

RUBE GOLDBERG

MACHINE CONTEST®

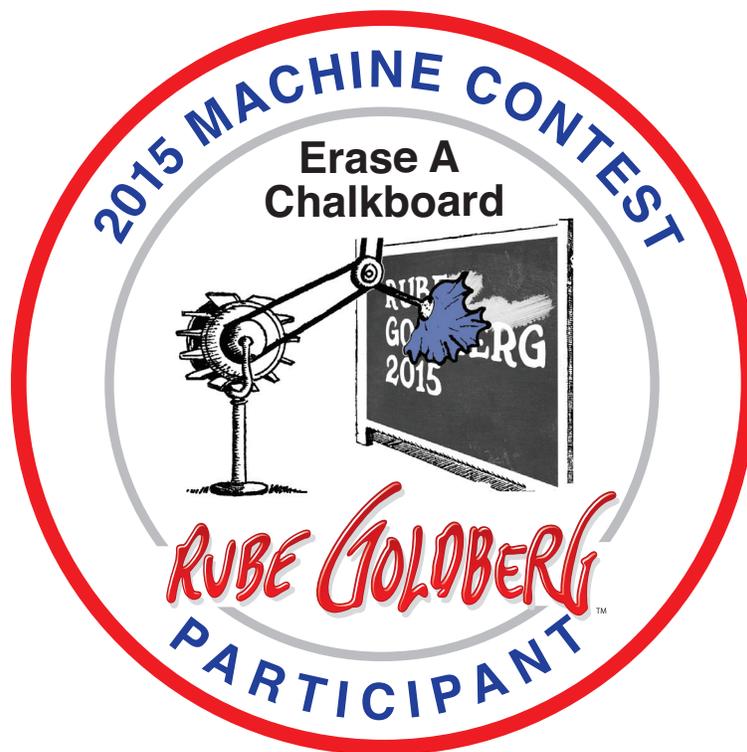
2015 OFFICIAL RULE BOOK

Division I: Ages 11-14

Division II: Ages 14-18

Division III: Ages 18+

ALL NEW CONTEST!



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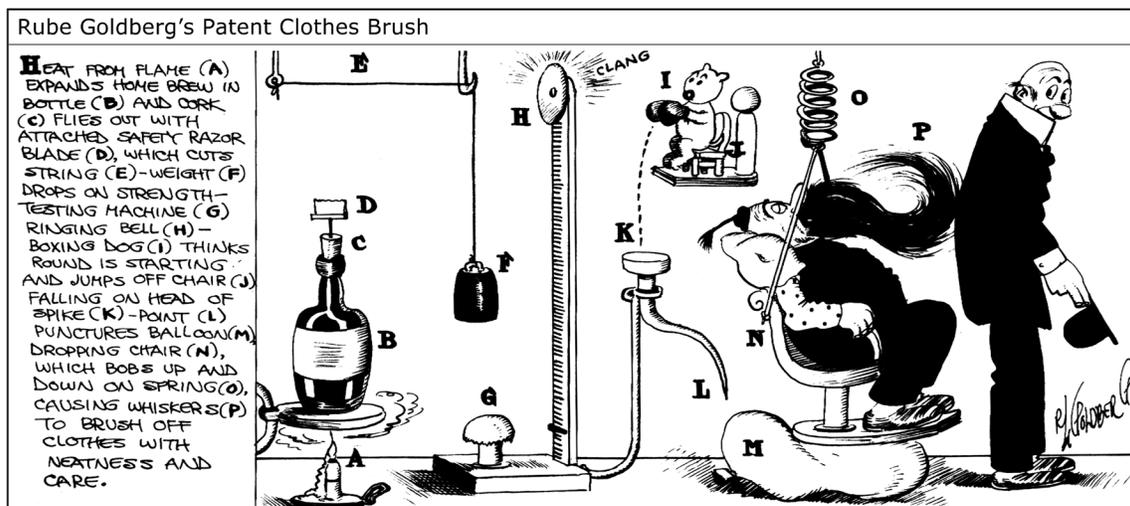
MISSION

RUBE GOLDBERG MACHINE CONTESTS® (RGMCs) are designed to encourage teamwork and out-of-the-box problem solving for students of all ages.

STEM and STEAM friendly, RGMCs tackle the most mundane tasks (see past contests, pg 4) and ask participants to create their own overly elaborate and hilariously conceived wacky contraptions in honor of the competition's founding father.

