass half full with ice cubes, and the rest with water from the tap. Put it back in the microwave oven and set the timer to 10 minutes again, with power on high. When half of the cubes have thawed, shut off the oven, stir for a while and feel the water, when there are cubes left, the water feels cool. Continue heating and measure time to boil. It will take a longer time to bring the **water and ice** cubes to a boil.

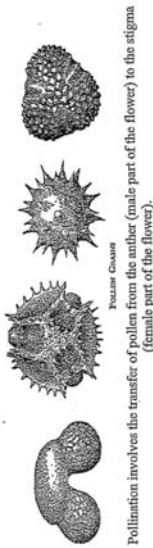
Why? To make ice cubes the freezer uses energy to cool the water and freeze it. Energy is moved from the water by the freezer and put back into the kitchen as heat. While doing this the water cools then freezes. BUT to melt the ice cubes it then also takes a lot of energy (heat) to thaw the ice cubes back into water or the liquid state.

Experiment 3: Bring another glass of water to a boil in a pan on the stove and hold a small mirror or a glass, above the steam coming off the boiling water. Use a glove to keep your hands away from the steam! Now look at the mirror or the cold object you used to hold in the steam. It has lots of water droplets clinging to it. The steam has **condensed** into water: vapor when cooled by the object changed to the liquid state!

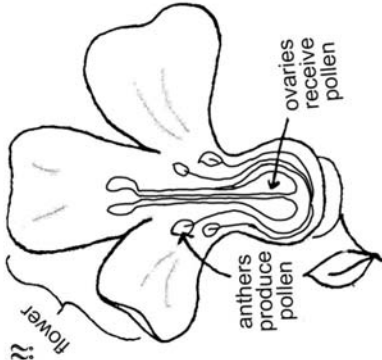
Credits: Text edited by Sarah Klynkramer Laurier University. The locomotive diagram is from www.sciencemuseum.com.

HOW DO PLANTS MAKE NEW PLANTS?!

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



↑ Tiny pollen grains magnified! ↑

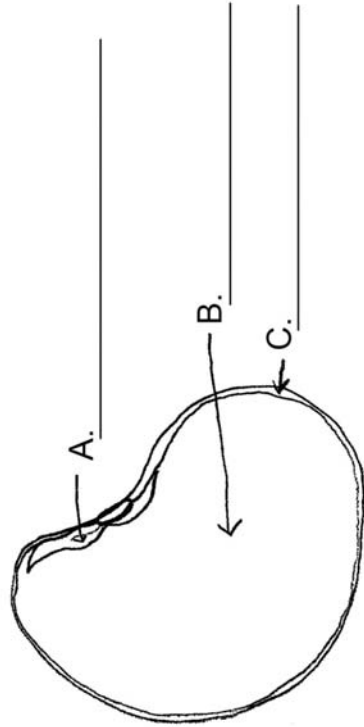


Some flowers have only stigma and ovaries (female) and some have only stamens and pollen (male)

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.



Heirloom Seed Sanctuary
Kingston, ON

Using Video Games to Get Physical Exercise



Pedalling faster makes avatar faster
Higher heart rate gives special powers

Design Challenge

How would you convert your favourite video game to pedal-to-play?
How would pedalling control the game?
What special heart rate powers would you add?



Learn Game Development at Queen's
www.cs.queensu.ca/applicants/gamedevlopment

EQUIS Lab
School of Computing
Queen's University





science at home!

THE PING-PONG PADDLE GAME

How your brain helps you follow rules

The Science Behind the Game
 The largest part of the human brain, and the one that takes the longest to develop, is the frontal lobe. A healthy frontal lobe is really important when we need to control how we move and follow rules. It is really hard to follow rules when the rules go against things that we usually want to do. As our frontal lobes develop from childhood through adolescence, we get better at following rules, even in challenging circumstances. The ping-pong paddle game is one way of giving our frontal lobes a really challenging workout. See how well you do!

Play the Game!

Materials Needed

- Two ping-pong paddles with different colours on each side (for example, Red and Green)
- A friend, parent, brother, sister, grandparent, neighbour.... anyone!

