Presenting the 3rd Annual

WNY BRAIN CHALLENGE

A Rube Goldberg Style Competition for Students in Grades 6-12
A true STEAM experience fully aligned with Common Core & NGSS

LOCATION: ECC South Campus Cafeteria

TIME: 8:00 am Set-Up, 9:00 am — 1:00 pm Competition - May 23, 2019

LEVEL: Middle School / High School Grade 6 - 12

COST: There is no cost to the team to register. MISSION: IGNITE is partnering with corporate sponsors to support this initiative. If there is an organization your school works with, please let us know and we will be glad to connect with them.

TRANSPORTATION: If your school needs assistance to secure transportation please contact us directly. Sponsor contributions may be used to assist.

OBJECTIVE: Each team must design, build and present a Rube Goldberg Device created to perform the tasks outlined here.

TEAMS: Teams must have a maximum of 6 members and a supervising teacher.

REGISTRATION: A school may register multiple teams, each with a unique machine. Please visit our website to register: wnybrainchallenge.com or contact Alex Passarell for more information: alex@missionignite.org

RUN TIME: No more than 60 seconds. Time will be kept by a volunteer

STARTING TASK: The initial task must be a ball and ramp. The ball cannot be released by hand. (Example: a gate/barrier must be removed for the ball to roll.) Be creative!

ENDING TASK: The device must end by zipping a zipper.

SPACE: Each team will be assigned an 8 x 10-foot area. The machine may not exceed 125 cubic feet and must fit entirely inside the team's assigned space. All team members and machine must fit into the 8 x 10-foot area.

VOLUME: The overall dimensions of your machine may not exceed 125 cubic feet; using the formula: area x height = machine volume. Height is measured from the lowest to the highest point of your machine. (NOTE: if the **entire machine** sits on a table, the height of the table may be excluded from the height of the machine. If **only one section** of the machine uses the table, then the height of the table must be included in the height of the machine.) A volunteer will measure the machine.

Between the start task and ending task, there must be a minimum of eight discernible steps. The device will earn points by executing a series of mechanical energy transfers between different simple machines. The simple machines are:

1. Wheel & Axle (wheel must do at least 1 full rotation)
2. 1st, 2nd & 3rd class levers

3. Pulley
4. Wedge
5. Inclined Plane
6. Screw (must do at least 1 full rotation)

Each type of machine may be used up to 3 times for points, however, each class of lever may only count once. (For clarification: you can have extra steps in your sequence, you might want to use a pulley 5 times but it would only count for points the first 3 times)

Each simple machine must be preceded by and followed by a completely different simple machine (or bonus task).

There are **THREE** bonus tasks that you can use in your action sequence.

1. One of your simple machines can be 3D printed.
2. You can add a pneumatic action to the sequence.
3. You can use energy released from a stretched rubber band in the sequence.

NO electricity will be provided, nor will teams be allowed to access electrical outlets. Machines may include a maximum of 3 tasks that require battery power. Buttons, switches, and physical wire connections are all permissible.

Materials are NOT allowed to leave the device during the run.

NO device will be allowed to run if it is deemed by the judge to be unsafe.

No live animals. No flames. Liquids must be properly stored, used, and cleaned up.

Any materials may be used, except those specifically prohibited above.

DEVICE FLOW CHART: Each team will need to create a flow chart that outlines the process that takes their device from the start to end task. No parallel tasks are allowed. Each task must happen in a linear sequence. The chart should also track how many points are being accumulated, assuming a “perfect” run.

COMPETITION: At the contest, the team will present their Flow Chart for inspection. The team will walk the judge through the chart and point out where the corresponding parts of the device are. The judge will ask clarifying questions regarding the theory and construction as well as reliability and safety, which the students will be scored on. After the inspection, students will be given up to 15 minutes to ready their device for their official run. A volunteer will record the run time and measure the machine. The judges

will assess whether each part of the device worked as it was described during the inspection. Any parts of the sequence that do not work during the run will not be counted for points.

MATERIALS: RGMs should be “green” machines, made of recycled items, wherever possible. Everyday, household objects are best and you can use just about anything! Not just toys, but a lamp, chair, fork, your grandpa’s suspenders – you name it! Try using items differently than for their original purposes – an overturned bike’s wheels can generate momentum, or a chair on top of a table can give you the power of gravity. We ask that teams don’t spend money on

materials.

CREATIVITY IS KEY: Look in the basement, garage or junk drawer, rummage around for old keys, check out a yard sale for weird stuff no one else wants! Note: Rube Goldberg never used dominoes in any of his machines! Marble runs and falling dominos are fun to look at – but they're not very creative. We encourage you to be resourceful and find alternatives in creating your machine's energy transfers.)

HUMOR: Rube Goldberg was a cartoonist – he was very funny! RGMs should work but they also need to capture attention. Theatrical and funny machines are very engaging and draw a crowd! The most successful teams have members with diverse skills including; engineers, entertainers, mathematicians, and comedians working together!

PLANNING: Making something look easy is hard – and it takes a lot of time. We recommend about two months to build, test and ready your machine for competition. Run your machine often- make sure the steps are all working as they should. The most successful machines are not built the week before the competition!

TRAVEL: Travel is tough on machines! Make your machine in small, sturdy sections which can be transported easily and safely – and quickly and simply set up. Duct tape and cardboard machines usually fall apart on their way to competitions. Bring extra materials to the competition, just in case! Double-check the dimensions of doorways, elevators, hallways and stairwells at the competition site – and whatever vehicle you're using for transport - and make sure your machine fits!

WNY BRAIN CHALLENGE

MISSION: IGNITE
Powered by Computers For Children

Round 1 or 2:	
Team Name:	
School:	

	CRITERIA	POINTS	NOTES
PART 1: Inspection Component	Flow chart sequence matches device	/10	
	Flow chart tracks potential points	/10	
	Judges questions are addressed	/10	
	Data of trial runs presented	/10	
	Device does not exceed 125 cubic ft.	/10	
	Total points Part 1:	/50	

	CRITERIA	POINTS	NOTES
PART 2: Device Operation Component	Ball & Ramp	/10	
	1st Class Lever	/10	
	2nd Class Lever	/10	
	3rd Class Lever	/10	
	Pulleys (10 pts each for the first three instances)	/30	
	Wheel & Axles Must complete at least 1 full rotation (10 pts each for the first three instances)	/30	
	Inclined Planes (10 pts each for the first three instances)	/30	
	Screws Must complete at least 1 full rotation (10 pts each for the first three instances)	/30	
	Wedges (10 pts each for the first three instances)	/30	
	Total Points Part 2:	/190	
	BONUS TASKS: (Points for only 1 instance)		
	3D Printed Machine Part	/30	
	Pneumatic Action	/30	
	Elastic Action	/30	
	Light Turns On	/20	
	Total Bonus Points	/110	
	DEDUCTIONS:		
	Run Time (-1 per sec after 60)		
	Student Touches (-5 per instance)		
PART 3: SCORING	Total Points Earned (Part 1 + Part 2+Bonus)	/350	
	Total Deductions		
	FINAL SCORE	/350	