Rube Goldberg (1884-1970) was a Pulitzer Prize winning cartoonist, best known for his nutty chain reaction inventions. The popularity of these cartoons made him a cultural touchstone, an adjective in Merriam-Webster's Dictionary, and a term that today is invoked daily in American media. (If you're not familiar with Rube Goldberg's work, go to the "Gallery" section of www.rubegoldberg.com).

We encourage the use of every-day objects to create your Rube Goldberg Machine™ and to integrate as many recycled items as possible. Imagine the kinetic component of everything in the world around you and put it into motion in your Rube Goldberg Machine™!



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PAST CONTEST TASKS

- 2014 Zip A Zipper
- 2013 Hammer A Nail
- 2012 Inflate A Balloon and Pop It!
- 2011 Watering A Plant
- 2010 Dispense an Appropriate Amount of Hand Sanitizer into a Hand
- 2009 Replace an Incandescent Light Bulb with a More Energy Efficient Light Emitting Design
- 2008 Assemble a Hamburger
- 2007 Squeeze the Juice from an Orange
- 2006 Shred 5 Sheets of Paper
- 2005 Change Batteries and Turn on a 2-battery Flashlight
- 2004 Select, Mark and Cast an Election Ballot
- 2003 Select, Crush and Recycle and Empty Soft Drink Can
- 2002 Select, Raise and Wave a U.S. Flag
- 2001 Select, Clean and Peel an Apple
- 2000 Fill and Seal a Time Capsule with 20th Century Inventions
- 1999 Set a Golf Tee and Tee Up a Golf Ball
- 1998 Shut Off An Alarm Clock
- 1997 Insert and Then Play a CD Disc
- 1996 Put Coins in a Bank
- 1995 Turn on a Radio
- 1994 Make Cup of Coffee
- 1993 Screw a Light Bulb into a Socket
- 1992 Unlock a Combination Padlock
- 1991 Toast a Slice of Bread
- 1990 Put the Lid on a Ball Jar
- 1989 Sharpen a Pencil
- 1988 Adhere a Stamp to a Letter
- 1987 Put Toothpaste on a Toothbrush

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WHAT'S NEW!

Dear Fellow RGMC Participants,

We've made a few changes to our contest this year.

We have split the Contest into three divisions. They are:

- **DIVISION I:** Ages 11 – 14 (Middle School)
- **DIVISION II:** Ages 14 – 18 (High School)
- **DIVISION III:** Ages 18+ (College)

But that's not all!

All divisions will compete under the same set of rules ("one book to rule them all"). These rules have been expanded to allow you to **build outside of the box!** You got it - No more 6' cube machine size constraint! PLEASE READ THESE NEW RULES CAREFULLY.

We hope these new rules will help free your imagination to explore new areas of design, complexity, and of course that whimsical Rube Goldberg Spirit.

Our goal is to give YOU the canvas to build and think like Rube Goldberg!

GOOD LUCK and HAPPY RUBEING!

Sincerely,

The Rube Goldberg Team

Rube Goldberg (rōōb gōld'berg), n. a comically involved, complicated invention, laboriously contrived to perform a simple operation – *Webster's New World Dictionary*



MACHINE CONTEST®

TO PARTICIPATE IN THE RUBE GOLDBERG MACHINE CONTEST (RGMC)

1. **Start a team** of at least 3 people

NOTE: Teams entering in DIVISION I: Ages 11-14 (Middle School) and DIVISION II: Ages 14 – 18 (High School) require a Teacher/Parent Advisor.

2. **Register**

- a. Go to www.rubegoldberg.com.
- b. Complete the online registration form and pay the registration fee.
- c. Entry fees are non-refundable.

3. **Design and build a machine**

2015 Task - **ERASE A CHALKBOARD**

NOTE: Steps, pieces and components from previous machines may be recycled, but the RGMC relies on the ingenuity of students and teachers to create entirely new machines for each year's contest.

4. **Compete!**

- a. LIVE CONTEST: Travel to your Contest and compete.
- b. ONLINE CONTEST: Complete your online submission by March 3, 2015.

5. **Win** if the judges choose your entry.

