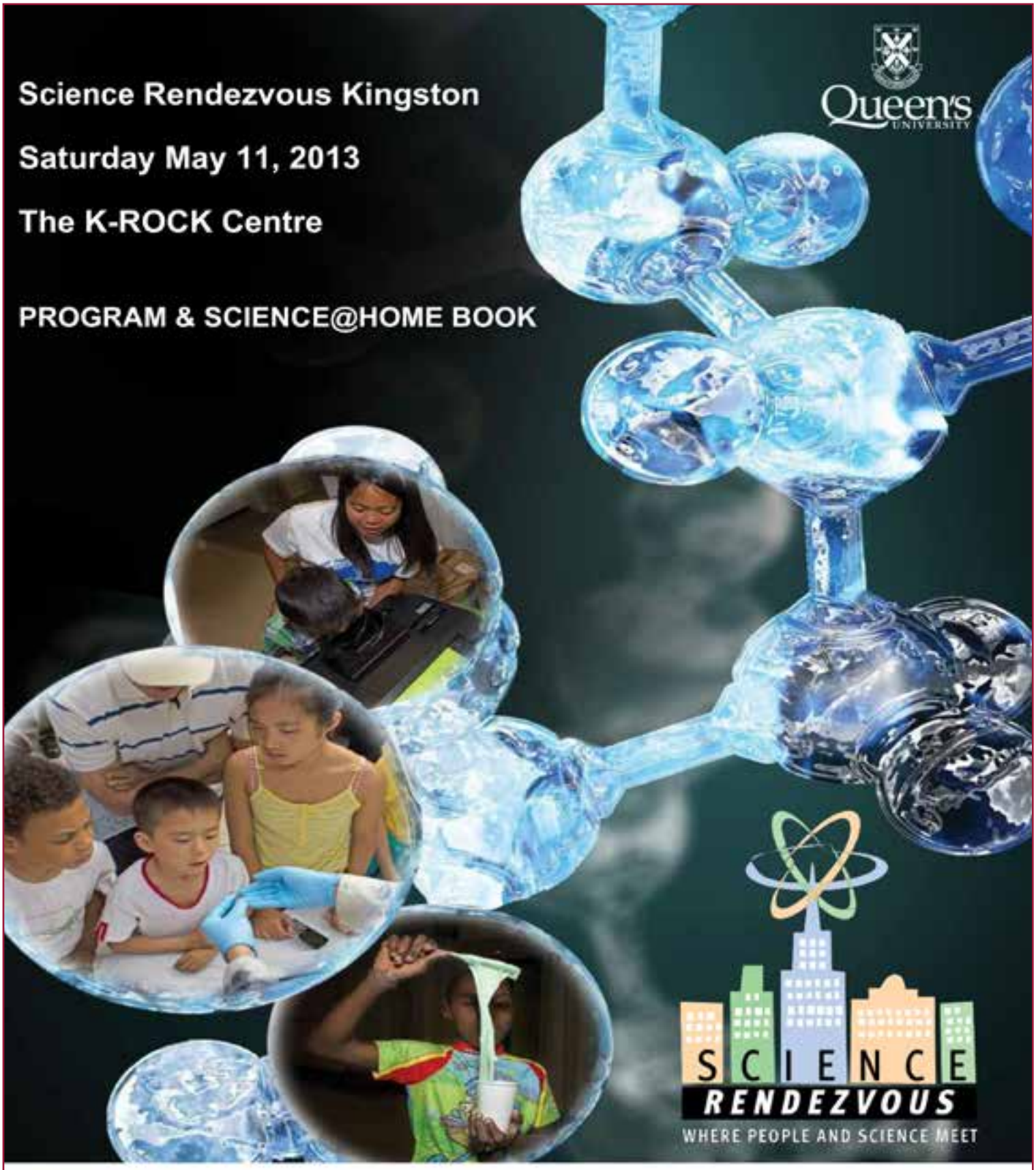
Science Rendezvous Kingston

Saturday May 11, 2013

The K-ROCK Centre

PROGRAM & SCIENCE@HOME BOOK



Queen's University

SCIENCE RENDEZVOUS

WHERE PEOPLE AND SCIENCE MEET

K ROCK CENTRE

KINGSTON'S K ROCK 105.7

Queen's Community Outreach Centre

Esso Imperial Oil Foundation

MSTE

Community Outreach Centre

Table of Contents

What is inside?

1. Proclamation by Kingston Mayor Mark Gerretson: 3
   Science Rendezvous Day in Kingston Saturday May 11, 2013
2. Letter from the Coordinator, Dr.Lynda Colgan…..……...……. 4
3. Schedule of events…….. 5
4. Sponsors ……..……. 6
5. The Stations You Can Visit and the Scientists You Can Meet There……. 7
6. Science Rendezvous Greetings……..……...…….... 19
7. Science@Home Activity Pages and Resources…..…… 20

KINGSTON

The City of Kingston

PROCLAMATION

Science Rendezvous Day

WHEREAS there is an international decline in the number of students who are pursuing careers in Science, Technology, Engineering and Mathematics (STEM); and

WHEREAS there is a need to encourage children to be curious and aware of STEM related careers; and

WHEREAS there is a need to support teachers, community leaders, parents, and other adult role models to encourage children's interest in and pursuit of science and engineering-based professions; and

WHEREAS research findings suggest that "particularly in fields like science and technology—the best scenario for learning is one in which, outside the classroom, students remain immersed in curiosity, discovery, and experimentation;" and

WHEREAS Kingston has three post-secondary institutions that have active research programs in science; a number of businesses and industries that are committed to the implementation of scientific research; many local museums dedicated to science; a large number of community organizations dedicated to conservation and ecology; and

WHEREAS the City of Kingston is widely recognized for its efforts in sustainability; and

WHEREAS, across Canada the second Saturday in May is dedicated to *Science Rendezvous*—a day to celebrate and honour science, research, scientists and careers in science;

THEREFORE, I, Mark Gerretsen, do hereby proclaim May 11, 2013, as "Science Rendezvous Day" in the City of Kingston. I encourage all citizens open their eyes and minds to the wonderful world of possibilities that exists by pursuing science studies and considering scientific careers.

DATED at Kingston this 20th day of February, 2013

Mark Gerretsen
Mayor

Letter from the Coordinator, Dr. Lynda Colgan

Welcome to Science Rendezvous Kingston 2013!

Today, all across Canada, at Universities and Community Centres and in parks and on street corners, tens of thousands of people are participating in exciting, interactive public festivals where people and science meet!

The goal of the day is to share the work of the dedicated scientists in our local community — individuals who strive to improve our quality of life, sustain our environment and all the components within it, and advance knowledge through formal and informal methods. Through our program, it is hoped that your curiosity will be sparked and that you will be inspired to learn about all of the ways that science, technology, engineering and mathematics (STEM) impact each and every one of us daily, in explicit and implicit ways. By the end of your visit it is hoped that you have a broader view of what science is and what scientists do.

Science Rendezvous is a part of a dynamic campaign to change societal attitudes towards STEM subjects. *"Science is a word we throw around and sometimes understand only as academics in white coats doing research in laboratories."* Bonnie Schmidt

The reason for such a sea change is crucial: for Canada to be a global leader and to stay competitive and productive, we need to encourage our young people to consider careers in STEM fields.

In a recent article, Dr. Bonnie Schmidt, President of *Let's Talk Science*, cited the following facts as she wrote about the ways in which STEM education impact Canada's job market and economy:

- By the end of high school the majority of Canadian students take no science at all;
- Of 15 highest-demand careers, almost all require STEM education;
- The greatest demand is for healthcare professionals and managers, engineering science and technical occupations;
- Job growth is also predicted in skilled trades requiring STEM education;
- Government projections are 75 percent of new jobs over next 10 years will be high-skill; and,
- The Conference Board of Canada ranking puts Canada near the bottom in innovation compared to other developed countries (14th out of 17).

Rene Barlow, Executive Director of *Youth Science Canada* argues that many adults make the erroneous assumption that students make career choices in high school, when in fact, a 2011 study found that most chose whether or not to pursue STEM by the end of grade eight. With little knowledge of what STEM offers, middle school students are "opting out" when opportunities in the field have never been greater.

Many individuals contribute to a child's education both inside and beyond classroom walls: parents, family members, teachers, community volunteers, expert peers and role models in the Arts, academics and athletics. It is my hope that the many presenters at our amazing displays and activity stations will spark the imagination of children in STEM subjects and encourage the many teachers in a child's life to advocate for the possibilities afforded by a STEM education. Chef or mechanic, meteorologist or oceanographer, or any one of thousands of other career options are possible through STEM. It is never too early for children to believe that with the right combination of knowledge, curiosity and creativity they can change the world.

Schedule of Events

10:00 a.m.	**OPENING CEREMONIES** *Chris Whyman, Kingston Town Crier* *Dr. Ted Hsu, MP, Kingston & The Islands* *Dr. Stephen Elliott, Dean, Faculty of Education, Queen's* *Dr. Lynda Colgan, Science Rendezvous Coordinator*
10:15 a.m. to 3:00 p.m.	Science Rendezvous Stations and Explorations: The K-Rock Centre and The Tragically Hip Way
11:00 a.m.	Chemistry Magic Show
1:00 p.m.	Chemistry Magic Show

VOTE FOR YOUR FAVOURITE STATION!
TAKE HOME A SCIENCE RENDEZVOUS BALLOON AND T-SHIRT!
POSE WITH A FAMOUS SCIENTIST!
ENTER TO WIN PRIZES!

Community Outreach Centre

Faculty of Education

Community Outreach Centre
Queen's University
Faculty of Education A364
511 Union Street
Kingston ON Canada K7M 5R7
(613) 533-6000 X 75775
community.outreach@queensu.ca

To learn more about the work of the Community Outreach Centre; download resources (including math songs, lessons and video) to use to support learning at home or in the classroom; or, register for workshops & activities, visit:

http://educ.queensu.ca/community/outreachcentre.html

Community Outreach Centre

A Special Thank You!

The following individuals have been instrumental in making *Science Rendezvous Kingston 2013* possible. Without their continuous efforts and many contributions, it would not have been possible to turn The K-ROCK Centre and The Tragically Hip Way into a giant Science Discovery Centre!

Faculty of Education	Vicky Arnold Don Kersey
Community Outreach Centre	Lynda Colgan Nancy Dalgarno Dustin Garrett Kim Garrett
Book Production (The Campus Bookstore)	Andrew Sutton
Floorplan	Tom Riddolls
K-ROCK Centre	Lynn Carlotto Anne Lindsay Ken Noakes Kent Taggart
Rogers Radio Group Kingston (Kingston's K-ROCK 105.7)	Dave Hopkins Dave Ligthart
Advisory Committee	Neda Bavarian Christine Bibic Ann Blake Kyle Clarke Phillip Jessop Gillian Mackey Kimberley Sutherland-Mills Henk Wevers
Photographers	Megan Bond Sandy Fanning
Royal Military College of Canada Coordinator	Neda Bavarian
Sponsorship	Kyle Clarke Gillian Mackey

Sponsors

SCIENCE RENDEZVOUS
WHERE PEOPLE AND SCIENCE MEET

The Community Outreach Centre, Faculty of Education, Queen's University would like to express appreciation to the following businesses and organizations for supporting the 3rd Annual *SCIENCE RENDEZVOUS KINGSTON* held on Saturday May 11, 2013 at K-Rock Centre. Without their generous support, this important public education event would not have been possible.

In-Kind Support

The K-Rock Centre
K-Rock 105.7
The Campus Bookstore, Queen's University
Queen's Publishing and Copy Centre
Digigraphics/Delta Printing
The Rocking Horse

Financial Support

The Imperial Oil Foundation
The Mathematics, Science & Technology Group (MSTE)
Office of the Principal, Queen's University
Golder Associates
GreenCentre Canada

Door Prizes

Office of Advancement (Queen's University)
Ayva Educational Solutions
Kelsey's
Kingston Association of Museums
Marine Museum of the Great Lakes at Kingston
Minotaur Games & Gifts
Novel Idea
Staples
TD Friends of the Environment Foundation

Community Outreach Centre

Stations to Visit and Scientists to meet…….

