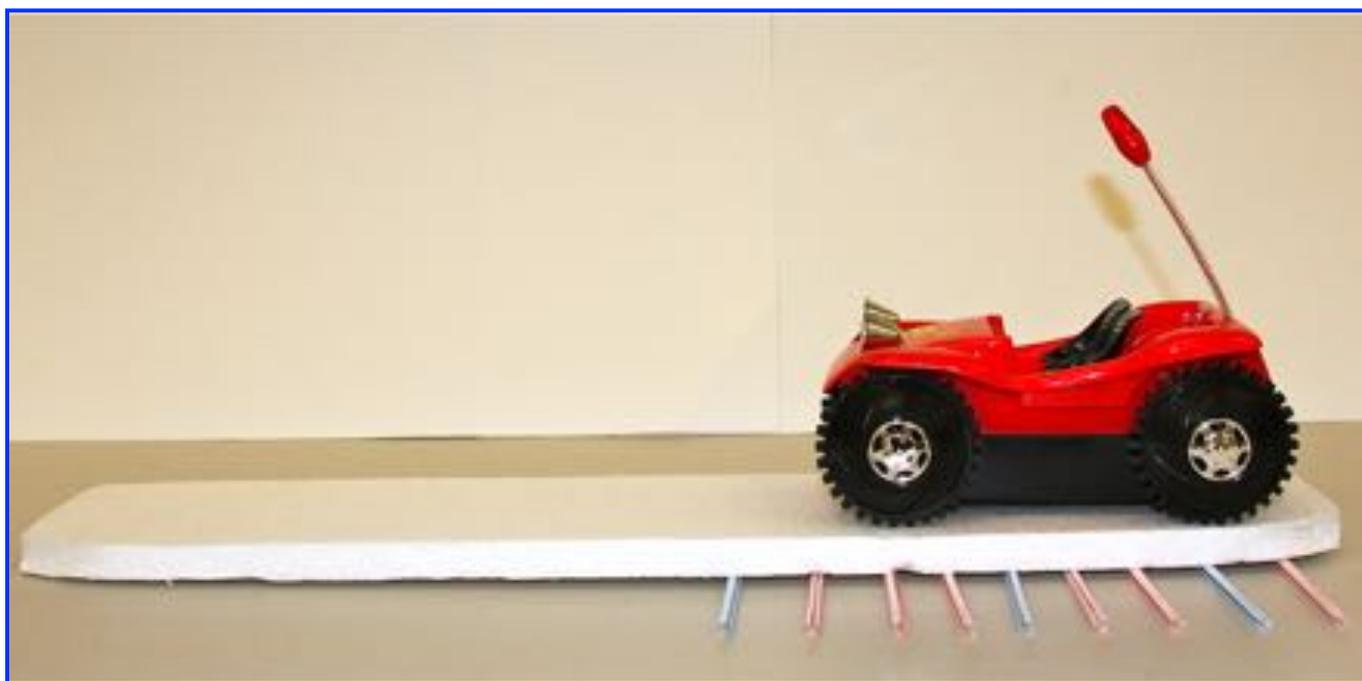


BIG Science

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Newton' Third Law Demonstration

This issue includes *Part 8* of a series of teaching tips on the topic of **Forces and Motion**. Of course, many of these activities can be done at home as well as in the classroom.

Request for Feedback: Response to my request for feedback about the newsletter was underwhelming. However, thanks to both respondents for their positive and constructive comments.

Response to the offer of a CD called "Applied Physics" was equally disappointing. The package contains enough ideas to use as a methods course in physical science teaching. Thank you to the two readers who actually purchased the CD. The author thought readers might wish to support the BIG Little Science Centre by purchasing a resource worth far more than the token price of \$25.00. Advertising will be discontinued.

Science Centre Programming Spring 2018

**The BIG Little Science Centre is open year round:
Tuesday to Saturday, 10am to 4pm**

The Exploration Room is open 10am to 4pm, with over 140 different exhibits to enjoy.
Special shows and activities run at the centre: daily July/August and Saturdays in the school year.
All activities are included with the standard entry fee, unless otherwise stated.