6. **Have fun!**

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RUBE GOLDBERG MACHINE CONTEST (RGMC) SCHEDULE

Live Contests	Online Contest
<p>Fall 2014: Registration opens</p> <p>Division I: Ages 11-14</p> <p>Division II: Ages 14-18</p> <p>Division III: Ages 18+</p>	
<p>See your Host Site at www.rubegoldberg.com for deadlines and competition dates</p> <p>Division II and III Winners will compete at the Live World Contests</p> <p>April 18, 2015 Division II: Waukesha County Technical College, Pewaukee, WI</p> <p>March 28, 2015 Division III: COSI, Columbus, Ohio</p>	<p>February 18, 2015 Registration closes at midnight EST</p>
	<p>March 3, 2015 Team Pages close for editing at midnight EST</p>
	<p>March 4, 2015 Online Contest judging begins</p>
	<p>March 17, 2015 Top 10 Online Teams announced</p>
	<p>March 18, 2015 Online World Contest judging begins</p>
	<p>March 27, 2015 Online World Contest winners announced Team Pages made public People's Choice voting starts</p>
	<p>April 19, 2015 People's Choice voting ends at midnight EST</p>
	<p>April 20, 2015 Winner of the People's Choice Award announced</p>

Find the latest schedule on www.rubegoldberg.com/contest_schedule

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1. START A TEAM

All Teams

- Must be comprised of at least 3 eligible members.
- Will receive a 3" embroidered Contest Participant badge displaying the year and the task for each registered team member (up to 12). These badges will be mailed to the team Teacher/Parent Advisor/Captain at the address provided during the registration process.

Additional badges are available for \$5 each by emailing rube@rubegoldberg.com.

Please include: Your division, the name of your school, your mailing address and the name of the host site where you are competing (if applicable).

DIVISION I: Ages 11 – 14 (Middle School) Team Eligibility

- Each team must have a Teacher/Parent Advisor who will be present at the Contest.

NOTE: All team members must be between the ages of 11 and 14 and enrolled as full-time students in order to participate in the Contest.

DIVISION II: Ages 14 – 18 (High School) Team Eligibility

- Each team must have a Teacher/Parent Advisor who will be present at the Contest.

NOTE: All team members must be between the ages of 14 and 18 and enrolled as full-time students in order to participate in the Contest.

DIVISION III: Ages 18+ (College) Team Eligibility

- Each team must have a team Captain who will be present at the Contest.

(Optional) Each team may have a faculty Advisor, whose attendance at the Contest is not required.

NOTE: All team members must be 18 years of age or older and enrolled as full-time undergraduate or graduate students at an accredited university in order to participate in the Contest.

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2. REGISTER

- Contest registration will open at www.rubegoldberg.com in Fall 2014.
- For Live Contest Host sites, see the Contest Schedule on www.rubegoldberg.com/contest_schedule.
- Complete the online registration form and pay the registration fee*

NOTE: A team may only compete in one Contest. However, a school may register multiple teams with different machines.

* **NOTE:** For Live Contests, the registration fee may be higher or lower depending on the host. Find the specific fees for your host and more in the Contest Schedule at www.rubegoldberg.com/contest_schedule

BE ADVISED: Your slot at a Live Contest will only be secured by receipt of payment to RGI and at some Contests, the local Contest Chairperson.

- Entry fees are non-refundable.





MACHINE CONTEST®

3. DESIGN AND BUILD A MACHINE

2015 Task

The task is determined by Rube Goldberg, Inc. and changes on an annual basis. The 2015 Task is **Erase A Chalkboard**. The 2016 task will be announced live on-air, or posted at www.rubegoldberg.com on Rube's birthday, July 4th.

Machine Specifications & Rules

Specification	Minimum	Maximum
Complete official challenge	Required	
Steps	10 steps (DIVISION I), 20 steps (DIVISIONS II and III)	75 steps
Height	None	8' (2.4 m)
Overall Footprint Area	None	10' x 10' (3 m x 3 m)
Machine volume (Footprint Area x Height of highest point on the machine)	None	250 ft ³ (7.1 m ³)
Single run time	None	2 minutes
Machine explanation and walkthrough	None	3 minutes
Reset time	None	8 minutes
Air compressor hoses, AC or DC power cords, and/or water hoses running to or from the machine	0	2 total
Hazardous materials, explosives, or flames	Not allowed	
Electrical arcing	Allowed with safety precautions	
Live animals	Not allowed	
Corporate logos	Allowed, with written permission from the logo owner. All responsibility for copyright permission rests with the team.	
Use of profane, indecent, or lewd expressions	Not allowed	
Objects flying beyond machine footprint	Not allowed	
Safe for participants and observers	Required	

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3. DESIGN AND BUILD A MACHINE *continued*

NEW: Calculating Machine Volume

New to the 2015 RGMC, ALL TEAMS must design their machine to fit in an overall volume of 250 cubic feet (7.1 cubic meters). The machine volume is defined as the overall footprint (area) of the machine (rounded up to the nearest foot) multiplied by the height of the tallest step.