1. **Canadian Association for Girls in Science (CAGIS) - Kingston Chapter**

Building Bridges: *Learn about strong structures by building bridges out of simple household materials and testing their strength with various weights. Come test your bridge building skills!*

Station Coordinator:
Jessamyn Little

Station Volunteers:
Mei-Ni Belzile
Laura Hull

2. **Cataraqui Region Conservation Authority**

Stop by our booth as it will consist of an *information board, some taxidermy, and handouts!*

Station Coordinator:
Matt Ellerbeck

Station Volunteers:
Clinton Alexander

3. **Cataraqui Archaeological Research Foundation**

Cataraqui Archaeological Research Foundation

The Dirt on Digging: *Come help unearth ancient artifacts and unlock their secret messages using hieroglyphics from 3 ancient cultures! Make your own artifact to take home!*

Station Coordinator:
Ashley Mendes

Station Volunteers:

Kip Parker
Jeff Seibert

4. **FLASF Science Fair**

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 Coordinator:
Linda Lamoureux & Elizabeth Suriyuth

Station Volunteers: FLASF 2013 Science Fair participants

Mac Lamoureux
David Lougheed
Sydney Mosaheb

Stations to Visit and Scientists to meet……..…

5. **Henk Wevers (Professor Emeritus, Mechanical Engineering Queen's)**

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

Station Volunteers:
Klaus Bescherer-Nachtmann

6. **Kingston Field Naturalists**

Flight of the Small Aviator: Butterflies. *2012 was an exceptional year for spring migrants! We will explore some of the reasons why and look at species around Kingston as seasons change. Come and see the exciting time lapse photography and do a butterfly activity that stands out.*

Station Coordinator:
Shirley French

Station Volunteers:
Ariel Gittens
Janis Grant

7. Kingston Frontenac Public library

Science Books. *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 here at the K-Rock Centre!*

Station Coordinator:
Kimberly Sutherland Mills

Station Volunteers:
Emma Bell
Brianne Peters
Brenda MacDonald

8. Kingston Police Force

Come on over to watch our tactical squad rappel down inside the K-Rock Centre! We also have an accident reconstruction station and "Johnny 5" our tactical robot would like to meet you!

Station Coordinator:
Lillian Walcer

Station Volunteers:
Sergeant Darren Keuhl
Sergeant Steve Saunders

8

Stations to Visit and Scientists to meet……

9. **Kingston Youth Arts Cooperative**

Come over to see some juggling, face painting, and boom whackers! It will be loads of fun!

Station Coordinator:
Mary Greenspan
Station Volunteers:
Caitlin Barton
Ronald Smith
Kaye Byars

10. **Maclachlan Woodworking Museum**

Wood in Warfare: catapults and trebuchets. *Come make your own weapons – we will test them by launching harmless balls at targets. You will have to build a plan, evaluate structures and create your own machine!*

Station Coordinator:
Tom Riddolls
Station Volunteer:
Jamie McKenzie-Naish

11. **Miller Museum of Geology**

Rock and Roll: The Science of Earthquakes and Tsunami. *Find out what causes earthquakes and tsunamis! Interactive activities show how faults in the rocks can store energy, and how the released energy waves shake the Earth. A demonstration of how undersea earthquakes can produce deadly tsunamis thousands of km away!*

Station Coordinator:
Mark Badham

Station Volunteers:
Brad Badham
Farisa Mohammed

12. **Geomatics Section – Ministry of Transportation**

Explore the World of Surveying and Geomatics at MTO: *you will see the various data, tools and technologies used by today's Surveyors and Geomatic professionals!*

Station Coordinator:
Michael Matthews

Station Volunteers:
Emily Agar
Steve Bruce
Michael See
Tom Hayes
Nigel Day

9

Stations to Visit and Scientists to Meet…….

13. **Museum of Health Care at Kingston**

Germ Detectives: *Learn all about germs and take a look at your hands in a special black light box to discover how clean they really are!*

Station Coordinator:
Jenny Stepa

Station Volunteers:
Tiffany Martin
Stephanie Stobbe

14. **Prince Edward Point Bird Observatory**

Migration Monitoring at Prince Edward Point: an Introduction to the annual bird banding and bird migration monitoring that goes on at the Observatory: *Interactive bird identification games/puzzles (with prizes), a video presentation and information on how/when you can visit the Observatory*

Station Coordinator:
Peter Fuller

Station Volunteers:
Carolyn Barnes
Vickie Clowater

15. **Pump House Steam Museum**

Water Works! *Build your own water pump and discover the power of water.*

Station Coordinator:
Gordon Robinson

Station Volunteers:
Melissa Cruise

16. **Queen's Baja SAE Design Team**

SAE Team: *We are a student run team that designs, builds and races a single seat off-road vehicle at 3 SAE sanctioned events across North America.*

Station Coordinator:
Luke Damron

Station Volunteers:
Chris Carrick
Kevin McCathie

Stations to Visit and Scientists to Meet……..

17. **Queen's Centre for Neuroscience Studies**

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 see what little critters can do to teach us about the nervous system!*

Station Coordinator:
Kasey Hemington

Station Volunteers:
Noor Al Dahhan
Ethan Heming
Mohsen Omrani
Angelina Paolozza
Ben Chang
Hailey McInnis
Ashley Parr

18. **Queen's Child & Adolescent Dev. Group Dept. of Psychology**

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:
Jeannette Benson
Ruxandra Filip
Jessica Lougheed
Kathleen Merwin
Scott Robson
Mark Sabbagh
Pablo Sabbagh

19. **Queen's Clinical Simulation Centre**

Patient Welfare First – Display of partial trainers used to train doctors, nurses and therapists in a simulated environment! *Kids can try a laparoscopic surgery trainer and airway trainer with the help of nurses to provide guidance and supervision.*

Station Coordinator:
Kim Garrison

Station Volunteers:
Alicia Clark
Dan Johnson
Ruth Johnson
Anne Prouse

20. **Queen's Department of Chemistry**

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

Station Coordinator:
Gillian Mackey

Station Volunteers:
Nicholas Andrews
Katie Groom
Lili Mats
Ashley McMath
John Saunders
Nausheen Sadiq

Stations and Volunteers Who Make It Happen…

21. Queen's Department of Chemistry

Chemistry Magic Show: *What else is there to say? Come see what the excitement is all about!*

Station Coordinator:
Philip Jessop

Station Volunteers:

Trisha Ang
Marie Barnes
Kyle Boniface
Brandon Moore
Christene Smith
Samantha Voth
Tamara deWinter

22. Queen's Department of Electrical & Computer Engineering

Come over to see a robot in action! You will be impressed!

Station Coordinator:
Michael Greenspan

23. Queen's Dept. of Pathology & Molecular Medicine Graduate Students

DNA Extraction: DNA is what makes you YOU! *Extract your own DNA using household items.*

Station Coordinator:
Mackenzie Bowman

Station Volunteers:

Silvia Albanez
Jackie Leonard
Victoria Hoskin
Lindsey Hawke

Stations and Volunteers Who Make It Happen…

24. **Queen's Dept. of Physics, Engineering Physics & Astronomy: Ultrafast**

Coldplay: Low Temperature Experiments! *Ever wondered what -196 degrees feels like? You can float a magnet above a superconductor, hammer a nail with a banana and make tasty ice cream using very 'cool' liquid nitrogen!*

Station Coordinator:
Anneke Timan

Station Volunteers:
Mitchel Anderson
David Taylor

25. **Queen's Geological Sciences and Engineering**

Fun with Rocks! *Come pan for gold, make rock candy, and learn about Earth's natural wonders!*

Station Coordinator:
Ryan Dhillon

Station Volunteers:
Andres Acevedo
Jenn Bentz
Greg Burzynski
Rohanna Gibson
Anezka Radkova
Paul Stewart
Bart Warren

26. **Queen's KGH & Hotel Dieu Hospitals, Human Mobility Research Centre**

Human Mobility Research Centre. *At HMRC our focus is helping people live fuller, more reliable lives by pioneering the development of innovative and effective treatment strategies for bone and joint disorders caused by arthritis, osteoporosis, injury, and related problems.*

Station Coordinator:
Joan Willison

Station Volunteers:
Lydia North
Leone Ploeg
Yvonne Schumacher

27. **Queen's Laboratory for Percutaneous Surgery, 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:
Tamas Ungi

Station Volunteers:
Manjunath Anand
Ryan Anderson
Eric Moult

Stations and Volunteers Who Make It Happen…

28. **Queen's Solar Design (QSDT)**

QUEEN'S SOLAR DESIGN TEAM

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:
Graham Calvin

29. **Queen's Space Engineering Team**

QUEEN'S SPACE ENGINEERING TEAM

Our main goal as the QSET is to provide an environment where students can develop industry transferable skills through hands-on experience (mechanical, mining and electrical, to chemical and financial). We are currently 1 of 3 Canadian schools competing in NASA's Lunabotics Competition 2013.

Station Coordinator:
Jessica Steeves

Station Volunteers:
Sean Connolly
Adam Hall
Andrew Ironside
Sydney Koby
James McLean
Will Phippen

30. **Queen's University Biological Station and the Elbow Lake Environmental Education Centre**

Biology *Come out to see our full display of biological specimens and learn about some of the amazing discoveries being made at Canada's largest biology station!*

Station Coordinator:
Mark Andrew Conboy

31. **RMCC Astronomy and Astrophysics**

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

Station Coordinator:
Karen Lee-Waddell

Station Volunteers:
Alexandre David-Uraz
Robert Waddell
Lindsay Holmes

32. **RMCC (Biology)**

Planting: *Investigate how soil invertebrates help create a nurturing environment for plant growth, and how pumpkin plants can be used to keep soil healthy by extracting contaminants. Plant a pumpkin seed in soil with a worm and take it home to watch it grow!*

Station Coordinators:
Michele Parisien & Barb Zeeb

Station Volunteers:

Brian Campbell
Mackenzie Denyes
Teresa Liu
Surmita Paul

33. **RMCC (Chemistry)**

What is the Matter? *We will describe the states of matter and melting, boiling and freezing process in fun fashion and interactive ways using water, ice, liquid and solid freezies.*

Station Coordinator:
Neda Bavarian

Station Volunteers:

Michelle Bégin-Major
Justine Deveau
Bob Whitehead

34. **RMCC (Environmental Engineering)**

The Science Behind Green Roofs. *Come see shingled roofs and a green roof bombarded with a heat lamp. Participants are able to touch the roofs and see how hot they are for themselves.*

Station Coordinator:
Kela Weber

Station Volunteers:

Cosmo Lauzon
Jeffrey MacDonald

35. **RMCC (Civil Engineering)**

Civil Engineering Demonstrations. *Come see how a high speed camera captures failure to watch it in slow motion, test the stability of a building on a sand column, and much more!*

Station Coordinator:
Kristine Mattson

Station Volunteers:

Shawn Burdett
Fawzy Ezzein
Yasan Qasrawi
Lee-Ann Sills
Bardia Tabiatnejad
Nick Vlachopoulos

36. **RMCC (DNA/Animal Physiology)**

Frog Centre: *Come discover metamorphosis, frog origami, frog jokes and pollution impact.*

Station Coordinator:
Valerie Langlois

Station Volunteers:

Sonja Bisseger	Laura Gibson
Justine Denoncourt	Kira MacDougall
Diana Flood	Gratn Norman

37. **RMCC (Environmental Contaminants)**

Identification of Environmental Contaminants. *Learn how chemical spills occur and how these chemicals can be identified in the soil or groundwater. Explore our mobile laboratory and examine samples.*

Station Coordinator:
Daniela Loock & Dean Morrow

Station Volunteers:

Lauren Forrester	Kim House
Ian Goode	Megan Lord-Hoyle
Sharilynn Hoobin	Shari Reed