Instructions

- Hold one paddle in each hand.
- Stand facing your partner.
- Explain the rules to your partner: "When I lift a paddle showing the GREEN side, you raise your hand that is on the SAME side as the paddle (like if you were looking in the mirror). But, when I lift a paddle showing the RED side, you raise your hand that is on the OPPOSITE side of the paddle."
- Do about 20 paddle raises, alternating hands and colors randomly. It's pretty hard, and your partner will make some mistakes. Even adults do!

Questions

- What kinds of things do you think that you can do to increase the number of mistakes your partner makes?
- Why do you think that the game is so hard?



CHILD AND ADOLESCENT DEVELOPMENT AT QUEEN'S

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

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



HOW DO I PARTICIPATE?

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

CONTACT US:

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



Queens
UNIVERSITY

Phone: 613-533-2476

E-mail: child.studies@queensu.ca

Web: <http://psyc.queensu.ca/developmental>



Like us on Facebook for updates and study results!
Search for: Child and Adolescent Development

613.533.2476

child.studies@queensu.ca

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CHILD and ADOLESCENT DEVELOPMENT
 Queen's University



Books to Inspire Young Scientists

For more suggestions visit www.pinterest.com/kfp/science-rendezvous

Basher Science: Human Body: A Book with Guts by Dan Green & Simon Basher (2011)

This book makes body parts into characters that tell about how the body works. Prepare to meet Cell, DNA, Protein, Bones, Muscles, and Organs.

Bedtime Math: A Fun Excuse to Stay Up Late by *Laura Overdeck* (2013)

Numbers are made fun with math problems about kangaroos, roller coasters, LEGO and more! The three levels of difficulty (Wee Ones, Little Kids, and Big Kids) are bursting with kid appeal.

Citizen Scientists: Be a Part of Scientific Discovery from Your Own Backyard by Loree Griffin Burns & Ellen Harasimowicz (2012)

Full of engaging pictures, this book will show readers how to gather their own data for scientific studies. All you have to do is go to a field, a park, or your own back yard to find out more about the big world of science.

Crazy Concoctions by Brown, Jordan (2011)

This collection of experiments will have little scientists creating safe but informative messes and making mind-expanding discoveries! Witness some of the most impressive chemical reactions around.

Gut-Wrenching Gravity and Other Fatal Forces by Anna Claybourne (2013)

Part of the *Disgusting & Dreadful Science* series, this book provides painful and fascinating facts, stories, and experiments on gravity. Topics ranging from magnet mayhem to frightening friction will make children from Grades 3 to 6 "fall" for this title.

Motion, Magnets and More: The Big Book of Primary Physical Science by Adrienne Mason & Claudia Davila (2011)

A must-read for any budding scientist! This basic introduction to the physical sciences includes plenty of hand-on activities which help children learn about materials, forces, structures, solids, liquids and gases.

The Racecar Book: Build and Race Mousetrap Cars, Dragsters, Tri-Can Haulers & More by Bobby Mercer (2013)

Got a need for speed? Using step-by-step instructions, learn how to create 25 racecars with recycled and repurposed materials while learning the science behind the techniques.

Weird Science: Mad Marvels from the Way-Out World by Matt Lake & Randy Fairbanks (2012)

With odd-looking animals, crazy chemistry, and freaky physics facts, this upbeat book probes the weird side of biology, zoology, physics and chemistry.

The Lego Ideas Book: Unlock your Imagination by Daniel Lipkowitz (2011)

Want to build a Viking ship, a dragon or a plane? Split into six sections – including vehicles, buildings, castles, space and fantasy – this large book can help inspire you to create something new with your LEGO.

Unofficial LEGO Builder's Guide by Allan Bedford (2012)

Includes complete instructions to build models but also encourages you to use your imagination to construct your own creations. Learn how to build to scale and make jumbo-sized LEGO bricks, among other tricks.

130 Johnson St. • Kingston, ON • K7L 1X8 • Phone: 613.549.8888 • Fax: 613.549.8476
www.kfp.ca

Information inspiring imagination



The Smartphone Microscope

Turn your smartphone into a functional microscope!

Activity:

Using the camera on a smartphone or tablet, and a lens taken from a laser pointer, you can make a functional microscope good enough to see individual cells.

