SCIENCE RENDEZVOUS

KINGSTON 2019









SATURDAY MAY 11, 2019

LEON'S CENTRE
1 THE TRAGICALLY HIP WAY

SCIENCE RENDEZVOUS

Queen's UNIVERSITY

Program & Schedule and Science Experiments to Do at Home

WELCOME

from Lynda Colgan and Kim Garrett,
Science Rendezvous Kingston Coordinators

Storied television host Ed Sullivan had many claims to fame over the more than three decades that his weekly variety program ran. He brought The Beatles, Elvis, Itzhak Perlman, Barbra Streisand, Bo Diddley and a slate of other celebrities into the living rooms of North America every Sunday evening at 8:00 p.m. EST, always opening with his famous tagline: *folks, you're in for a really big shew* (his pronunciation of the word "show").

It is with the promise of a *really big show* that we invite you to Kingston's ninth annual *Science Rendezvous* festival here today at Leon's Centre! "Big" doesn't begin to describe the size of Dippy, Research Casting International's famous *Diplodocus carnegii*, a 25 m long behemoth who is making his Canadian debut in #ygk. Nor does "big" capture the enormity of the vista viewed by our very special guest, NASA astronaut and former Commander of the International Space Station, Dr. Andrew Feustel. The research accomplishments of Dr. Hans-Peter Loock, the teaching accolades awarded to Dr. Les MacKenzie, the awards garnered by First Robotics Canada teams, The Machine Mavericks, W.A.F.F.L.E.S. and Lake Effect Robotics and the crowd-pleasing excitement generated by *IBEX* and *Husky* at the recent opening of Mitchell Hall are each so "big" individually that it is difficult to find an adjective that adequately describes the collective effect when these, and all of the other presenters/facilitators at *Science Rendezvous Kingston* are together in one space at one time.

While words may fail to describe what a really big show our many volunteers create at *Science Rendezvous Kingston*, we hope that the smiles and oohs and ahhs of visitors to the event will communicate the message loudly and clearly in such a way that our sponsors and supporters will be gratified and proud of their role in bringing this unique public education event to our city.

Who knows what the long-range impact may be for the children and adolescents who are here today, being inspired and enthused by our brilliant, leading edge researchers. Perhaps one of those awestruck students will come up with a clever new engineering design. It is possible that one of them will discover a new element. Maybe one will become an astronaut or be a member of a team that wins a Nobel Prize. When one or all of these things happen, we hope that the winner(s), on the award dais, harkens back to the day it all began at *Science Rendezvous Kingston*—the *really big show* made possible by Interim Provost and Vice-Principal (Academic), Dr. Tom Harris and Interim Vice-Principal (Research), Dr. Kimberley Woodhouse. We thank Chris McKercher, Leon's for the use of the venue and Stephen Peck, Sales Manager, as well as John Noon, Promotions and Web Director, Rogers Media Kingston for our Media sponsorship. For coordinating the many behind-the-scenes essential tasks that make the day safe and enjoyable for presenters and visitors, we are indebted to Lynn Carlotto, Roseanne Vilar, Brandon Tattersall, Colton Robb, Kyle Schultz and Rob Moeys from Leon's Centre.

Lynda Colgan Kim Garrett

SCHEDULE OF EVENTS

WHAT?	WHO?	WHERE?	WHEN?
Opening Ceremonies	MP Mark Gerretsen Kingston Town Crier, Chris Whyman Ingenuity Lab Robot, Husky	The Tragically Hip Way	**9:50 a.m.**
Special Guest Appearance	Dippy the Diplodocus Research Casting International	Centre Bowl, Leon's Centre	**All Day**
Chemistry Magic Show	Dr. Kevin Stamplecoskie Chemistry Graduate Students	Main Stage, Leon's Centre	**10:45 a.m.**
Special Guest Appearance	Ingenuity Lab Robot, IBEX Astronaut Andrew Feustel	Main Stage, Leon's Centre	**11:30 a.m.**
Special Guest Appearance	Ingenuity Lab Robot, IBEX Astronaut Andrew Feustel	Main Stage, Leon's Centre	**1:30 p.m.**
Chemistry Magic Show	Dr. Kevin Stamplecoskie Chemistry Graduate Students	Main Stage, Leon's Centre	**2:15 p.m.**

All Day **Inside** the Leon's Centre:

- Exciting Demos and Interactive Displays
- Graffiti Wall—we want to hear from you!

All Day **Outside** the Leon's Centre:

- Solar Telescopes: RMCC Astronomy and Astrophysics, Royal Astronomical Society of Canada, Queen's Observatory
- Tech 'n Tinker Mobile Makerspace
- Canada Learning Code Mobile
- Queen's Chemistry Graduate Student Society
- Queen's Baja SAE
- Kingston Police Force

NEW THIS YEAR

Drew Feustel PhD'95, DSc'16

Dr. Andrew Feustel grew up in Michigan, and came to Kingston to complete a PhD in Geological Sciences at Queen's in the nineties. He and his wife Indira, a speech-language pathologist from Ontario, met while both were studying at Purdue University and later moved to Kingston together. Dr. Feustel attained his Canadian citizenship while in Kingston, and moved to Houston after his PhD to pursue a career in geoscience. Their children, Ari and Aden, were born in Kingston and the family is still closely connected to the area through family and friends.

Dr. Feustel dreamed of becoming an astronaut since childhood, and became interested in the opportunity after watching the Canadian Space Agency's (CSA) astronaut search in 1992. He then reached out to Canadian astronaut Chris Hadfield while in Houston who encouraged him to pursue his dream. Dr. Feustel applied to become an astronaut with NASA in 2000, and was selected on his first try. During the six-month long mission, which began in March 2018 (his third) Dr. Feustel became the Commander of the International Space Station on June 1st. As a result of his recent work on the ISS, during which time he and his colleagues conducted about 250 research investigations and technology demonstrations not possible on Earth, Dr. Feustel set a new personal record: he is now ranked third for most cumulative time spent spacewalking.

On April 6, 2018, through NASA's Mission Control, Queen's University linked up with Dr. Feustel on the ISS and chatted about all things space. The astronaut himself also spoke to the challenges of conducting research in zero-gravity, described his day-to-day-life aboard the ISS, and shared what it's like to perform a spacewalk. Queen's University was the only school in Canada to hold an educational downlink live from space, and now we are proud to say that not only is he is the first astronaut to make a live appearance at Canada's national celebration of science here at Science Rendezvous Kingston—an annual Queen's public education event.

https://www.queensu.ca/gazette/alumnireview/stories/long-commute-drew-feustels-working-life-underground-orbit

"I think outreach is important, because I believe that our role now as explorers and seniors in our fields really should be to think about the chances we have to inspire the next generation of students and young people around the world. So, for me this is an opportunity to reach out, to talk about what I did with my career and my career path, and get folks to consider that no goal is too great for them to achieve."

NEW THIS YEAR

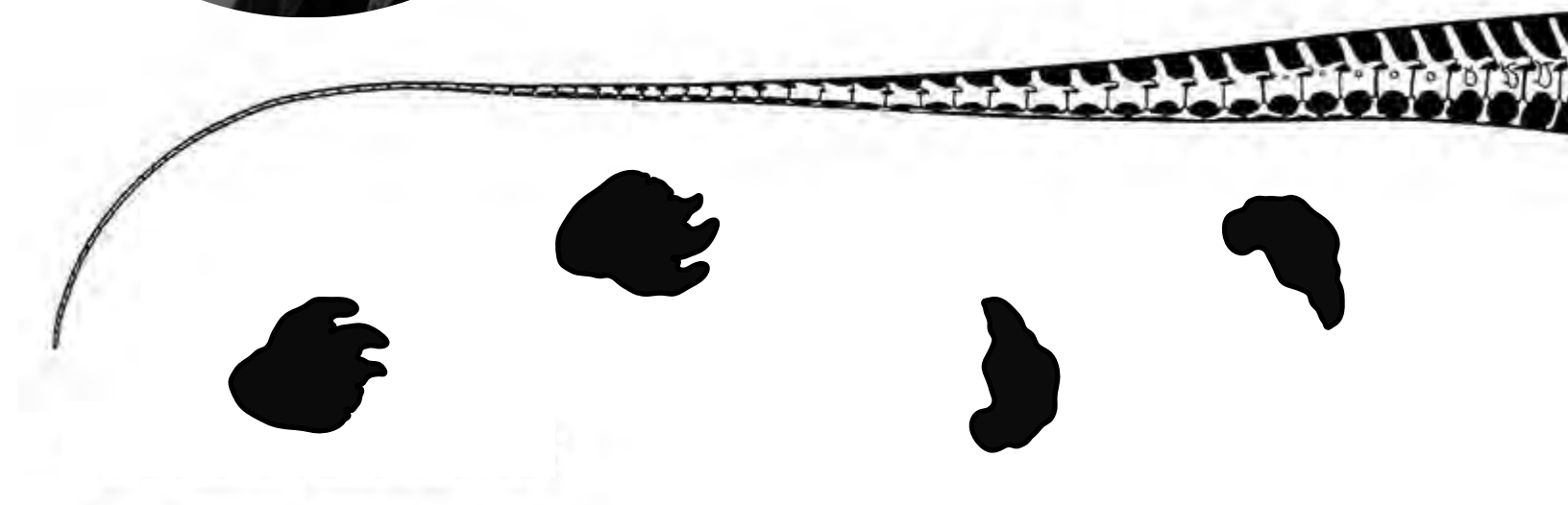
Dippy the Diplodocus

Meet Dippy the Diplodocus—a long necked, plant-eating dinosaur that roamed around the American midwest at the end of the Jurassic period (about 155.7 million to 150.8 million years ago). At 26 m (or 85 feet) long and 13 tons (12,000 kg), Diplodocids are among the largest creatures ever to walk the Earth! The majority of Diplodocus' length was taken up by its neck and tail: the neck alone was at least 21 feet (6.5 meters) long.

The first Diplodocus fossil was found near Cañon City, Colorodo, by Benjamin Mudge and Samuel W. Williston in 1877, and was named by Marsh in 1878. A number of Diplodocus fossils have been found in the Rocky Mountain region of Colorado, Montana, Utah and Wyoming.

In December of 1898 an almost complete skeleton of Diplodocus was discovered, Andrew Carnegie helped fund the expedition and preparation, 10 replicas were made, funded by Andrew Carnegie and gifted to museums around the world. Dippy, the original replica, arrived in London from America in 36 packing cases in 1905. His 292 bones took months to assemble and his unveiling that year at the Natural History Museum was a sensation.

We welcome Dippy (a resin cast of a fossilized Diplodocus skeleton) courtesy of Research Casting International (www.rescast.com), the Trenton, Ontario company charged with

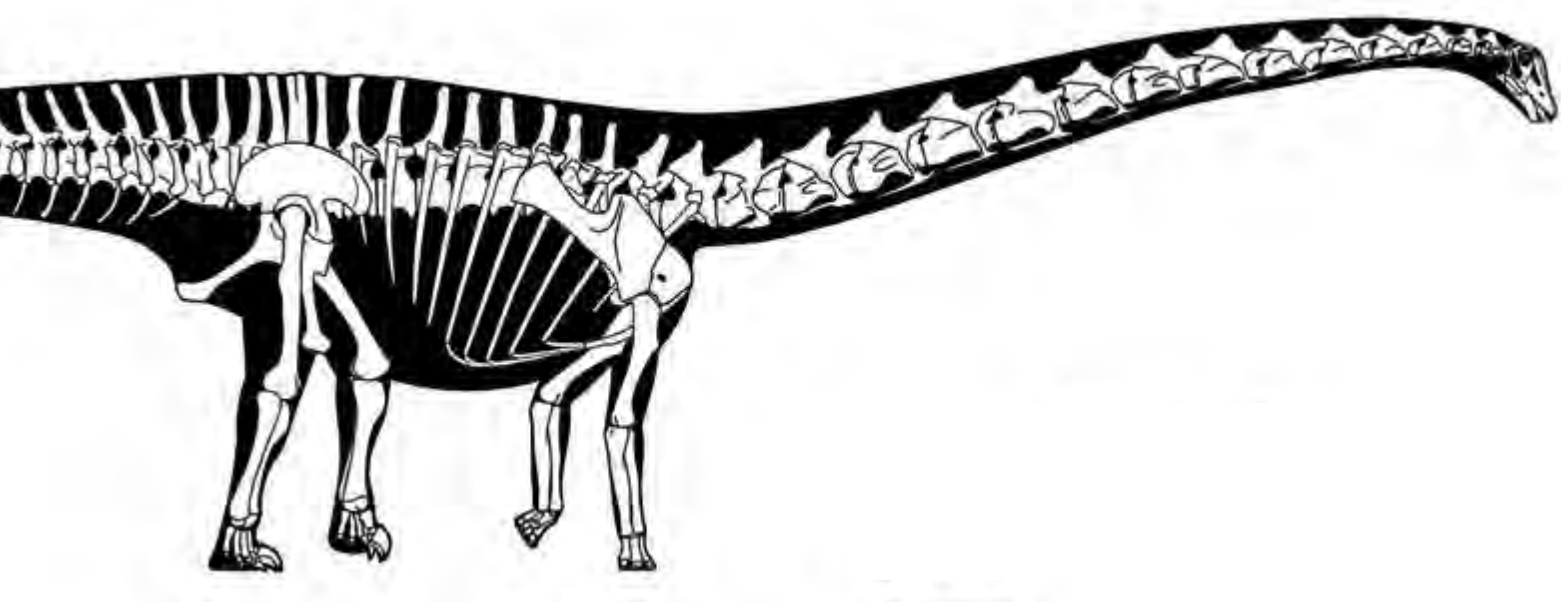


the nine month task of cleaning and correcting the original Carnegie plaster skeleton who had graced the central entrance hall of the Natural History Museum, in London from 1905 to 2017 so that it could go on tour throughout the UK until 2020.

According to RCI founder, Peter May, his team—the gifted creators of mounted dinosaurs and other cast specimens—are experts in the art and technology of preserving the past—one skeleton at a time. Peter explains that mounting priceless original fossil remains takes expertise and craftsmanship from conservators, paleontologists, fossil preparators, museum curators and blacksmiths and employs an impressive range of tools from delicate paintbrushes and forges to complex pneumatic and computer imaging systems. Teams from RCI have been involved in paleontological installations of rare specimens at many of the world's foremost natural history museums, including The Smithsonian Institute.

The Dippy here at Science Rendezvous Kingston 2019 is 26 metres long, 4.3 metres wide and 4.17 metres high and is constructed of 292 bones.

On behalf of all of the visitors to The Leon's Centre here to celebrate STEAM—the integration of the arts into science, technology, engineering and mathematics, we extend a warm welcome to Dippy and a huge round of applause to RCI for its generous support of public education!



NEW THIS YEAR

Limestone Beekeepers' Guild

Please welcome the Limestone Beekeepers' Guild to Science Rendezvous Kingston 2019! We are very fortunate to have members from this organization together to share their knowledge and experience.

Did you know that honey is one of our earliest sources of sweetness? In fact, we have evidence of humans gathering honey 15,000 years ago and we know that jars of honey were discovered in King Tut's tomb.

Today, the honeybees' work is more important than ever. Why? About one-third of the world's food supply is dependent on the pollination honeybees provide; however, harsh environmental changes, widespread use of pesticides, and the spread of diseases are causing bees to die off at an alarming rate.

