Springing Into Science

By: John Van Horn

Force and Motion are major topics of study in the sciences students. To understand these, we have to understand Newton’s Laws. Here is one quick activity for understanding Newton’s Third Law. This is a good activity to introduce this topic and then you can expand on student’s understanding by additional programming.

Newton’s Third Law

This activity is for 6-8th grades. Imagine that you are watching a volleyball match and suddenly the ball comes towards you. Due to your reflexes you hit the ball so that you do not get hurt. The ball moves away from you due to the action of your hand on it. But definitely your hands pain due to the impact of the ball. That is, whenever two bodies interact with each other, each exerts a force on the other. The force exerted by one of the two bodies is called the action force while the force exerted by the other is called the reaction force.

In the above example the force exerted by you on the ball is the action force and the force exerted by the ball on your hand is the reaction force.

Action and reaction forces act simultaneously but on different bodies. Let us find out why a rubber ball rebounds when it is thrown on a hard floor. It is due to the action and reaction forces that are acting simultaneously. The ball exerts a force (action force) on the floor and the floor exerts an equal and opposite force (reaction force) on it. The rubber ball being light rebounds. Based on such examples of action and reaction forces, Sir Issac Newton gave the third law of motion “To every action there is an equal and opposite reaction”.

An Experiment to Prove Newton’s Third Law of Motion

Couple two spring balances A and B as shown in the figure. When we pull the balance B both the balances show the same reading indicating that both the action and reaction forces are equal and opposite. In this case, the pull of either of the two spring balances can be regarded as action and that of the other balance as the reaction.

Examples to illustrate Newton’s third law of motion

● When we walk on the ground, then our foot pushes the ground backward (action force) and the ground in turn exerts a force on the foot (reaction force) pushing the foot forward

● When a man jumps from a diving board he pushes the board (action force) and the board in turn pushes the man forward in the opposite direction (reaction force)

● The birds, while flying, push the air downwards with the help of their wings (action force) and the air in turn exerts a force on the bird in the upward direction (reaction force).

A bird in flight

● A swimmer pushes the water in the backward direction (action force) and the water exerts a force on the swimmer (reaction force) which pushes him forward.
SPRING FEVER
By: Karen Meyer

Testing, spring break, and the March Madness are behind us as we look forward to the warm days ahead. It is time to take advantage of possible spring related activities. Try a baseball themed review game or measure and estimation activities outside. Here are a few more ideas:

**M**ake the most of the last few weeks of the school year. Don’t count the days. Make the days count!

**A**rrange materials and packets for students to use in the summer. Enlist some volunteers or parents to help get Math Bags ready.

**T**ry some new websites:
- KenKen.com - Sudoku with a math twist for all grade levels
- Nlvm.org - virtual math activities for everyone to try
- Mathcats.com - a wonderful collection of online and offline activities

**H**ave fun with math. Remember that bad news is that time flies but the good news is you’re the pilot. As the school year flies by enjoy your students in the remaining days.

PREschool PREparation!!
By: Kenya Thomas

Preschoolers tend to be the overlooked group when it comes to science education. Research supports the idea of early exposure to science can enhance future interests in science education and science preparation for higher education. Here is a simple and fun hands on experiment to share with preschoolers!

**Racing Raisins**
Label two glasses, A and B. In the cup labeled A, pour enough water into it until it is ¾ full. In cup B, pour enough carbonated soda water until it is ¾ full.

Have the children drop 4-5 raisins in cup A. Ask them what they observed. Have the children then drop 4-5 raisins in cup B and ask them what they observed.

The raisins in cup B will begin to “dance” by traveling up and down the length of the cup due to the carbon dioxide or “air bubbles” from the soda water; whereas the raisins in cup A will sink to the bottom and become motionless. This will show the children how the air bubbles make the raisins rise and fall.

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**FUN FACTS ABOUT PETS**

- Pets age faster than people
- Big pets age faster than small pets
- Most dogs and cats are fully grown by age 2
- Many pets start to feel old around age 7
- Bringing your pet to the veterinarian once a year is the same as a person seeing a doctor just once every 7 years.
PETS & SOCIETY
By: Dr. Oye Ajifolokun

The importance of animals in our society cannot be overemphasized. The love, care and management of these creatures therefore require special training and attention. People especially youth need to be aware of their civic responsibility to animals and how best to take care of them.