Materials Needed:

- A slide or piece of Plexiglas
 - Tape
 - Laser pointer lens
 - Light source (LED lights work best)
- Smartphone or tablet with a camera
 - A stack of books (or anything that is convenient) to prop the piece of Plexiglas on

Step-by-step Procedure:

1. Carefully tape the laser pointer lens to the piece of Plexiglas
2. Place the Plexiglas over the stacks of books on a stable surface
3. Place the light source directly under the Plexiglas, pointing upwards
4. Using a smartphone camera, you can look through the laser pointer lens at high levels of magnification

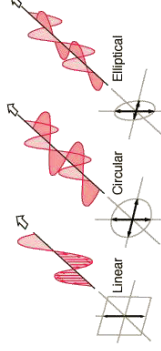
What is happening?

The lens bends the light coming from the specimen so that the image appears larger when it enters the camera, just like any ordinary light microscope



For more free hands-on activities, visit our database at letstalkscience.ca or the lab section of curiosity.ca
Visit www.letstalkscience.ca/queens to learn more about local Let's Talk Science Activities!

Light is made up of electromagnetic waves. The orientation in which these waves vibrate is called "polarization". Light from the sun or a light bulb in your house is randomly polarized. If you shine light from the sun or a light bulb through a special filter, you can select light of a single polarization type. Light that vibrates in a single plane is called "linearly polarized light". Light reflecting off a lake surface or a wet road is usually linearly (horizontally) polarized. To reduce glare, polarized sunglasses have vertically polarizing filters in them to block the light reflecting off water or wet surfaces. Other filters let through polarized light that is rotating in either a clockwise or counter-clockwise direction. This is known as circularly polarized light.



Types of Polarized Light

<http://hyperphysics.phy-astr.gsu.edu/hbase/physopt/poiclas.htm#lfc1>

How do 3D Movies Work?

Our two eyes view objects from different angles, allowing us to see in 3D. If you hold a finger in front of you and close your eyes one at a time, you will see your finger move. When both eyes are open your brain makes a 3D image from these two different images. When 3D movies are filmed, they use two cameras to film the action from slightly different angles. In the theatre, the projector switches between images from the two cameras and gives each of them a different circular polarization. Your 3D glasses contain two different filters that let each eye see only the images from a single camera. The image alternates between your left and right eyes around 48 times per second. This is fast enough that your brain thinks it is seeing the images at the same time and makes a 3D movie from the two recordings.

Experiment 1 – 3D Glasses and Mirrors:

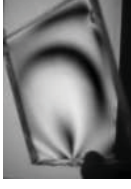
While wearing 3D glasses from the movie theatres, look into a mirror. Now close one eye at a time while looking at a mirror. What do you see? You should notice that the lens over your closed eye is transparent while the lens over your open eye is dark. Why do you think this occurs?



Experiment 2 – 3D Glasses and Computer Screens:

Hold your 3D glasses up to a computer screen and rotate them. You may see a small colour change. If you turn them around, at around 45° the glasses should go black. What does this tell you about computer screens? Computer screens are made with liquid crystals between polarizing filters that rotate when a voltage is applied to them, so that the output is linearly polarized light.

Experiment 3 – Examining Stress in Clear Plastics:



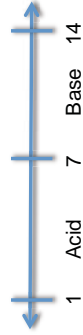
For this experiment you will need to find some clear plastic objects around your house. Try a plastic fork, a tape dispenser or a CD jewel case. Hold these objects in front of a white LCD computer or TV screen and look through your 3D glasses. You should see many colours of the rainbow. These colours are produced as the polarized light from the monitor travels through strained areas in the plastic. In the strained areas, the atoms are not uniformly spaced so they cause the polarization of the light to be rotated as it passes through the object. Different colours will experience unique amounts of rotation giving rise to the patterns you observed. This phenomenon is known as "birefringence". Try experimenting around your house with other clear plastic objects: plastic wrap, cellophane and clear tape to look for different optical effects.

What are acids and bases?

Acids are substances that produce hydrogen ions when dissolved in water. They taste sour and are corrosive.

Bases accept hydrogen ions from other substances. They feel slippery because they react with oil on your skin to make soap.

