

CARDBOARD BOAT BUILDING 101

City of Arnold
BOAT FLOAT



SPONSORED BY
HOME DEPOT
& Arnold
License Office

“WHAT FLOATS YOUR CARDBOARD BOAT?”

First Annual City of Arnold Boat Float

\$10 per floater

Cardboard will be provided

Any materials not found in your own
home can be purchased at Home
Depot.

November 7th, 2020

Building from 11-1(in the gymnasium)

Float from 1-2

Age groups: 5-8, 9-12, 13-16

Construction Rules

1. The entire boat must be built of cardboard, duct tape and one-part polyurethane. Only exceptions are the paddles and decorations.
2. Use cardboard boxes, blocks, carpet tubes
3. No pre-treated cardboard allowed
4. No Sona-Tubes, waxed or treated cardboard
5. No wood, plastic or fiberglass
6. No caulking compounds or two-part/mixed adhesives
7. No wrapping in duct tape, plastic or fiberglass
8. Duct tape may be used to reinforce seams
9. Waterproof the boat with varnish, paint or polyurethane
10. Decorations are encouraged as long as they don't affect structural strength or buoyancy
11. The crew compartment **cannot** be enclosed for safety reasons

Participation Rules

1. Participants must be within age restrictions.
2. Boat must pass construction rules and signed off on by a judge.
3. Each participant must be able to swim and sign the participation waiver.

Construction Materials

Permissible Materials

- Corrugated Cardboard
 - Acquired from Appliance or Grocery stores
- Cardboard “blocks”
 - Acquired from furniture stores
- Cardboard Tubes
 - Acquired from carpet/flooring stores
- Fastening material
 - Duct Tape or Masking Tape
 - Liquid nails adhesive
 - Twine, rope, string

Material Not Allowed

- Wood, Styrofoam
- Styrofoam
- Plastic sheeting
- Sona-tubes, coated cardboard
- Silicon, wax, tar
- Caulking compounds
- Metal, staples, clamps, screws, washers
- NeverWet

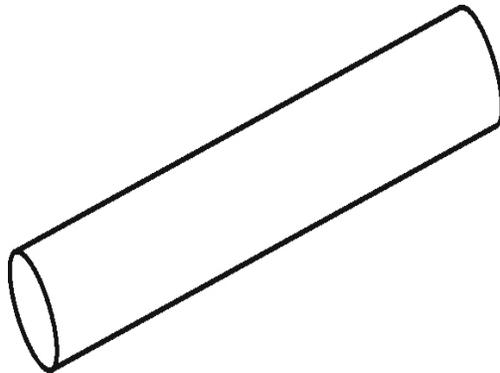
Please note: Judges decide on the interpretation of the rules.

Judges' Decisions are Final!

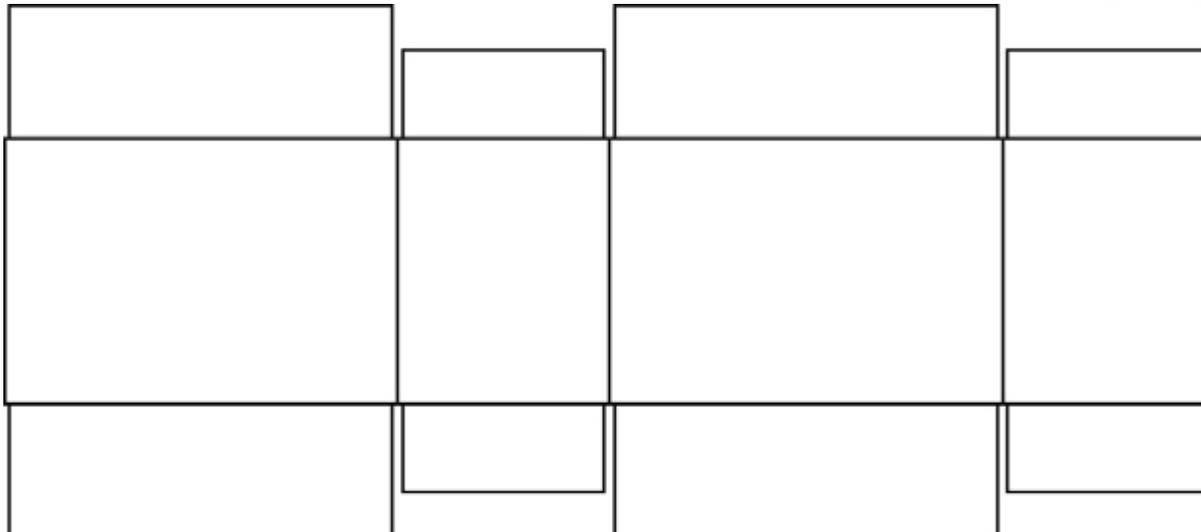
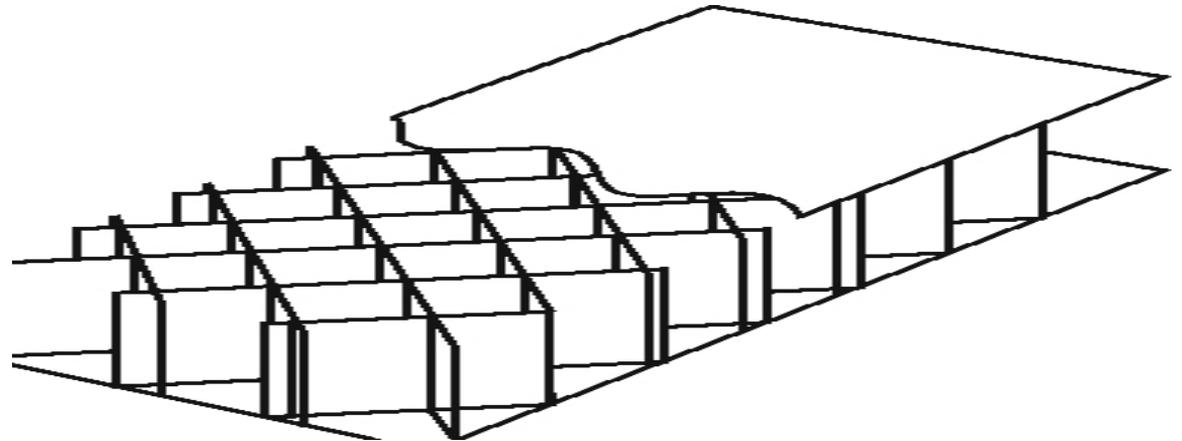
Construction Materials

