



# BOAT BUILDING & RULES

**Thursday, July 11, 2024**

**Inn at Harbor Shores, 800 Whitwam Dr, St Joseph, MI**

**4:00-4:30 PM Check In • 4:45-5:00 PM Safety Briefing • 5:15 PM Race Start**

**Registration Fee: \$500 (charitable donation)**

# OVERVIEW & RACE RULES

Boats are made entirely of cardboard and powered by human paddling. Your boat is to be constructed in the weeks leading up to the race. The sooner you register, the more time you have to engineer your watercraft! Must supply your own paddles and life jackets. Limit to 2 people per boat.

As a part of our fleet you will:

- Have a boatload of fun
- Compete in an amazing event
- Have a safe racing environment on race day
- Encourage team building engagement

## Commitment

Captains and Crews who wish to participate in the United Way of Southwest Michigan's Rock the Boat event make a commitment to the following:

- Construct a boat out of cardboard, duct tape and sealer
- Must bring your own life jacket (required for every person in/on the boat)
- All boats are human powered (oars and paddles are acceptable as propulsion tools; you provide the oars/paddles)
- Participate in the entire event which includes:
  - Attend the race by dropping off your boat within the designated timeframe between 11:00 AM-4:00 PM and register the rowers participating between 4:00-5:00 PM
  - Dispose of or remove boat from property/water after the race. If disposing, bring to designated dumpster.

## Important Dates

**Thursday, June 13, 2024** - Last day for boats to register. All boats must have submitted their final Name of Boat (or boat will be only known as the business name).

**Thursday, July 11, 2024** - RACE DAY!

# CONSTRUCTION & RACE RULES

The **ENTIRE** boat must be built of cardboard, duct tape, and sealer. Your boat is to be constructed in the weeks leading up to the race. The sooner you register, the more time you have to engineer your watercraft! The winner of each heat will race again to see who the ultimate winner is. There will also be People's Choice winners so creativity will be rewarded as well.

Any part of your boat that touches the water must be cardboard. This includes the hull, decking, keel, cowling, superstructure, oar locks, seating and rudder. Nuts, bolts, washers and staples are **NOT** allowed in hull construction. The cardboard may be as thick as you want, but may not be glued or attached to wood, plastic, fiberglass, styrofoam, etc.

- Only exceptions are the paddles & decorations
- Use cardboard boxes, "blocks", carpet tubes
- **NO** pre-treated cardboard allowed
- **NO** Sona-Tubes, waxed or 'treated' cardboard
- **NO** wood, plastic, styrofoam or fiberglass
- **NO** caulking compounds or two-part/mixed adhesives
- **NO** wrapping in duct tape, plastic or fiberglass or similar product
- Duct tape may be used to reinforce seams
- Duct tape, masking tape, or adhesives such as 'liquid nails' **CAN** be used to connect cardboard to cardboard and **CAN** be used to reinforce all seams and stress points. It **CANNOT** be used to waterproof boats.
- Waterproof the boat with Varnish, Paint or Polyurethane. (If you don't want your boat to sink, waterproof the entire boat with any paint-able, one-part substance like Varnish or Polyurethane inside and out.)
- Decorations are encouraged - as long as they don't affect structural strength or buoyancy
- Boats **CANNOT** tow anything behind them for the safety of other boats.
- The crew compartment **CANNOT** be enclosed so as to interfere with escape
- Every crew member must wear a **PERSONAL FLOATATION DEVICE (PFD)** & proper footwear (water shoes/sandals). Please provide your own **PFDs**.