This was the reason where a 3-week pet and society program was organized for some 4-H members at Arlington Heights. The program was held at Patton School in Arlington Heights and about 10 students and some parents attended the program. Students were taught about how important animals are to people, responsibility and caring for animals, health and benefit of animals to people. At the end of the program, students were taken on a field trip to Buddy Foundation-a humane animal welfare organization in Arlington Heights.

It was a fun-filled period for these kids as they had the opportunity to play with real life animals and asked various questions that further enhanced their understanding of animals.

Schools, park districts or 4-H clubs interested in this program can contact Dr. Oye Ajifolokun. Email: aji@illinois.edu. Tel: (708)449-4320

MATH TO GO KEEPS ON MOVING
By: Karen Meyer

In response to expressed needs of Cook County schools, the University of Illinois Extension STEM team continues to deliver unique math programs designed to meet the teachers’ professional development needs while meeting the Illinois State Standards. Over three hundred elementary teachers representing districts throughout Cook County including Cicero, Lindop, Mannheim, Matteson and Chicago have participated in these programs. They engage in activities including interactive games which can immediately be applied in their classrooms using materials distributed at the session. Comments from teachers include “Excellent workshop! Thanks for sharing. I can’t wait to use them” and “Great institute! Learned a lot of great activities for the classroom.” The teachers are better prepared to make a difference as well as feeling more confident about the mathematics they were teaching. As thousands of students are impacted from this program, Extension is truly helping teachers put knowledge to work.

STUDENTS SOLVE SCIENTIFIC MYSTERY
By: John Van Horn

“The room was surrounded by yellow plastic tape with the words “Crime Scene: Do Not Cross.” There were 20 or so people in white coats looking for clues. None of them were taller than four feet.” This is the beginning of an article in the Franklin Park Herald Journal describing the highly successful Forensics program conducted by the Cook County STEM team.

The program conducted on November 17-19 at Westdale Elementary School and involved every student in the 5th grade at that school. The program was an interdisciplinary effort involving biology, physics, mathematics and genetics. The students ultimately solved the mystery, learning scientific knowledge and skills in the process. Kathy Lovely the fifth grade science teacher summed the event up, saying “I think the kids will remember this experience the rest of their lives. I will.”

Since November the STEM team has presented this same hands on exciting course also at Stickney Public Library to students and also Robert A. Black Magnet School seventh graders.
THE CASE OF THE MISSING BIKE

CSI: Elementary
The STEM team now offers a 3 day forensics exploration unit to solve The Case of the Missing Bike. Students will learn and apply a variety of math and science skills used in forensics—speed calculations, map reading, fingerprinting, DNA analysis, and chromatography—to help solve this mystery. If you are interested in learning more about how this program can come to your school, please email Angel Edmond at edmond@illinois.edu

ACCEPTING SUMMER REQUESTS
If you are interested in the STEM team delivering a summer program to your school, camp and/or organization, please contact any member of the STEM team.

Science Fun Facts
Biology:
The world's largest amphibian is the giant salamander. It can grow up to 5 ft. in length.

Environment:
It is estimated that a plastic container can resist decomposition for as long as 50,000 years.

Astronomy:
A day on the planet Mercury is twice as long as its year. Mercury rotates very slowly but revolves around the Sun in slightly less than 88 days.

Math:
googol = 10^{100};
1 googolplex = 10^{googol} = 10^{10^{100}}

Earth Science:
The oldest and largest clearly visible meteorite crater site in the world is The Vredefort Dome in Free State, South Africa. It is 380km across.

Physics:
If you yelled for 8 years, 7 months and 6 days, you would have produced just enough sound energy to heat up one cup of coffee.

Food Science:
Chewing gum was invented by a dentist, named William Semple-as a way to exercise your jaws. Sciensational.com

Horticulture:
A Pineapple is actually a giant berry.

Pets:
At the end of the Beatles' song "A Day in the Life", an ultrasonic whistle, audible only to dogs, was recorded by Paul McCartney for his Shetland sheepdog.

Teacher Professional Development
Innovative Math and Science Programming you can use in your classroom and CPDU Credits

University of Illinois Extension in Cook County offers professional development in science and mathematics, with the aim of enhancing the delivery of instruction in mathematics and the sciences.

These workshops are designed for teachers in elementary or middle schools. Teachers and schools have found this program to be a very economical professional development opportunity as well as a way to receive CPDU credits. The classes can be offered at Extension offices or we can bring them to you. Each workshop can be modified to fit the needs and times for your school.

Contact Karen Meyer if you are interested in math and contact Kenya Thomas or John Van Horn if you are interested in science professional development workshops. The educators can be reached at 708-449-4320.