38. **RMCC (Environmental Field Work in the Arctic)**

Environmental Field Work in the Arctic. *Will illustrate how contaminated soils and sediments are identified in the Artic. You will be able to collect soil samples and see pictures of actual field work, not to mention hands-on activities and the chance to try on gear.*

Station Coordinators:
Daniela Loock & Dean Morrow

Station Volunteers:

Andrea Ellis	Sheila Johnston
Dustin Ellis	Rob Williams

39. **RMCC (Inorganic Chemistry)**

Environmental Remediation: *The use of surfactants in environmental remediation.*

Station Coordinator:
Jennifer Scott

Station Volunteers:

Kelly Milliken	Joanna Asia-Zolnierczyk

Stations and Volunteers Who Make It Happen…

40. **RMCC (Nuclear)**

The SLOWPOKE-2 Facility at the Royal Military College of Canada (RMCC): *Hands-on experience using radiation detectors, an illustration of the RMCC SLOWPOKE-2 Facility and a game on controlling reactor stability.*

Station Coordinator:
Kathy Nielsen

Station Volunteers:
Dr. Paul Chan
Maria Iligan
Daniel Mullins
Adrian Pang
Dylan Pierce
Andrew Prudil

41. **Salamander Conservation**

Save the Salamanders Display. *Learn about the conservation and protection of salamanders. Will feature live species and informative handouts.*

Station Coordinator:
Matt Ellerbeck – Salamander Conservationist

Station Volunteers:
Clinton Alexander

42. **St. Lawrence College**

Sustainable Energy and Energy Management: *Use renewable energy equipment and building energy management systems to produce clean energy and reduce energy consumption in buildings.*

Station Coordinator:
Steve Lapp
:

43. **Ted Hsu**

MP Ted Hsu Talks Science: *Kids will have an opportunity to enter contests, answer skill-testing questions and/or participate in activities related to the skills necessary for careers in science. Kids can talk and ask Ted questions related to science and his work in parliament.*

Station Coordinator:
Ted Hsu

Station Volunteers:
Raly Chakarova
Sam Gregory
Nicole Honderich
Rafael Rodriguez
Maddy Ross
Megan Stiff

44. **The Queen's Faculty of Engineering and Applied Science**

Design Hoopla! *Try out different launcher designs to get a ball through a hoop. Get a taste of the engineering design process, and see that engineering is about applying science to meet a need.*

Station Coordinator:
Gillian Woodruff and Corrine Hoas

Station Volunteers:
Melanie Robb

45. **The Real Batman**

BATS. *Visitors can view images of bats from around the world, use a microscope to figure out what local bats eat and build a bat house to take home ($20 while supplies last). Questions about bats and bat stories are appreciated!*

Station Coordinator:
Matt Saunders

46. **W.A.F.F.L.E.S.**

Robotic demos for different age groups 6-9, 9-14 and high school. Opportunities to try operating different robots.

Station Coordinator:
Christine Bibic

SCIENCE RENDEZVOUS
WHERE PEOPLE AND SCIENCE MEET

18

Ted Hsu, MP
Kingston and the Islands

14-303 Bagot Street, Kingston
Ontario, K7K 5W7
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www.tedhsu.ca | ted.hsu@parl.gc.ca

Welcome all participants to Science Rendezvous Kingston

John Gerretsen, M.P.P.
Kingston and The Islands

Constituency Office:
303 Bagot Street, Suite 2
Kingston, ON
K7K 5W7

Phone: (613) 547-2363
Fax: (613) 547-5001

jgerretsen.mpp.co@liberal.ola.org
www.johngerretsen.onmpp.ca

The volunteers who have made Science Rendezvous Kingston 2013 possible would like to extend your experience beyond our one day festival by inviting you to try out some simple, but exciting activities, projects and experiments at home.

On the following pages you will find instructions and information about everything from green roofs to bats! You will learn about steam engines, nuclear reactors and how to make your own air quality test kit!

RESOURCES FOR PARENTS & TEACHERS

Websites

http://science-at-home.org/

http://www.tvokids.com/shows/primeradicals

http://www.sciencebob.com/experiments/index.php

http://www.ontariosciencecentre.ca/School/Resources/Teacher/

http://nature.ca/notebooks/english/mon2.htm

http://sciencetech.technomuses.ca/english/schoolzone/try-this-out.cfm

http://www.science.gc.ca/default.asp?lang=En&n=0EECFABF-1

Canadian Association for Girls in Science (CAGIS)

Kingston Chapter

How-to-Make Paper Chromatography Flowers

Materials needed:

- Plastic bag
- Coffee filter
- Washable markers
- Spray bottle (filled with water)

Instructions:

1. Cover a flat surface with a plastic bag to use as your work area.
2. Place a coffee filter flat on the plastic bag surface and use washable markers to draw a colourful design.
3. On the plastic surface, spray just enough water to lightly wet the coffee filter and lay it flat to dry (be careful not to make a mess!).
4. Once dry, pinch the bottom of the coffee filter and gently twist to form a stem. Then, fold out the top of the coffee filter to form the flower petals!

The SCIENCE of what's happening:

Water on the coffee filter spreads via "capillary action" carrying the colours from the markers with it. Notice how some colours, like black, will separate into many different colours!

Discover some of the fields of Science, Technology, Engineering, and Mathematics in this WORD SEARCH!

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

ASTRONOMY BIOINFORMATICS BIOLOGY
CHEMISTRY COMPUTERSCIENCE ENGINEERING
FORENSICS GEOSCIENCE KINESIOLOGY
MATHEMATICS MEDICINE METEOROLOGY
NANOTECHNOLOGY PHYSICS PSYCHOLOGY

Want to find out more information about CAGIS?

Visit our website: www.cagis.ca

E-mail us: CAGISKingston@gmail.com

What is a Watershed?

Watersheds are place we call home. A watershed is an area of land that is drained by a river and its tributaries into a particular body of water such a pond, lake or ocean. Think about your local creek, river or stream. Where does it start? What types of landscapes does it pass through and where does it end up? All of the area covered is a watershed."

A Watershed Example

Our water that we use is 'recycled water.' Water exists on the surface of the earth, underground and in the air as humidity and precipitation. Through the water cycle, all of our water gets recycled from the earth to the air and back to the earth. Water conservation should not be just a choice, but a way of life.

What will do you do to conserve water?

CATARAQUI REGION CONSERVATION AUTHORITY
P.O. Box 160 ◆ 1641 Perth Road ◆ Glenburnie ON ◆ K0H 1S0
Phone: (613) 546-4228 Fax: (613) 547-6474
E-mail: crca@cataraquiregion.on.ca Website: www.cataraquiregion.on.ca

The Dirt on Digging: Ancient Pottery Puzzle

CATARAQUI ARCHAEOLOGICAL RESEARCH FOUNDATION

Colour this Middle Woodlands clay vessel. Glue it onto a piece of cardboard or cardstock. A side of an empty cereal box works really well! When the glue has dried, cut out the pot. Most pots that are found by archaeologists are in pieces and need to be carefully put back together. Cut your pot up into 5-10 pieces. The more pieces you "break" it up into, the harder your job will be when you piece it together again. Good luck!

Pottery vessels like this one were created and used by First Nations communities in the Maritimes. A vessel like this would have been used for holding water or cooking. Pottery like this was made from 500 B.C. and onwards, during what was called the Middle Woodland period.

Frontenac, Lennox and Addington Science Fair

Visit FLASF at www.flasf.on.ca for more experiments and science project ideas.

FLASF Regional Science Fair occurs every spring. For more information visit www.flasf.on.ca

FLASF's Outreach team visits classrooms providing science fair presentations and mentoring. Contact outreach@flasf.on.ca

Dancing Raisins!

What makes the raisins dance in this experiment?

Materials:
a can of colourless pop or Club Soda
a tall, clear glass or container
8 to 10 fresh raisins

Pour the can of soda into a tall glass. Notice the bubbles coming up from the bottom of the glass. The bubbles are carbon dioxide gas being released from the liquid.

Carefully drop 8 to 10 raisins into the glass. Observe the raisins for several minutes. What do you see? What is happening to the raisins? Why is this happening?

The dense raisins fall to the bottom of the glass where the carbon dioxide bubbles from the pop or soda adhere to the rough surface of the raisins. The bubbles of carbon dioxide increase the raisins buoyancy causing them to rise. When the raisins reach the surface of the liquid the carbon dioxide escapes into the air and the raisin sinks to the bottom of the glass.

Science Fair is open to all students in grades 5-12 regardless of school participation.

FLASF presented students with more that $15,000 in prizes, this year, from our sponsors.

Go Fly a Kite!

How does a kite having a tail affect its performance?

Build on your experiment by testing to see if tail length improve performance: try tails of different lengths.

Use a store bought kite to test if no tail, one tail or two tails allows for better kite flying performance.

Pump up your experiment!

Test for speed - fly your kite as you stand, walk, and run.

Test for height - use different lengths of string as you fly your kite.

Do these changes improve performance?

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…

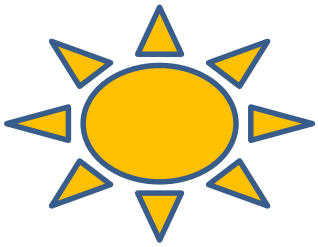
Experiment 2: Take a glass of water from the tap and heat it in the microwave oven set at 10 minutes and on high power. Measure the time to boil with a watch or stopwatch; depending on the oven it may take 2 minutes more or less. The water boils when you can see the bubbles rising in the liquid and steam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

Flight of the Small Aviator:



Migrants

- no overwintering stage in Kingston
- ~10% of ~90 butterfly species are migrants
- Common Buckeye (spring)

Photo by Bruce Ripley

- Red Admiral (spring arrival)

Photo by John Poland

- Monarch (fall)

Residents

- > 90% of butterflies in the Kingston region are residents;

Glue Pop-up along middle

ie. at least one stage overwinters here

- Gray Hairstreak (very rare here)

Photo by Bruce Ripley

- Giant Swallowtails (arrived in 2006) *Photo by Bruce Ripley*
- Black Swallowtail

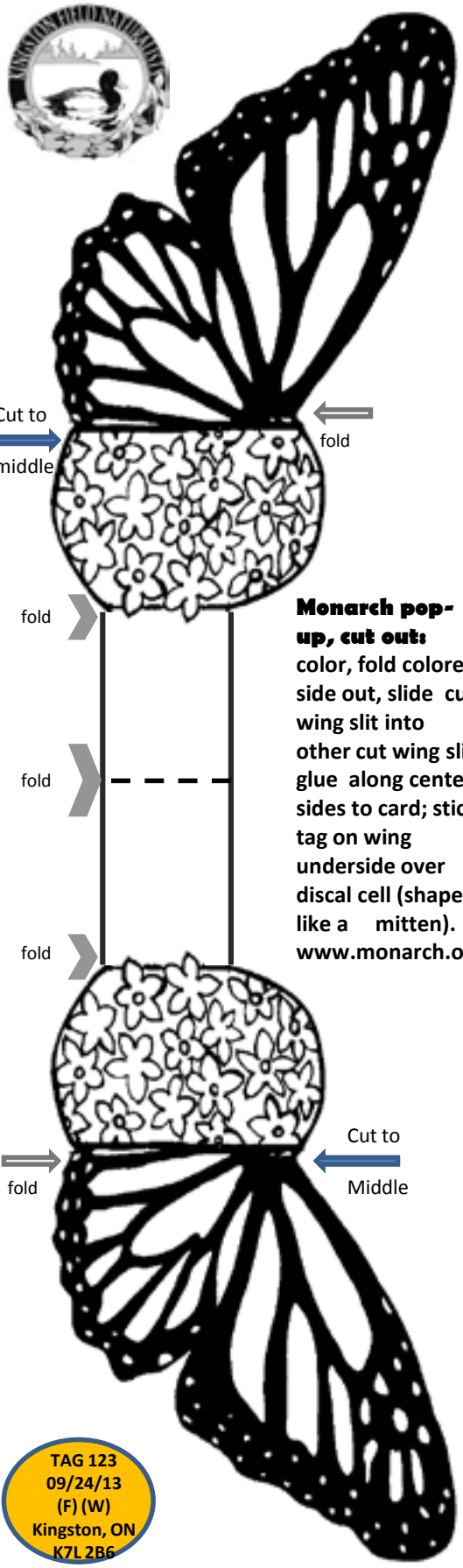
photo by Jan Elliott

- Mourning Cloak

Photo by John Poland

Butterflies

www.kingstonfieldnaturalists.org



Monarch pop-up, cut out: color, fold colored side out, slide cut wing slit into other cut wing slit; glue along center sides to card; stick tag on wing underside over discal cell (shaped like a mitten). www.monarch.org

TAG 123
09/24/13
(F) (W)
Kingston, ON
K7L 2B6

Tag Code (ie. TAG 123)
Release date: 09/24/13
Female (F) or Male (M); Reared (R) or Wild (W)
City, Province, Postal Code

Books to Inspire Young Scientists

For more suggestions visit www.pinterest.com/kfpl/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.

