

**ARTIST: RON ANGLIN –“Quite a Catch”**

**PROGRAM NAME: F.I.G. NEWTON**

**GRADE LEVEL(S): 3-5 6-8 9-12**

**TYPE OF PROGRAM: Assembly**

**Workshop (Optional for 35 students at a time)**

**MAIN IDEA: Juggling is not Magic! It requires a good grasp of basic physics and lots of practice. The juggler must obey all three of Newton’s Laws of Motion and struggle against his nemesis: Gravity! Learning to juggle brings physical, social, and cognitive benefits!**

**KEY CONCEPTS:**

1. Center of Gravity and Balance
2. I- Inertia/Law of Momentum-1st
3. F- Law of Acceleration-2nd
4. G-The Law of Interaction-3rd
5. Forces: Push versus Pull
6. Six Simple Machines help us do Work
7. Work is Force Applied over a Distance
8. Constant Acceleration of Gravity
9. Gyroscopic Force and Precession
10. Potential and Kinetic Energy
11. Friction
12. Difference between Mass and Weight

**13. Centripetal Force**

**14. Heat versus Temperature (when Torches are juggled)**

**15. Importance of Brain Laterality (How Juggling increases Brain size!)**

**BRIEF PROGRAM DESCRIPTION:** Newton's 3 Laws of Motion are illustrated through juggling and manipulation. The acronym F I G helps students remember

That  $F = ma$  (2<sup>nd</sup> law), Inertia (1<sup>st</sup> Law) and Get a Reaction (3<sup>rd</sup> Law). The Juggler/Teacher uses different props for juggling, such as balls, superballs, rings, clubs, scarves, and machetes to demonstrate the laws. He also manipulates rhythm sticks, boxes, Shaker cups, Japanese kendamas, Chinese yo-yos, poi, and dice to teach concepts such as friction, gyroscopic motion, and centripetal force. This program can be adjusted for grades 3-12.

**TECHNICAL REQUIREMENTS:** Program benefits from the highest ceiling possible, but this is not an absolute requirement. Gyms tend to work best, but auditoriums or cafeterias will also work. For workshops, the students need to come to a central location. I have way too many props to carry around to different classrooms.

I will bring my own table and sound system. The school does not need to provide any technical equipment. **NOTE:** If announcements need to be made, the school should provide their own microphone for the administrator.

**EQUIPMENT/PROPS/COSTUMING:** I do not need student or staff assistance with my load-in or load-out. I will bring everything that I need to conduct the assembly program and with administrative permission, juggle torches for middle schools and high schools. I wear long pants and a tie-dye shirt normally to perform in. I do not wear any clown make-up when I discuss medical clowning and do soap bubble tricks.

**OPTIONAL WORKSHOPS:** (For up to 35 students at a time) Children will learn plate spinning, Japanese kendamas, Chinese yo-yos, and juggling scarves.

Offered as a hands-on follow-up program after the science assembly program. CCGPS: S4P3, PE4.1, PE4.2, PE4.3, PE4.5, PE4.6

**BACKGROUND/PRE-ACTIVITIES:** Students may want to learn about the history of Circus and/or Vaudeville. Other historical accounts of Juggling include the famous women jugglers of Egypt from 4,000 years ago depicted on the wall of a tomb in the Beni Hasan area. They can also read Anatole France's "The Jongleur of Notre Dame" which for younger readers has been redone recently by Tomie de Paola as "The Clown of God". Teachers can continue the Geography theme by studying China where many props originated, or by studying the importance of the Kendama in Japan. This toy originally started in France as the Bilboquet, which author Jane Austen became very good at! Famous Jugglers in History that can be researched are Enrico Rastelli, Francis and Lottie Brunn, W.C. Fields, Trixie, and Bobby May. Current Jugglers include Anthony Gatto, Greg Kennedy, Cindy Marvel, Albert Lucas, Gina Schwartzman, Jason Garfield, Viktor Kee, Segei Ignatov, Ivan Percel, Michael Davis, David Cain, Nathan Dorrell, and David Ferman, who just set the record with 11 balls! Juggling Groups include The Raspyni Brothers, Flying Karamazov Brothers, Luma, Get the Shoe, Team RootBerry, and Air Jazz. Professional Jugglers in Georgia include Dan Thurmon, Michael Jay Garner, Jimmy Robertson, Dan Berg, Todd Key, Judah Andrews, and the Atlanta Jugglers Association.

