

3rd Annual Model Water Tower Competition

Instructions

General

- Challenge: The challenge is to build a structurally efficient model water tower that holds water that can be filled and drained quickly, while also being aesthetically pleasing.
- The 3rd Annual Model Water Tower Competition will be held as follows:
 - When: Saturday December 3rd from 9:00 a.m. to 12:00 p.m. First place will be awarded a cash prize of \$300, Second place \$200, and Third Place \$100.
 - Time: Check-in between **9:00 am and 9:30 am**
 - Where: **Neuse River Wastewater Treatment Plant, 8500 Battle Bridge Road, Raleigh, NC**
 - Who: Elementary (4th and 5th grades) and Middle School Students (individuals or teams of up to 4)
 - Registration deadline: Friday, November 18th.
- There is no cost to enter. To participate, arrive at the check-in with the following materials:
 - Bring your completed **model water tower**.
 - Bring your completed **Registration**, a blank form is attached.
 - Bring your completed **Participant Release**, a blank form is attached.
 - Bring your completed **Materials List**, a blank form is attached.
- 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**. Creative designs mean the water tower will function even though it does not look like any other tower. Innovate materials may have been used for something else at one time – an old broom handle used for support, for instance. An instructional video is available for download on ftp.hazenandsawyer.com (username: Raleigh, password: wo31) in the Model Water Tower folder. Contact Chris Belk at cbelk@hazenandsawyer.com.

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 does this by having students develop an idea into a functioning water tower, just like water professionals do in the real world!



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Prizes will be awarded to the top three finishers, with a top prize of \$300 for 1st place. The lowest scores win. Judges' decision is final.

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

Structural Efficiency

Structural efficiency is calculated by **dividing** the weight of the model when it is empty by the average height of the tank **times** the amount of water it holds. The lower this number the better. This is shown with the following formula:

$$\text{Structural Efficiency} = \frac{\text{Weight of the tower when empty (pounds)}}{\text{Average tank height (ft)} \times \text{Amount of water the model holds (gal)}}$$

This criterion is similar to what engineer's use in the real world! Remember, the tank should be between 1.5 feet and 2.5 feet high.

Hydraulic Efficiency

Hydraulic efficiency is the amount of **time it takes** the judges to fill the model with 1 gallon of water and drain it back out again. The judges will fill the tank through the 3/8 inch connector. The less time it takes to fill and drain the tank through the connector the better.

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 pt
\$ 5.01 - \$ 10.00	2 pt
\$ 10.01 - \$ 15.00	3 pt
\$ 15.01 - \$ 20.00	4 pt
More than \$ 20.00	5 pt



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List all items used in your model and their costs on the **Materials List Form**. 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 pt will be given for each missing receipt for items purchased new. No receipt is necessary for recycled items.

Design Ingenuity

Ingenuity (in·ge·nu·i·ty) is how much **imagination and skill** were used in your model. Water professional 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 or materials unique)?
- Artistic merit (does the model have creative ideas, colors or themes)?

Penalties

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

- The base of the model must fit in a square **1 foot on each side**.
- The tank must be **between 1.5 and 2.5 feet high**.
- The tank must have a **vent or removable lid** so the judges can tell when it is full.
- When full, the tank must **hold between 1 and 2.5 gallons** of water and it **should not leak**. Hint: test your model to make sure.
- The model must use the **3/8 inch connector** specified.
- **Bring receipts** for all materials purchased for your model. A one point penalty will be given for each item not having a receipt.

Penalties will be assessed for not following the above standards. These standards are demonstrated in the diagram attached at the end of this hand-out.

Additional Information

For more information please contact the event organizer as follows:

Chris Belk, PE (919-833-7152 or cbelk@hazenandsawyer.com – mobile 672-4506)
c/o Hazen and Sawyer P.C.
4011 Westchase Blvd
Raleigh, NC 27608



*3rd Annual
Model Water Tower Competition
Registration*

Team Name: _____

School: _____

Teacher or Advisor: _____

Complete this form and bring with it you to the check-in.

List the name of your team members below. Teams may have from 1 to 4 members.

Name*	Grade	Telephone #
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

*Each team member must bring a signed **Participant Release Form**.



3rd Annual
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Participant Release Form

INSTRUCTIONS: Each team member must bring a copy of this form signed by their parent or guardian.

I AM THE PARENT/GUARDIAN OF _____
I HEREBY AUTHORIZE THE MEMBERS OF THE WATER TOWER COMPETITION COMMITTEE, A SPECIAL PROJECT OF THE AMERICAN WATERWORKS ASSOCIATION-WATER FOR PEOPLE COMMITTEE 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 receipts on the day of the contest. List the materials and costs used to construct your model water tower. Put an 'R' in the cost column where recycled materials are used.

MATERIAL	COST
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
	TOTAL _____

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

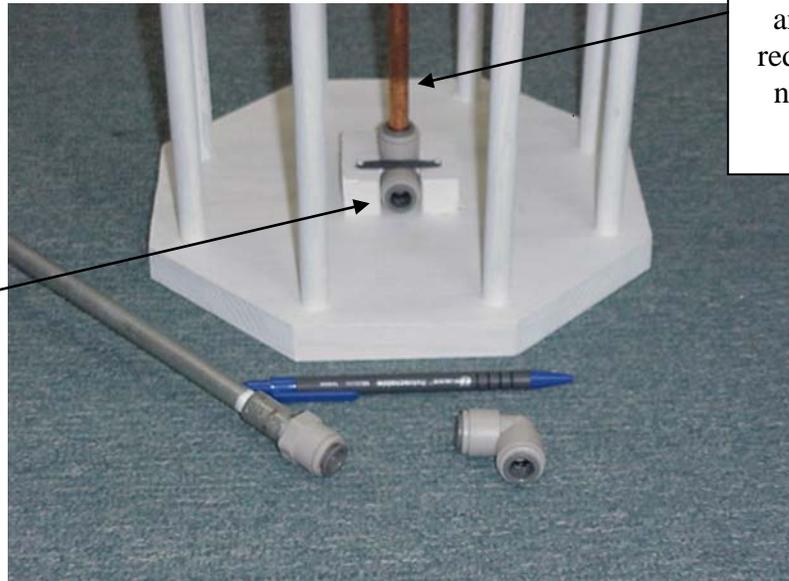


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Model Water Tower Connector

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

Connectors are available at Home Depot or Lowes. Ask for the WATTS Model No. PL-3022 Quick Connect 3/8" OD by 3/8" OD Union Elbow.



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

The proper 3/8" diameter push-on connector must be used by all registered contestants. Connectors must be 3/8" O.D. on the pump connection side. Watts 3/8" OD by 3/8" OD quick connect union elbows (Model No. PL-3022) are available at both Lowes and Home Depot for approximately \$3.50. The cost of the connector will be deducted from the total cost to construct so it will not affect your "Cost Efficiency" score. You must use the connector specified to avoid a penalty. Contact Chris Belk (information provided below) if you need additional information about the connector:

Chris Belk, PE
c/o Hazen and Sawyer P.C.
4011 Westchase Blvd
Raleigh, NC 27608
(919) 833-7152
cbelk@hazenandsawyer.com



MODEL TESTING

