FIFTH ANNUAL MODEL WATER TOWER COMPETITION

Be an Engineer for a Day!
Test your creative ability to design &
Build a model water tower

Register By January 31, 2020
Competition to be held February 8, 2020 @ FGCU Emergent Technologies Institute

Register online at www.stemtour.org
or go to www.fsawwa.org for more information

“From Today’s Youth Comes Tomorrow’s Leaders – Let’s Lead Some to the Water Profession”
REGION V

IV ANNUAL MODEL WATER TOWER COMPETITION

Instructions

General

• Register on the STEM Tour website by January 31, 2020 at www.stemtour.org.

• The 5th Annual Model Water Tower Competition will be held as follows:
  o When: Saturday, February 8, 2020
  o Time: Check-in is between 8:30 - 9:30 am. Teams arriving after 9:30 am will not be eligible to compete.
  o Where: Florida Gulf Coast University - Emergent Technologies Institute, 16301 Innovation Lane, Fort Myers, Florida 33913.

• There is no cost to enter. To participate, arrive at the check-in with the following materials:
  o Completed model water tower.
  o Completed Materials List, a blank form is attached.
  o Completed Participant Release, a blank form is attached. Please note: Students will not be allowed to compete without the completed and signed release form.

• Model water towers may be of any design and constructed from any materials. In fact, you will be awarded for using creative designs and innovative materials. A creative design is a water tower that will function even though it does not look like any other tower. Examples of innovative materials are an old broom stick from your garage as a support structure, a watering can as a tank, or any other atypical items that you might find around the house.

Objective

The objective of the competition is to make participants aware of the importance of reliable drinking water and the rewarding opportunities available in the water profession. The competition meets this objective by having students develop an idea into a functioning water tower, just like what water professionals do in the real world.

Prizes will be awarded to the top three finishers in the elementary school, middle school and high school categories. The lowest scores win (similar to a golf score!). Judges decisions are final and non-refutable. Judging will be based

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on four criteria – structural score, hydraulic efficiency, cost efficiency, and design ingenuity. Understand and achieve these criteria to do well! They are explained below.

Structural Score
Structural efficiency is the maximum mass that a structure can hold divided by the mass of the structure. Therefore, the model tower’s structural efficiency is the weight (in pounds) of the maximum amount of water that the tower can hold divided by the weight (in pounds) of the tower. This is shown with the following formula:

Structural Efficiency = Maximum weight (pounds) of water that tower can hold / Weight (pounds) of tower when empty

A higher number indicates a more structurally efficient tower. This criterion is similar to what engineers use in the real world. Remember, the tank should be between 1.5 feet and 2.5 feet high and hold at least 1 gallon of water but no more than 2.5 gallons!

A tower’s structural Score will be calculated utilizing the following formula:

Structural Score = 1 / Structural Efficiency

A more structurally efficient tower will have a better structural score. Remember, the towers with the lowest total scores win.

Hydraulic Efficiency
Hydraulic efficiency is the amount of time it takes the judges to fill and drain the model with one (1) gallon of water. The judges will fill the tank by pumping water through the 3/8 inch connector. The tank will be drained by letting the water flow out of the tank by gravity only. The less time it takes to fill and drain the tank through the connector the better. The tank must have a vent or a cover so the judge can see into the tower. Coverless towers will not be considered vented. Each tank will be tested (filled and drained) twice and the average of the two fills and drain times (in minutes) will equal the hydraulic efficiency score. The hydraulic efficiency formula is as follows:

Hydraulic Efficiency (time in min) = First Test (fill and drain) + Second Test (fill and drain) / 2

Cost Efficiency
Cost efficiency measures your ability to save money while building your model. Bring receipts for all items purchased for your model. Points will be assigned as follows (the lower the score the better):

- $ 0.00 -$ 5.00 1 point
- $ 5.01-$ 10.00 2 point

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List all items used in your model and their costs on the Materials List Form. This form is required on the day of the event. Where recycled items are used, put the letter “R” in the cost column. You may use as many recycled materials as you wish. A penalty of 1 point will be given for each missing receipt for items purchased new specifically for tower construction. A 3 point penalty will be added to the student’s score if the Materials list form is missing. No receipt is necessary for recycled items; however, the items must be accounted for on the materials list form. The cost of glue, nails, screws, general adhesives, and items used to decorate the tower should not be counted towards the tower’s total cost. The cost of the tower should not include tax.

Design Ingenuity

Ingenuity is how much imagination and skill were used in your model. Water professionals must often use ingenuity; they use skill and imagination to solve difficult problems. The judges will look at several items:

- Craftsmanship (is the model sturdy, do the parts fit together nicely)?
- Imagination (are the design and materials unique)?
- Artistic merit (does the model have creative ideas, colors or themes)?

Required Design Standards and Penalties

Keep to the following standards when designing and constructing your model:

- Footprint: The base of the model must fit in a square 1 foot on each side. If not, a 2 point penalty will be assessed.
- Tank Height: The tank must be between 1.5 and 2.5 feet high. If not, a 2 point penalty will be assessed.
- Tank Volume: When full, the tank must hold between 1 and 2.5 gallons of water. Hint: test your model to make sure the tower can hold the weight of the water! If not, a 2 point penalty will be assessed.
- Leaks: The tank should not leak. If any part of the tower leaks (e.g. tank, piping, connector), then a 2 point penalty will be assessed.
- Vent/Lid: The tank must have a vent or removable lid so the judges can tell when it is full. Uncovered towers or non-vented towers will result in a penalty of 1 point.
- 3/8 Inch Connector: The model must use the 3/8 inch connector. If the tower does not have this 3/8 inch connector, then a 1 point penalty will be assessed.
- Receipts: Bring receipts for all materials purchased for your model. A one point penalty will be assessed for each item not having a receipt (Maximum of 3 penalty points).