Full activity information is on the website calendar.

Saturday April 14: StarLab from Okanagan Science Centre



Explore the skies above, inside the Okanagan Science Centre's Inflatable Planetarium. Watch in fascination as the sky is recreated above your head inside the Star Dome. Learn about the skies above, stars, and the legends and lore behind them. For all ages. When registering tell us if you need a chair.

**Contact BIG Little Science Centre to reserve seats for one of the five shows:
10:05, 11:05, 12:30, 1:30, 2:30**

This program is run in a dark contained dome; people must be comfortable in the dark and inside a closed space. Each show has a limit of 30 people. The StarLab is included with the cost of admission. BIG Little Science Centre would like to thank Holiday Inn and the Okanagan Science Centre.

Saturday April 21: Beautiful Crystals Lab, at 11am & 1:30pm

Examine many types of gorgeous crystals under microscopes and discover some surprising properties. Grow some crystals right before your very eyes!

Saturday April 28: Super Static Electricity Show, at 11am & 1:30pm

An interactive, fun show that introduces static electricity, explores how it works and produces static in many ways, including using van de Graaff generators. Is it time for your science centre hair-do?

Saturday May 5: Creating Circuits Lab, at 11am & 1:30pm

Using circuit kits to discover how electricity works, you will make circuits to run light bulbs and motors.

Saturday May 12: Mining Day at BIG Little Science Centre, 10am to 3pm

Free entry! Co-sponsored by Kamloops Exploration Group/CIM South Central Branch. Mining, rock ID, gold pan with Yukon Dan, recycle your batteries, large mining vehicles, enter to win a bike, and more.

Saturday May 19: Make an Electromagnet Lab, at 11am & 1:30pm

Use simple electrical materials to build a working electromagnet. How quickly can you transfer nails?

Saturday May 26: Beautiful Light and Colour Show, at 11am & 1:30pm

Discover: many ways of making light; different types of light; properties of light; and rainbows!

Saturday June 2: Bouncing Bubble Lab, from 10:30am to 3:30pm

Get outside for some BUBBLE fun. Discover the shapes that can be made using small bubble instruments and using the giant bubble making equipment. Make and chase flying bubbles to liven up your day.

Saturday June 9: Super Static Electricity Show, at 11am & 1:30pm

An interactive, fun show that introduces static electricity, explores how it works and produces static in many ways, including using van de Graaff generators. Is it time for your science centre hair-do?

Saturday June 16: The Amazing Magnetism Show at 11am and 1:30pm

A fun show that explores magnetism and gives you some magnetic magic tricks to try out at home!

Saturday June 23: Awesome Air Pressure Show, at 11am & 1:30pm

Air is a force of nature that demands respect; join us for this interactive show to learn why.

Friday June 29 and Saturday June 30: Welcome to SUMMERTIME

Build and Test a Boat, 10:30am to 3:30pm

Get a start to summer by designing a foil boat and testing it in our pool. Loads of learning while trying to support as much weight as possible in your very own boat.