What can you do? Plenty! At The Limestone Beekeepers' Guild booth, you will:

· learn about the difference among honey bees, bumblebees, and wasps;

· find out the difference between a Queen, drone and worker bee;

· have an opportunity to see honeybees making honey behind a clear observation beehive;

· learn why honeybees are called "master engineers" because they design perfect hexagonal honeycombs for their houses;

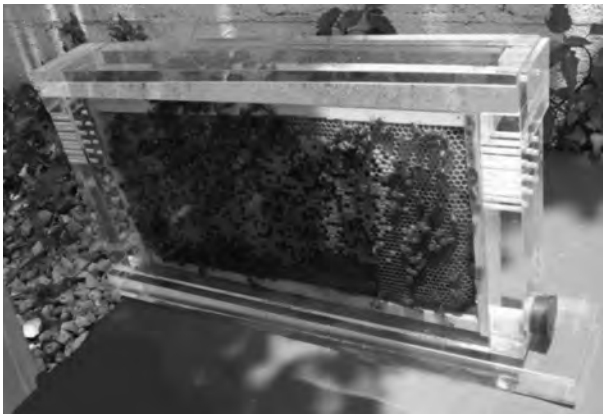
· see how different honey from Kingston, Harrowsmith, Elginburg and Selby looks and tastes;

· discover the simple secrets to planting a bee-friendly garden (http://www.uoguelph.ca/honeybee/documents/Bee-Garden-Brochure.pdf); Did you know bees pollinate lima beans, canola, cotton, grapes, pears, some soybeans, strawberry, and tomatoes?

· find out what to do if you see a swarm;

· learn about the "waggle dance" and its role in bee communication;

· get answers to your questions: *How many eyes do honeybees have? How many legs? How many bees are in an average hive? Do all bees bite? Why are honeybees so important? How many times per minute does a honeybee beat its wings? Do honeybees sleep?*



NEW THIS YEAR

The Department of Biomedical and Molecular Sciences at Queen's University (Anatomical Sciences)

Welcome to Dr. Les MacKenzie, an Associate Professor and the Director of the Pattern II MSc Program in Anatomical Sciences, and his team to *Science Rendezvous Kingston*!

Did you know that the study of the human biological systems of the body—anatomy—goes back over 2,000 years, to the Ancient Greeks? In fact, the word "anatomy" comes from the Greek words *ana* meaning *up*, and *tome*, meaning *a cutting*. For many centuries, studies of anatomy traditionally depended on cutting up, or dissection, but with modern technology, it is increasingly possible to see how a body is made up without dissection.

Physicians and scientists need to understand how the various parts of your body work together and perform jobs that help you live your life. For example, your heart is a strong muscle, which makes it great at pumping blood through the kilometres of blood vessels in your body. Did you know that if laid end to end, an adult's blood vessels could circle the Earth about two-and-a-half times? That's about 100,000 km of blood vessels!

We are grateful that Dr. MacKenzie and his team will provide visitors to *Science Rendezvous Kingston* with the opportunity to learn by exploring life-like human anatomy models from the William James Henderson Anatomy Learning Centre.

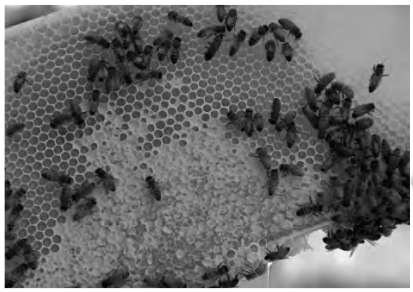
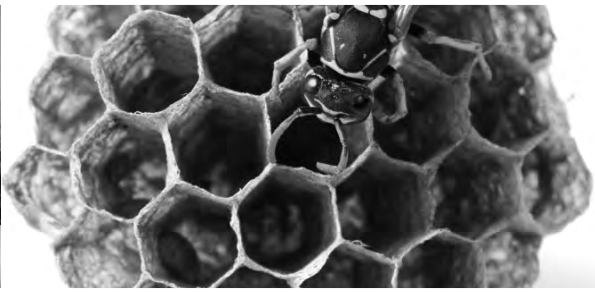
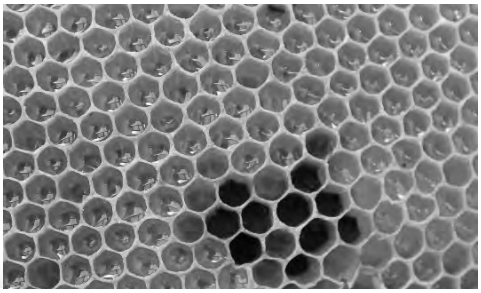
Come and learn about your incredible body!

To learn more about what we're made of and how we work download https://tinybop.com/apps/the-human-body This app let's you explore an interactive model and dive into the skeletal, muscular, nervous, circulatory, respiratory, and digestive systems where the heart beats, the guts gurgle, the lungs breathe, and the eyes see.

NEW THIS YEAR

Math Midway

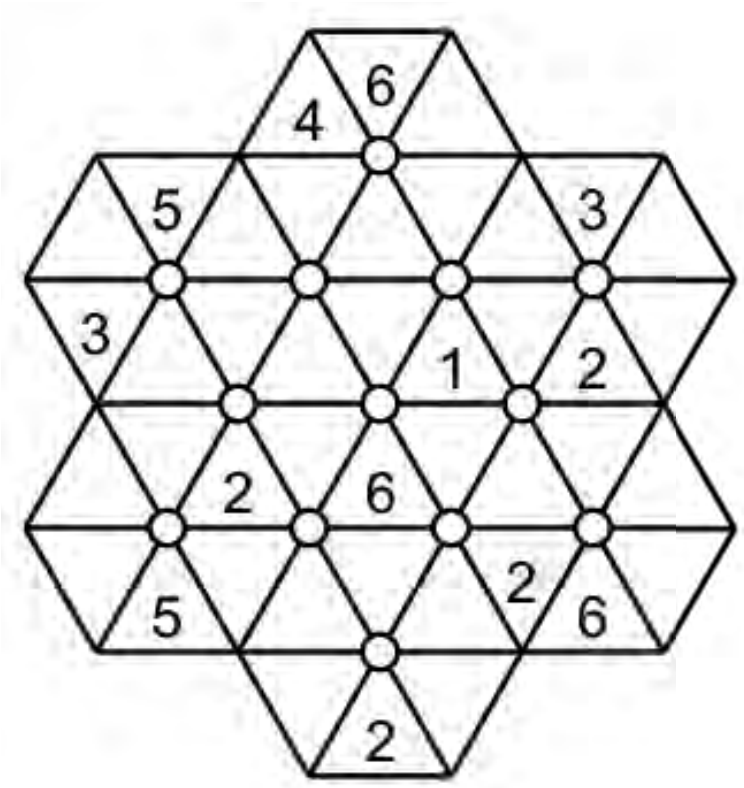
Did you know that the **hexagon** is the most efficient, least wasteful shape found in nature? Studies of the hexagonal geometry of the beehive tell us that no other shape can create more space with less material and simultaneously allow it to be one of the strongest structures in the world!

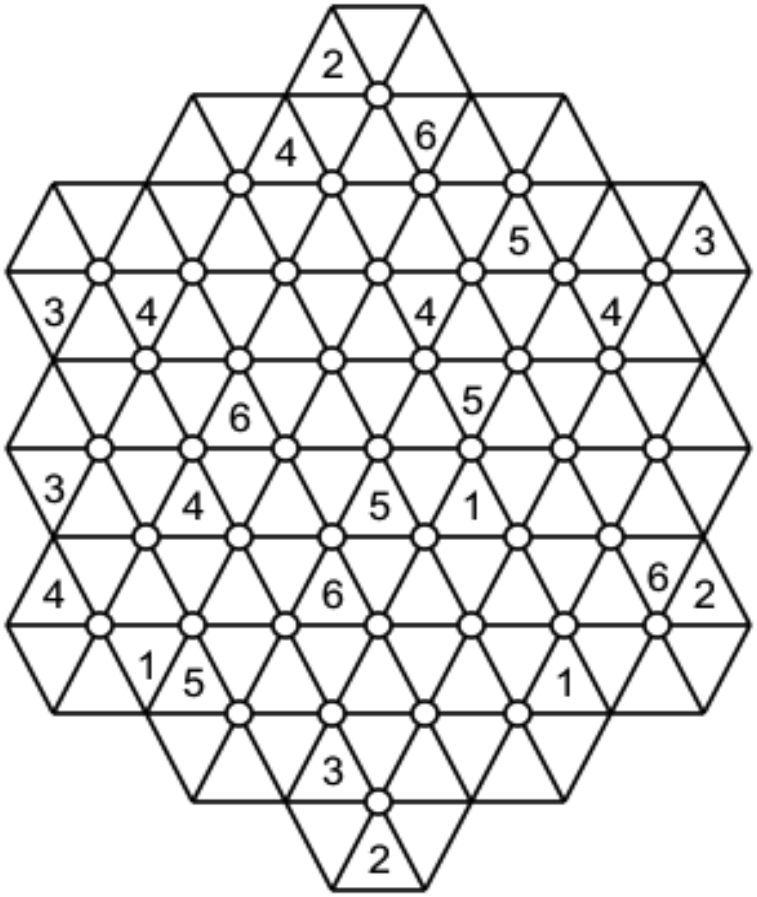




Hexagons are also common in mathematical games and recreations—including many games of strategy.

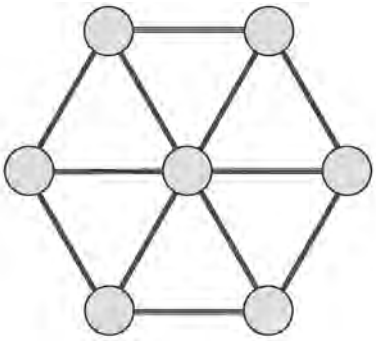
Here are a few hexagon-inspired games for you to try!

The **Snowflake Sudoku** is composed of hexagons that overlap partially. The goal is to put a number from 1 to 6 in each hexagon so that no number repeats. The problem is that every hexagon shares cells with at least 2 other hexagons; therefore when you place a number into a cell, it can belong to other hexagons. Below are two game boards: one with 13 hexagons (each with a circle in the middle) and one with 43 hexagons (each with a circle in the middle).

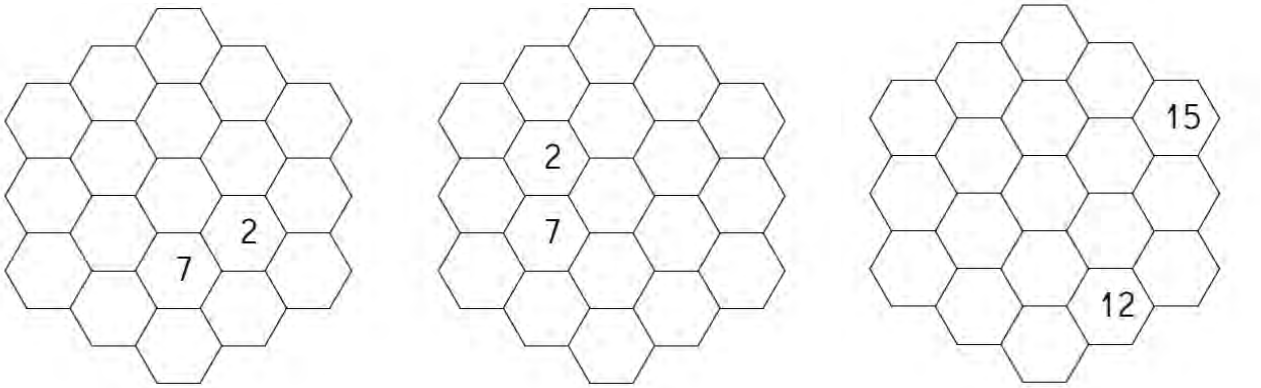




Three Hexagon is a game for two people. Each player has three counters (you could use coins or dried beans). The aim of the game is to get the three counters in a straight line. The player going first places a counter on one of the circles. The second player then places one of his/her counters on a circle. This continues until all the counters have been placed. If neither player has got 3 counters in a straight line then the first player slides a counter along a line to a circle that is not already covered. The other player then slides a counter to an adjacent circle. Counters can only move along one line into an empty space, i.e., they cannot jump over counters. If a player cannot move a counter she/he misses a turn.



Magic Hexagons Write the numbers 1 to 19, so that each row and diagonal has the same sum.



The hexagonal puzzle in your take-home package is called a **Polyhex Puzzle**. When you pop out the puzzle pieces, you will have three trihexes (shapes made with three hexagons) and seven tetrahexes (shapes made with four hexagons), for a total of 37 hexagons.

If you succeed in putting all ten pieces onto the game board to make a hexagonal shape, congratulations! But don't stop at your first solution because there are 12,290 ways to put the shapes together to solve the puzzle! Looking for another challenge with your polyhex puzzle pieces? Try to make the hexagram shape…there are 167 ways to do so!

NEW THIS YEAR

Ingenuity Labs

The Ingenuity Labs research institute is an interdisciplinary initiative at Queen's University focused on creating intelligent systems and robotic machines that enhance human productivity, safety, performance, and quality of life. Our expertise spans a continuum—from artificial intelligence, machine learning, and cyber-human systems, to robot control, smart sensors, and mechatronic devices. Through creativity, collaboration, and invention, our researchers strive to facilitate the complex interactions between humans, engineered machines and infrastructure, as well as their natural and social environments.

Quick Facts about Ingenuity Labs

- Unique focus on applied AI, robotics, and intelligent systems
- Access to nearly 12,000 sq. ft of research space in the new Mitchell Hall
- Precipitated by a significant philanthropic gift
- Current membership includes 17 faculty members from multiple disciplines, from three faculties
- Have hired two new faculty, and have plans to hire three more
- Received two-year provisional status at Queen's in September 2018

Primary Objectives of this Institute

- Become a recognized Canadian and international leader in safe and practical applications of AI and related techniques with a particular focus on the design of smart environments and infrastructure, advanced human sensing and assistive devices, as well as intelligent mobile systems
- Facilitate researcher coalescence and interdisciplinary collaboration
- Establish strong and diverse industry linkages and partnerships
- Build unique and world-class research facilities
- Attract and train exceptional students, researchers, and faculty
- Locally develop and incubate new technologies and business opportunities

WE WANT TO HEAR FROM YOU!

Grab some markers and write on our feedback wall to let us know what was best about this year's Science Rendezvous Kingston event. Make suggestions for next year. Tell us something that you learned. What inspired you? Surprised you?

Write a few words or draw a picture.

Throughout the day, volunteers will be circulating through Leon's Centre with iPads loaded with an electronic feedback survey. It only takes a few minutes to complete, but the information is invaluable to the Coordinators who are already planning for Science Rendezvous 2020 on Saturday May 9th.

SAVE THE DATE!

MAY 2020

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

READING BEYOND SCIENCE RENDEZVOUS

Lists Compiled by Brenda Reed, Head Education Librarian, Faculty of Education, Queen's

Recommended Books for Kindergarten Readers

Dinosaurs

Boy, Were We Wrong About Dinosaurs! By Kathleen V. Kudlinski. Puffin, 2008.
Dino Block by Christopher Franceschelli and Illustrated by Peskimo. Abrams, 2015.
How Big Were Dinosaurs? Illustrated by Lita Judge. Roaring Brook, 2013.
How Do Dinosaurs Count to Ten? By Jane Yolen and illustrations by Mark Teague. Blue Sky Press, 2004
Little Kids First Big Book of Dinosaurs, by Catherine D. Hughes. National Geographic, 2011.
Prehistoric Actual Size, by Steve Jenkins. Houghton Mifflin, 2005.