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- Materials’ List: Bring your materials’ list to the competition. If the materials’ list is not provided at the competition, a 3 point penalty will be assessed.
- Structural Stability: The tower should be structural stable throughout any part of the competition. If the tower exhibits structural instability (e.g. tower has to be supported by a person during filling of water or during any part of the testing), then a 2 point penalty will be assessed.

Penalties will be assessed for not following the standards described above and these penalties will be directly added to the tower’s score. Please note that these Standards are based on the FSAWWA State-Wide Model Water Tower Competition and can’t be modified.

**Additional Information:**
For more information please contact the event organizer as follows:
Karen M. Miller
FSAWWA Region V MWTC Coordinator
Work: (239) 215-3910
Fax: (239) 936-0819
karen.miller@ghd.com
Participant Release Form

INSTRUCTIONS: Complete this form with your parent or legal guardian’s signature and return to your teacher. Teachers must bring the forms to the event. Students will not be able to participate without a signed form.

I AM THE PARENT / GUARDIAN OF ____________________________________________________________

I HEREBY AUTHORIZE THE MEMBERS OF THE MODEL WATER TOWER COMPETITION COMMITTEE, A SPECIAL PROJECT OF THE AMERICAN WATERWORKS ASSOCIATION TO:

1. PREPARE ANY PROMOTIONAL MATERIAL SUCH AS PRESENTATIONS, SLIDE SHOWS, VIDEO TAPES, PHOTOGRAPHS, AND MOVIE FILMS IN WHICH MY CHILD WILL SPEAK AND/OR APPEAR.

2. USE, REUSE, PUBLISH AND REPUBLISH THE SAME IN THE WHOLE OR IN PART INDIVIDUALLY OR IN CONJUNCTION WITH OTHER PHOTOGRAPHS, VIDEO OR FILM IN ANY MEDIUM FOR ANY PURPOSES WHOSOEVER, INCLUDING (BUT NOT BY WAY OF LIMITATION) ILLUSTRATION, PROMOTION AND ADVERTISING BY THE COMMITTEE.

I HEREBY WAIVE ANY MONETARY RIGHTS OR OTHER RIGHTS THAT I MAY HAVE TO INSPECT AND/OR TO APPROVE THE FINISHED PRODUCT OR THE ADVERTISING COPY THAT MAY BE USED IN CONNECTION THEREWITH OR THE USE TO WHICH IT MAY BE APPLIED. I UNDERSTAND AND AGREE THAT ALL RIGHTS, ROYALTIES AND MATERIALS WILL BELONG TO THE COMMITTEE.

Parent/Guardian (Print Full Name): ________________________________________________________________

Parent/Guardian (Signature): ________________________________________________________________

Date: _________________________ Phone: _____________________________

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**Materials List Form**

Team Name: ________________________________________________________________

Participants: ________________________________________________________________

Complete and bring this form and all receipt on the day of the contest. List the materials and costs used to construct your water model tower. Put an R in the cost column where recycled materials are used.

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TOTAL: __________________

Use additional sheets if necessary to list all materials. A penalty will be given for not bringing this form or receipts.

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Model Water Tower Connector

Vertical tube may be any diameter - use a reducer or increaser as necessary to change tube size.

Connector must be installed at the base of the model. Use the 3/8” diameter connector.

Contact the event organizer as follows for questions on the connector:

Karen M. Miller
FSAWWA Region V MWTC Coordinator
2675 Winkler Avenue, Suite 180 Fort Myers, FL, 33901 USA
Work: (239) 936-4003 Ext: 108
Fax: (239) 936-0819
karen.miller@ghd.com

“From Today’s Youth Come Tomorrow’s Leaders-Let’s Lead Some to the Water Profession”
How a water tower works: Height equals pressure

Prosaic as they may seem on the landscape, water towers such as this one on High Point Road perform a crucial service you probably don’t think about when you turn on your water tap. The water towers not only store water, their height helps provide the pressure that helps fight fires and makes your morning shower so pleasant.

**Tower** 125 ft. high

**Elevation creates pressure:**
Each foot of height provides 0.43 PSI (pounds per square inch) of pressure.

**Capacity:** Tower can hold 250,000 gallons. That’s equal to 2,086,351 pounds, about the weight of 630 small SUVs.

**Telecommunications:** Companies pay for use of the high location. Insulated cables run through the tower interior.

**Inside the water tower column:**
- Overflow pipe
- Two 16" dia. water pipes
- Telecom. cables

1. Water from treatment plant is stored. Can hold 4 million gallons of water.
2. Pumps push water up the tower at 1,000 gallons per minute.
3. Water is in constant motion. Tower tank level fluctuates about 10 ft. per day based upon demand.
4. Height of tower is determined by the elevation of customers and the pressure needed.

**SOURCE:** Madison Water Utility

**NOTE:** Diagram is not to scale
The model water tower must use a 3/8 inch connector at the base of the tower. There will be a 1 point penalty for towers that do not have the 3/8 inch connector. The cost of the connector will not be counted in the material list.
Go East 2 miles on Alico Road (from intersection at Ben Hill Griffin Parkway)

Go past Airport Haul Road and make a left at the next street, Innovation Lane (which may not have a sign)

Go down 500 feet and you will see a large white building on your right

INSTRUCTIONS:

• Arrive between 8.30 - 9.30 AM
• Report to the Registration Desk

EMERGENT TECHNOLOGIES INSTITUTE

Florida Gulf Coast University

16301 Innovation Lane
Fort Myers, FL 33913
Ph: 239-745-4467