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.

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.

My Little Handbook of Experiments: Physics, Water and Light, Ecology by Denis Pero (2012)
Explore the world of science with step-by-step explanations of simple and but fascinating experiments.

TIME for Kids Big Book of Science Experiment: A Step-by-Step Guide
by Time for Kids Editors (2011)
Kids 8 to 12 will love this full-colour book, which presents 100 fresh and intriguing experiments in physical, life and earth sciences.

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.

Science Rendezvous Kingston 2013
Kingston Police "Take-Home Book" Page

The Kingston Police have many specialty units within our organization. One of the specialty units is the "Traffic Safety Unit". This unit is comprised of officers that are involved in a variety of tasks such as: collision reconstruction, traffic enforcement, community complaints, RIDE program, breath technician program, commercial vehicle enforcement, parades, and collision training.

The Kingston Police Collision Reconstruction team are specially trained officers that have completed several training courses. The officers are trained to use several pieces of equipment, some of which include: a Total Station (surveying equipment designed to forensically map a collision scene), a drag sled (equipment designed to determine the coefficient of friction of the roadway – i.e. the "stickiness of the road"), fiberglass measuring tape (for completing unique measurements), smart level (for taking the angle/grade of the roadway), Crash Data Recorder (designed for downloading the "black box" of a vehicle),CAD software (Computer Aided Design – drawing program) and heavy weight scales.

Collision Reconstructionists are considered expert witnesses when testifying in court. The Kingston Police Reconstruction team will respond to collisions within the City of Kingston and assist other Police agencies as required. The Collision Reconstruction team will respond to collisions involving life threatening injuries, fatalities, high profile, unexplained, and also assist front line officers.

Collision Reconstruction is an interpretation formed by piecing together bits of evidence and witness information and other details. In addition, it is the analysis of physical evidence left after a collision toward reaching an understanding of, and the factors or actions which may have lead to those events. i.e. What lead up to the collision, what happened at the time of the collision, and what happened a short time after the collision.

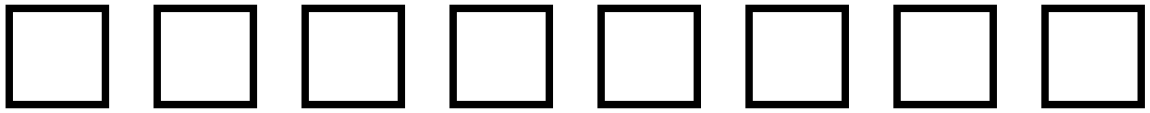
One of the questions that is commonly asked of a Collision Reconstructionist is "How fast were the cars going"? One of the methods that is used to determine the pre-collision speeds of two vehicles that have been involved in a collision is the interpretation of the physics of 'momentum'. Momentum is a system based quantity. An object's momentum is represented as its mass times its velocity. Momentum is a vector with speed and direction; i.e. mass in motion. We consider the conservation of momentum - the total momentum present in a system before a collision remains constant after the collision. We also use Newton's Laws of Motion.

By using all of the above discussed concepts and information, and the evidence left at a collision scene, it can be possible to determine the following: The incoming angles of the vehicles prior to the collision, the outgoing angles of the vehicles after the collision, the mass of the vehicles (including the occupants and any loads that they may have had) and the distances travelled from the time of the collision to their final rest position. By determining these factors, it can be possible to calculate the speed the vehicles were travelling prior to the collision (and after the collision) to answer that very question – "How fast were the cars going"?

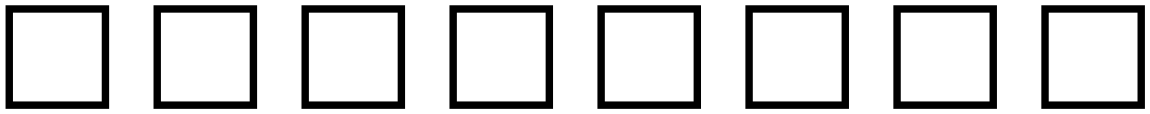
Kingston Youth Arts Cooperative

_____'s Melodies

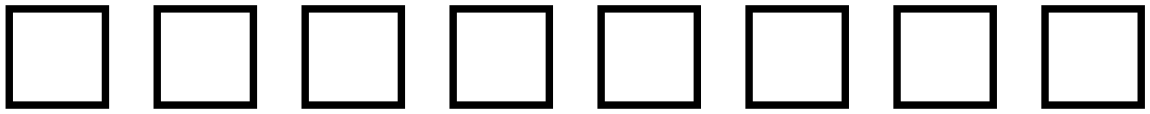
Use the Boomwhackers to create your own melodies.
When you are done, use the crayons to write it down in these boxes.



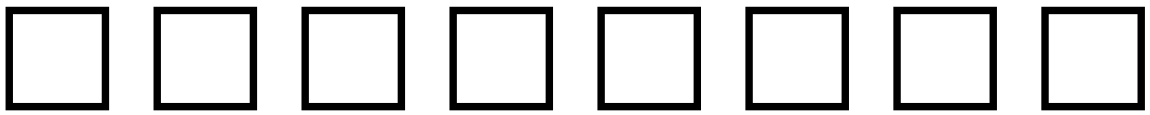
Create another melody:



Create a melody that uses the same colour more than once:



Create a melody that only uses three colours:



© Caitlin Barton, 2013

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

MacLachlan
WOODWORKING MUSEUM

Miller Museum of Geology | Queen's University, Kingston

MAKE YOUR OWN SEISMOGRAPH!

The ground movement during an earthquake is recorded using a seismograph where the intensity of vibration is shown by drawing lines on paper. The greater the intensity of vibration the farther the lines diverge from the centre and the greater the magnitude. Check out the steps below to make your own seismograph at home!

WHAT YOU WILL NEED:
Empty cereal box, paper cup, 1 pencil, string, scissors, masking tape, ruler, sand, hole punch, paper and a hot glue gun* (*please have the supervision of an adult when using a hot glue gun).

STEP 1:

- Cut the front and back out of a cereal box, 2.5 cm from each side.
- Before taping the lid closed, punch a hole in the centre for the string that holds up the cup, and cut two 6 cm wide slits, 1 cm from the bottom of each side, where the paper or cardboard will feed through.

STEP 2:

- Punch a hole through the bottom of the cup and feed the pencil through. Hot glue around the pencil to keep it in place. If adult supervision is not available, please use tape instead.

STEP 3:

- Punch four holes, 1 cm from the rim of the cup, and feed two pieces of string through.
- Make sure each string is greater than 40 cm in length. As you feed through the holes, loop around the pencil to hold it in the centre of the cup.

STEP 4:

- Fill the cup with a 2.5 cm thick layer of sand
- Trace out a circle of cardboard from the excess pieces and punch a hole through the top and place over the pencil to fit over the top of the cup. Hot glue the rim and around the pencil to keep in place (use tape if adult supervision is not available)!

STEP 5:

- Feed a piece of paper or cardboard through the slits you made in Step 1.
- Feed each piece of string through the hole at the top of the cereal box and secure at the length at which the pencil touches the paper or cardboard *(see picture at the top)*.

You have now created your very own seismograph! Place the seismograph on top of a vibrating dryer and slowly pull the paper or cardboard through the slot. The pencil will record the vibrations just like a seismograph. Try it in a moving car!

Adapted from: http://www.mrsec.psu.edu/education/nano-activities/

Today's Online Mapping Tools

Geomatics Section - Ministry of Transportation

Plan a family trip with:

MTO's Traveller's Road Information Portal (TRIP).
Check in on current traffic with online traffic cameras, road conditions, closings and incidents.

1) Go to: http://www.ontario.ca/511

2) Select any area you like, Kingston for trips closer to home, or North Bay perhaps if you're planning a camping trip!

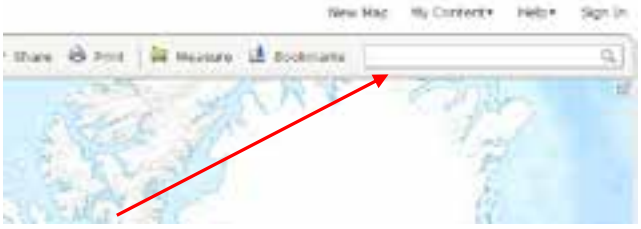
3) You can zoom to different areas on the map, turn on different layers by clicking in the circle to the left and look through different pre-made interactive maps on the left hand side of the screen.

Make your Own Map Online!!

On ESRI ArcGIS Online you can access numerous interactive maps such as maps of Mars, endangered species, or a history of tropical storms over the US. You can also make your own map!

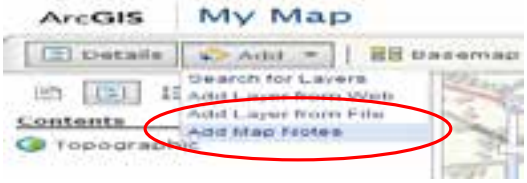
To make your own map go to:
http://www.arcgis.com/home/webmap/viewer.html

1) In the search box in the upper right corner type in, Kingston, Ontario.



2) Zoom into the KRock Centre.

3) Click on **"Add"** on the Upper right corner, then select **"Add Map Notes"** then select **"Create"** on the pop up.

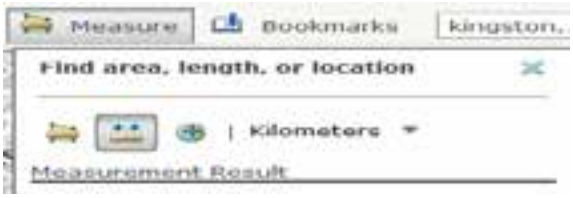


4) Click on the type of symbol from the table on the left you would like to use to represent the K-Rock Centre. Move your mouse over the K-Rock and click to add the symbol to the map.

5) A dialog box is going to open where you can add a Title, a little description and an image. This information will show up when someone clicks on this point in the map.
Type http://www.k-rockcentre.com/images/bw.jpg into the Image URL box. Click close once you have added the information you like.

6) Now click on the Edit tab at the top left of the screen to de-select it. You can now click on this point in the map and see the information you added in a pop up window.

7) Now select the Measure Line tool, click on the map and measure the distance from the KRock Centre to Kingston General Hospital. It should be roughly 1.8 Km.



Come See our Exhibit and Explore the World of Surveying and Geomatics at MTO!
You will see various data, tools and technologies used by today's Surveyors and Geomatics Professionals!

Exhibitor Contact Information:

Michael Matthews, OLS
Ministry of Transportation
Phone (613) 545-4710
Email: michael.matthews@ontario.ca

be a germ detective!