Space Travel and Astronauts

The Darkest Dark: Astronaut Chris Hadfield, by Chris Hadfield and Kate Fillion and illustrated by The Fan Brothers. 2016.
If You Decide to Go to the Moon, by Faith McNulty and Steven Kellogg. Scholastic, 2005.

Bees

Bees, by Rebecca Rissman. Raintree, 2012.

Endangered Species

Gone Wild: An Endangered Animals Alphabet, by David McLimans. Walker, 2006.

Endangered species – Turtles & Frogs

Turtle Pond, by James Gladstone. Groundwood, 2018.

Recommended Books for the Primary Grades

Dinosaurs

Barnum's Bones: How Barnum Brown Discovered the Most Famous Dinosaur in the World by Tracey Fern with illustrations by Boris Kulikov. Farrar Straus Giroux, 2012.
Bizarre Dinosaurs, by Christopher Sloan. National Geographic, 2008.
Breakout Dinosaurs: Canada's Coolest, Scariest Ancient Creatures Return! By Hugh Brewster. Royal Ontario Museum with Whitfield Editions, 2007.
Did Dinosaurs Eat Pizza? By Lenny Hort and illustrations by John O'Brien. Henry Holt, 2006.
Encyclopedia Prehistorica: Dinosaurs, by Robert Sabuda and Matthew Reinhart. Candlewick, 2005.
Monster Fliers From the Time of the Dinosaurs by Elizabeth MacLeod and illustrations by John Bindon. Kids Can, 2010.

Space Travel and Astronauts

Everything Space, by Helaine Becker. National Geographic Kids, 2015.
Meet Chris Hadfield, by Elizabeth MacLeod and illustrated by Mike Deas. Scholastic, 2018.
Moonshot: The Flight of Apollo 11, by Brian Floca. Atheneum, 2008.
Next Time You See the Moon, by Emily Morgan. NSTA, 2014
Thirteen Moons on Turtle's Back, by Joseph Bruchac and Jonathan London. Philomel, 1992.

Bees

Bees, by Deborah Hodge. Kids Can Press, 2004.
Bees: Explore, Create, Investigate! by Andrea Quigley. QEB Publishing, 2017.
The Buzz on Bees, by Shelley Rotner, Anne Woodhull and photographs by Shelley Rotner. Holiday House, 2010.
The Hive Detectives, by Loree Griffin Burns with photographs by Ellen Harasimowicz. Houghton Mifflin, 2010.
The Honeybee, by Kirsten Hall and Isabelle Arsenault. Atheneum, 2018.
You Wouldn't Want to Live Without Bees, by Franklin Watts, 2016.

Endangered Species – Turtles
Baby Sea Turtle, by Aubrey Lang and photographs by Wayne Lynch. Fitzhenry & Whiteside, 2007.
The Journey of a Turtle, by Carolyn Scrace and illustrated by David Salariya. Franklin Watts, 2000.
A Place for Turtles, by Melissa Stewart and illustrated by Higgins Bond. Peachtree, 2013.

Endangered species -- Frogs
Face to Face with Frogs, by Mark Moffett. National Geographic, 2008.
Frog Song, by Brenda Guiberson and illustrated by Gennady Spirin. Henry Holt, 2012.
Wood Frogs, by David Schwartz and photographs by Dwight Kuhn. Creative Teaching, 1999.

Recommended Books for the Junior Grades

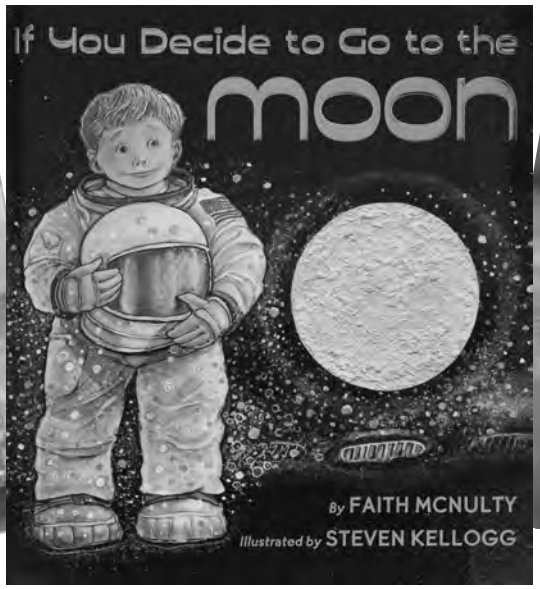
Dinosaurs
Digging Canadian Dinosaurs, by Rebecca L. Grambo and illustrated by Dianna Bonder. Walrus Books, 2004.
Dinosaur Mountain, by Deborah Ray. Farrar Straus Giroux, 2010.
Dinosaurs: A Visual Encyclopedia. DK/Simthsonian, 2nd ed. 2018.
Encyclopedia Prehistorica: MegaBeasts, by Robert Sabuda & Matthew Reinhart. Candlewick, 2007.
In the Past,by David Elliott and illustrated by Matthew Trueman.
Tracking Tyrannosaurs, by Christopher Sloan and illustrated by Xing Lida and Liu Yi. National Geographic, 2013.

Space Travel and Astronauts
Amazing Solar System Projects You Can Build Yourself, by Delano Lopez, Nomad Press, 2008.
Beyond: A Solar System Voyage, by Michael Benson. Abrams, 2009.
Space! The Universe As You've Never Seen it Before! DK Smithsonian, 2015.

Bees
Bees, by Laura Marsh. National Geographic Kids, 2016.
Buzz About Bees, by Kari-Lynn Winters. Fitzhenry & Whiteside, 2013.

Endangered Species – Turtles
How Turtle Set the Animals Free in **Kou-skelowh = We are the people : a trilogy of Okanagan legends,** illustrated by Barbara Marchand. Theytus, 2004.
Saving Turtles, by Sue Carstairs. Firefly, 2014.
Turtle Rescue, by Pamela Hickman. Firefly, 2005.

Endangered species -- Frogs
Frogs, by Nic Bishop. Scholastic, 2015.
Frogs, by Seymour Simon. HarperCollins, 2015.




ASCP
CIENCE


39
Wejay
Serve Pro
SKF
JC PRECISION
Mitutoyo
igus
ST-HUBERT
MACHINE SHOP


Skills


BLUE JAYS
BASEBALL

VOLUNTEER APPRECIATION

Science Rendezvous Kingston is made possible by over 400 volunteers from Queen's University, The Royal Military College of Canada, St. Lawrence College, and the Greater Kingston community.

Thank you!

Your efforts are appreciated.

Presentations, Demonstrations, Hands-On Activities, Make & Take Workshops

ACTIVITIES & PRESENTATIONS

Who We Are	What You'll Be Doing at Our Station	Volunteers
Association of Ontario Land Surveyors	Explore the World and Science of Surveying by getting "hands-on" experience with the various data, tools and technologies used by today's Surveying professionals. The Association of Ontario Land Surveyors (AOLS) is excited about the SHSM Surveying Certification program being introduced to Ontario's School Boards. The AOLS will be sharing more information with you about the SHSM program and Careers in Surveying. See www.aols.org	**Nigel Day** **Michael Matthews** **Les Higginson** **Siara Cheng**
APGO ASSOCIATION OF PROFESSIONAL GEOSCIENTISTS OF ONTARIO	Minerals are naturally occurring, homogeneous, inorganic solids that have definite chemical compositions, and characteristic crystalline structures. Minerals have physical properties that can be measured and used to identify them. Visit our booth to conduct hands on experiments to classify a suite of minerals and to learn what minerals are used to make items that we use, everyday.	**Lesley Hymers** **Deana Schwarz**
bricks 4 kidz	Bricks 4 Kidz has exciting learning opportunities for you! Please join us to learn about our LEGO builds that use motors and battery packs. We teach Science, Technology, Engineering and Math concepts using LEGO bricks in our Camps, PA Day programs, In-School Lunch Hour Programs, Kids Night Out, Birthday Parties and more! Visit our table to create some Spin Art using our LEGO Spin Art Machines!	**Sarah Utting**
CAGIS	The Canadian Association for Girls in Science (CAGIS) display at Science Rendezvous will be a demonstration of limnology (the study of lakes). We will have field equipment to demonstrate, and algae and zooplankton samples to look at under the microscope.	**Liz Favot** **Margaret MacConnachie** **Emily Stewart**
CANADA LEARNING CODE	Canada Learning Code (CLC) offers digital literacy education, workshops, and programs for Canadians. CLC has hosted over 2,800 workshops across Canada since 2011 - that's amounted to over 1,000,000 hours of coding by our community. Stop by and learn to code with us!	**Jessica Bredschneider** **Shelby Bastarache** **Steve Blair**

ACTIVITIES & PRESENTATIONS

Who We Are	What You'll Be Doing at Our Station	Volunteers
Cardiovascular Imaging Network Queen's	The Cardiovascular Imaging Network at Queen's University (CINQ) will present to you hands-on demonstrations of ultrasound exams of a simulated human heart and blood vessels, teach you about heart and vascular anatomy, and provide you with some simple steps to keep your heart healthy! Come explore the anatomy of the heart, and even try out one of our state-of-the-art hand-held ultrasound devices on an ultrasound model	**Dr. Amer Johri** **Dr. Marie-France Hetu** **Dr. Stephen Pang** **Christie Boswell-Patterson** **Orli Chapman** **Nick Grubic** **Julia Herr** **Salwa Nihal** **Nicole Protopapas** **Michelle Weller**
ESU enrichment studies unit EST. 1987	What science discoveries will you make today? Come and use your creative thinking to solve fun, hands-on math and science activities at the ESU booth.	**Linda Lamoureux**
FLASF Frontenac, Lennox and Addington Science Fair	Join in hands-on activities with young scientists from the Kingston area. See grade 5 to 12 students demonstrate their projects from this year's Frontenac, Lennox and Addington Science Fair. Learn more about the Science Fair - perhaps you would like to enter yourself next year?	**Trina Tran** **Anahita Sehgal** **Lily Emma Naaman** **Emily Monaghan** **Julia Kolosov** **Alisha Khan** **Aeliya Haider** **Grace Fu** **Mayssa Ferchichi** **Jon Clarke** **Isabel Clarke** **Keenan Broad**
GIRLS SYSTEM	Girls SySTEM Mentorship Program, a unique mentorship program for girls in grades 7-12 eager to pursue STEM fields	**Kathryn L. Hong** **Anna Logan** **Caleigh Matheson**

ACTIVITIES & PRESENTATIONS

Who We Are	What You'll Be Doing at Our Station	Volunteers
KING'S TOWN SCHOOL	Let's Torque about Spinning Tops! Make a spinning top featuring your own creative flair and see how long you can keep it spinning for. Learn all about torque and the physics behind how the top spins.	**Kate Beattie** **Ashley Echols** **Roxanne Garwood** **Theresa Jones** **Bryan Little** **Riley MacKinnon** **Katherine Noyes** **Emma Stambach** **Martha Thomson**
Information inspiring imagination KINGSTON FRONTENAC PUBLIC LIBRARY YOUR PUBLIC LIBRARY	Drop by the KFPL booth in the Leons Centre and get technical with our 3D Printer, and our Makey Makey and other hands-on Lego and Magnet Activity Tables	**Behrooz Golbahar** **Tiffany Mao** **Charlotte Massey** **Serena Sengupta** **Jack de Sousa** **Margi McKay** **Erika Lamon-Nolet** **Maddy Scovil**
SERVING OUR COMMUNITY KINGSTON POLICE	Mobile Engagement Trailer Motorized Electric Vehicles and a Road Course Traffic Unit Vehicle and Drone Demonstrations Emergency Response Unit Equipment Display	**Members of the Kingston Police Force**
2708 LAKE EFFECT ROBOTICS	Check out our World Champion robot from 2018 as well as our new 2019 robot. Try driving different types of robots and other interactive activities."	**Kevin Wood** **Kevin Firth** **Jennifer McCann** **Don Wartman** **Curtis Wartman** **Noah Brock** **Dashiell Giguere** **Sean Green** **Halil Kelebek** **Gregory Kelly** **Levin Kroenke** **Nathaniel Moore** **Luca Piomelli** **Ajay Ramachandran** **Bryce Stilwell** **Meghan Wartman** **Thomas Wartman** **Griffin Wilson** **Vannah Wilson**
LIMESTONE BEEKEEPERS' GUILD	Ontario Bee Association has a booth, table top signage, brochures, recipes, and temp bee tattoos that we can provide to support local beekeeper outreach and education.	**Alexandra Pederson** **Gail Ashley** **Leo Ashley** **Ryan Benvenuti** **Jane Boulder** **Kyle Casselman** **Nancy Cole** **Kevin Ferrah** **Garry Goodberry** **Mandy Green** **Tom Kaemmer** **Bill Kriby** **Bill Lake** **Julie Leclerc** **Alexandra Pedersen** **Dieter Schonwandt** **Carol Sparling** **Monika Vogel** **Curtis Burnet** **Elaine Peterson**

ACTIVITIES & PRESENTATIONS

Who We Are	What You'll Be Doing at Our Station	Volunteers
Machine Mavericks	Machine Maverick's mission includes promoting gender parity in STEM. We believe that young men and women who have learned to face challenges together is of great value to the 21st century workplace	**Ella Hsu** **Christian Johnston** **Mara Klug** **Aadya Mishra** **Madison Mussari** **Isobel Moore** **Olivia O'Driscoll** **Namirah Quadir** **Sebastian Rielo** **Saachi Singh**
MILITARY COMMUNICATIONS AND ELECTRONICS MUSEUM LE MUSÉE DE L'ELECTRONIQUE ET DES COMMUNICATIONS MILITAIRES	Explore the STEM pilot flight simulator and learn about First World War communications on the ground and in the air! Try out the Morse keys and field telephones. Strap yourself in for a flight in a Curtiss JN-4 Canuck for your first solo flight!	**Jessica Beardsley** **David McCarey**
MUSEUM OF HEALTH CARE AT KINGSTON	"What's that or, Doc?" This display will use the Museum's collection of artifacts as well as harness teaching aids and interactive models created by the APSC Queen's University Engineering program to show just what some of the unique, odd and interesting looking tools that medical professionals use are actually for!	**Darragh De Groot** **Kevin Moorhouse**
Professional Engineers Ontario	The Kingston Chapter of PEO has these hands on activities for all ages to try: Catapult, Gears and Pulleys! Circuits! Roundabouts!	**Kazi Haque** **Doug Hatfield** **Christina Klein** **Brenden Mackinnon** **Koushawn Monajemi** **Brian Surgenor**
Loock Laser Lab	Visit our booth to experience a 'stealth' computer screen, learn how your TV remote works, and watch us light matches with a laser!	**Dr. Peter Loock** **Adam Bernicky** **Travis Ferguson** **Emily Groper** **Matthias Hermann** **Leo Mahlberg** **Jenny McLeod** **Rebecca Schapelhouman** **Behnaz Seyedahmadi** **Andrew Williams**