# CONSTRUCTION & RACE RULES

- All crew members **MUST** sign a Participant Waiver/Hold Harmless Agreement on race day. Boats will not be allowed to race without a signed agreement from each race participant
- Alcoholic beverages are **NOT** permitted on the boat
- Boats should weigh less than 200 lbs – This rule is for us. (Please keep your boat under 200 lbs. If you need help getting out of the water, we need the odds stacked in our favor.)
- Boats should be less than 6 feet wide – in this competition, more is not better.
- Care should be taken that construction does not include pointed objects and sharp edges that could injure anyone.
- Surfboard style designs are **NOT** allowed. Consider “staying dry” part of the challenge.
- Raft style designs **ARE** allowed. (The distinguishing feature of a raft design as opposed to a surfboard style is the use of cardboard “logs” and other such accoutrements as one would expect to find in/on a raft. Think Huck Finn.)
- **RACE DAY** – Please drop off your boat in the designated display area between 11:00 AM - 4:00 PM. Teams will receive a drop off time based on the assigned heat. Plan to come back for registration at 4:00 PM. At this time, please park in the grass lot on the other side of the bridge. Please check in (entire crew) at the registration table on race day between 4:00 PM - 5:00 PM. After the safety inspection is complete, the boats will begin with predetermined heats. The boat heats/race order will be supplied in advance. Please prepare to get your boat to the water on time for your designated heat. If you win your heat, plan to hang onto your boat for the final race. If the winning boat of the heat is no longer functional, the second-place boat will compete in the final race. After the race, the boat crews must remove all cardboard, decorations and other materials from the water and the grounds. Volunteers will be on hand to help. Plan to take your boat (or whatever is left of your boat) home with you.
- There will be a commissioner present checking the boat construction race day. If there is any doubt about the construction, the commissioner reserves the right to use a probe, such as an icepick, to test and verify that only cardboard has been used. Failure to abide by any design, race rule or the direction of a race official shall be cause for disqualification of winning the race. The commissioner’s decision shall be final.
- Please contact one of the following with any questions:
- Erin Glaske: [erin.glaske@uwsm.org](mailto:erin.glaske@uwsm.org), Xay Somsanith: [xay.somsanith@uwsm.org](mailto:xay.somsanith@uwsm.org), Diane Binder: [diane.binder@uwsm.org](mailto:diane.binder@uwsm.org), Dawn Howley: [dawn.howley@uwsm.org](mailto:dawn.howley@uwsm.org)

# CONSTRUCTION

## Permissible Materials

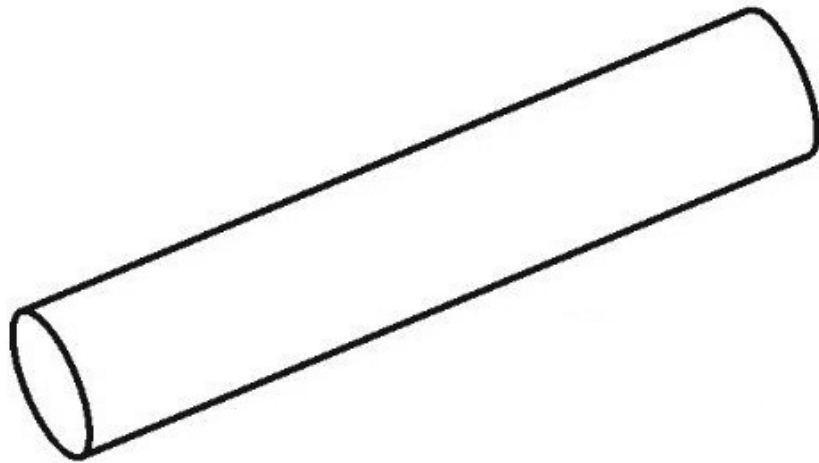
- Corrugated Cardboard
  - Appliance or grocery stores
- Cardboard “blocks”
  - Furniture stores
- Cardboard Tubes
  - Carpet/linoleum stores
- Fastening material
  - Duct or masking tape
  - Liquid nails adhesive
- Latex Paint, Varnish

## Materials NOT Allowed

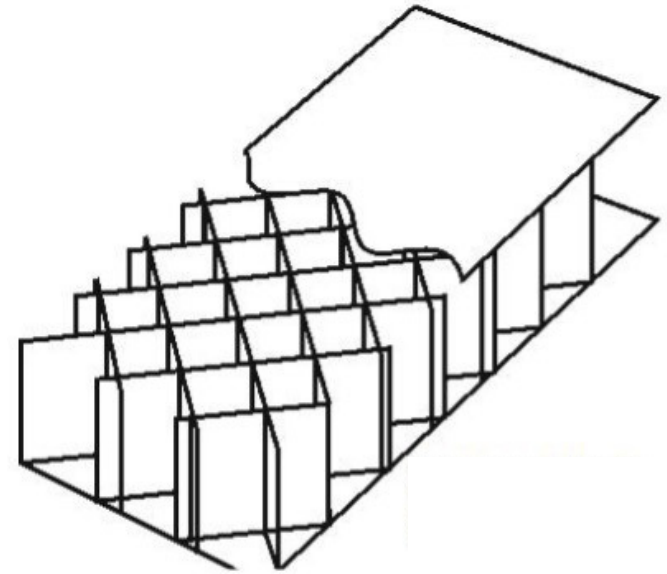
- Wood, Styrofoam
- Plastic sheathing
- Fiberglass
- Sona-Tubes, coated cardboard
- Silicone, Wax, Tar
- Caulking compounds
- Metal
- Staples, clamps, screws