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

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

A Coloured etching by William Heath, London, 1828

word search

i	t	z	n	e	l	l	s	q	x	x	s
l	n	v	o	p	c	t	n	c	o	m	a
u	a	b	i	s	m	r	e	g	u	z	j
v	n	p	t	j	s	y	g	v	t	r	x
m	i	a	c	a	p	y	o	p	b	e	y
s	m	o	e	n	e	p	h	j	r	i	n
t	a	z	f	r	s	s	t	k	e	s	n
d	t	o	n	e	g	t	a	x	a	i	d
j	n	t	i	f	g	z	p	e	k	j	n
j	o	o	s	f	h	z	m	y	s	d	c
b	c	r	i	m	n	z	m	z	w	i	e
r	a	p	d	b	i	s	u	r	i	v	d

germs
virus
pathogen
protozoa
outbreak
disease
contaminant
disinfection

museumofhealthcare.ca/explore/exhibits/glass/

can you match the microorganisms?

1.

2.

3.

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

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

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

Answers
3C
2A
1B

Bringing Canada's healthcare story to life!

Ann Baillie Building National Historic Site
32 George Street, Kingston, ON K7L 2V7
Phone: **(613) 548-2419 ● www.museumofhealthcare.ca**

MUSEUM OF HEALTH CARE AT KINGSTON

Yellow-shafted Flicker (Photo: Bruce Parker)

Saw-whet Owl (Photo: Justin Walker)

PRINCE EDWARD POINT BIRD OBSERVATORY

- Located at the south-eastern tip of Prince Edward County, about 20 minutes southeast of Picton, Ontario in a National Wildlife Area
- Designated as a **Globally Important Birding Area (IBA)** in 1998
- Part of the **Canadian Migration Monitoring Network** since 1999

SPRING BIRDING FESTIVAL

MAY 11 – 20, 2013

Guided walks, Workshops, Special Events

COME VISIT US!

- **View Spring migration banding (Apr 16-May 30) Dawn to noon**
- **View Fall migration banding (Aug. 15 to Oct. 31) Dawn to noon**
- **Owl banding (Oct. evenings after dusk)**
- **School Programs (see website)**

HAVE FUN IDENTIFYING BIRDS and THEIR SONGS

http://www.natureinstruct.org/dendroica/

www.allaboutbirds.org/

www.peptbo.ca

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

Pump House Steam Museum

Water Works!

Build Your Own Diaphragm Water Pump

What is a Diaphragm Water Pump?

The diaphragm pump was invented in 1857 by Jacob Edson. Edson's diaphragm pump was originally used for sewage pumping and later in marine vessels. The diaphragm pump is an example of a positive displacement pump powered by compressed air. The diaphragm is flexed, causing the volume of the pump chamber to increase and decrease thus drawing water into the chamber and then pushing it out. This action is similar to breathing in and out of our lungs. Everyday examples of a diaphragm pumps also include air compressors and small fish tank pumps.

Supplies Needed:

- Balloon
- Cup
- Scissors
- Straw
- Elastic

Instructions

1. Fill two thirds of the cup with water.
2. Using the scissors cut one side of the balloon from the bottom to the top so that the balloon can be stretched over the cup.
3. Stretch the balloon over the mouth of the cup so it is tight and have a friend place an elastic over the balloon to hold it in place around the cup.
4. Poke a hole in the centre of the balloon. Ask an adult for help with this step!
5. Put the straw in the hole.
6. Push on the top of the balloon with two fingers to pump the water!

Pump House Steam Museum Forty Years 1972

Kingston

Safety first! Please carry out all science experiments with adult supervision. Visit our website at www.phsmmuseum.ca

Queen's Baja SAE

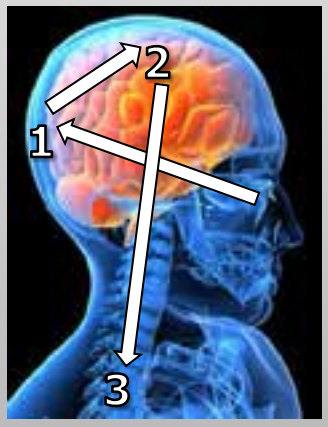
The Queen's Baja Design Team is a student run design team out of Queen's University that designs, manufactures and races an off-road vehicle every year. The team is made up of engineering students, mostly from Mechanical Engineering. Being on the team, the students get to learn about 3D modelling using Computer Aided Design (CAD), how to design parts to withstand different loading scenarios using computer analysis, how to manufacture those parts and how to use the machines and tools needed to 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.

Exploring the Central Nervous System!

Beauty of the Beast: What can locusts tell us about the nervous system?
Did you know that many different animals have nervous systems? Even little locusts have neurons that sense things and control them.

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

Muscles:
Just like you, locusts 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 locust legs move!



At home science experiment: Reaction Time with Rulers
Measure your response time – or challenge a friend!
You will need:
-One ruler -One friend -One calculator
What to do:
Have a friend hold the top of the ruler at the 30cm mark. Place your hand at the bottom of the ruler so you are ready to catch it but not touching it. Have your friend drop the ruler unexpectedly and try to catch it as quickly as you can. Record the level in centimeters at which your fingers catch the ruler. Now let's figure out your reaction time. Because objects always fall at a constant acceleration, we can use a formula to figure out how long it took you to catch the ruler. Substituting "y" for the level (cm) where you caught the ruler will give you time "t" in seconds! $t=\sqrt{\frac{y}{980}}$
What happens in your brain?
1. Your eyes see the ruler fall and send a message to your visual cortex
2. The message goes to your motor cortex
3. Your motor cortex sends a message to the nerves in your spinal cord, which tell the muscles in your hand to catch the ruler!

Centre for Neuroscience Studies
Botterell Hall
18 Stuart Street
Queen's University
Kingston, Ontario
(613) 533-6360




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

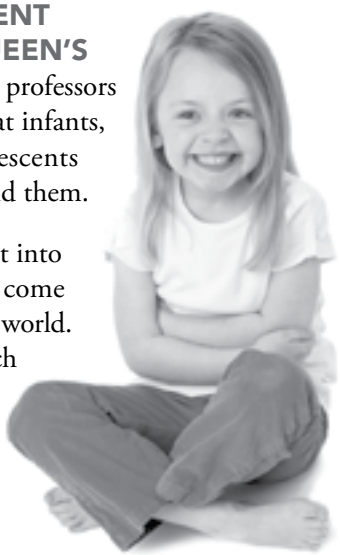
1. Hold one paddle in each hand.
2. Stand facing your partner.
3. Explain the rules to your partner: "When I lift a paddle showing the GREEN side, you raise your hand that is on the SAME side as the paddle (like if you were looking in the mirror). But, when I lift a paddle showing the RED side, you raise your hand that is on the OPPOSITE side of the paddle.
4. 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

1. What kinds of things do you think that you can do to increase the number of mistakes your partner makes?
2. 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:

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Like us on Facebook for updates and study results! **(search for Child and Adolescent Development)**

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CHILD and
ADOLESCENT
DEVELOPMENT
Queen's University

Making Your Own Stethoscope

A Real One

Things You'll Need

Your Homemade Stethoscope

Things You'll Need

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

Instructions

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

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

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

Activity for Using Your Stethoscope

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

How does chemistry explain the Diet Coke and Mentos reaction?

Brought to you by the Queen's University Department of Chemistry

Materials Needed:

- 2 index cards or small piece of paper
- 2 Litre bottle of Diet Coke
- 1 package of mint flavoured Mentos
- Large open space

Safety

A good chemist should always think about safety before trying an experiment:

- This experiment should be done with the help of an adult.
- Sometimes, chemistry can be messy, so try this experiment outside!
- Never try to place the cap on the bottle after adding the Mentos.
- There might be spraying liquid… wear eye protection, like swimming goggles.

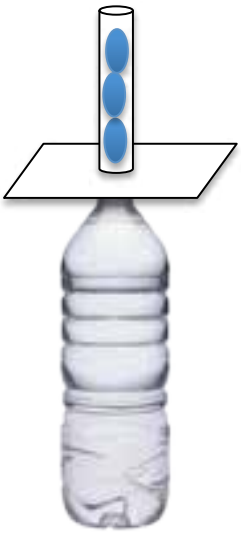
Chemistry Principles

Why Mentos? When you add the Mentos, lots of carbon dioxide is released very quickly because the candies' coatings are rough. The carbon dioxide forms in bubbles on the surface of the candy, a process called **nucleation**.

Why Diet Coke? Water molecules like to stick together, which means water has high **surface tension**. Diet Coke contains aspartame, which causes the Diet Coke's surface tension to be weaker. This allows the bubbles to grow faster. Try the reaction again with regular Coca Cola… does it work as well?

Procedure:

- Place 2 Litre bottle on a flat stable surface outdoors.
- Remove the cap from the bottle and do not at any time try to put the cap back on the bottle.
- Roll one index card into a tube that is big enough for the candy to fit.
- Put the remaining index card over the opening of the pop bottle, then place the tube on top and line it up with the pop bottle opening.
- Put 3 Mentos candies in the tube.
- Quickly remove the flat index card and allow the Mentos to fall into the pop.
- As soon as you do this, stand back and watch the reaction happen!



Chemistry Magic of Matter Show

Reacting metals in oxygen/ air

What colours appear when you burn these metals? Match the metal on the left with the correct colour on the right.

Calcium (Ca)	yellow
Potassium (K)	green
Sodium (Na)	orange
Lithium (Li)	red
Copper (Cu)	violet

11 am & 1 pm

Don't try these at home!

Elephant Toothpaste, Genie in a bottle, Ethanol cannon & much more!

Fun At Home

Try the vinegar popper

~ Vinegar
~ Baking Soda
~ Film Canister
~ Plastic Bottle Cap

Note: Make sure the bottle cap slides freely into the film canister. Also the cap

Directions:

1. Fill the film canister ¼ full with vinegar
2. Fill the bottle cap with baking soda. Keeping the open end of the cap facing upwards, insert it into the film canister and let it float on the vinegar.
3. Carefully close the film canister so that the vinegar doesn't splash around.
4. Give the popper a solid toss. As it tumbles, the vinegar with mix with the baking soda, creating enough carbon dioxide to pop open the film canister

Queens Chemistry

Answers: Ca = orange, K = violet, Na = yellow, Li = red, Cu = green

DNA Extraction

You can't normally see your own DNA but with a few items from around the house you can see those tiny molecules that hold all of the important information that make you so unique!!

What you will need:

** make sure you have the help of an adult!

- 500 ml of drinking-water
- 1 tablespoon of cooking salt or table salt
- 1 clear cup or glass
- 125 ml of chilled rubbing alcohol (Isopropyl alcohol USP 70%)
- a few drops of blue food colouring
- 1 eyedropper or 1 spoon
- 1 drop of clear dishwashing detergent
- 1 stir-stick
- safety glasses
- 1 pair of rubber gloves

Step 1: Add the salt to the water and stir until the grains of salt have disappeared. Pour 3 tbsp. of the salty water into a cup.

Step 2: Gargle and swish all the salty water from the cup around your mouth. Do not swallow the water. Spit it back into the cup.

Step 3: Dip the stir-stick in the drop of dishwashing detergent and gently stir it in the cup 2 to 3 times.

Step 4: Add 2 or 3 drops of food colouring to the rubbing alcohol if you want, and stir well. The blue food colouring will help you distinguish the alcohol from the water.

Step 5: Use the eyedropper or spoon to dribble the rubbing alcohol down along the inside wall of the cup. Try to add the alcohol very gently, so that the water and the alcohol do not mix. You want the alcohol to form a separate layer on top of the water. Pour enough rubbing alcohol to create a 2 cm-high layer on top of the water.

Step 6: Watch the thin strands of DNA collect together in the alcohol. The strands link together and form nets or webs of DNA. If the alcohol is cloudy, try the experiment again and add the alcohol more slowly.

Step 7: Discard the contents of the cup and clean up.

How did this work?

The skin cells inside your mouth were removed by gargling and swishing the water in your mouth. Salty water was used because it acts like the salty fluids inside our bodies.

Our cells are protected by "walls" that are really a fatty layer called a membrane. When you added the drop of dish soap you broke open the cell membrane and the DNA was released into the water.

When the alcohol layer was added, the DNA strands gradually moved into it and joined to other DNA strands. As more and more strands stuck together, the DNA became visible.