ACTIVITIES & PRESENTATIONS

Who We Are	What You'll Be Doing at Our Station	Volunteers
QGEM	QGEM Visit our station and learn about how scientists study DNA! There will be interactive workshops on microbial genetics, and we will be explaining how these concepts contribute to the field of synthetic biology.	**Jonathan Coutinho** **Kathleen Harrison** **Ryan Kirkpatrick** **Matt Laporte** **Julia Morris** **Kayne Park** **Heidi Riek** **Emma Robertson** **Kaitlyn Tresidder** **Emma Walton** **Rachel Yep**
Queen's University **Queen's University Observatory**	The Queen's Observatory was first established in 1855, the beginning of a long and distinguished history of astronomical observing. The current Observatory houses a 14-inch telescope on the roof of Ellis Hall. You are invited to come and experience the wonders of our Universe with your own eyes! Regular FREE monthly Open House public sessions are organized in collaboration with the RASC every month, on the second Saturday.	**Connor Stone** **Nikhil Arora** **Sean Begy** **Matt Frosst** **Ryan Groome**
Connections QUEEN'S ENGINEERING EXPERIENCE PROGRAM **Connections: Queen's Engineering Outreach**	Tech 'n' Tinker Trailer which is a mobile Makerspace. A Makerspace is a physical location where people gather to share resources and knowledge, work on projects, network, and build. Makerspaces provide tools and a space in a community environment.	**Scott Compeau** **Lydia Bradau** **Cora Jennings** **Alex Jones** **Tianna Lombardo** **Thor Render** **Desuree Vandendam**
Queen's University **Department of Chemistry**	Chemistry Magic Show	**Dr. Kevin Stamplecoskie** **Graham Beaton** **Kasia Donovan** **Alastair Kierulf** **Jenny McLeod** **Ola Pasternak** **Hannah Ramsay** **Bailey Smith**
Queen's University **Child and Adolescent Development Group**	We will be displaying a number of games appropriate for different age-levels of children ranging from video games to brain puzzles-all of which are related in some way to brain development.	**Beth Kelley** **Brooke Hilton** **Tara Karasewich** **Beth Kelley** **Valerie Kuhlmeier** **Jenn McNeil** **Mark Payumo** **Sylvia Pinheiro** **Hannah Taalman**

ACTIVITIES & PRESENTATIONS

Who We Are	What You'll Be Doing at Our Station	Volunteers
let's talk science	What is light and what is it composed of? The Let's Talk Science team at Queen's will expose the nature of light and show how to manipulate its properties to create optical illusions.	**Jasmine Buddingh** **Melissa Munoz** **Heidi Gipp** **Sarah Ellis** **Tina Tabrizizadeh** **Kara MacIsaac**
Queen's University **Department of Chemistry Graduate Studies**	We will have signs for the three stations on what the experiments are, with detailed ingredient lists and explanations on what chemistry is happening.	**Josh Clarke** **Shideh Admadi** **Emily Albright** **Josh Clarke** **Dianne Lee** **Tanya Levchenko** **Laura Laverdure** **Kasra Saeedfar** **Andrew Schug** **Ishwar Singh** **Marshall Timmermans** **Lorena Ucciferri** **Alex Veinot**
Queen's University **School of Kinesiology Biomechanics and Ergonomics Lab**	When we move, we apply a force to an object and that object also applies a force on us. This reaction force from the object pushes on us to allow us to move! Very often, that object is the ground. The pushing force from the ground against us is what allows us to walk, run, and jump. Even when we're just standing still the ground is pushing on us. The Queen's University Biomechanics and Ergonomic Lab can show you how we measure these forces that allow us to move!	**Josh Davies** **Pat Costigan** **Megan McAllister** **Spencer McGregor** **Emilie Mondor**
RIVAL LAB **Department of Mechanical and Materials Engineering**	Come see the RIVAL LAB at work as we showcase 3 separate experiments that demonstrate Physics of Flight and Aerodynamics.	**Professor David Rival** **Lindsay Gibson** **Julian Alexander-Cook** **Louis Burelle** **Adnan El Makdah** **Joshua Galler** **Rowayne Murzello**
OSA® The Optical Society	Come by our booth and play with lasers! Together we will explore what light really is, and how can be harnessed to achieve amazing things -- including beautiful holograms, advanced security systems, and bringing high speed internet to your home!	**Kiran Birdee** **Chelsea Carlson** **Kate Fenwick** **James Godfrey**

ACTIVITIES & PRESENTATIONS

Who We Are	What You'll Be Doing at Our Station	Volunteers
School of Medicine Clinical Simulation Centre	Come be a medical student for a few minutes. Learn how to resuscitate a non-breathing person and how residents learn how to do laparoscopic surgery.	**Kim Garrison** **Ella Breen** **Lucy Rebelo** **Cathy Santyr**
Bio-Mechatronics and Robotics Laboratory, Department of Mechanical and Materials Engineering	Our lab will display the New Ingenuity Labs and we will demonstrate the display the energy and human power generation.	**Dr. Qingguo Li** **Emile Flavin** **Johann von Tiesenhausen**
Art of Research Exhibit	Come explore the dynamic world of research at Queen's University! The act of research is a beauteous endeavour, whether it is conducted in the lab, in the field, in the studio, or in the archives. The Art of Research photo contest provides the opportunity for Queen's faculty, students, staff and alumni to showcase and celebrate their research, scholarly, and artistic work in creative, provocative and engaging ways. The Art of Research photo exhibit highlights winners and shortlisted images from the annual contest.	**Melinda Knox** **Kayla Dettinger** **Dave Rideout** **Uchitta Vashist**
Space Engineering Team, Department of Engineering	Check out the Space engineering team's Mars Rover. Learn how the peripheral subsystems (robotic arm/hand, soil analyser, machine vision system) work.	**Andrew Downie** **Cal Graham** **Lily de Loe** **Alex White** **James Xie**
School of Computing Laboratory for Percutaneous Surgery	The Perk lab is planning to bring the Operation pig demo, and we will put together another demo which is especially intuitive and interactive for the kids.	**Jacob Laframboise** **Keiran Barr** **Laura Connolly** **Lydia Elbatarny** **Jacob Laframboise** **Catherine Wu**

ACTIVITIES & PRESENTATIONS

Who We Are	What You'll Be Doing at Our Station	Volunteers
Indigenous STEM presented by the Aboriginal Teacher Education Program	Have you ever wondered how a hand-drum is created? Come check out our booth to learn more about the intricate process of drum making, see some hand drums and get to explore the different stages as they relate to science and math!	**Liv Rondeau** **Sian O'Hara**
Baja SAE Design Team	Our design team provides students with a variety of hands-on experience in design, project management, business correspondence, and manufacturing. Knowledge is passed down through peer interaction and faculty guidance, which creates a friendly, collaborative learning environment. Baja SAE also introduces students to the competitive nature of the consumer industrial market, professionalism and financial organization. Our members are involved on a voluntary, interest-driven basis and have found that the experience they gain from Baja provides an unparalleled advantage in the job market upon graduation.	**Matt Jansen** **Derek Posthumus** **Tye Morgan** **Arjun Ivimey** **Courtney Rider**
Elbow Lake Environmental Education Centre Eco-Adventure Camp	Investigate the five turtle species that live in our area! Learn how to identify each species, find out how we track turtle movements, and get answers to questions like "where do turtles go in the winter time?" We guarantee you'll have a turtle-iffic time!	**Emily Verhoek** **Ruth Bryce** **Rachael Wootton** **Jennifer Cooke** **Caroline Burchat**
Department of Physics, Engineering Physics, and Astronomy SNOLAB Group	Learn more about the exciting particle astrophysics research being done at SNOLAB, which is located more than 2km underground in a mine near Sudbury, ON. At the same time, have a blast learning about waves with our air vortex cannons, experience electrostatics with our Van de Graaf generator, and have fun with other hands-on activities.	***Queen's University*** **Elizabeth Fletcher** **Phil Harvey** **Hector Hawley Herrera** **Brian Krar** **Ian Lam** **Alex Rolland** **Ingrida Semenec** **Matthew Stukel** **Benjamin Tam** ***McDonald Institute/ Queen's University*** **Ken Clark** **Jennifer Low** **Mark Richardson** ***Institute of Particle Physics/ Queen's University*** **Alex Wright** ***SNOLAB*** **Szymon Manecki**

ACTIVITIES & PRESENTATIONS

Who We Are	What You'll Be Doing at Our Station	Volunteers
University Ingenuity Labs, Faculty of Engineering and Applied Science	IBEX the Robot New research institute in AI/robotics/ mechatronics called "Ingenuity Labs".	**Michael Fader** **Unal Artan** **Aaron Best** **Michael Fader** **Heshan Fernando** **Emile Flavin** **Keyvan Hashtrudi-Zaad** **Natassia Lunzmann** **Joshua Marshall** **Misan Mayuku** **Kyle Ross** **Jeremy Roy** **Zhan Shi** **Johann von Tiesenhausen** **Amy Wu** **Yang Xiaoyu** **Xiaodan Zhu**
	What are FUNtervals? FUNtervals are high intensity interval type activities that consist of whole body movements. Each FUNterval activity takes kids through a story line composed of 8 intervals of 20 seconds of quick, enthusiastic movement followed by 10 seconds of rest. The FUNterval protocol, which takes only 4 minutes to complete, was designed to provide a fun way for kids to be active without requiring significant equipment, space or time.	**Marnie Girard** **Kelly Blair-Matuk** **Brendan Gurd** **Cory Watkins**
School of Medicine , Biomedical and Molecular Sciences Anatomy	Models of body parts, information on courses and areas of research, graduate programs, outreach programs, and information on the human body donor program.	**Leslie MacKenzie** **Jackie Moore** **Stephen Pang**
Research Casting International	Creators of mounted dinosaurs and other cast specimens; experts in the art and technology of preserving the past – one skeleton at a time. Come meet Dippy the Diplodocus!	**Peter May**
Rideau Public School	Wendy Dossett, a Grade 3 teacher at Rideau Public School, and the members of her Lego Robotics Club will share their work and answer your questions.	**Wendy Dossett**

ACTIVITIES & PRESENTATIONS

Who We Are	What You'll Be Doing at Our Station	Volunteers
Military Psychology and Leadership Department	Our theme this year is illusions (optical and physical): Lots of illusions to look at and to touch and explore: - 3-D concave/convex Einstein illusion - Wooden puzzle length/width illusion - Three card box illusion - Vase/face illusion	**Alexandra Horeczy** **Dr. Adelheid Nicol** **Daphne Denney** **Madison MacKinnon** **Pierre-Charles Rousseau** **Harvey** **Xiao Fan Wang** **Calista Weir** **Maria Zhurov**
Astronomy and Astrophysics	Solar telescopes and space-related take-home information. Ask us about black holes!	**Colin Lewis** **Ananthan Karunakaran** **James Sikora**
Chemistry and Chemical Engineering, Zeeb Phytoremediation Lab	We will be doing a display of worms in dirt as well as a station where children will have the opportunity to plant a sunflower seed to take home.	**Ellen Mann** **Dr. Barbara Zeeb** **Ryan Bergen** **Amelie Litalien** **Ellen Mann** **Logan Morris** **Adrian Pang**
	Solar telescopes and Royal Astronomical Society (RASC) Kingston Chapter stickers, info booklets, magazines	**Devin Ascin** **Hank Bartlett** **Bruce Elliott** **Susan Gagnon** **Laurie Graham** **Kim Hay** **Brian Hunter** **Kevin Kell** **Rick Wagner**
Wind Turbine Technician Program	The SLC display items are show casing renewable energies such as solar and wind as well as using the energy of air in a compressed air demonstration. We also will provide an interactive display that demonstrates temperature measurement and distribution using infrared technology. Participants will also have an opportunity to use human pedal power to generate electricity.	**Ryan Goff** **Matt McTaggart**

ACTIVITIES & PRESENTATIONS

Who We Are	What You'll Be Doing at Our Station	Volunteers
Queen's University **The Barz Lab at Chemical Engineering**	Build your own energy conversion devices from simple household items: 1) Make an electrolyser to produce hydrogen and oxygen from simple things like two pencils, a battery, water and baking soda. 2) Make a fuel cell which produces electrical power from hydrogen and chlorine using simple things like two pencils, a battery, water and salt. 3) Make a battery using two nails and a lemon and measure the voltage.	**Dominik Barz** **Merit Barz** **Mahmoud Khademi** **Ali Khazaeli** **Sreeman Mypati**
PUMPHOUSE HISTORY *in* MOTION MacLachlan WOODWORKING MUSEUM	We challenge you to explore the design cycle! Investigate the different properties of building materials and what makes a structure strong and stable. Experiment with different materials to build self-supporting structures and see if they can withstand the forces of nature!	**Paul Robertson** **Jennifer Campbell** **Victoria Babcock** **Heather Hubert** **Keely Maddock** **Max Manga** **Karla Salgado-Navarete** **Francesca Pang** **Francesca Rousselle**
Save All Frogs	SAVE ALL FROGS! Presented by Frog Conservationist - Matt Ellerbeck. Learn about the conservation of these amazing amphibians! See a display of live captive-bred frogs, both local and exotic species!	**Matt Ellerbeck**
W.A.F.F.L.E.S. Community Robotics	W.A.F.F.L.E.S. aren't just for breakfast - they are Wild About Family & Friends Learning Engineering & Science! W.A.F.F.L.E.S. Community Robotics is a local not for profit group run by volunteers that are passionate about STEAM. Stop by and see what area students ages 6-18 have been learning about and see their robots in action. You will be amazed at how much you can learn playing with LEGO® and see first hand the ingenuity the W.A.F.F.L.E.S high school aged team has integrated into their 120lb FIRST® Robotics Competiton robot. Find out how you can get involved in our programs and summer camps, and even how to book a W.A.F.F.L.E.S. birthday party. wafflesrobotics.com	**Brennan Bibic** **Christine Bibic** **Eden Bibic** **Logan Bibic** **Darryl Gillespie** **Kaitlyn Johnston** **Duncan McCarron** **Lorelei Secrieru** **Duncan Stevenson** **Gavin Stevenson** **Stephen Swartzentruber** **Echo Terrell** **Isabelle Thierrin** **Cole Thierrin**
Firefly ADVENTURES	Learn about free non-polluting solar energy and its applications including a solar water heater and a solar powered fan; taste a hotdog cooked on a parabolic solar cooker and, participate in a solar energy experiment to help determine what colour collector gets the most energy from the sun, grey, black, red or brown.	**Walt Sepic**

Activities, Experiments, Information, and Resources to Try and Use at Home

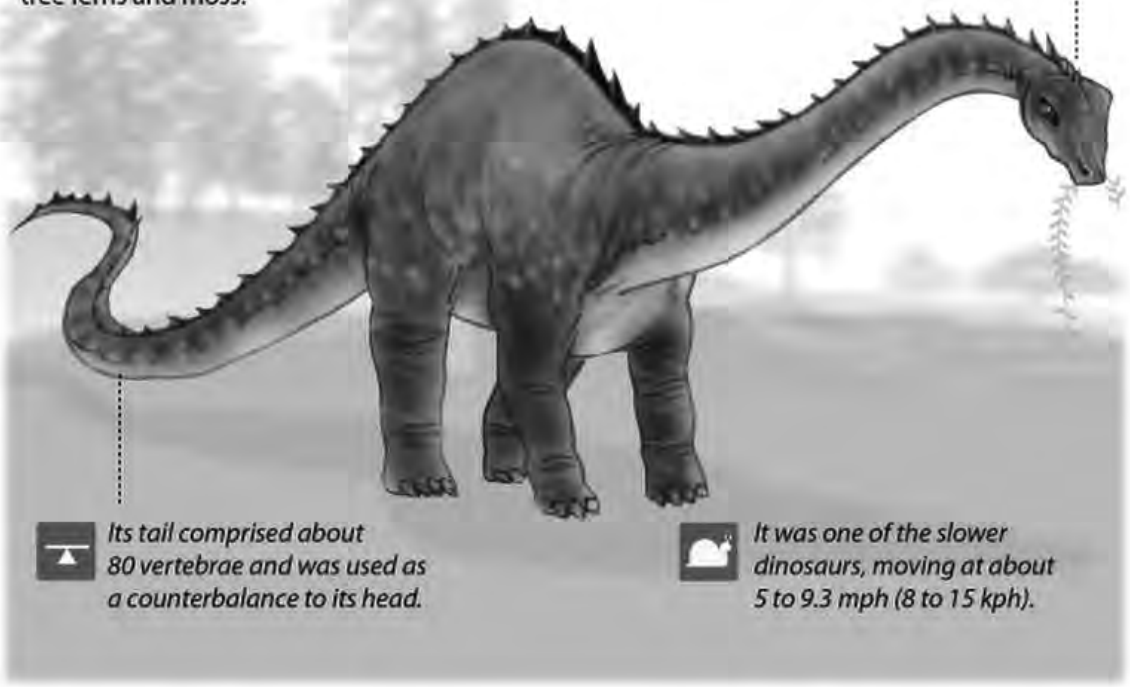
DIPLODOCUS

Spinosaurus lived during the late Jurassic Period, about 155 million to 145 million years ago.