KEVA Blocks & LEGO construction materials, 10am to 4pm

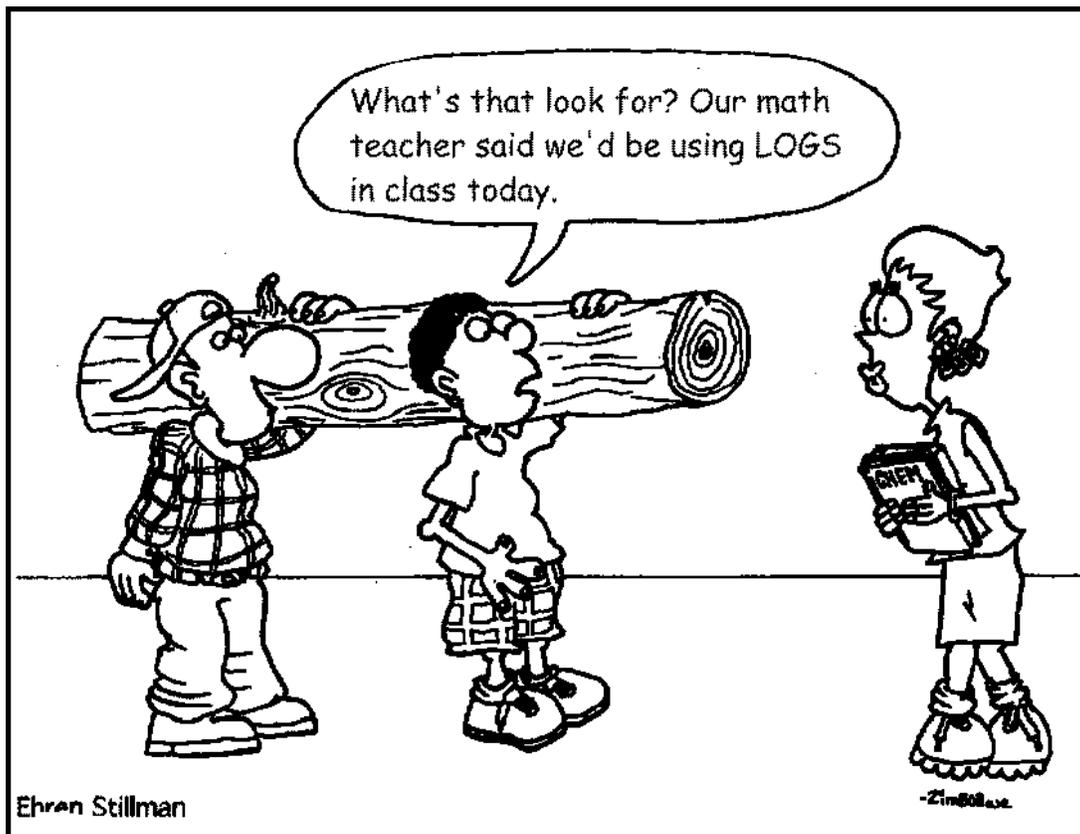
Inside in the cool air continue the construction theme using LEGO and KEVA blocks. Use your imagination to create your own structures right in front of you.

Super Summer Science Camps: STEM themed for all to enjoy

Stay tuned for fantastic science fun for kids of all ages. Dates will be posted soon.

**Looking for an awesome place for a Birthday Party or Event?
Give us a call to discuss the possibilities.**

For more information please contact Susan Hammond: susan@blscs.org, or call 250-554-2572.
BIG Little Science Centre reserves the right to substitute alternate programming if needed.



BIGScience

This Newsletter is a publication of **BIG Little Science Centre Society**
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Back issues of **BIGScience** can be viewed at <<http://blscs.org/newsletters/>>

The **BIG Little Science Centre** is open to the public at these times:

Tuesday to Saturday 10:00 AM to 4:00 PM

CLOSED SUNDAYS and HOLIDAYS

Phone: 250 554 2572 *E-mail* Gord@blscs.org or Susan@blscs.org

Drop-in Visit Rates: Adults (16 to 59) **\$6** Seniors (60 plus) **\$4** Youth (6 to 15 years old) **\$3** Family **\$15**.
Children 5 years old or younger) **Free**

A family membership is \$60.00/year. An individual membership is \$45.00/year. A family membership consists of five directly related people. (This includes any combination of grandparents, parents and children). Individual day rates are:

The Main Benefits of Membership

- Member ID cards for all members
- Free entry to our Exploration Room, events, shows, activities
- FREE or discounted admission to MOST Canadian science centres, including Science World and the H.R. MacMillan Space Centre in Vancouver
- Discounts for Science and Robotics Camps / Clubs in Kamloops
- Voting privileges at the BIG Little Science Centre's Annual General Meeting

Visit our website blscs.org for more details on the benefits of membership.