Did you know fruit also has DNA? Try extracting DNA from a strawberry, banana or a kiwi:
http://chainreactionkids.org/activities-extract-dna-from-a-strawberry

What does DNA stand for?

DeoxyriboNucleic Acid

Why is DNA important?

DNA carries the genetic instructions for making living things.

DNA is passed down from parents to children and is what makes us unique.

DNA is what determines the hair colour and eye colour that you have! (and many other things)

DNA is what makes you YOU!

Grow your own salt crystals!

What you will need:

- **Table salt**
- **Hot water**
- **Jar or other clear container**
- **Pencil**
- **String and paper clip**
- **Spoon for mixing**
- **Food coloring (optional)**

Instructions:

1. **With help from an adult, boil 1 cup of water and let cool for a couple minutes.**
2. **Add the water to your jar.**
3. **Slowly stir table salt into your water. Keep adding salt until it stops dissolving (you will see salt grains at the bottom of the jar).**
4. **Add a couple drops of food coloring and stir (optional).**
5. **Tie one end of your string to a paper clip and tie the other end to the center of your pencil.**
6. **Place the pencil on top of your jar so the paper clip is hanging in the salt water without touching the bottom.**
7. **Place the jar in a sunny, dry place and wait. Salt crystals will start growing on your paper clip over the next few days!**

Queen's UNIVERSITY

Queen's Geological Science and Geological Engineering
Graduate Student Society (Jolliffe Club)

36 Union St. – Miller Hall
Queen's University
Kingston, ON K7L 3N6

Human Mobility Research Centre

Research that Moves You

At HMRC our focus is helping people live fuller, more mobile lives by pioneering the development of innovative and effective treatment strategies for bone and joint disorders caused by arthritis, osteoporosis, injury, and related problems.

The Centre is a partnership between Queen's University and Kingston General Hospital (KGH) and serves as a point of collaboration between the disciplines of medicine, engineering, health sciences, and computer science. HMRC provides shared research space and services for clinicians, orthopaedic surgeons, university faculty, students, and industry.

For an at home activity we suggest visiting:

http://www.edheads.org/

Edheads.org has put together some wonderful animations where children (recommended for Grades 7-12+) can perform a Virtual Hip Replacement Surgery, a Virtual Knee Replacement Surgery, they can learn about Stem Cell Research, and many other wonderful activities.

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 than 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 to power generators that produce electricity. How cool is that?

Pollutant Emission Factors for Electrical Generation (g/kWh): The Total Fuel Cycle*

Energy Source	CO_2	NO_x	SO_x
Coal	322.6	1.6	3.400
Oil	258.5	0.88	1.700
Natural Gas	178.0	0.9	0.001
Nuclear	7.8	0.03	0.030
Photovoltaics	5.3	0.007	0.020
Biomass	0.0	0.6	0.140
Geothermal	51.5	TR	TR
Wind	6.7	TR	TR
Solar Thermal	3.5	TR	TR
Hydropower	5.9	TR	TR

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.

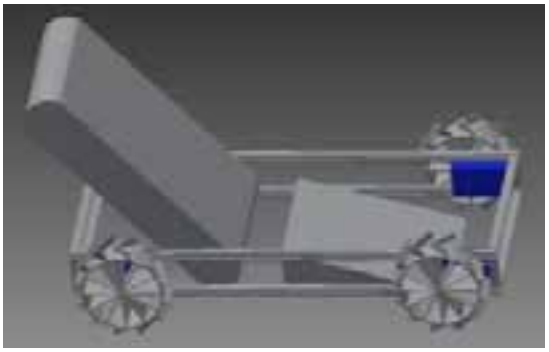
- Solar electricity is immune to the dreaded electricity blackouts.

- 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, 115i Beamish Munro Hall, 45 Union Street, Kingston, ON.(613)-533-6682.

QUEEN'S SPACE ENGINEERING TEAM



We are the Queen's Space Engineering Team (QSET) from Queen's University! This year we are building a lunar mining rover for a NASA run design competition. Our design involves deciding how we are going to dig up the regolith (soil that is on the moon!) We went with a scraper since the regolith is very fine and get messy if you dig it up with a bucket wheel.

When we dig up the regolith we have to have a mechanism to lift it up and into a bucket which is what the conveyor will be used for.

Soil on the moon is very different then the stuff that we have here on Earth. It is a lot softer and since the particles are so fine, the regolith can create a lot of dust! We had to design special wheels that increased our rover's traction with the regolith. That is what the ridges you see in the picture are used for.

The rover is controlled via several motors that are controlled by a central laptop. This laptop is wirelessly connected to a joy stick.

Our rover is going to be competing against other rovers from all over the world down at the Kennedy Space Centre in May. Come by our booth at the Science Rendezvous to see our rover in action and ask us any questions!

RMC 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.

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

Upcoming Sky Events:

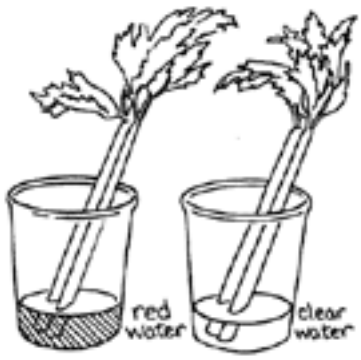
May 25 – penumbral lunar eclipse
May 28 – conjunction of Venus and Jupiter
Jul. 27, 28 – Delta Aquarids meteor shower
Aug. 11, 12 – Perseids meteor shower
Oct. 18 – penumbral lunar eclipse
Oct. 21, 22 – Orionids meteor shower
Nov. 16, 17 – Leonids meteor shower
Nov. 28 – Comet ISON closest approach
Dec. 13, 14 – Geminids meteor shower

Using celery to learn about plant uptake!

Plants have tiny tubes running up their stalks that carry nutrients and water from the roots all the way to the leaves and flowers. These tubes can also carry contaminants into the plant, and plants can therefore be used to help clean up polluted soil. This experiment will use food coloring to represent contaminants, and will demonstrate how they are taken up by plants.

You will need:

1. Red and blue food coloring
2. Two celery stalks
3. Two glasses of water (¼-full)
4. Sunlight
5. Notebook



Procedure:

1. Add red food coloring to one glass and blue to the second;
2. Select two stalks of celery from the inside of the bunch, and cut ½ inch off the bottom;
3. Place one stalk in the red glass and the second stalk in the blue glass, and place both glasses on a sunlit windowsill;
4. Leave the stalks in the glasses overnight, and record your observations throughout the day and again in the morning;
5. Continue to observe the stalks until the color reaches the leaves.

Results & Discussion:

At the end of the experiment, ask an adult to cut the celery stalks in half and observe the cross section of the tubes. What do you notice?
Do you think the celery stalks were successful at removing some of the contaminants from the water?

The Science:

Capillary action is what plants use to move water (and the things dissolved in it) up the tubes in their stalks. This is accomplished using ***adhesion*** and ***cohesion***. Adhesion makes water molecules stick to the inside of the tubes, and cohesion makes water molecules stick to each other. When adhesion is stronger than cohesion, water moves up the tubes, carrying dissolved nutrients and contaminants with it.

Royal Military College of Canada

What's (the State of) Matter?
Liquid, Solid or Gas?

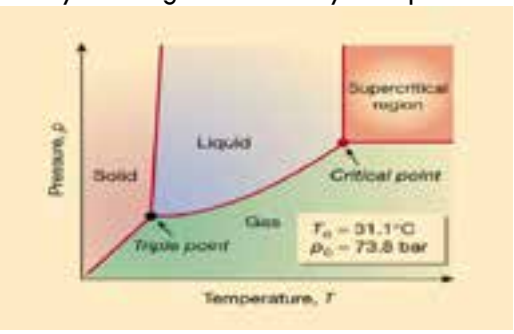
What Do We Have and What Do You See At this Station?

Looking around us we can see so many different compounds, objects and materials. Some of them are runny like water, maple syrup, 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.***

Now again 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.*** Funny thing is 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.

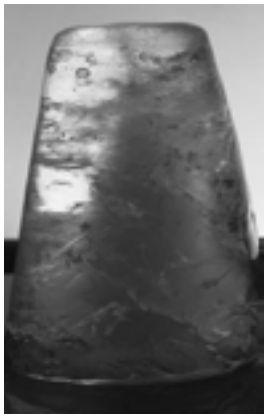
At this moment take a good deep breath, yes, breathe in and breathe out! Better yet, take a balloon and blow in it. Oh look! It is growing, bigger and bigger as you blow in your balloon. What is happening? Is there anything in the balloon? It may not have color and it may not smell but there is air in 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.

At this station you can explore some compounds in liquid, solid and gas states. You can have a hand boiler and see how a liquid can warm up and boil by just the heat of your hand and you can explore the boiling, melting and freezing of different compounds using a very exciting fun chemistry set up.



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.

Liquid: like water



Solid: like ice

Gas: like air or oxygen

Green Roofs

What is a Green Roof?

A green roof is the growth of vegetation on the rooftop of a man-made structure. Conventional roofs are usually made of asphalt concrete. Health and environmental issues are becoming of concern to society with the ever-increasing number of urban establishments taking over green space. Green roofs offer an innovative solution to alleviate many of these problems.

Vancouver Public Library[1]

The Science Behind Green Roofs

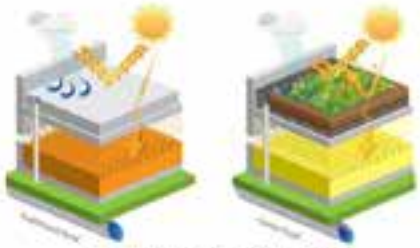
There are two main types of green roofs each with distinct features, which are summarized below:

Intensive	• deeper growing medium • supports a diversity of plant species • can be used for recreation or horticulture • more expensive to install and maintain
Extensive	• thinner growing medium (lightweight) • limited to local plants or those able to survive harsh environments • relatively inexpensive • requires less frequent maintenance

Layers of a Green Roof[2]

Green roofs aim to replace the vegetative land that has been lost due to urban development. Some benefits provided by this technology include:

- ***Storm Water Retention*** – traps rainwater that could otherwise cause flooding, sewage system overflow and habitat destruction, through retention in soil and evapotranspiration.
- ***Energy Efficiency*** – both intensive and extensive green roofs can help reduce energy consumption.



Green Roof Comparison[3]

Green roofs keep roofing membranes cool during the spring and summer and provide insulation during the winter months. This reduces the dependence on space conditioning for regulating indoor temperatures.

- ***Mitigating the Urban Heat Island (UHI) Effect*** – the UHI effect refers to the fact that major cities are usually higher in temperature than surrounding suburban areas creating "islands" of heat.

Things to Consider

Green roofs offer social, health and environmental benefits, however there are factors that need to be considered before initiating a green roof project.

- ***Cost of installation and maintenance*** – capital investment and yearly maintenance fees will vary depending on the type of green roof installed.

Enviro-Turf[4]

- ***Installing on new buildings or retrofitting*** – the construction material, rainwater retained and human activity are loads that put stress on the support system of a building. Thus, the design of a green roof that is to be constructed on an existing building (retrofitting) will be limited since there is little that can be done to alter the building's original structure. Incorporating a green roof in the structural planning of a new building allows for more flexibility in the roof design.