Diplodocus *means "double beam"*

Its long neck was supported by about 15 elongated vertebrae.

Length: 90 to 175 feet (27 to 53.3 meters)
Weight: 12 tons (10,886 kg)
Diet: Survived mostly on low-lying vegetation; mostly soft new growth of conifers, tree ferns and moss.



Its tail comprised about 80 vertebrae and was used as a counterbalance to its head.

It was one of the slower dinosaurs, moving at about 5 to 9.3 mph (8 to 15 kph).

SIGNIFICANT FINDS

Rocky Mountain region of Colorado, Montana, Utah and Wyoming

The first Diplodocus fossil was found near Cañon City, Colo., by Earl Douglass and Samuel W. Williston in 1877.

SIZE COMPARISON

PERIOD *Triassic* ***Jurassic*** *Cretaceous* *Age of Mammals*

Millions of years ago *250* *200* *145* *65* *Present*

SOURCE: LIVESCIENCE RESEARCH

HEY, YOU!

Did you know that we recently launched an initiative called **Junior Astronauts**?

If you think you have "the right stuff" to be a junior astronaut, and will be in Grade 6, 7, 8 or 9 in the 2019–2020 school year, we also encourage you to take part in our national **Junior Astronaut Recruitment Campaign**!

In time for the new school year, we will make available activities focused on three streams — science and technology, fitness and nutrition, and communications and teamwork — that you can do with a participating school or a local youth organization.

Two junior astronauts from each Canadian province and territory will be selected by a committee of astronauts and experts to come to our headquarters in Saint-Hubert, Quebec, for a special **space camp in summer 2020**. During the camp, you will get to meet some of our experts and train like an astronaut!

In the meantime, you can visit our Junior Astronauts portal for **fun activities and challenges** for youth of all ages, educators and parents – they will take you to the Moon and back!

Educators, Junior Astronauts is also for you!

You can take part in our activities to have a chance to **win a visit from an astronaut** or space expert. Sign up for our **email distribution list** to receive the latest news about the initiative.

Check out **http://asc-csa.gc.ca/JuniorAstronauts** for more information!




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

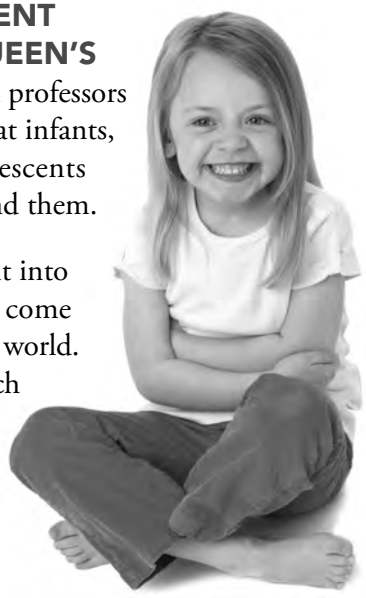
1. Hold one paddle in each hand.
2. Stand facing your partner.
3. Explain the rules to your partner: "When I lift a paddle showing the GREEN side, you raise your hand that is on the SAME side as the paddle (like if you were looking in the mirror). But, when I lift a paddle showing the RED side, you raise 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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Humphrey and Craine Halls
Queen's University
62 Arch Street, Kingston, ON K7L 3N6

Queen's University

Phone: **613-533-2476**
E-mail: **child.studies@queensu.ca**
Web: **www.queensu.ca/psychology/developmentalparticipate**

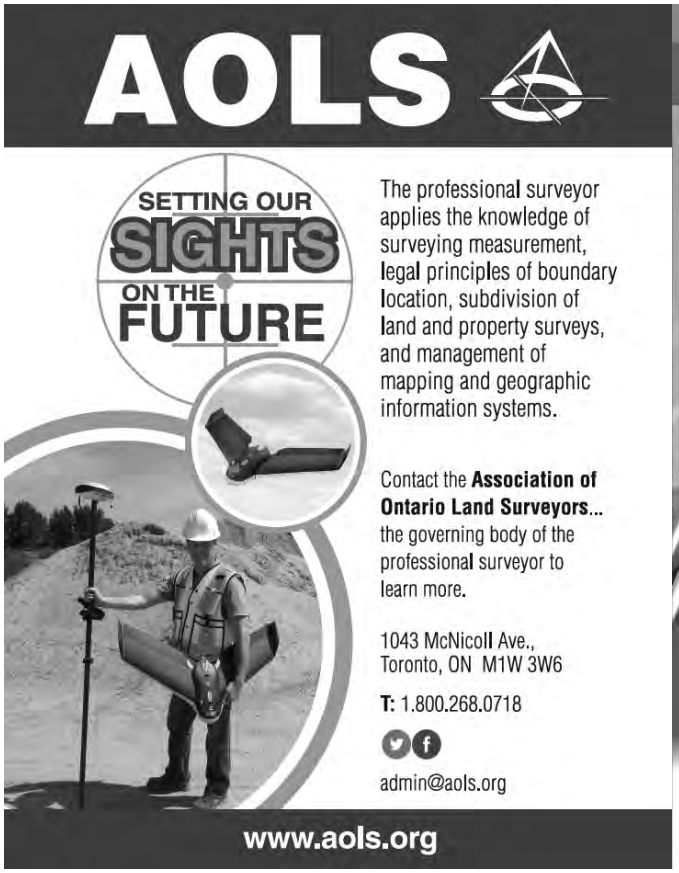
Like us on Facebook for updates and study results! **(search for Child and Adolescent Development)**

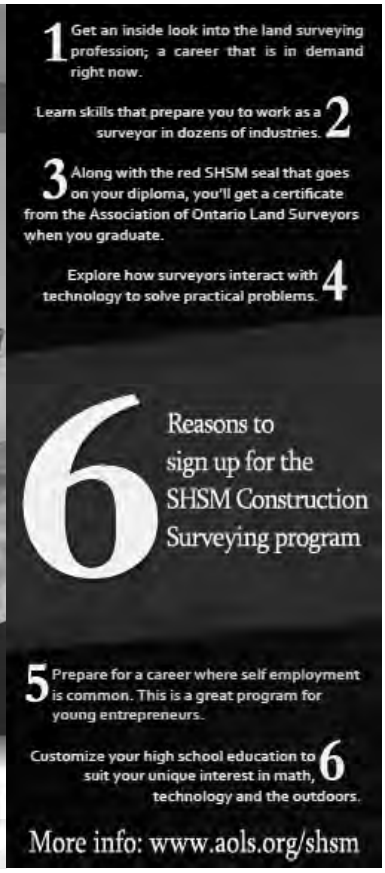
613.533.2476
child.studies@queensu.ca
Twitter: @QueensChildDev

CHILD and **ADOLESCENT DEVELOPMENT**
Queen's University

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

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





Drop by our booth to learn more about the
Association of Ontario Land Surveyors (AOLS)
<u>SHSM Surveying Certification program</u>
and
Careers in Surveying.

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

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

- Go to: https://www.aols.org/find_a_surveyor

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

EXPERIENCE UNIVERSITY

FOR GRADE 7-12 STUDENTS

Sidewalk Painting

What a great way to spend some time outside! Paint some pretty pictures with squeeze bottle painting.

Materials:

* 2 cups warm water
* 2 cups cornstarch
* 4 food colourings
* 4 small squeeze bottles with fine tips or recycled ketcup bottles for more dramtic art

Directions:

Mix the warm water and cornstarch until smooth. Divide the mixture into 4 parts between each bottle. Add drops of food colouring to make your desired colour. Shake until mixed.

Gently squeeze the paint out of the bottle onto a driveway or sidewalk to make beautiful art.

Sidewalk Chalk

This project requires googles and careful mixing, but the results are brillant!

Materials:

* 1 cup Plaster of Paris
* 3/4 cup cold water
* Tempura paint or food colourings
* Cookie molds, muffin pans, or small containers from your Recycling Box

Directions:

If using tempura paint, mix paint into dry Plaster of Paris. If using food colouring, mix food colouring into water then measure.

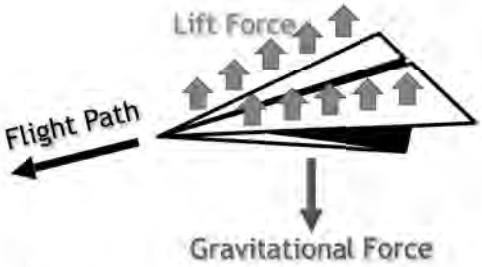
Mix Plaster of Paris with water and stir until smooth. Pour mixture in moulds and set aside until completely dry.

Join us for programs in May and August!

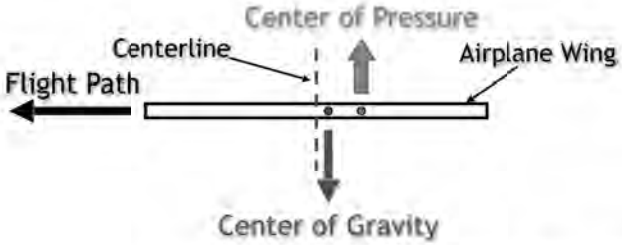
Queen's University

esu.queensu.ca

ESU enrichment studies unit EST. 1987



- The Gravitational Force is a force that pulls the airplane towards the earth. The total weight of the plane is represented by a force that pulls at the Center of Gravity.
- The Lift Force is a force that pushes the plane upwards due to air moving over the wings. The total lifting force on the wings is represented by a force that pushes from the Center of Pressure.



- The Center of Gravity of most paper airplanes is located behind the centerline of the original piece of paper due to how the paper has been folded.
- The Center of Pressure of most paper airplanes is located even farther behind the centerline.
- The Center of Pressure needs to be located **behind** the Center of Gravity in order to maintain stability!

Experiment!

Attach a penny to the rear of a paper airplane using a paperclip and try to make it fly.

- What's happening? The weight of the penny is changing the position of the Center of Gravity of the plane so that it is now behind the Center of Pressure!
- Can you move the penny to re-stabilize the plane?

Queen's UNIVERSITY

RIVALLAB

Fold In Along Solid Line in Order
Cut on Dotted Lines

5

3

7

1

9

4

2

The Barz Lab; Contact:
barzd@queensu.ca

Faculty of Engineering and Applied Science
Chemical Engineering

The ice tray battery

This battery turns regular household items into electrical energy that can power a LED light or other things.

What we need:

Copper wire:
You can use old electric wires, remove the plastic insulation.

Galvanized nails:
We need 4 to 6 with a length of 5cm or longer.

Distilled white vinegar acid:
In case you don't have it, just buy at the grocery store. Avoid eye contact, it burns.

Ice cube tray
Without ice of course.

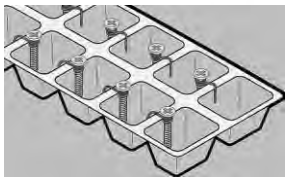
LED light:
Red or yellow LED need little voltage and work best.

How to make it:

1. Wrap the wire 3 times tightly around the nail. Make 4 to 6 wired nails.

2. Pour vinegar into the ice tray. Each wired nail needs a filled well.

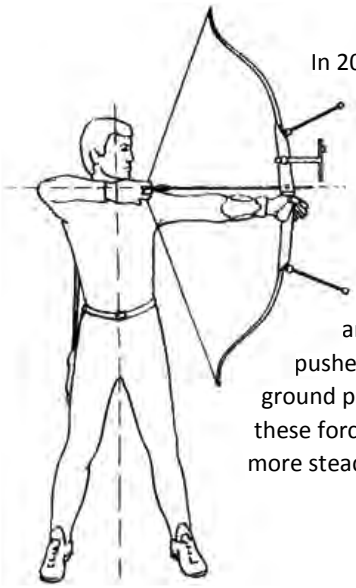
3. Place each nail into one well of vinegar and make sure the copper wire is bent so that it goes into the vinegar in the next well. There should be only vinegar between the metals in each well.



4. Place one wire of the LED into a well with only copper wire inside. Place the other wire into a well with only a nail in it. If LED doesn't light up, turn LED around so that wire goes in the other well because LEDs are one-way streets for current.

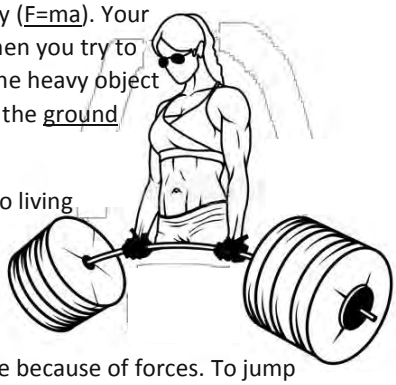
SUPER CANADIANS

Debbie Brill is one of Canada's most famous women high jumpers. She was the first woman to jump over 6 feet and invented the 'Brill bend'. To jump high you need to push off the ground with a lot of force. When you push down on the ground, the ground pushes up, making you jump.



In 2013 Crispin Duenas won a bronze medal at the World Archery Championships. It was Canada's first medal in 42 years. Archers need to be very steady to hit the bullseye. As an archer stands still, ready to shoot, there are forces acting on them even though they are not moving. Their body weight pushes down through their feet as the ground pushes up. Balance is the control of these forces. The more control you have the more steady you will be and the more accurate

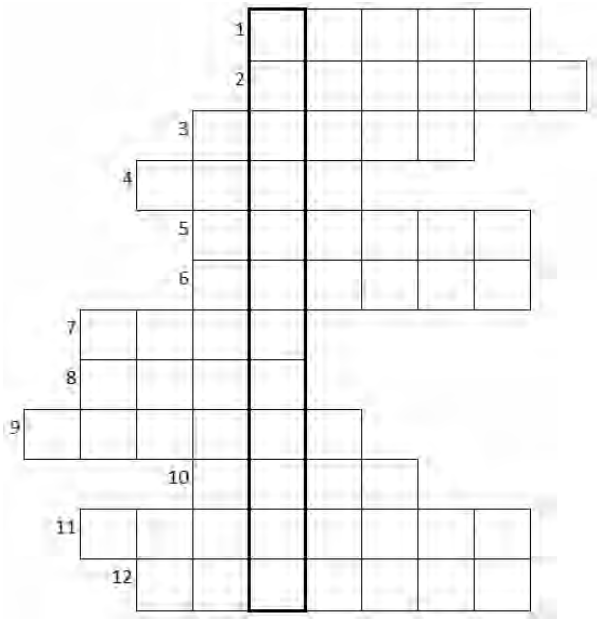
Calgary's Allison Lockhart is currently named Canada's strongest woman. She competes in strongwomen events and can lift more than 500 pounds (more than 3 average Canadian women). That's a lot of weight! Weight is an object's mass times the pull of gravity (F=ma). Your muscles make this force. When you try to lift something you can feel the heavy object pulling on you. You also feel the ground pushing on you.