Chemists use a number called "pH" to describe acids and bases. The pH scale ranges from 1 to 14, with 7 being neutral.



Where can you find acids and bases?

Many fruit juices are acidic because they contain citric acid. Your stomach contains hydrochloric acid, which helps dissolve food. Sometimes, rain can be acidic due to pollution.

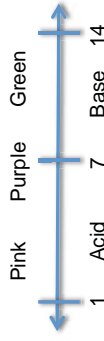


Bases make very good household cleaners. If you are baking, you might use sodium bicarbonate (baking soda), which is also a base.

Make your own pH indicator

When a chemist wants to find out if something is an acid or a base, they might use an indicator. This is something that changes colour depending on pH.

1. Get your parents to help you cut 2 cups of red cabbage into small pieces. Then, boil the cabbage on the stove in about one cup of water for 10 minutes. Warning: chemistry can be smelly!
2. Let the mixture cool, and then pour it into a bowl through a colander or sieve to remove the cabbage from the juice.
3. Add 2 teaspoons of the liquid you want to test to a cup. Hint: try lemon juice, dish soap in water, baking soda in water, and vinegar.
4. Add ½ teaspoon of your red cabbage juice to the cup and watch for a colour change, as shown below, then fill in the chart with your observations:



Liquid	Acid/Base/Neutral
Lemon juice	
Baking soda in water	
Vinegar	
Dish soap in water	

How does it work?

When you boil cabbage, you extract chemicals called anthocyanins into the water. These chemicals change colour depending on the pH of the liquid you test.

all bent out of shape

Why do twigs on a tree bend easily but become brittle when they get old? It's rheology! As the tree gets older, the wood dries out, and its properties change.

Rheology? what's that?



Rheology – the study of hard things going soft

Take a dry popsicle stick and try to bend it around your finger.

What do you observe? It breaks, right? Why?

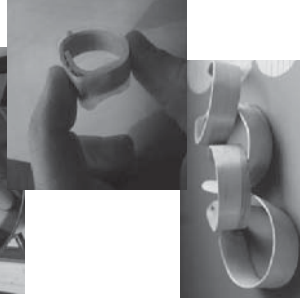
Only some things that are hard - like a popsicle stick - become soft when heated or soaked in water. They are considered "soft solids" and the scientists that study them are rheologists. Mud is a "soft solid." The blood in your veins is another!

The rheology of wood

Wood's molecules stick tightly together when wood is dry and cool. This makes wood hard and stiff. Adding heat and water makes the molecules become unstuck. When the wood cools and dries out again, the molecules restick - this time in their new position. Lacrosse sticks and snow shoes are examples of things made by bending wood.

Play with rheology at home!

1. Bring an inch of water to a boil in a sauce pan and put in your popsicle sticks or tongue depressors - add a few more than you think you will need as some will break.
2. After 30 minutes of boiling, remove the sticks with tongs. Handle them wearing dishwashing gloves.
3. Quickly wrap the sticks around a form like a broom handle or the neck of a narrow glass.
4. Use tape to keep the stick tight around the form. Leave overnight to dry out.
5. By morning you will have a ring that you can use for any number of things, like a bracelet or a napkin ring.



Join us at the museum to see more fun ways that you can explore wood!

2993 highway 2 East, Kingston
t: 613-542-0543

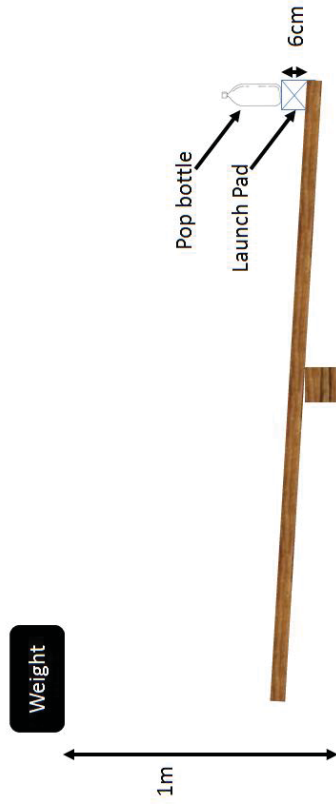
Build and Test your own Pop Bottle Launch Pad!