Drop-in Visit Information

What is a Drop-in Visit?

During drop-in times our hands-on rooms are open for visitors to tour at their leisure. The rooms have approximately 140 stations of hands-on activities to try. We also have an activity or show running Saturdays!

Drop-in Visiting hours

- *Tuesday - Saturday 10:00 - 4:00*
- *Check Facebook or twitter for the latest information.*
For safety purposes we require children under age 16 be accompanied by a minimum number of supervising adults:
 - For children 4 years old and under, 1 adult per every 3 children is required.
 - For children 5 years old to 9 years old, 1 adult per every 5 children is required.
 - For children 10 years old to 16 years old, 1 adult per 10 children is required.

Ideas for Teaching about Forces and Motion

(From the Archives of Gordon Gore)

Part 8 A Force Is Never Lonely (Newton's Third Law)

- If you wish to climb up some stairs, in which direction do **you** push?
- When you swim forward, in which direction must your arms push?
- If you are rowing a boat, which way must your oars push if the boat is to move forward?
- When a car moves forward, in which direction do the **wheels** push on the road?

Isaac Newton observed that *forces act in pairs*. If one body pushes on a second body, the second body exerts an equal force on the first body, *but in the opposite direction*.

To do push-ups, for example, you push **down** on the floor. The floor exerts an equal force **up** on you. *The floor lifts you up!*

The earth exerts a force of gravity on the moon. The moon also exerts a force of gravity on the earth. (The ocean tides provide us with the evidence for this statement.)

Newton's Law of Action and Reaction

If two bodies interact, the force the first body exerts on the second body will equal the force the second body exerts on the first body. The two forces will be opposite in direction.

Force Pairs



Figure 1

What You Need

- 2 identical spring balances
- 1 length of string, about 100 cm
- 10 straight soda straws (or round pencils)
- 1 toy wind-up or battery-powered car
- 1 strip of stiff cardboard, about 50 cm x 30 cm

What to Do

1. Tie a string between two identical spring balances. Have two students stretch the string between them. See **Figure 1**. What do the two spring balances read? Try pulling with different forces. Compare the forces on each spring balance each time you pull on the string with a different force. Does it matter who does the pulling?

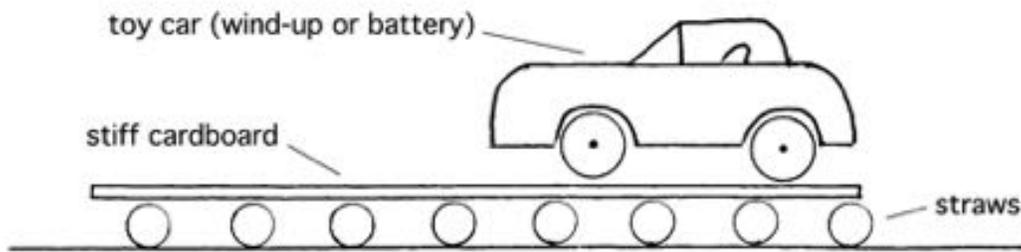


Figure 2

2. Set up the arrangement in **Figure 2**. The 'road' is a strip of stiff cardboard, sitting on a row of soda straws. A wind-up or battery-powered toy car is placed on the 'road'.
3. *Predict* what will happen to (a) the car and (b) the 'road', when the car is started and starts to move forward.
4. *Test your prediction!*

Questions

1. In **Procedure 1**, what did you learn about the forces acting on the two ends of the string? If someone else was watching the two spring scales, but not the people pulling on them, could the outside observer tell *who* was pulling on the scale?
2. When a car moves forward, in which direction do the *wheels* of the car push on the road?
3. What exerts the force that actually makes the car move forward?