Biomechanics applies rules to living systems, including plants, animals, and people. One rule is that force causes movement. Jumping, lifting, and walking are only possible because of forces. To jump we push on the ground. To lift we pull on an object. Another rule is that forces come in pairs (action and reaction). When we push on the ground, the ground pushes back to make us jump. We use tools like motion tracking systems and force plates to measure motion and the forces that cause motion. Knowing how people move helps us understand how to make athletes perform better and how to help people recover from an injury faster.

BIOMECHANICS ERGONOMICS LAB Queen's University

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



1) She is a great jumper.

2) You have it when you are hurt.

3) It causes motion.

4) It follows the word high, long and triple.

5) It is the pull of the earth on you.

6) Newton's law of _____ and reaction.

7) The opposite of pull.

8) An important equation.

9) You walk on it outside.

10) It means to raise up.

11) Newtons' law of action and _____

12) They provide the force you use to move.

Canadian Association For Girls in Science

Kingston

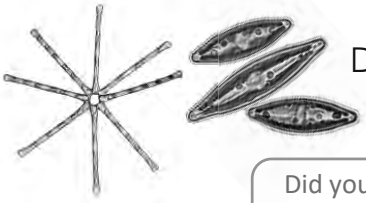
LIMNOLOGY: the science of lakes!

Have you seen the microscopic creatures that live in lake water?

ALGAE

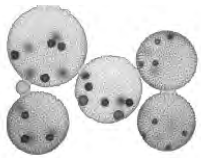
Cyanobacteria
(blue-green algae)

Did you know? These can cause harmful algal blooms!



Diatoms

Did you know? These produce 25% of Earth's oxygen!



Green algae

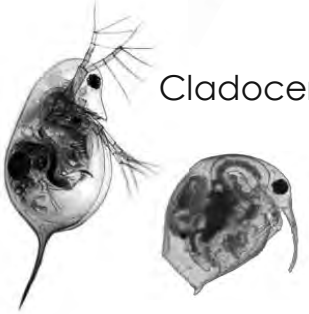
ZOOPLANKTON

Copepods

Did you know? These were the first animals discovered with a microscope!

Rotifers

Did you know? These are the "cows" or grazers of the lake. Moo!



Cladocera

We are a national award-winning club for girls aged 7 to 16 that facilitates interest in Science, Technology, Engineering, and Mathematics (STEM).

CAGIS chapter members meet monthly to explore STEM with fun, hands-on events led by experts in a variety of STEM fields.

These monthly events often occur at the work places of our STEM experts, giving girls a behind-the-scenes view and allowing them to experience the lab and field environment for themselves! E-mail us or check out our website for membership information.

CAGIS Kingston

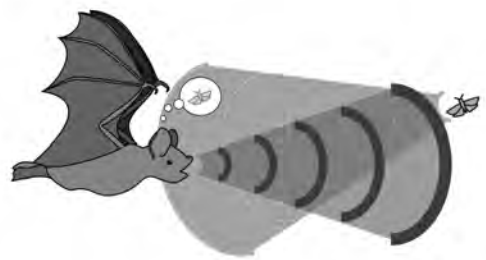
cagiskingston@gmail.com

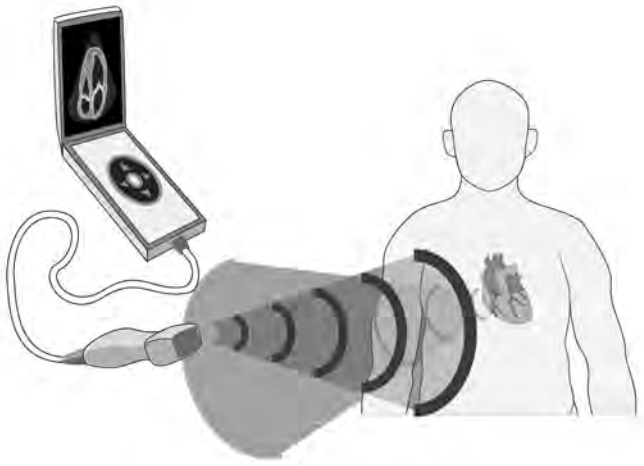
girlsinscience.ca

What is Ultrasound?

"Ultrasound" is sound that is higher than humans can hear. Like all sound, it travels in waves, and bounces off of objects it hits, creating an echo. The returning sound can tell us what the object looks like.

Bats send out ultrasound waves to "see" their environment. When the sound waves hits something, like the moth the bat is hunting, the bat hears the echo, and can tell what and where the moth is.





Ultrasound for our heart works the same way! We use a 'probe' on the outside of our chest to send sound waves into our bodies. The sound waves hit the heart, then bounce off the heart and go to a screen. The picture that is created by the ultrasound waves can help us make sure the heart is healthy.

Word Search

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

ULTRASOUND
ATRIUM
RIGHT
BEAT
BLOOD
ARTERY
VEINS
VALVE
HEART
IRON
CHAMBERS
VENTRICLE
PULSE
ECHO

Red

FIRST LEGO LEAGUE

Ages 9-14

1

"Everything is awesome, everything is cool when you're part of a team."

6

Q: What was the robot's favourite nursery rhyme?

A: Ro, Ro, Ro, your bot gently down the stream.

Orange

FIRST TECH CHALLENGE

Grades 7-12

7

"FIRST is more than robots. The robots are the vehicles for the students to learn important life skills."
Dean Kamen

www.wafflesrobotics.com

8

Q. What is a robot's favourite snack?

A. Computer Chips!

TEAM: Together Everyone Achieves More

www.firstroboticscanada.org

Find out what "coopertition" means.

3

4

Q: What do you call a pirate robot?

A: Arrrrr2D2.

Do the robot dance!

Green

FIRST LEGO LEAGUE JR.

Ages 6-10

2

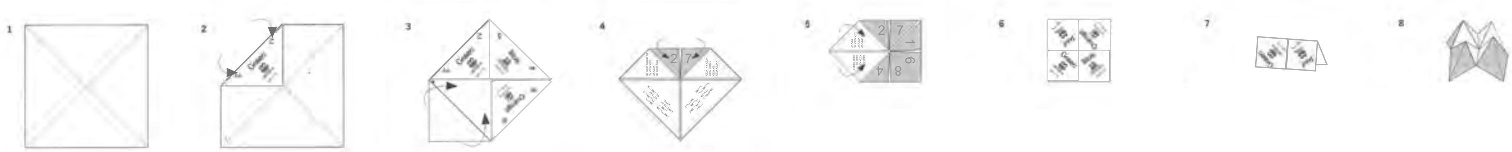
5

Blue

FIRST ROBOTICS COMPETITION

Grades 9-12

Cootie Catcher: Colour, Cut, Fold, and Play!



W.A.F.F.L.E.S. Community Robotics is a local not for profit group lead by volunteers. Our mission is to inspire young people ages 4-18 to explore STEM (Science, Technology, Engineering, Arts and Math) and to grow personally through robotics teams. For information on how to volunteer, start a team, join a team, or sign up for one of our popular summer camps visit **www.wafflesrobotics.com**

Frontenac, Lennox and Addington Science Fair

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

Spin Class

Question: Does the distribution of mass change how an object spins?

Materials: a chair that can spin, such as an office chair; heavy objects you can comfortably lift, such as two cans of soup, perhaps even a 4L jug of orange juice or bags of milk

Method:

1. Position the chair more than arm's length from any obstacles then sit with your arms out straight to the sides
2. Have a friend spin you (gently…) and then step out of the way
3. Try pulling your arms close in to your chest – see whether it changes the rate that you are turning
4. Try holding your arms out straight again – is there any change?
5. Try again, holding the heavy object(s) at arm's length
6. Don't stand up until any dizziness has passed

Angular momentum is a measure of how much an object is rotating. It relates to how heavy it is, its position, and how fast it is rotating.

The amount in a system (you and the chair) does not change, unless there is a push from outside (your friend's shove).

The same effect is seen in the Solar System, for instance that all the planets orbit the Sun in the same direction.

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

PRESENTED BY FROG CONSERVATIONIST
MATT ELLERBECK

SAVE ALL FROGS

Frog species from around the world are facing extinction! Find out how you can help these amazing amphibians by visiting:
www.saveallfrogs.com

The Afterimage Effect

What To Do:

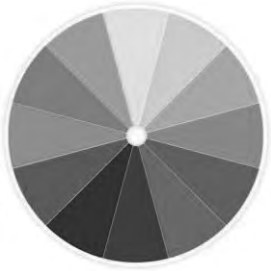
1. Stare at the eye of the first bird for 30 sec.
2. Quickly look at the cage.
   What do you see?
3. Repeat with the next two birds.
   Is there a difference?

What's Happening?

The ghostly image that you see in the cage is what we call an afterimage, an image that stays with you even after looking away from the original image.

This happens because of how our eyes let us see and adapt to different colours. At the back of our eye, called the retina, there are two different kinds of cells that react to light. The first kind are called rods and they let us see in low light, but only in shades of grey. The other kind is called cones and they let us see different colours. There are actually 3 different types of cones that each detect a different range of colour.

When you look at the blue bird, the light from that image hits a certain spot on your retina and the blue-sensitive cones in that spot will activate to tell your brain that you see blue. When you stare at it for a long time, those blue-sensitive cones will start to adapt to all the blue light and reduce their response. When you then look at the cage, the white background will reflect all colours of light into your eye (since white light is made up of all colours of light), but now that spot where the blue bird was hitting your retina has stopped responding to blue light so your brain thinks you see every colour there except blue. This makes it look like you still see the bird, but in the negative colour (the opposite colour on the colour wheel, a yellow-orange in this case). The same thing happens with the other coloured birds, only the afterimage you see should be different colours. What colours do you see for the afterimages of the other birds?



KING'S TOWN SCHOOL

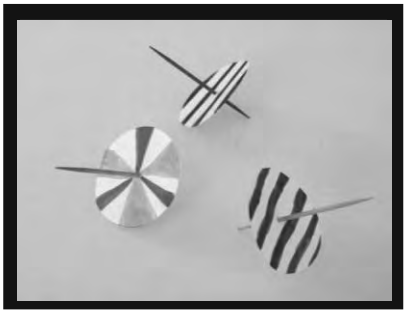
Let's Torque About T  ps!

Torque is a measure of how much a force acting on an object causes that object to rotate. The point where the object rotates is known as the **axis of rotation**.

The History of Spinning Tops

Archeologists have found clay tops in Iraq dating from 3,500 B.C., ceramic tops in Turkey dating from 3,000 B.C. and wooden tops in Egypt dating from 2,000 B.C. During Medieval times in Europe, a large top was often found in the market square that was at least eight inches tall and two pounds in weight. People living in the town would use the top for exercise, fun and in competitions between other towns. Pacific Islanders attached spiritual meanings to their shell tops and in Borneo and Java, top spinning became a sport with tops weighing as much as 15 pounds.
The turban seashell and a simple acorn are both examples of naturally occurring tops.

MAKE YOUR OWN SPINNING TOP AT HOME



Materials

- Cardboard
- Toothpick
- Colouring pencils or markers

Method

1. Draw your preferred spinning top shape on the cardboard; e.g. round, square, hexagon. The ideal diameter is the same length as the toothpick.
2. Accurately find the middle of the shape and mark with a dot. This will be where the toothpick goes through.
3. Use colouring pencils or markers to personalize your top.
4. Cut out the shape.
5. Pierce the middle dot with the toothpick and insert the toothpick about one third of the way in.
6. Spin!

Interesting Fact!

Did you know that the LIMBO spinning top holds the Guinness World Record title for the longest running mechanical spinning top. The exact duration of its world record spin is 27 hours, 9 minutes and 24 seconds!

ROYAL MILITARY COLLEGE

DEPARTMENT OF MILITARY PSYCHOLOGY & LEADERSHIP

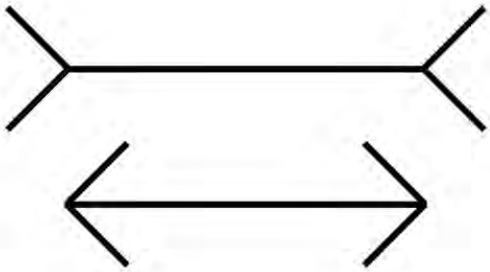
WHY DO OPTICAL ILLUSIONS WORK?

Optical illusions aren't really "optical" – although we see distortions of reality, there's nothing wrong with our eyes! Optical illusions are really more "neural" illusions. The distortion comes from the way our brain interprets the information it has access to. As humans evolved, we had to make quick decisions based on environmental cues in order to help us respond to and survive threats. Neural shortcuts made quick reactions easier, so those whose brains could take thought shortcuts more effectively survived. A good way to think about this is by comparing it to counting. By adding one each time, you can count from 1 to 10 by saying 1, 2, 3, 4, 5, and so on. Once you become better at counting, you don't need to count each number up from 1 to know that 6 comes after 5 – you just know it! This is a shortcut your brain takes that makes counting numbers much easier. Unlike counting, however, your brain gets *tricked* by optical illusions.

What do you see? A black vase?

Or two people looking at each other?

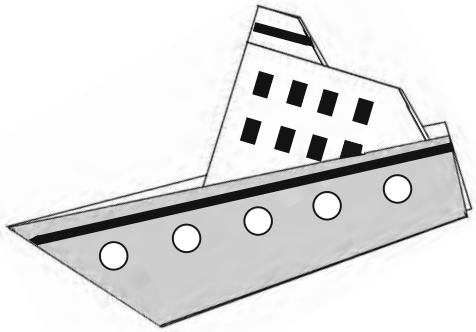
Can you switch back and forth?



Which line looks longer?

Try holding a ruler perpendicular to the lines, at the tip of the arrows. Which line is actually longer?

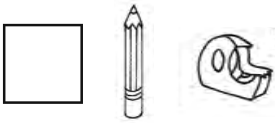
Stop by the RMC Military Psychology & Leadership booth to learn more, check out 3D optical illusions, and try some fun activities!



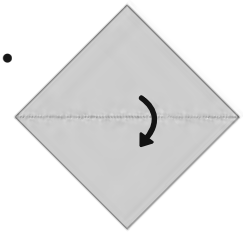
Buoy oh Buoy! IT'S AN ORIGAMI BOAT

HOW TO MAKE

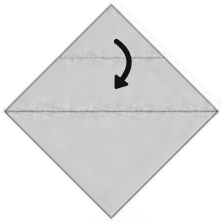
YOU NEED



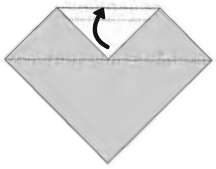
1 piece of square paper
Pencil or marker
Tape



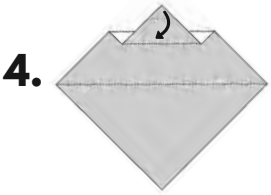
1. Take a square piece of paper. Fold the top corner down to meet the bottom corner. Open the paper.