**Commissioner decides on the interpretation of the rules.**

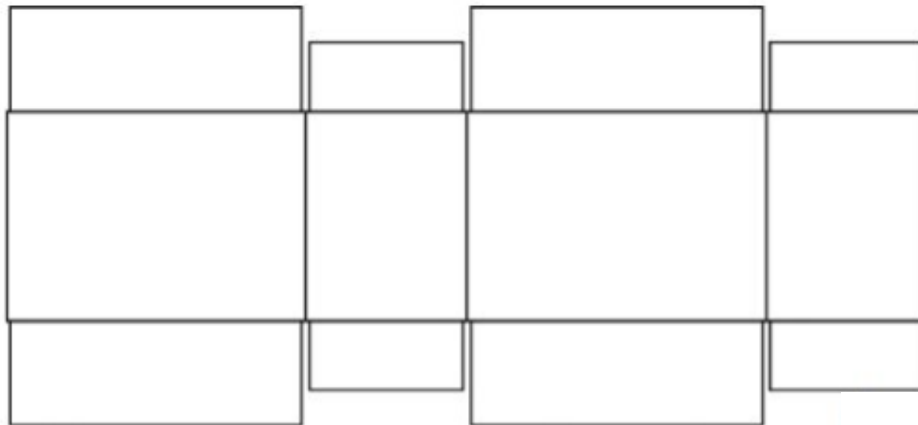
# CONSTRUCTION



Carpet Tube (about 4 1/2" dia.)



Cardboard Block (2-3" thick)



Cardboard Box - cut open

# CARDBOARD BOAT DESIGN

- Consider the size of the boat - building & transporting
  - Big enough to hold crew, small enough to transport and carry
  - Wider is better for stability, but still must be able to paddle
    - No surfboard style designs are allowed
    - Rafts are allowed
  - Consider total weight of all materials when wet
  - **EVERYTHING** must be removed from the pond
- Boat decorations and crew costumes are encouraged - use your imagination; you will be awarded for your creativity!
- Be sure to encourage your friends and family to vote for your boat for People's Choice winner!

# CARDBOARD BOAT PHYSICS

## “How much will you sink?” - Displacement

Weight of Water =  
62.4 pounds/cubic-foot

Water Displaced (ft<sup>3</sup>) =  $\frac{\text{Weight-of-boat-}\&\text{people-lbs}}{62.4\text{lbs/ft}^3\text{-H}_2\text{O}}$

Depth (ft) boat sinks \_\_\_\_\_

### Example:

Box boat, 3ft x 6ft, 1 ft tall (high)

Boat volume = 3' x 6' x 1' = 18 ft<sup>3</sup>

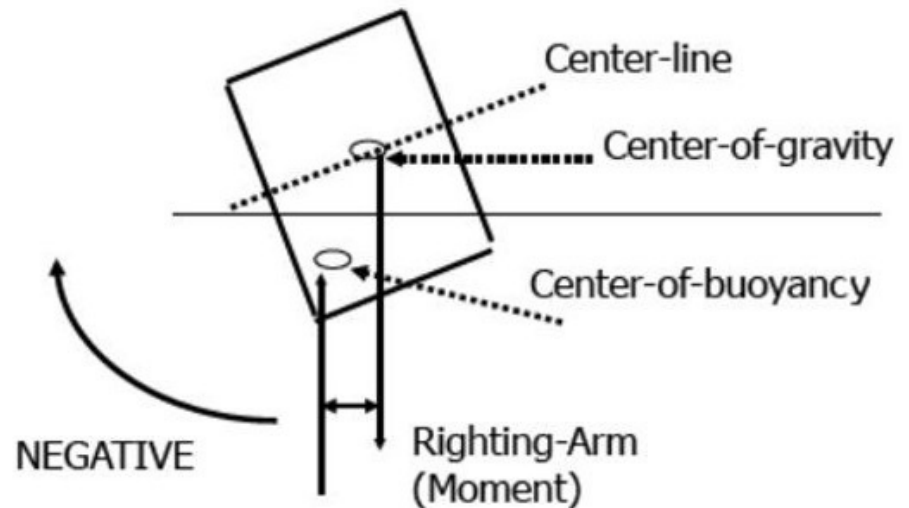
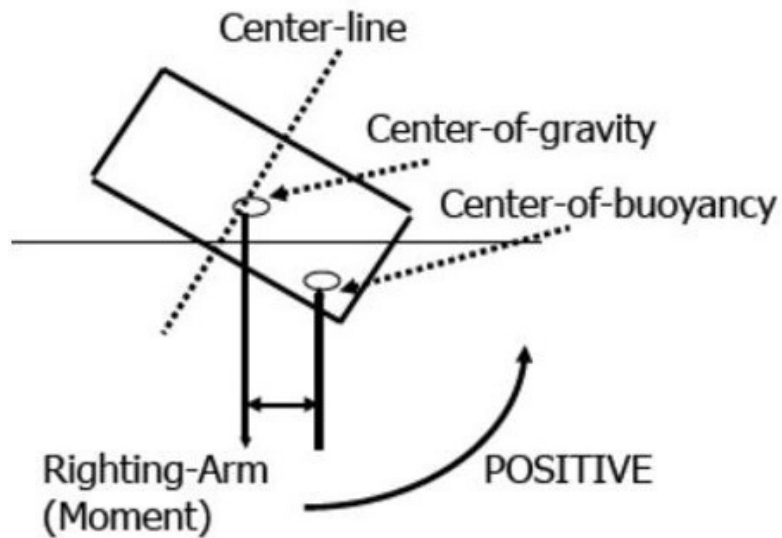
Boat displacement = 18 ft<sup>3</sup> x 62.4 lbs/ft<sup>3</sup> = 1123.2 lbs