Challenge! Strictly speaking, your **weight** is the **force of gravity exerted on you by the earth**. Discuss this outrageous statement: *"You weigh the same as planet earth!"*

'Rocket' on a String

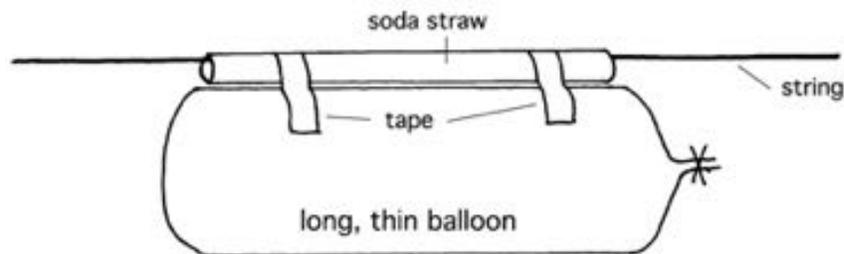


Figure 3

1. Run a piece of string, long enough to go from one wall of your classroom to the other, through a soda straw, as in **Figure 3**.
2. Attach the ends of the string to opposite walls of the room
3. Blow up a long, thin balloon, and tape it to the soda straw.
4. Let the air out of the balloon, and watch it accelerate across the room on the string.

How the Balloon Rocket Works: When the balloon is sealed, air molecules inside the balloon exert forces in every direction as they collide with each other and with the wall of the balloon. When one end of the balloon is opened up, molecules rushing out of the *open end* have no wall against which to push. Molecules at the *closed end* do have a wall to push against, so they push that wall (and the rest of the balloon) in that direction. The wall and the molecules exert an equal but opposite force on air molecules, as they escape from the open end.

Comical Critters
Gordon Gore



"Today, we conquered this rock pile. Tomorrow, Mount Everest!"

Science Crossword 1

by Dr. David McKinnon

1		2		3		4		5		6		7		8
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Scientific Crossword #1 Clues

Across

- 1) Solar System's largest planet (7)
- 5) What a solute goes into (7)
- 9) Describing an unmoving organism (7)
- 10) Straight! A type of algebra (6)
- 12) Like pairs of interacting particles, or maybe your shoelaces (9)
- 13) Jelly loved by microbiologists(4)
- 15) The Saxe-..., members of Prince Albert's German noble house (7)
- 16) Enzyme suffix (3)
- 20) What you get by addition (3)
- 21) Rash-causing children's disease (7)
- 25) e.g. X- or cartilaginous fish (4)
- 26) Ancient Egyptian hieroglyph symbol (9)
- 28) Blue dye used in blue jeans (6)
- 29) Log support in fireplace (7)
- 31) Element #3 in periodic table, used for rechargeable batteries (7)
- 32) Shape of DNA or a coiled spring (7)

Down

- 1) Coloured Silica mineral (or Alberta town) (6)
- 2) Opposite of electron, the p in PET. (8)
- 3) Three star constellation between Andromeda and Pisces (10)
- 4) Physics of flow of matter (8)
- 5) Chemical symbol for Element # 14 (2)
- 6) Where a wild animal hangs out (4)
- 7) It makes work, or heat (6)
- 8) Salt of Tartaric acid (8)
- 11) Chemical suffix of salt of e.g. HCl or HBr
- 14) Describing objects like e.g. Ceres or similar heavenly body(10)
- 17) Describing property of keeping motionless or moving in straight line (8)
- 18) Intermediate in Moonshine production(4,4)
- 19) Power from electron movement (8)
- 22) Industry term for e.g. sodium salt of alkylsulfonic acids(6)
- 23) Number one in cards (3)
- 24) Centre of a nut (6)
- 27) Citrus hybrid (sounds awful!) (4)
- 30) Chemical symbol for element no. 95 (2)



Gordon Gore Photo

How Do They Do It? For the past four years, ospreys Oprah and Oscar have returned from the winter locations to The Dunes Golf Course in Kamloops, on the same day! In 2015 they arrived April 4, and from 2016 to 2018 (after the leap year in 2016) they arrived on April 3. What do they use for a 'calendar'? Is it the stars?



Red-winged Blackbird