Professional Engineers Ontario (PEO), Kingston Branch

The goal of the activity is to construct the lightest possible launcher using only material 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 launch pad must stand 6cm high and must be able to balance a full pop bottle without any assistance as shown in the figure below.

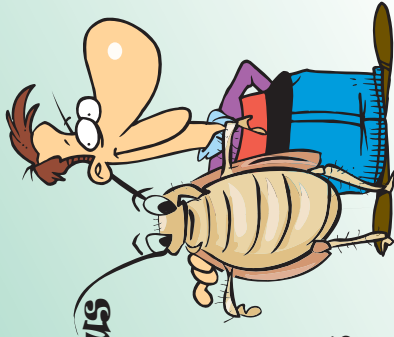
Testing the launch pad:

1. Launcher will be weighed and recorded
2. Launchers are to be placed onto the testing apparatus
3. A full pop bottle will be placed on top of the launcher.
4. The pop bottle must be able to balance without any assistance.
5. The booth staff will stand by the pop bottle to catch the projectile.
6. A PEO member (or additional assistant) will drop a weighted sack from 1m.
7. The launch pad must not break and still stand 6cm high



How light were you able to make your successful launch pad?

Beauty of the Beast: What can cockroaches tell us about the nervous system?



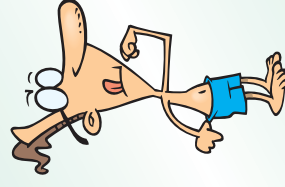
Did you know that many different animals have nervous systems?

Even little cockroaches have neurons that sense things and control them.



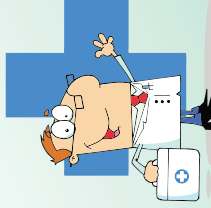
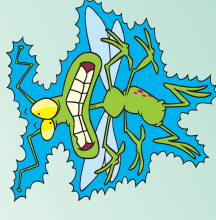
Senses:

You aren't the only thing that can sense. Just like you can feel touch, cockroaches can feel touch as well, using the little hairs on their legs. We can listen to the cockroach's neurons with electrodes to investigate.



Muscles:

Just like you, cockroaches have muscles that move their legs. They control their muscles with neurons in their legs. We can show how this works by stimulating the neurons with electricity to make the cockroach legs move.



These little critters can help us to understand our own nervous systems, advancing science and medicine for all.

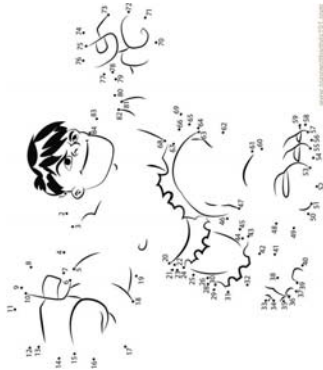
How does Superman leap over tall buildings?



We exert a force on everything that we interact with where each of these exerts a force back on us (Newton's 3rd law of motion). For example, when jumping we push down onto the ground and the ground then pushes back up on our feet propelling us into the air. We use a force plate (a high-tech bathroom scale) to measure these "ground reaction forces". If we were to measure Superman while he "leaps tall buildings", we would see that the force he is exerting on the ground very high in order for the ground to provide an equal and opposite force to drive him up over tall buildings!

How do movie animations like "The Hulk" move so lifelike?

Have you ever wondered how regular people are turned into monsters in the movies? They use motion capture! Reflective markers are placed all over an actor's body, where special cameras track and record these markers. Similar to connect the dots, these markers can be used to re-create the movement on the computer. This is how computer-generated movie characters can be made to move so realistically!



How fast can The Flash really run?



Accelerometers are devices used to measure accelerations. They are not used exclusively in research though. Most smart phones contain one which is used by different apps to detect the position of your phone (think about games where you tilt your phone). If we were to put one on The Flash, we would be able to see just how fast he really moves!

Whose muscles would have to work hardest to win an arm wrestling match?