2. Fold the top down to the middle line.

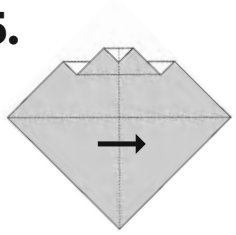


3. Take the folded piece and fold it back up leaving about 2.5 centimeters of paper.

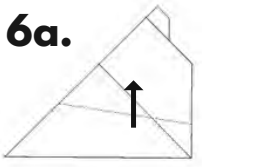


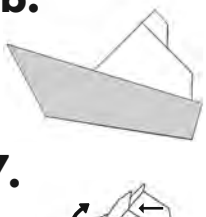
4. Fold the tip of the folded piece down. This makes the cabin of the boat.

5. Fold the paper in half with upper folds inside the big fold.

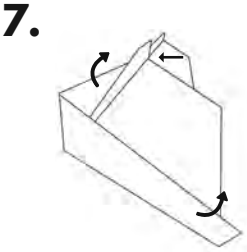


6. Fold along the dotted line (see picture 6a).
This will make the hull of the boat (see picture 6b).

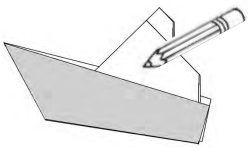




7. Open the paper so it looks like Step 5. Flip it over so the folded pieces face down. Do a hood fold (pinch the back pieces together so the two sides come up).



8. Decorate your boat! Draw windows, portholes, or flags!



9. Tape the back pieces of the boat together to help it stand. Great job! You just made an origami boat!

DISCOVER

BREWERS, BAKERS, AND BOILERMAKERS: ONTARIO STREET, 1830 - 1970
AT THE
PUMPHOUSE
NOW - NOV. 23 2019

PUMP HOUSE
HISTORY in MOTION

MacLachlan
WOODWORKING MUSEUM

KINGSTON

The Optical Society
Queen's Student Chapter presents:

Wielding Lasers: Holograms, Security, and Powering Your Netflix!

Optics and photonics are sub-fields of physics that have a profound effect on our daily lives. We can thank optics and photonics for fiber-optic high-speed internet that brings us Netflix, a host of medical imaging techniques, many components in smartphones and digital cameras, & more! The Optical Society (OSA) has been the world's leading champion for optics and photonics for over 100 years, uniting and educating scientists, engineers, educators, technicians and business leaders worldwide to foster and promote technical and professional development.

Thank for you checking out our booth about holograms, the physical backbone of the internet, and our laser maze challenge! The Queen's OSA Student Chapter can be reached at ***<queensuniversity@osachapter.org>***; please feel free to contact us if you have any questions about the OSA, our booth at Science Rendezvous, the fun experiment below, or optics in general.

Try this at home!

Experiment: *Bending Light*

Required time: ≤10 minutes
Source: <https://www.optics4kids.org/>

Materials checklist:

- O Utility / Exacto knife
- O Clear cylindrical drinking glass
- O Water
- O Scotch tape
- O A piece of colored plastic
- O Flashlight
- O Shoebox or similar box (*no top needed*)

Procedure:

1. Carefully cut 2 vertical slits in one end of the box, you may want an adult to help you. The space between the slits should be smaller than the width of the drinking glass.
2. Place the colored plastic over one of the slits, and tape it in place.
3. Turn on your flashlight and darken the room.
4. Shine the flashlight into the box through the slits.
5. Look inside the box. What is the light doing? Where do the light rays appear on the side of the box?
6. Pour water into the glass, and place it in the center of the box. Repeat steps 3 and 4.
7. What happens to the light beams after they pass through the glass of water?

Explanation:

The box is a model of your eye. Light enters through the opening in the front of your eye (the iris) and passes through a crystalline lens. The lens focuses the light into an image that falls on your retina (the inside of the back of your eye). When an image falls on the retina, nerve cells send signals to your brain which are interpreted to create an image.

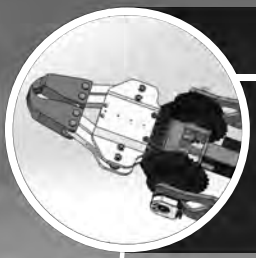
Mars Desert Research Station,

On-Board Reactor

Analyses soil samples to detect signs of life

Chemistry, Biology

Differential Wrist



Precision hand to grab & manipulate objects

Mechanical, Electrical

Environment Sensors

Measures the atmosphere & weather for research

Geology, Enviro. Science

Robot Operating System

Communication betwen subsystems & base station

Computer Engineering

LiDAR & Cameras

Object avoidance during autonomous driving

Computer Science

Electronics Housing

Rover controlled by Raspberry Pi & Arduinos

Electrical, Mechanical

Rocker Suspension

Linked frame lets rover to drive on rocky ground

Mechanical

QUEEN'S SPACE ENGINEERING TEAM

2019

MARS ROVER

Please visit us at qset.ca or send us a message at qset@engsoc.queensu.ca

The Queen's Observatory

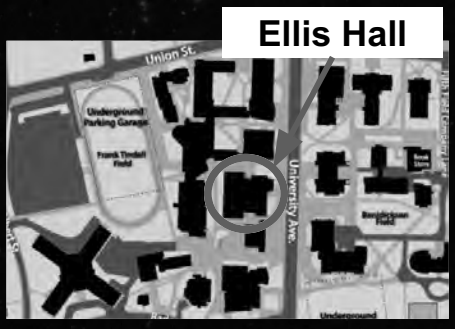
Free and for all ages! On the second Saturday evening of every month, learn about space from an Astronomer, then see it for yourself through a 14" telescope!

The Queen's Observatory has been a part of Queen's University's and Kingston's history for over 150 years! Every month a professional astronomer shares their knowledge about the wonders of the Universe, then we head up to the dome and observe Planets, Galaxies, and Nebulae! The observing targets change all year so there is always something new to see.

The Open House also includes a viewing session with the Royal Astronomical Society and a tour through the McDonald Institute Visitor Center! Don't miss out on these opportunities to chat with a Physicist!

Open Houses happen rain or shine, and the talks are targeted to a variety of knowledge levels. Starting times vary throughout the year. Check out our website at observatory.phy.queensu.ca or like us on Facebook for more information!

58 University Ave, Kingston ON (4th floor)



The Observatory also runs educational tours for school groups. Visit the website or contact the Observatory Coordinator at queensuobservatory@gmail.com for more information.

Queen's University

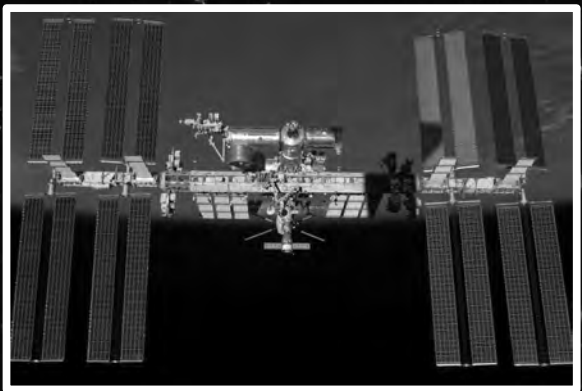
Royal Astronomical Society of Canada Kingston Centre

Queen's University BAJA SAE

The Queen's Baja SAE team provides the opportunity for students to gain hands-on experience through designing, manufacturing and testing our off road vehicle. The senior students pass down knowledge and discuss ideas with the help of faculty advisors through a supportive environment. The Baja team also provides information on business, consumer market, professionalism and financial management. Members on the team are involved through a self-driven basis and gain experiences through the design cycle and traveling to competitions across North America. After graduation it has been found that employers are encouraged to see the hard working and self-driven students that are on the team and have a large advantage in the job market.

Royal Military College of Canada

Department of Physics and Space Science



The International Space Station (ISS) is an artificial satellite with astronauts onboard. You can see it zoom across the sky from your own backyard!

Go to https://spotthestation.nasa.gov/ to know when the Space Station will be overhead in your area.

Night Sky apps can help you learn about the sky. You can identify planets, stars and constellations!

Point your phone at a celestial body and the app will tell you what you're looking at.

Android

iPhone

Visit the Canadian Space Agency's website for some fun activities that you can do at home:

http://www.asc-csa.gc.ca/eng/activities/fun-experiments/default.asp

http://www.asc-csa.gc.ca/eng/missions/expedition58/default.asp

Images from NASA, CSA

THE DEPARTMENT OF CIVIL ENGINEERING

AT THE ROYAL MILITARY COLLEGE

Make your own Archimedes Screw Pump

The Archimedes screw is made up of a hollow cylinder and a cylindrical core. Helical blades are wound around the core and secured tightly against the hollow cylinder. The helical blades create pockets between the core and the inner wall of the hollow cylinder. To move water the screw is rotated and it scoops up a small amount of water into the first pocket. With each turn of the screw, the pocket of water moves to the next pocket, and a new scoop of water enters the first pocket. This motion continues until the first scoop of water comes out at the other end. The Archimedes screw is used to transport water from low-lying areas to higher areas. The design is so effective that it is still being used in many modern-day applications. For instance, it is used to lift wastewater in treatment plants because it works well with varying rates of flow and with suspended solids of found in wastewater.

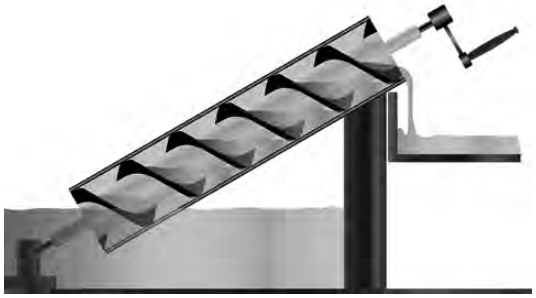


Figure 1: Inside view of Archimedes screw pump. (http://empoweringpumps.com/screw-pump-basics/)

Supplies

- Cylindrical dowel or tube, ½-inch diameter, 2-foot length
- Clear vinyl tubing, 10-foot length, with a 3/8-inch outer diameter x ¼-inch inner diameter
- Gorilla tape or duct tape
- Permanent marker
- Strong scissors
- Lab notebook
- Liquid measuring cup
- Spoon
- Water
- Food coloring
- 2 plastic bowls, 12-oz
- Tape
- Pen
- Books or plywood board of various thickness (1-2)

Instructions

1. Using the cylindrical dowel and the ¼-inch-inner-diameter vinyl tubing, take a piece of strong tape and tape one end of the tubing to the outside of one end of the dowel such that a ¼-inch length of tubing is hanging off the end.
2. Carefully wrap the tubing around the dowel in regular intervals until you come to the other end of the dowel leaving a ¼ inch to hang off of the end. Cut the tubing with scissors and tape it down with pieces of strong tape along the dowel. There should be a ¼-inch of tubing hanging off both ends of the dowel, past the sections that you taped down.
3. Tape one bowl to the table and place the other bowl on the book or plywood about 2 feet away from the bowl taped to the table. Pour the 1 cup of water into the bowl on the table and dye it with food colouring.

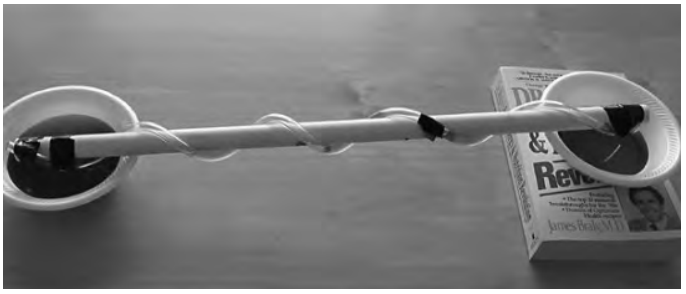


Figure 2: Modified Screw pump

4. Place your Archimedes screw across the two bowls, as shown in Figure 2. Be sure the extra ¼ inch of tubing hanging off the end is in the bowl of water on the table. Turn the screw so that every time the end of the tube goes into the water it scoops up some of the water. You may need to adjust the angle of the tubing.
5. Tilt the screw so that one end is in the water and the other end is above the second bowl.
6. Make sure that as you turn the screw, the water doesn't fall back out of the screw. If the water does fall out, adjust the tilt of the screw, the placement of the bowls, and/or the height of the discharge bowl. Use an extra book or board if needed.
7. Turn the screw a few times to make sure that the water is traveling through the tubing. Have fun moving water from the lower bowl to the higher bowl. You can measure the vol

Reference:

Science Buddies Staff. (2017, November 11). It's All in the Wrist: Moving Water with the Archimedes Screw Pump. Retrieved March 1, 2018 from https://www.sciencebuddies.org/science-fair-projects/project-ideas/ApMech_p039/mechanical-engineering/build-archimedes-screw-pump

TRUTH • DUTY • VALOUR

VÉRITÉ • DEVOIR • VAILLANCE

Groovy Lava Lamps!

Background

Ever made a salad and noticed your salad dressing had two layers in the bottle? This is because oil is **less dense** than water and vinegar! Explore the concept of density in this easy lava lamp activity!

Materials

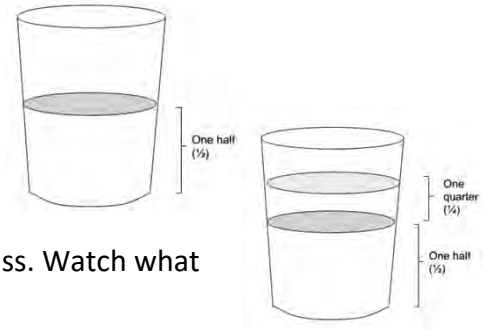
- Clear glass or plastic cup
- Vegetable oil (or any cooking oil)
- Effervescent antacid tablet
- Water
- Food colouring

Safety Considerations

Don't drink the solution! It's not very tasty and might make your stomach sore. If ingested, don't worry, this solution is non-toxic.

Procedure

1. Fill your glass or cup halfway full with water.
2. Add 1 or 2 drops of food colouring to the water in the cup.
3. Pour vegetable oil to fill another quarter of the glass. (Your glass should be three quarters full now!) Notice that the oil rests on top of the water because it is **less dense** than water.
4. Break your effervescent tablet in half and drop it into your glass. Watch what happens!



What's going on here?

When you drop your effervescent tablet into the **liquid** water, it starts a **chemical reaction** that releases bubbles of **gas**. The oil in your cup sits on top of the water because it is **less dense** than the water and the bubbles rise through both the water and the oil because gases are **less dense** than liquids! Enjoy your lava lamp!

About Science Quest

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

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

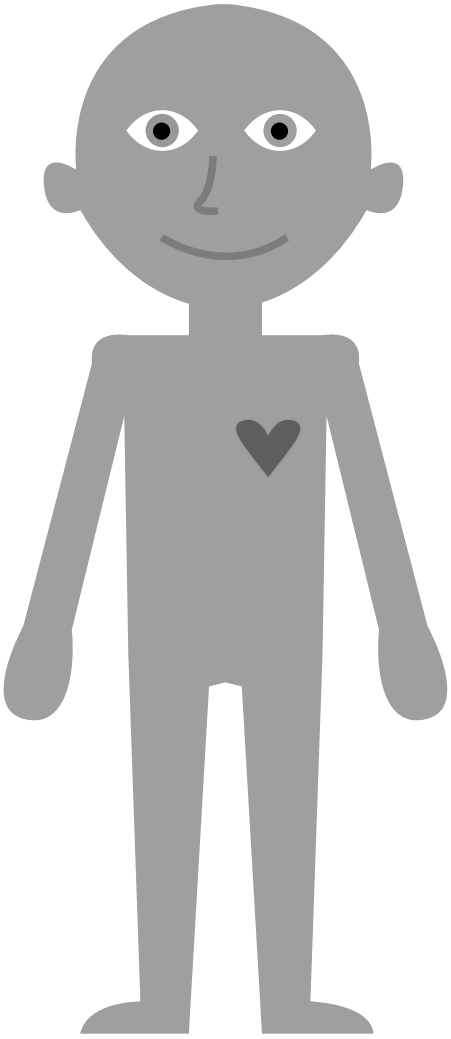
What's That For, Doc ?