Teams may build a machine in any shape they wish, so be creative!

How to Calculate the Volume of a Machine

1. Draw out your machine footprint on the grid on page 17.

NOTE: The overall dimensions of your machine may not exceed 10' length x 10' width x 8' height (3 m x 3 m x 2.4 m). If any part of the machine enters any of the 1' x 1' (0.3 m x 0.3 m) squares (even if it does not touch the ground/table), the entire square must be counted.

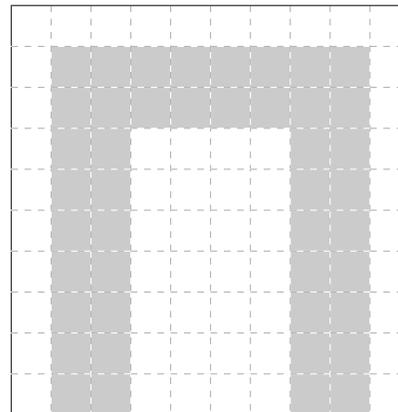
2. Count the number of 1' x 1' (0.3 m x 0.3 m) squares into which the machine footprint falls. This is the *area* of the machine footprint.

EXAMPLE: *area* = 44 squares

3. Measure from the lowest to the highest point of your machine; this is the *height* 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 a table, then the height of the table must be included in the height of the machine.

Example



EXAMPLE: The tallest part of the machine is a 5' tower, so *height* = 5'

4. Calculate the *Machine Volume* using the formula: *area* x *height* = *machine volume*

EXAMPLE: 44 squares (*area*) x 5' (*height*) = 220 ft³

5. Your *Machine Volume* must be equal to or less than 250 cubic feet (7.1 cubic meters)

EXAMPLE: 220 ft³ ≤ 250 ft³ (maximum) → *Machine Volume is within specifications*

More examples of how to calculate your "Machine Volume" can be found at www.rubegoldberg.com/contest/faq

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3. DESIGN AND BUILD A MACHINE *continued*

Frequently Asked Questions

Question: What is a step?

Answer: A step in the machine is a transfer of energy from one action to another action. Identical transfers of energy in succession should be counted as 1 step.

Example: A sequence of dominos hitting each other should be counted as 1 step. Counting 100 dominos as 100 steps is repetitive and not in the spirit of Rube Goldberg.

Question: What is an intervention?

Answer: Any physical touching or action to continue the operation of the machine through human interaction after the machine begins its Contest run.

Example: Your machine stops because one step does not trigger another. A team member interacts with the machine through a physical touch or other device to trigger any steps that follow.

Question: Can programmable logic controllers or microcontrollers be used?

Answer: Yes, but their use must fit within the definition of a step. Steps that use controllers should be clearly stated in the written step list and include detailed information on how the transfer of energy is accomplished. Using controllers as a fail-safe is illegal and will result in disqualification.

Example: A ball falls onto a switch connected to a controller that turns on a motor.

NO: If the ball misses the switch but the controller still starts the motor, the controller is not transferring energy from one action to another action. It is acting as a fail-safe instead of a step and is illegal.

YES: If the ball hits the switch and the controller starts the motor, the controller is transferring energy from one action to another action and is consistent with the definition of a step.

Question: Can I enter a machine that has been previously built and posted online?

Answer: No. All entries must be new machines built for entry into the current Contest.

Question: Where can I find answers to other frequently asked questions?

Answer: Visit <http://www.rubegoldberg.com/contest/faq>

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4A. COMPETING AT THE LIVE CONTEST

Prior to the Contest

Time to Contest	Event
2 hours prior	Host Site will provide participants adequate setup time in the Contest venue.
1 hour prior	Submit 10 (or other number specified by your Contest Host Site) concise, typed copies of (1) a step-by-step description of their machine, and (2) a completed machine volume worksheet to their Contest Host Site Chairperson. Diagrams and pictures may be included in this description along with typed information.
40 minutes prior	All machines must be set up and area surrounding them cleared.
30 minutes prior	Team Captains' meeting

During the Contest

- Teams will compete in a "Science Fair" format. Each machine will be assigned a judging time slot. During that slot, the teams will present their machine, commence a first run, reset their machine, and commence a second run within the required allotted time.
- **NEW TO 2015: There are NO VOIDED RUNS.** The entire machine presentation, first run, reset, and second run are judged.
- Teams are encouraged to run their machines and answer questions from the audience when not being judged.