Queen's University Faculty of Education in association with the Department of Chemistry and Chemical Engineering of the Royal Military College of Canada

Contact: Dr. Kela Weber, kela.weber@rmc.ca, www.weberwetlandlab.ca

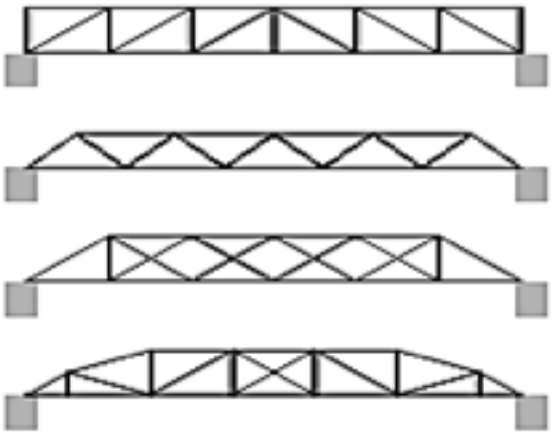
1 Vancouver Public Library Monitoring Project. Available from: www.bluestem.ca/pdf/GreenRoofPaper_pdf.pdf
2 Northwest EcoBuilding Guild. Assemblies. Green roof project. 2001. Available from: http://www.nwbg.net/greenroofs/
3 Green Roof Comparison. Available from: http://www.greenroofguide.co.uk/benefits/
4 Bruce Hemstock, New Westminster B.C. Enviro-Turf on the roof of a garage. Available from: http://www.bluestem.ca/enviroturf.htm

THE DEPARTMENT OF CIVIL ENGINEERING AT THE ROYAL MILITARY COLLEGE

Building a Model Bridge with Plastic Straws

Instructions

1. Design your bridge on a piece of paper before starting. Below are some trusses you can try, or design one of your own. Think about the types of shapes that are used in bridges. Which shape is the strongest?



Supplies

- Pencil
- Paper
- Plastic Drinking Straws
- Scissors
- Tape
- Ruler
- Small Plastic Cup
- 100 Pennies

2. Using only the materials on the list of supplies build a bridge that is 30 cm long and wide enough to hold your plastic cup. The tape should be used for fastening the straws together.
3. Place the bridge between two chairs with approximately 5 cm of each end resting on a chair.
4. Place the small plastic cup on your bridge and see how many pennies you can add to your cup before the bridge starts to fail.

Building a Model Bridge with Popsicle Sticks

You can also try this activity with popsicle sticks and Elmers white glue. This activity is more challenging and requires patience. Design your own bridge or follow the instructions at the following websites:

http://diyfamily.wordpress.com/2009/09/14/popsicle-stick-bridge/

http://www.eweek.org/site/discovere/popsicle.shtml

Building a Virtual Bridge

Visit this website to plan and design four different types of bridges.

http://www.pbs.org/wgbh/nova/tech/build-bridge-p1.html

How can we help save the frogs?

Why are frogs so important?

Because the growth of amphibians depends so heavily on the environment in which they live, they are a good indicator species of the conditions of our ecosystems.

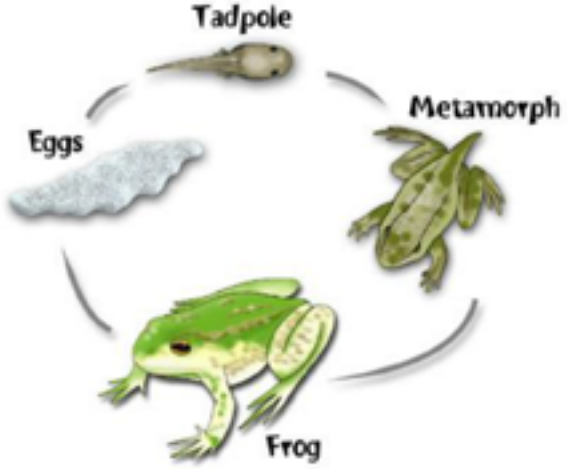
Did you know that certain species of frogs secrete chemicals from their skin that are studied in medical research for advancements in disease prevention and treatment?

Unfortunately, frogs are becoming increasingly endangered through the destruction of their habitats due to human pollution.

Froggy jokes

- Why are frogs so happy?
  They eat whatever bugs them!
- What car does a frog drive?
  A Beetle!
- What do frogs order at McDonald's?
  French flies and a diet croak!
- What kind of shoes do frogs wear?
  Open toad!
- How does a frog feel when he has a broken leg?
  Unhoppy!

Life cycle of a frog



What you can do to help save the frogs!

- Do not use pesticides.
- Bring expired drugs back to the pharmacy.
- Prevent the destruction of their habitats.
- Build a small pond behind your home or school.
- A great way to get involved in preservation of wildlife and natural habitats is to volunteer through:
  Kingston Field Naturalists
  Ducks Unlimited Canada

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

Royal Military College of Canada
Environmental Sciences Group

Many polluted sites exist, where the soil, sediment or the groundwater have high amounts of contaminants because of past industrial activities or their present use. As environmental scientists, we focus on identifying the contaminated areas and on determining whether they pose potential harm to the environment or the people and animals that use the site. We also try to find new ways of cleaning these sites up. Most of our work takes places in the Arctic or remote areas of Canada.

One component of environmental testing and monitoring is investigating air quality. Air quality has a big impact on our day to day lives and can be easily studied at home.

Make your own air quality test kit at home

Find an area where you can hang several cut out pieces of poster board. You can do this in your home or in your yard. You may want to try this at different times of the year so you can see the difference in spring (pollen), summer (dust), and winter (soot) air particles.

Materials needed

Poster board, scissors, Vaseline, string, hole punch, magnifying glass, permanent black marker, notebook.

Instructions

- Cut poster board into several squares and draw a smaller square on each board.
- Punch a hole in the top of each piece of poster board and tie pieces of string in the hole.
- Smear a thin layer of Vaseline inside the drawn square on each cut out and hang them in different places within the area you've chosen.
- Record the areas you've hung each cut out in your notebook.
- In about a week, collect your squares

Observations

With the magnifying glass, count how many particles you can see stuck to the Vaseline in each square. Record the number of particles, as well as the location of each cut out in your journal.

Results

Are there a lot of particles or just a few? How do you think the area you've chosen to hang your poster board in has affected your results? What do you think would happen if you performed this experiment in a heavily polluted area, such as a big city? Do you think you would find more particles stuck to the cut outs? How do you think the particles in the air affect the air quality and our ability to breathe? Can you identify what the particles are; soil, dust, hair, pollen?

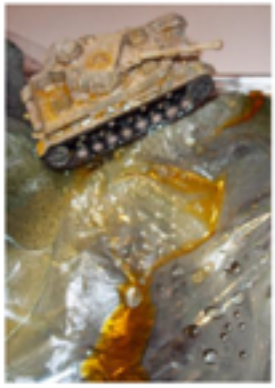
Adapted from:
http://www.sciencefairadventure.com/ProjectDetail.aspx?ProjectID=112

Environmental Sciences Group
Royal Military College of Canada
PO Box 17000
Stn. Forces, Kingston ON
K7K 7B4

Cleaning up the Environment using Chemistry!

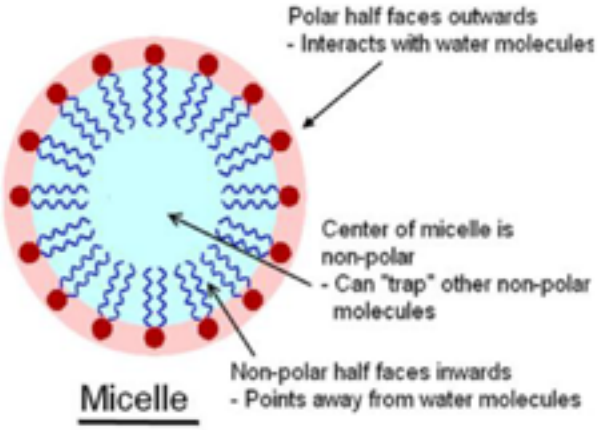
Environmental remediation is the process by which pollutants and contaminants such as oil, pesticides and industrial wastes are removed from the environment.

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.



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

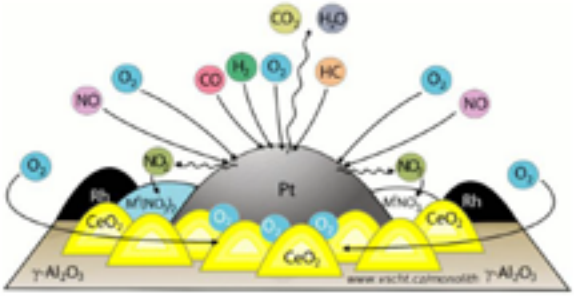
Surfactants can be used to help remove pollutants from the environment. Surfactant molecules form micelles (shown below), which can "trap" non-polar pollutants inside. The entire micelle (including the pollutant) can be washed away with water.



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

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

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 daily 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 year	70
Normal yearly background dose in North America	4000
One Chest CT scan	7000

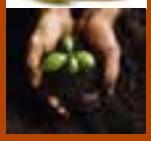
Do you have these at your house?

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

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HELP 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:

www.savethesalamanders.com

Save The Salamanders is a project created by Salamander Advocate & Conservationist Matt Ellerbeck (A.K.A. The Salamander Man). Matt strives to contribute to the preservation & protection of salamanders.

St. Lawrence College

Energy Systems
Engineering Technician
& Technology

The power of "off"

How scary is the phantom load at your house?

We use electricity every minute of the day in our homes.

Sometimes we need to keep appliances running all the time – like the refrigerator that keeps our food safe to eat and the alarm clock that wakes us up in time for school. Other energy-users that we can turn off with the flick of a switch: a light bulb, the dishwasher.

But electronic equipment – like televisions, computers and video games – is different. You may think you're turning off your electronic equipment but it's actually just "napping" – waiting to snap back into action. That's pretty convenient. But the equipment is still using energy called **standby energy**. To stop electronics from using energy, you need to either (1) unplug them or (2) plug them into a power bar that you can switch off. This can save up to 10% of the energy used in your entire home!

Did you know?

Electronic devices draw power even when you think they are "off." This standby energy is also called "phantom load" because it's invisible.

Be a ghost buster!

Take stock of all the equipment and appliances you have, and fill in the boxes below.

According to Natural Resources Canada, the government agency that researches Canadian energy usage, the average home in Canada wastes $75 per year on phantom power, that's about $800 million dollars for all of Canada - to do nothing!!

Device	How many of these devices are in your house?	How many are on a power bar?	Estimated $ savings per device per year using a power bar to turn off between uses!	Your house: potential savings (# of devices X $ saved per device)
Microwave			$25	
Older Television			$100	
Audio System			$60	
Cell Phone Charger			$15	
Laptop Charger			$50	
Other Stuff			??	

kidsclub.nrcan.gc.ca

Adapted from materials provided by:

Natural Resources Canada

MP Ted Hsu Talks Science

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

- Ted has a Ph. D. in Physics
- Ted has published 25 research papers in his field
- 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

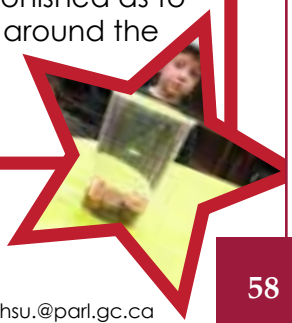
The "Science" in Parliament **CHALLENGE**:

Can you guess how many statements have contained the word "Science" in the House of Commons since 1994?

The answer to this challenge and its winner will be announced May 14th on Social Media. Please visit www.tedhsu.ca or follow @tedhsu on Twitter or like Ted Hsu on Facebook.

Try this Physics experiment at home!

Fill up a glass of water to the rim. Make sure you have several different kinds of coins (10-12 of each coin). How many of a single type of coin do you think can be placed into the glass without it overflowing? Line up the narrow edge of a coin to the middle of the glass, and gently place it in the glass. Be astonished as to how convex the water becomes around the rim without overflowing.



Ted Hsu, M.P. Kingston and the Islands • 14-303 Bagot St. Kingston, ON K7K 5W7 • T: 613 542 3243 • F: 613 542 5461 • E: ted.hsu.@parl.gc.ca

RUBBER BAND CAR

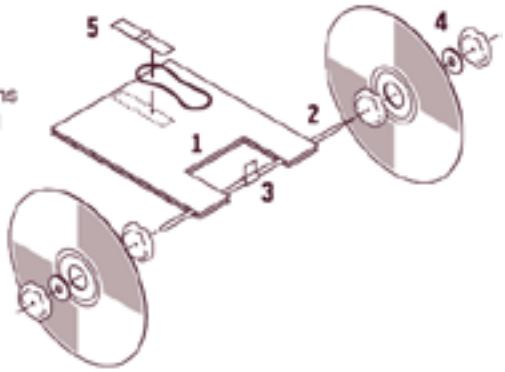
YOUR CHALLENGE

Build a car that goes really fast and really far (at least four feet, that is). Oh, by the way, your power source is a rubber band, and your car can only have two wheels. Start your engines!