Our muscles are very important for everyday life because without them, we wouldn't be able to move. As biomechanists, we are interested in how our muscles help us move, specifically how hard they have to work to make us move. For example, when trying to win an arm-wrestling match, the muscles would have to work very hard. Electromyography (EMG) lets us measure just how hard the muscles are working. In the case of arm-wrestling, if we were to put a sensor on Thor's arm, and another sensor on Superman's arm, we would be able to see which hero is working the hardest to win the match. We can also see if the person who is working the hardest, is the person who is winning the match! Try it yourself!



OPTICAL ILLUSIONS

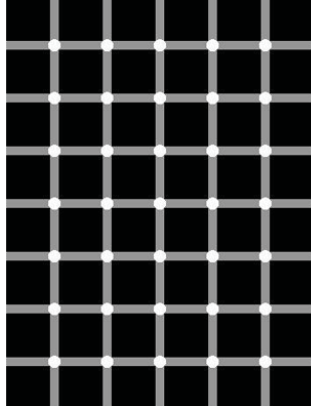
What you see depends on how you look:

How many legs do I have?



Answer: Four

Count all the black dots you can see.



Answer: There are no black dots

If you focus directly on each dot, you'll see that all of them are white.

Pump House STEAM MUSEUM



Experiments to Try at Home

Magnificent Marbling

Materials:

- Light Coloured Construction Paper
- Food Colouring
- Aluminum Roasting Pan
- Cookie sheet
- Clear Cooking Oil
- 3 Disposable Plastic Cups
- Fork
- Disposable Tablecloth

Procedure:

1. Cover your work space with a disposable tablecloth.
2. Measure 1 tablespoon of oil and 1 teaspoon of food colouring into each plastic cup. Stir the mixture with your fork until well combined. Be patient it can take some time, about 3 minutes.
3. Fill aluminum pan with a few millimetres of water.
4. Pour some of your oil and food colouring mixture into different areas of the pan. Watch how the oil spreads and colourful bursts appear!



5. Lay a piece of construction paper on top of the water. After thirty seconds carefully lift it off and hang your marbled paper from a clothesline and allow it to dry for a few hours.

The Science Behind It: Oil is more dense than water. That's why oil spills can be so bad for the environment—a little oil spreads quickly to cover a large area. It's also why the oil and food colouring mixture spreads out in your pan. Then the food colouring sticks to the paper, leaving a swirling marble-like pattern. Be creative and use different colours combinations each time.

Salty Ice Cube

Materials:

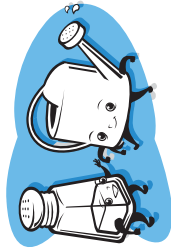
- Ice cube
- Salt
- String
- Spoon
- Plate

Procedure:

1. Place ice cube on plate and carefully lay string over ice cube.
2. Sprinkle salt onto the ice cube and string.
3. Wait approximately 30 seconds and gently lift the string.
4. The ice cube should be attached to the string!



The Science Behind It: Salt works to lower the freezing temperature of the ice cube. Thus, the salt you sprinkled on the string lowered the freezing temperature of the ice cube. This caused some water to melt around the string. When the water forms it dilutes the salt on the ice and allows the water to freeze around the string.



Pump House Steam Museum
23 Ontario Street Kingston, ON
613-544-PUMP (7867)
www.steammuseum.ca



2014

Nature Explorers Camp

at Little Cataraqui Creek Conservation Area
and Gould Lake Conservation Area for

6 to 11 year-olds



Weekly from July 2 to Aug 22

\$ 185 per week per child

Register online at www.crca.ca



CATARAQUI REGION CONSERVATION AUTHORITY
P.O. Box 160, 1641 Perth Rd. Glenburnie ON K0H 1S0
Phone: (613) 546-4228 ext. 251 Fax: (613) 547-6474
Toll-free: 1-877-956-CRCA (2722) Web: www.crca.ca



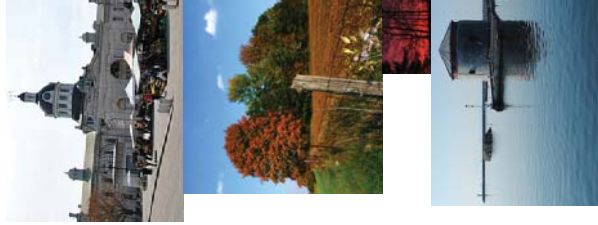
Queen's University Biological Station

Let's Go Birding!