Specification	Minimum	Maximum
Verbal presentation length	None	3 minutes
Team members participating during judged machine operations	None	4
Team members in contact with machine during a Contest Run	None	2 simultaneously
Reset time limit	None	8 minutes
Destructive action against other machines	Contest disqualification	

After the Contest

- Machines must be removed and the area cleaned by a time determined by the Host Site Chairperson.
- Contest participation implies consent to use Contest photographs in all forms of publicity.
- For site-specific rules and processes, contact your Host Site Chairperson.

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4B. COMPETING IN THE ONLINE CONTEST

Complete your Team Page by March 3, 2015

1. Your Online Welcome email will have a link to your Team Page.
 - a. This email will have a link for you to download the Official Poster and Certificate of Ingenuity (Division I only).
2. Follow the directions on your Team Page to submit the following required information by March 3, 2015:

- School, teacher and team information
- **OUR MACHINE EXPLANATION AND WALKTHROUGH:** A video explanation of the machine and step walkthrough (3 minutes maximum)
- **OUR MACHINE RUN VIDEO #1**

NOTE: There will be TWO videos of the entire machine running (2 minutes maximum each). Put your #1 video here.

Each video must be a single continuous view with the machine in view at all times and no video editing or breaks. Any evidence of editing will result in disqualification.

- **OUR STEP LIST:** A Step list (3 pages maximum).
- **OUR CLOSE-UPS: PHOTOS:**

Box #1: MACHINE VOLUME WORKSHEET - download (at 100%) page 17 from the Rule Book, fill it out, scan it at 100% and save as a .jpg. Upload just like the photos.

Box #2 and #3: Upload photos of your choice.

- **OUR CLOSE-UPS: VIDEOS:**

Box #1: Machine RUN VIDEO #2

NOTE: There will be TWO videos of the entire machine running (2 minutes maximum each). Put your #2 video here.

Box #2: FAVORITE STEP

Box #3: TASK COMPLETION

You can also add a team logo and further customize your Team page (optional).

Your Team page will only be editable until March 3, 2015.



5. 2015 RUBE GOLDBERG MACHINE CONTEST JUDGING FORM (ALL CONTESTS)

TEAM NAME: _____

100 Points Total Judging will be based on a 100-point scale broken down into the following categories:

■ Spirit of Rube Goldberg (50 points)

_____ **Whimsical** (0 to 5 points)

Does the machine use whimsically creative steps to complete the task?

_____ **Everyday Items** (0 to 5 points)

Do you find everyday and/or repurposed items on the machine?

_____ **Laugh Barometer** (0 to 5 points)

Similar to Rube Goldberg's cartoons, how funny is the machine?

_____ **Theme or Story** (0 to 5 points)

Does the machine tell a story?

_____ **Absurd Complexity** (0 to 30 points) = $0.46 \times \underline{\hspace{1cm}}$ - 4.6 (DIV I)
(round to nearest) = $0.55 \times \underline{\hspace{1cm}}$ - 10.9 (DIV II & III)

How many steps does the machine have? (# steps)

■ Reliability (18 points)

_____ **Reliability of the Machine** (0, 9, or 18 points)

0 points - Machine requires interventions on both runs.

9 points - Machine runs perfectly for one run.

18 points - Machine runs perfectly for both runs.

■ Repeatability (9 points)

_____ **Repeatability of the Machine** (0 or 9 points)

0 points - None of the steps ran identically in both runs.

9 points - Machine ran identically in both runs.

SUBTOTAL COLUMN 1

■ Task Completion (8 points)

_____ **Task Completed** (0, 4, or 8 points)

0 points - Task did not complete during both runs.

4 points - Task completed on one run.

8 points - Task completed on both runs.

■ Communication and Teamwork (15 points)

_____ **Team Chemistry** (0 to 5 points)

How well did the team communicate, work together, and use checklists?

_____ **Step List and Machine Volume Worksheet** (0 to 5 points)

How clear, concise, and creative is the written explanation of the machine?

Were the calculations on the Machine Volume Worksheet correct?

_____ **Machine Explanation** (0 to 5 points)

How clear, concise, and creative is the video/live explanation of the machine?