Which equates to 93.6 lbs per inch of boat height



# MORE CARDBOARD BOAT PHYSICS

## “Wider is Better” - Center of Buoyancy



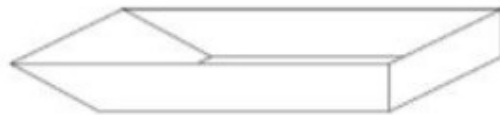
# EVEN MORE CARDBOARD



## Movement Through the Water



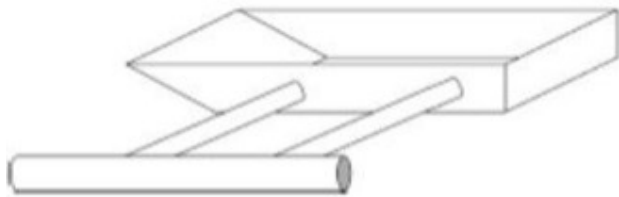
Simple Box



Slanted Box



V-Shaped Bow



Outrigger Design



Pontoon Design



Raft Design

# CARDBOARD BOAT DESIGN SUGGESTIONS

- Set the Design Goal: Fun, Speed and Appearance
- Sketch out your design
  - Build a scale model from manila paper:
    - Estimate materials or plan how to use what you have
    - Plan out what construction techniques will be used
- 1'x1'x3' box will float 187 lbs.
  - If it'll hold you, it's big enough to float
- Flat bottom, sit-to-paddle & canoe styles-are the best/easiest
- Rudders help keep you straight but make turning difficult and adds complexity to your design.
- Long boats go fast - but are harder to turn
- Short boats (<8') - are difficult to keep straight
- Best Length: 8 - 12 feet
- Best Height: 18 inches
  - Allows room to sit/kneel & still paddle over the edge
- Best Width:
  - 18"-30" (max) for 2 or more people front and rear
  - Minimum 48" wide for 2 people side by side
- Kneeling is a "power" position but sitting is more comfortable

# CONSTRUCTION TIPS & TECHNIQUES #1

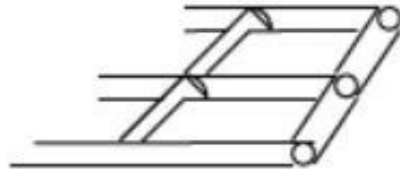
- Cover all edges of cardboard - acts like siphon
- Cardboard Tubes make great frames
- Cut for joining & bending
- Fasten tubes together
- Cardboard Hull
- 1-2 layers, fasten & cover the seams
- With 2 layers, overlap the seams & polyurethane in between
- Decorate, paint & varnish
- Reinforce the area where you sit, kneel or stand
- Carpenter's glue and liquid nails work well (hot-melt glues will melt in the heat and sun)
- Duct tape only non-painted surfaces (tubes or frame that will be covered)
- Duct tape shrinks when painted
- Duct tape should be covered with masking tape if you need to paint it
- Clear tape melts when painted
- Masking tape works well on glued edges & seams
- Kraft paper with spray adhesive may also be used

# CONSTRUCTION TIPS & TECHNIQUES #2

## Frames



Solid Tube  
Frame



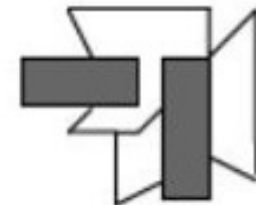
Center/Cross  
Beam Frame

## Connecting Tubes

Cardboard  
Wrapper for Tubes  
End-to-End



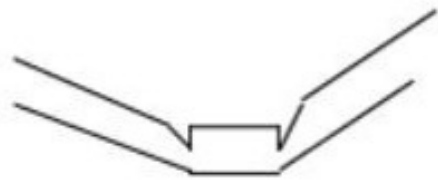
Cardboard  
Wrapper for Tubes  
at Right-Angles



# CONSTRUCTION TIPS & TECHNIQUES #3



## Frames Angles



V-Shaped Cuts



Multiple Cuts  
for Sharper Angles

## Tube Cutting Template