Match the objects with the body parts it would be used to fix, assess or assist! Don't know what the artifact does? Find the answer by checking out our website and searching our collections database at **https://mhc.andornot.com!**

Diagnostic Otoscope

Prosthetic

Bath Cup



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MUSEUM OF HEALTH CARE AT KINGSTON

How will Automation and Artificial Intelligence Impact the Jobs of the Future?

FIRST High School Robotics Team #7480 - The Machine Mavericks

According to willrobotstakemyjob.com, which ten of the following twenty jobs are the most at risk of being automated away, and which ten are the least at risk?

A. Watch Repairers	B. Emergency Management Directors	C. Audiologists	D. Occupational Therapists
E. Data Entry Keyers	F. Tax Preparers	G. Healthcare Social Workers	H. New Accounts Clerks
I. Mathematical Technicians	J. Oral and Maxillofacial Surgeons	K. Telemarketers	L. Cargo and Freight Agents
M. Title Examiners, Abstractors and Searchers	N. Orthotists and Prosthetists	O. Mental Health and Substance Abuse Social Workers	P. First-Line Supervisors of Mechanics, Installers and Repairers
Q. Hand Sewers	R. Photographic Process Workers and Processing Machine Operators	S. First-Line supervisors of Fire Fighting and Prevention workers	T. Recreational Therapists

History shows it's very unlikely that any type of job will completely disappear, but most will done differently!


Machine Mavericks - We believe that young women and men learning to work together is of great value to the 21st century workplace. We thank our sponsors and supporters: Novellis, SEW Eurodrive, Electro-Meters, Royal Canadian Legion Branch 560, Queen's FRC, Argosy Foundation, FIRST Canada, HD Supply, Ironclad Graphics, IGUS, Barr Cabinets

Answers: Lowest Automation Risk: B. C. D. G. J. N. O. P. S. T. and the others are at highest risk from automation

ELBOW LAKE ENVIRONMENTAL EDUCATION CENTRE

TURTLE SPECIES OF THE KINGSTON AREA

QUEEN'S UNIVERSITY BIOLOGICAL STATION

MATCH THE TURTLE TO THEIR SPECIES

1.

2.

3.

4.

5.

A) MIDLAND PAINTED TURTLE

B) EASTERN MUSK TURTLE

C) SNAPPING TURTLE

D) NORTHERN MAP TURTLE

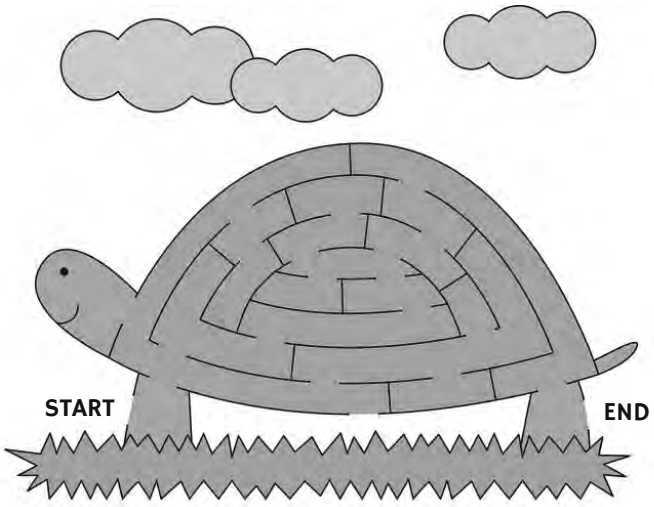
E) BLANDING'S TURTLE

Answers: 1E, 2D, 3B, 4C, 5A

According to the Species at Risk in Ontario list, SPECIAL CONCERN THREATENED

With most of our turtles being at risk, we must protect them and their habitats to ensure their survival!

TURTLE SHELL MAZE



QUBS PUBLIC FAMILY EVENTS

July 7th - Elbow Lake Family Fishing Day

July 8, July 22, and August 12 - QUBS Family Night, Opinicon Campus

Thursdays Weekly in July and August - Elbow Lake Family Night

Visit QUBS.ca and ElbowLakeCentre.ca for more info and how to register!

ECO-ADVENTURE DAY CAMP

Learn about turtles and much more this summer! Weekly day camp in July and August for kids aged 9-14. Leader in Training for youth aged 15-18.

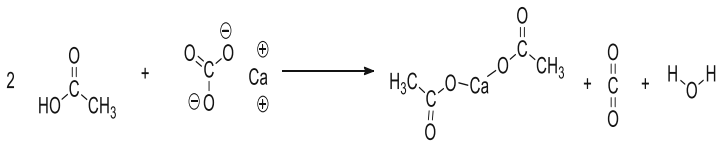
ecoadventurecamp.ca for more info

Rubber Egg

Acid-Base Chemistry

Acids are chemicals that produce H^+ ions and bases produce HO^- ions in water. When an acid and a base react together, they produce a salt and water in what's known as a neutralization reaction.

In this experiment, we are reacting acetic acid (a weak acid) with an egg shell that is mostly calcium carbonate (a base). Acetic acid is found in vinegar whereas calcium carbonate is found in sea shells and antacid tablets.

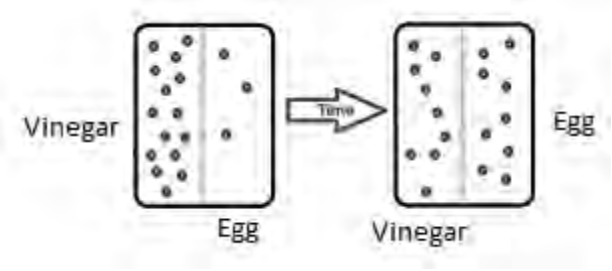


During the experiment you can observe bubbles forming on the egg shell, this is carbon dioxide gas.

Acid-base chemistry is very important in everyday life. Your body uses buffers to keep the pH (level of acidity) of your blood in a very small range to keep your proteins functioning properly. The acidification of the oceans is a large problem due to the dissolution of carbon dioxide from the atmosphere, changing the pH of the water and putting aquatic species in danger.

Diffusion

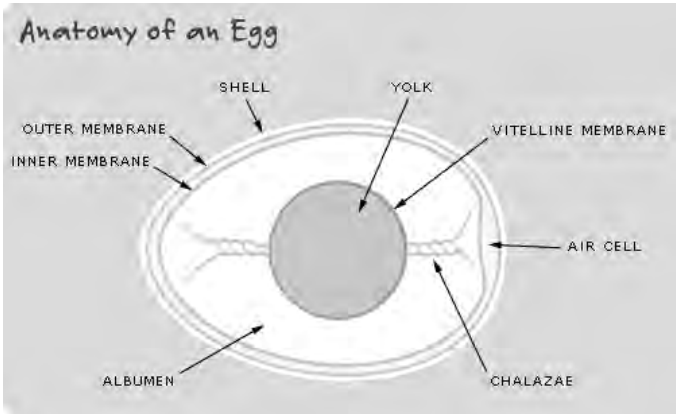
After removing the shell, you will find that the egg has actually grown in size! This is due to a principle known as diffusion. Fluids will exchange ions and molecules if there is a barrier with small holes allowing these chemicals to flow freely until both sides of the barrier have the same concentrations of these molecules. This phenomenon is also found in cells in your body!



An egg has a high concentration of ions and minerals use for the growing chick. When the egg is placed in a liquid with a low concentration of ions water will rush into the egg to equalize the imbalance and make it larger.

Egg Membranes

Eggs have two membranes made of proteins, including keratin that can be found in hair and nails found underneath the shell. These membranes are excellent protection against bacteria and allows the transport of molecules in and out of the yolk. These membranes are the rubber protective layer that allows the egg to bounce!



How to make your own rubber egg:

Materials

- One egg
- A container deep enough to submerge the egg in vinegar
- Vinegar (enough to submerge egg)

Method

1. Place egg in container (egg can be fresh or hardboiled).
2. Fill container with vinegar until egg is submerged.
3. Wait 12 hours.

Note: If shell is thick or egg is large, you may have to drain the vinegar and repeat for another 12 hours.

4. Take egg out of vinegar and rinse off what is left over.
5. Now the egg can bounce!

Note: If egg was fresh, bouncing the egg can still rupture the membrane so bounce close to the surface.

References

1. https://www.exploratorium.edu/cooking/eggs/eggcomposition.html
2. https://biologydictionary.net/diffusion/

BUILD A SIMPLE ELECTRIC MOTOR

WHAT YOU'LL NEED

- Enameled wire (magnet wire)
- D-cell battery
- Sandpaper
- Two paper clips
- Tape
- A thick rubber band (like the ones you get on broccoli)
- A small magnet

WHAT'S GOING ON?

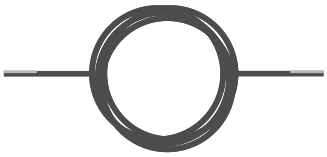
The wire and paper clips make a closed circuit that current can flow through. When current flows through a loop, it creates a magnetic field. Magnets have north and south poles. The same poles repel each other, and opposites attract. The magnet's field is not perpendicular to the one produced by the coil, so some part of it repels the coil and makes it spin.

We had to remove half of the insulation from the wire so that current is only flowing through the wire half of the time. Otherwise, the coil would go until it aligned itself with the magnet's field, and then would stop. Instead, when there is no current, momentum carries the loop around until current can flow again and the whole process repeats.

Once your motor is spinning it will keep going until the battery dies, or you stop it!

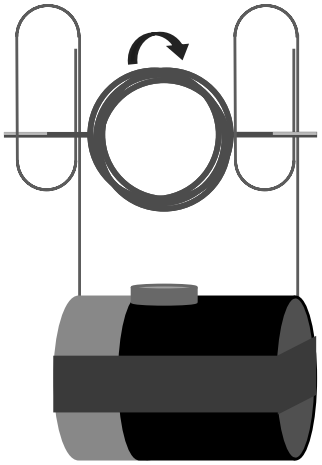
WHAT TO DO

1. Wrap the wire around the battery (or another round object) 10-20 times. Slide the coil off the battery, then wrap the loose ends of the wire around the coil a few times to hold it together. Leave the ends of the wire pointing out.
2. Use the sandpaper to remove the enamel from the top half of the wire for about 2cm on both ends.



3. Unbend the first loop of the paper clips.

4. Tape the battery to a table, then use the elastic to secure the paper clips to the ends of the battery.
5. Place one end of the coil in each paper clip loop.
6. Tape the magnet to the top of the battery under the coil.
7. Give the coil a spin - what happens?



How to Extract DNA from a Strawberry

Cells are the basic unit of life and make up all plants, animals and bacteria. Deoxyribonucleic acid, or DNA, is the molecule that controls everything that happens in the cell. DNA contains instructions that direct the activities of cells and, ultimately, the body. This activity will demonstrate how DNA can be isolated from a strawberry using common household materials.

https://www.youtube.com/watch?v=hOpu4iN5Bh4

What you will need:

1	2	2 tsp	1/2 cup	2	1	1	1/2 cup	1
re-sealable plastic bag	Strawberries (fresh or frozen)	Dish detergent	Water	Plastic cups	Coffee filter	Scientist	COLD Rubbing Alcohol	Coffee Stirrer

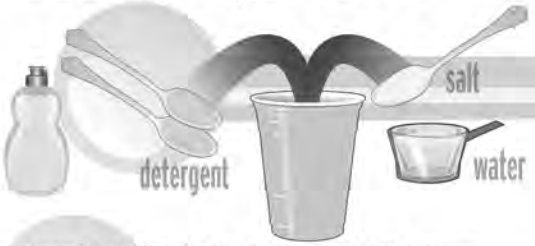
1

Pull off any green leaves on the strawberry that have not been removed yet.

2

Put the strawberries into the plastic bag, seal it and gently smash it for about two minutes. Completely crush the strawberries. This starts to break open the cells and release the DNA.

3

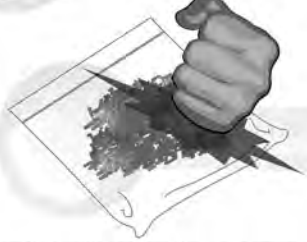


In a plastic cup, make your DNA extraction liquid: mix together 2 teaspoons of detergent, 1 teaspoon of salt and 1/2 cup of water.

4

Add 2 teaspoons of the DNA extraction liquid into the bag with the strawberries. This will further break open the cells.

5



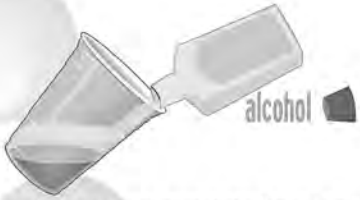
Reseal the bag and gently smash for another minute (avoid making too many soap bubbles).

6 and 7

Place the coffee filter inside the other plastic cup.

Open the bag and pour the strawberry liquid into the filter. You can twist the filter just above the liquid and gently squeeze the remaining liquid into the cup.

8



Next, pour down the side of the cup an equal amount of cold rubbing alcohol as there is strawberry liquid. Do not mix or stir. You have just isolated the DNA from the rest of the material contained in the cells of the strawberry.

9

Within a few seconds, watch for the development of a white cloudy substance (DNA) in the top layer above the strawberry extract layer.

10

Tilt the cup and pick up the DNA using a plastic coffee stirrer or wooden stick.

NIH National Human Genome Research Institute
GENOME

fireflyadventures.ca

Shoe Box Solar Collector

Items you will need: a shoe box, scissors, dark flat paint, paint brush, tape, thermometer (that reads up to 70 degrees Celsius) clear plastic (like cling wrap)

1. Paint the inside of the lid a dark flat colour. (not shiny).
2. Cut and remove the bottom of the box.
3. Carefully cover the bottom of the box (the part you cut away) with clear plastic and tape this in place on the outside of the box.
4. Make a hole in the side of the box close to either end, near the bottom, just big enough for the thermometer to slide in and out. Make sure the thermometer is not exposed directly to sunlight. This will give false high temperatures. Find a way to shade it with some cardboard and tape.
5. Tape the lid to the box. Your box is now ready to use!
6. Take your collector outside on a day when it is not raining. Do not face it to the sun yet.
7. After a few minutes, read and record the outside temperature. Make sure you shade the thermometer while you do this. It's the air temperature you want.
8. Then turn your box with the clear plastic to face the sun, or the brightest part of the sky. Make sure there are no shadows from the sides of the box on the painted lid.
9. Every minute, for 15 minutes, record the temperature in the box. If you plot this on a graph, you will notice an increase in temperature, especially on sunny days. Congratulations! You have a solar thermal collector. Could this idea help heat a home?

St. Lawrence College

Wind Turbine Technician

STLAWRENCECOLLEGE.CA

SPECIAL THANKS

Kathleen Miller, *Executive Director, Science Rendezvous*

Laura Morris, *Director of Media Relations, Science Rendezvous*

Chelsea Elliott, *P.Eng., Director of Corporate Relations, Faculty of Engineering and Applied Science*

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