■ Penalties (up to -30 points)

_____ **Rule Violations** (up to -15 points) _____

Did any aspect of the machine or presentation violate the rules?

_____ **Out of Bounds Objects** (up to -15 points) _____

-5 point deduction for each object that exits the machine boundaries.

SUBTOTAL COLUMN 2

COLUMN 1 + COLUMN 2 = TOTAL MACHINE SCORE

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6. WIN!

All Contests

- All entries will be judged and individual feedback provided by a panel of experts.

All Regional Contests

- There are no additional fees to compete in a World Contest.
- For every 20 participants in a Regional Contest, 1 team may attend the World Contest. For every additional 20 participants in a Regional, 1 additional team may attend (e.g., 21 – 40 = 2 teams advancing).
- After the winners of a Regional Contest are announced, teams advancing to a World Contest have 1 week to email rube@rubegoldberg.com whether or not they plan to participate.
- If an advancing team from a Regional Contest is unable to participate in a World Contest, the next highest scoring team from that Regional Contest may choose to participate in place of the advancing team.

Online Contest

- February 18, 2015, midnight EST: Registration deadline
- March 3, 2015, midnight EST: Team Pages close for editing.
- March 17, 2015: Top 10 teams will be announced on www.rubegoldberg.com.
- March 27, 2015: Online World Contest winners announced
People's Choice Award voting starts
Team Pages made public
- April 19, 2015: People's Choice Award voting closes
- April 20, 2015: People's Choice Award announced on www.rubegoldberg.com.

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MACHINE VOLUME WORKSHEET

(Official Team Submission Sheet)

Team Name: _____

School: _____

Region: _____

Division: I II III (circle one)

STEP 1: Draw the footprint of your machine

NOTE: If any part of the machine falls within a square, you must count the entire square.

STEP 2: Count the number of footprint squares

NOTE: Each square is 1' x 1' (0.3 m x 0.3 m)

AREA: _____ (choose one: ft² or m²)

STEP 3: Measure the height of your machine.

NOTE: The maximum height is 8' (2.4 m)

HEIGHT: _____ (choose one: ft or m) Note: Each square is 1' x 1' (0.3 m x 0.3 m)

NOTE: If your ENTIRE machine sits on a table, the height of the table may be subtracted from the height of the machine. If only PART of the machine sits on a table, the table height must be included in the height of the machine.

STEP 4: Calculate the volume of your machine

_____ X _____ = _____

AREA (ft² or m²) X HEIGHT (ft or m) = VOLUME (ft³ or m³)

STEP 5: Verify machine volume equal to or less than 250 ft³ (7.1 m³)

YOUR MACHINE VOLUME (ft³ or m³) ≤ 250 ft³ (7.1 m³)

_____ (ft³ or m³) ≤ 250 ft³ (7.1 m³)

We hereby confirm our calculations are correct. We understand at the time of the Contest, our machine may be measured by an RGMC official to confirm our submitted calculations. Deviations beyond the maximum allowed footprint and/or volume will result in Contest disqualification.

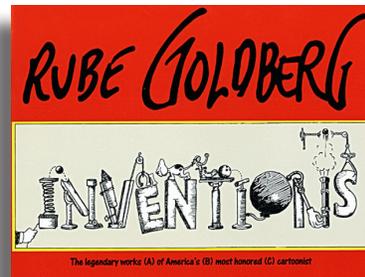
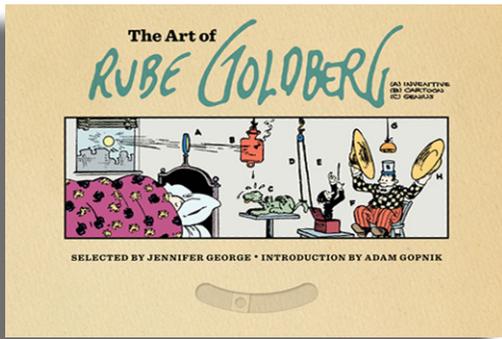
Team Advisor/Captain Signature _____ Date _____

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RUBE STORE

Rube Goldberg products are available in the Rube Store on our web site: rubegoldberg.com. RGI gives a 20% discount to any host site using the items as awards.





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CONTEST CONTACT INFORMATION

Executive Director: Kathleen Felix
www.rubegoldberg.com
Phone: 203-227-0818

Education Outreach Director: Shawn Jordan, Ph.D

Assistant Education Outreach Director: Drew Wischer

"To invent, you need a good imagination and a pile of junk."
– Thomas Edison