Birds are all around us: In our city, in our parks and in our backyards. Birds are interesting and easy to watch. In fact, watching birds – an activity that is also called “birding” – is enjoyed by millions of people around the world! **Are you ready to try it?**

Visit the Queen's University Biological Station booth, and use the checklist below to keep track of all the birds you “see” on our table. We will teach you about birds, and about lots of other interesting animals that you might see while exploring outside.

Habitat
(where the bird can be found)



Common Birds of Kingston

Common Birds of Kingston	I saw this bird... at QUBS!	Outside!	And, while exploring, I also saw and heard:
Crow	<input type="checkbox"/>	<input type="checkbox"/>	Squirrel <input type="checkbox"/>
Pigeon	<input type="checkbox"/>	<input type="checkbox"/>	Raccoon <input type="checkbox"/>
Sparrow	<input type="checkbox"/>	<input type="checkbox"/>	Rabbit <input type="checkbox"/>
Starling	<input type="checkbox"/>	<input type="checkbox"/>	Groundhog <input type="checkbox"/>
Falcon / Hawk	<input type="checkbox"/>	<input type="checkbox"/>	Bee / Wasp / Hornet <input type="checkbox"/>
Finch	<input type="checkbox"/>	<input type="checkbox"/>	Human! <input type="checkbox"/>
<small>Photo © Downtown Kingston</small>			
Blue Jay	<input type="checkbox"/>	<input type="checkbox"/>	Deer <input type="checkbox"/>
Robin	<input type="checkbox"/>	<input type="checkbox"/>	Porcupine <input type="checkbox"/>
Dove	<input type="checkbox"/>	<input type="checkbox"/>	Coyote <input type="checkbox"/>
Woodpecker	<input type="checkbox"/>	<input type="checkbox"/>	Snake <input type="checkbox"/>
Cardinal	<input type="checkbox"/>	<input type="checkbox"/>	Beetle <input type="checkbox"/>
Chickadee	<input type="checkbox"/>	<input type="checkbox"/>	Butterfly <input type="checkbox"/>
<small>Photo © QUBS Outreach</small>			
Owl	<input type="checkbox"/>	<input type="checkbox"/>	Frog <input type="checkbox"/>
<small>Photo © QUBS Outreach</small>			
Duck	<input type="checkbox"/>	<input type="checkbox"/>	Muskrat <input type="checkbox"/>
Goose	<input type="checkbox"/>	<input type="checkbox"/>	Fish <input type="checkbox"/>
Cormorant	<input type="checkbox"/>	<input type="checkbox"/>	Dragonfly / Damselfly <input type="checkbox"/>
Gull	<input type="checkbox"/>	<input type="checkbox"/>	Turtle <input type="checkbox"/>
Heron	<input type="checkbox"/>	<input type="checkbox"/>	Mollusc (snail, clam) <input type="checkbox"/>
<small>Photo © Downtown Kingston</small>			

Expand your birding and wildlife-watching skills! **Join us at Eco-Adventure Camp this summer**, one-week sessions in July & August for outdoor enthusiasts and young naturalists ages 9 to 14. Information: <http://ecoadventurecamp.ca>.



Queen's Baja SAE

The Queen's Baja Design Team is a student run design team out of Queen's University that designs, manufactures and races an off-road vehicle every year. The team is made up of engineering students across several disciplines, with the majority being in Mechanical Engineering. Being on the team, the students get to learn about 3D modelling using Computer Aided Design (CAD), designing parts to withstand different loading scenarios using special analysis tools, how to then manufacture those parts and how to use the machines to actually make them. Almost every component on the car is designed and made by the team. Once the manufacture and assembly of the car is completed, it is raced in three competitions across North America against over 200 other universities from around the world. The competitions test the design of the cars and push them to their limits; the courses often have mud bogs, rock gardens, logs and jumps that the cars must navigate. In the past Queen's has performed very well, coming 7th out of the 200 teams in the last season, placing 1st in 2008 and consistently placing in the top ten.