**RESOURCES:**

Books: Physical Science-Matter and Motion grades 4-8 by Edward Shevick

The Cartoon Guide to Physics by Larry Gonick & Art Huffman

Magazine Articles: "The Science of Juggling" in Scientific American, November, 1995, Vol.273, #5, pages 92-97

**Websites:** [www.juggling.org](http://www.juggling.org) Juggling Information Service has lots of help, vendors, and other professionals

[www.scienceofjuggling.com/benefits.html](http://www.scienceofjuggling.com/benefits.html) Benefits of Juggling

[www.exploratorium.edu/ronh/weight](http://www.exploratorium.edu/ronh/weight) Know your weight on any planet!

[www.atlantajugglers.org](http://www.atlantajugglers.org) Atlanta Jugglers Association

[www.left-hand.org](http://www.left-hand.org) It's all about the left-handed world.

<http://www.youtube.com/user/supernog73> Great Kendama YouTube Channel

[www.juggle.org](http://www.juggle.org) International Jugglers Association

<http://www.npr.org/blogs/monkeysee/2013/06/21/194298144/the-kendama-can-a-wooden-toy-be-a-viral-sensation> NPR report on

**Kendamas**

<http://physicsinfive.com/> Great physics page by North Carolina teacher and master juggler Chase Martin

[www.quiteacatch.net](http://www.quiteacatch.net) My website

**MINUTE BY MINUTE BREAKDOWN OF THE PROGRAM**

<b>Time (min.)</b>	<b>Description of Activity</b> (Activities include performance segments, demo of skills, techniques, instruments or ideas and audience participation. An activity may reveal/reinforce one or more concepts.)	<b>Key Concept Reinforced/Illustrated by the Activity</b>	<b>Repertoire</b> (Include title and composer/author/choreographer)	<b>Audience Participation</b> (Students should be actively and meaningfully engaged throughout the program, e.g., active listening, clapping in rhythm, call and response)
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4	Intro, followed by unicycle entry and round-off/Rap Song	ATTENTION GETTER!	Ice, Ice, Baby! <a href="http://www.unicycle.com">www.unicycle.com</a>	Clapping, one volunteer will be the D.J and shake the shaker
4	Plate-spinning routine	Center of Gravity, Friction, Balance		5 or 6 students will get one min to try to spin a plastic plate. Dancing may happen!
5	Juggling on Rola-Bola with fake machetes	Work, Simple machines, 2 <sup>nd</sup> law		Call and response for definition of work, types of forces, and simple machines. One volunteer will assist me with the rola-bola.
5	3 and 4 ball juggling routine, Head catch, and How to Juggle with nylon scarves or plastic grocery bags	Brain laterality, Juggling effect on the Brain, 3 <sup>rd</sup> law- action/Reaction	German study published in National Geographic Mag 3/05 that proves juggling actually increase brain size!	Students swim forward with one arm and backwards with the other at the same time!
5	5 ball bounce versus 5 balls in the air with a dive roll thrown in!	Newton's 2 <sup>nd</sup> and 3 <sup>rd</sup> Laws Potential and Kinetic Energy	"If I have seen further than other men, it is because I have stood upon the shoulders of giants." –I. Newton	Audience votes for the easiest way to juggle 5 balls: Bouncing or Throwing.
4	Kendama Demo, then student contest to make one catch in any of the 3 cups.	3 <sup>rd</sup> law- Action and Reaction	<a href="http://www.kendamaUSA.com">www.kendamaUSA.com</a>	Students volunteers are given a minute to win it!
3	Flowerstick versus Devilstick routine	Newtown's 1 <sup>st</sup> Law and Momentum		Flowerstick is gently tossed out into the audience.
5	Box manipulation and various ball drops	Push and Pull, Mass/Weight, Centripetal force	Currently using "Stuck on You" by Elvis Presley	Students decide which size ball will hit the ground first, or if will be a tie?
7	1 and 2 Chinese yo-yo (diabolo) routine, then whistling diabolo	Friction, Gyroscopic Motion, Centripetal Force, Pitch and Volume	Various pop songs, currently using Gangnam Style	Students usually do the motions along with me!

<b>5</b>	<b>Medical clown/Soap Bubble Tricks</b>	<b>Importance of Breathing and Releasing Tension for Pain management</b>	<b>“Bubble Magic” by Tom Noddy</b>	<b>Students that are lucky may pop a bubble!</b>
<b>2</b>	<b>Juggling is Not Magic!</b>	<b>Summary/Exit</b>		