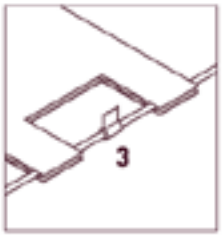
MATERIALS (PER CAR)*

- 2 compact discs (CDs)
- Corrugated cardboard (one piece about 5 ½ inches square)
- 2 faucet washers (Size: ¼ inch Large)
- Poster putty (¼ package—buy the tackiest available)
- Rubber bands of different lengths and widths
- Ruler
- Scissors
- Tape (masking or duct)
- 1 wooden skewer (buy the thinnest available)

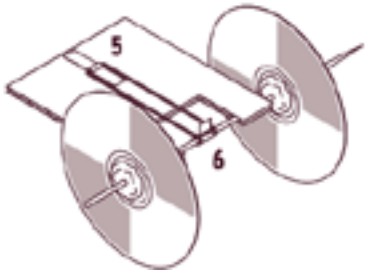
BUILD



1. **Notch the body.** Turn the cardboard so that, as you hold it flat, the corrugations run right and left (i.e., not forward and back). Cut across the corrugations and make a 2-inch-wide and 1 ½-inch-deep notch in the center of the side. Throw away the piece you've cut out.
2. **Make the axle.** Slide the skewer through the cardboard, close to the outer edge. Make sure the axle sticks out the same amount from each side of the body.
3. **Modify the axle.** Find where the skewer goes across the notch. In the middle of this section, wrap a small piece of tape to make a "catch" for the rubber band.



4. **Assemble the wheels.** Slip a washer into the center hole of a CD. Slide the washer and CD onto the axle, leaving lots of room between the wheel and cardboard. Put poster putty on each side of the washer to join the CD, washer, and axle REALLY TIGHTLY TOGETHER. The wheel and axle should now rotate together. Make the second wheel the same way.
5. **Attach a rubber band.** Choose one of the rubber bands. Tape one end to the cardboard at the end opposite the axle.
6. **Power your car.** Wrap the unattached end of the rubber band over the catch. Turn the axle several times. You've given the rubber band ***potential*** (stored) ***energy***. When it unwinds, the axle spins and this potential energy is transformed into ***kinetic*** (motion) ***energy***. The more you wind the rubber band, the more energy can go to your car's wheels—and the farther and faster your car goes.



You've just built a ***prototype***, which is an early version of a product. Prototypes help engineers understand a product's strengths and weaknesses and how it might be improved.

TEST AND REDESIGN

Wind up your car and set it on the floor. What happens when you let it go? When we made ours, we had to debug some things. For example, our axle didn't spin easily, the wheels wobbled, the poster putty stuck to the cardboard, and the rubber band jammed itself against the cardboard. If any of these things happen to you, figure out a way to fix the problem.

TAKE IT TO THE NEXT LEVEL

- Modify the car so it can work on sand or thick carpet.
- Change your car so it can carry a tennis ball.

DESIGN SQUAD

Watch Design Squad on PBS (check local listings). Download more challenges at pbskidsgo.org/designsquad.

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Are you interested in using science to solve problems?
Think about a career in engineering.
http://engineering.queensu.ca

Queen's University
Faculty of Engineering and Applied Science

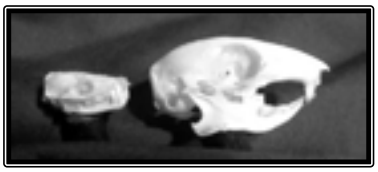
What's in a name?

Fledermaus (Ger.) = "Flying Mouse" ▸ (nope...they're not mice!)
Chauve-souris (Fr.) = "Bald mouse" ▸ (Still not mice. Rarely bald.)
Ledrblaka (Old Norse) = "Leather Flapper" ▸ (not bad!)
Fú (Chinese) = "Happiness, good fortune, luck" ▸ (awww…cute!)

What's a Bat?

Bats belong to the order *Chiroptera* (meaning, "hand-wing"). It's the 2nd biggest group of mammals on Earth with nearly 1000 different species. People often think of them as 'mice-with-wings,' but mice belong to the biggest order of mammals known as *Rodentia*. The rodent group includes rats, porcupines, beavers, voles, capybaras and many, many others – but not the bats!

BIG BROWN BAT SKULL



RODENT SKULL (chipmunk)

Are all bats bats?

Chiroptera is divided into two groups - the mega-bats and the micro-bats. Micro-bats are able to use sonar (or "echolocation") to navigate in the dark and are considered "true" bats. Mega-bats, on the other hand, may actually be primates and are therefore closely related to humans. Mega-bats are often called 'flying foxes' because of their fox-like faces.

Bats in Kingston?

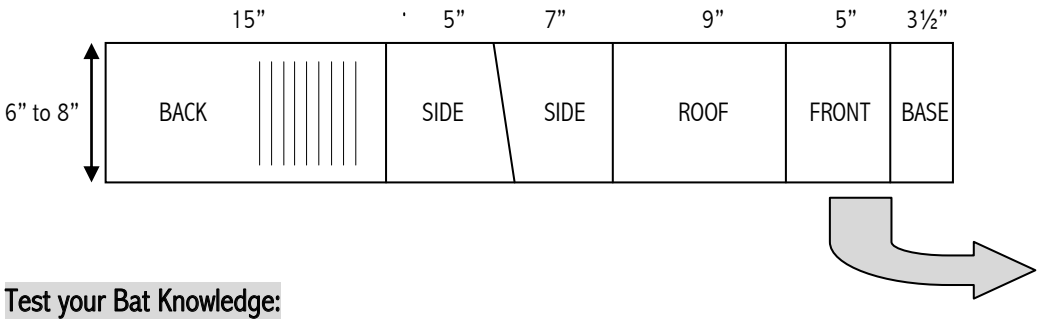
Several different kinds of bats are found in Kingston, but the one you're most likely to meet is the Big Brown Bat (*Eptesicus fuscus*). They're not that big – weighing only 18 g and having a wingspan of 30 cm. Big Browns are active throughout the year. Females may form a maternity colony in an attic, using the warmth of springtime to help them give birth. Big Browns will occasionally hibernate in human houses if conditions are right. It's common for hibernating bats to wake up and fly about in the wintertime, especially when temperatures change dramatically.

Bats in Trouble?

Although local bats don't have many predators, they do have worries. Habitat destruction is always a concern, as is disturbance when hibernating. It's tough to survive a long winter without food and lots of bats – especially young ones – don't make it. The latest threat – a fungus that causes a disease known as White-nose Syndrome – seems to be transported from cave-to-cave by unwitting humans. The fungus kills bats as they sleep. It's important to stay out of caves where bats hibernate. Their survival can depend on an undisturbed sleep.

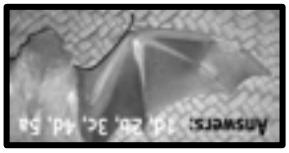
How can you help?

Keep learning about bats! They're amazing and actually help humans in many different ways. You can help them by making sure they have safe places to feed and to hibernate. Planting trees, maintaining clean waterways and supporting sustainable ecosystems will help many plants and animals...including bats. Below is a plan for a simple bat house that you can build and erect.



Test your Bat Knowledge:

1) How many bat species are found in Canada?	a) 1000	b) 200	c) 100	d) 20
2) How many bat species are found in Ontario?	a) 20	b) 9	c) 2	d) 0
3) Canada's bats eat only...	a) fruit	b) fish	c) insects	d) seeds
4) The biggest mega-bat has a wingspan of...	a) 0.5 m	b) 1.0 m	c) 1.5 m	d) 2.0 m
5) The smallest bat in the world weighs the same as a(n) …	a) dime	b) envelope	c) apple	d) cat



Matt Saunders
saundersm@sympatico.ca

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 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

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.

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?

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

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

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

The Story of Green Chemistry

You can uncover the story of green chemistry! First, decode the meaning of each symbol below, and then use them to read the story!

C__MI___Y ___S_ _L__H__ _A_ M_DI__N_ _L___T __LL_T___ E_E___ N_N-T___C

Did you know that  is everywhere and a part of pretty much everything we do?

It's in the  you wear, the  you live in, your parents'  , the 

you take to feel better and even in this book!

All of these things are only possible because of  – we couldn't live without it! It's too bad that the way we use  can cause problems too. It can damage our  , waste  , and cause  and health problems.

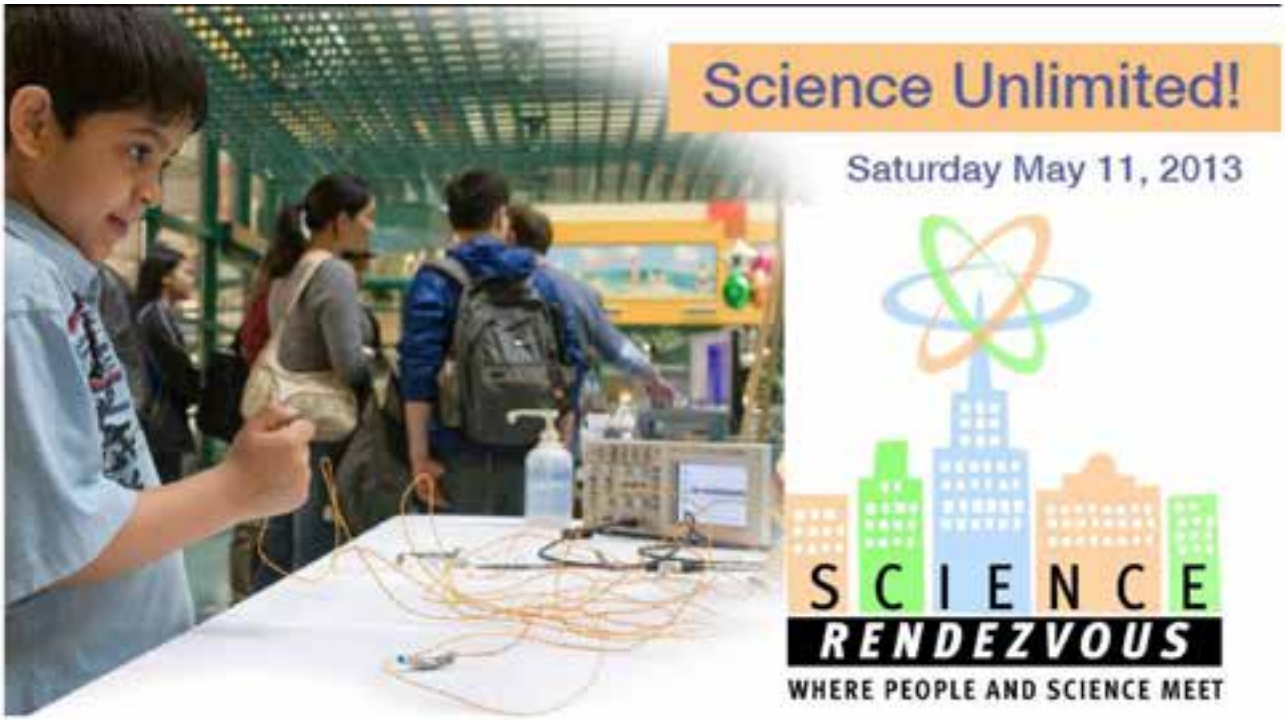
But, is there a way to get the benefits of  without these problems? To do this, we have to start using Green  !

 is green when scientists try their best to make less waste, use chemicals that are  and easy to find on our  , and use as little  as possible.

If we can make  less harmful to us and the environment, we can keep our  ,  ,  ,  , AND have a greener and healthier  too!

by GreenCentre Canada

ANSWERS: Chemistry, House, Clothes, Car, Medicine, Planet, Pollution, Energy, Non-Toxic



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