Examples:

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



Cardboard Block (2-3" thick)



Cardboard Box -cut open

Cardboard Boat Design

Consider size in terms of building and transporting:

- Big enough to hold person, small enough to float
- Less than 3x6 ft wide
- No surfboard style designs are allowed
- Raft designs are allowed
- Consider total weight of all material when wet



Note: remember dimensions must be 3x6 ft



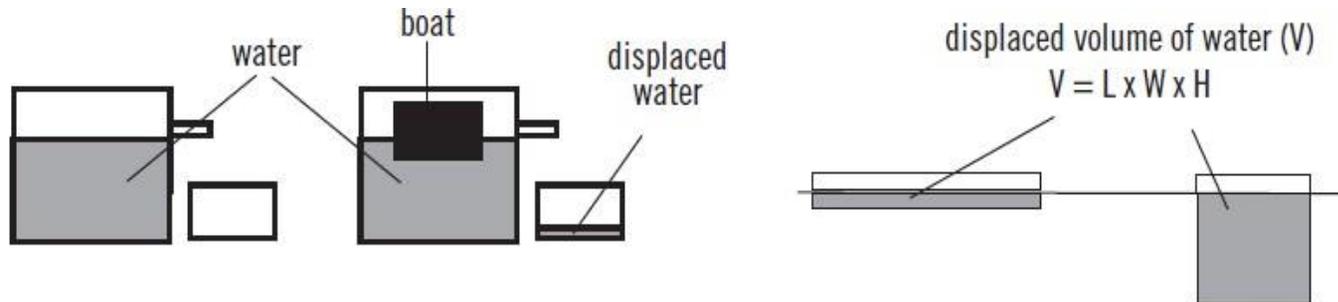
Boat decorations and crew costumes are encouraged. Use your imagination and you might be rewarded for your creativity! **Most of all....."HAVE FUN"!!!**



CARDBOARD BOAT

PHYSICS

“How much will you sink?”
Displacement



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

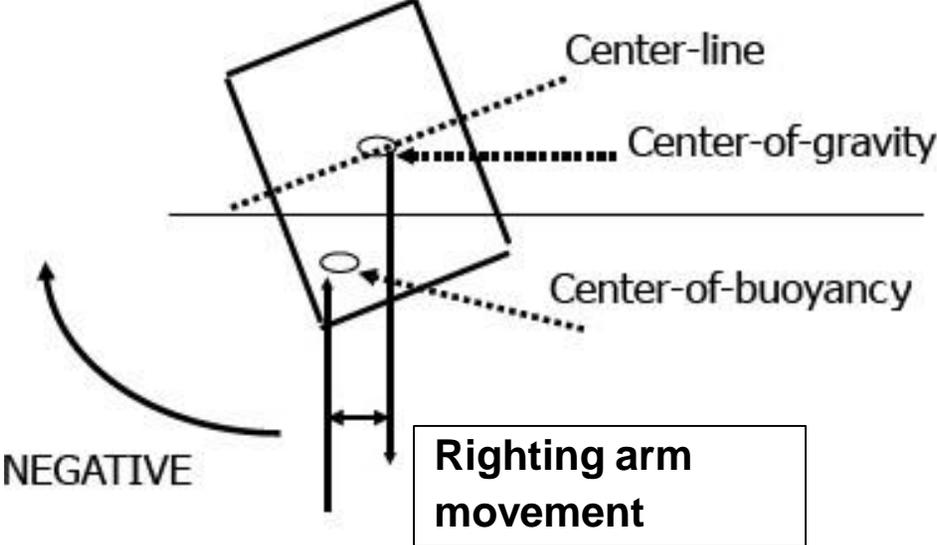
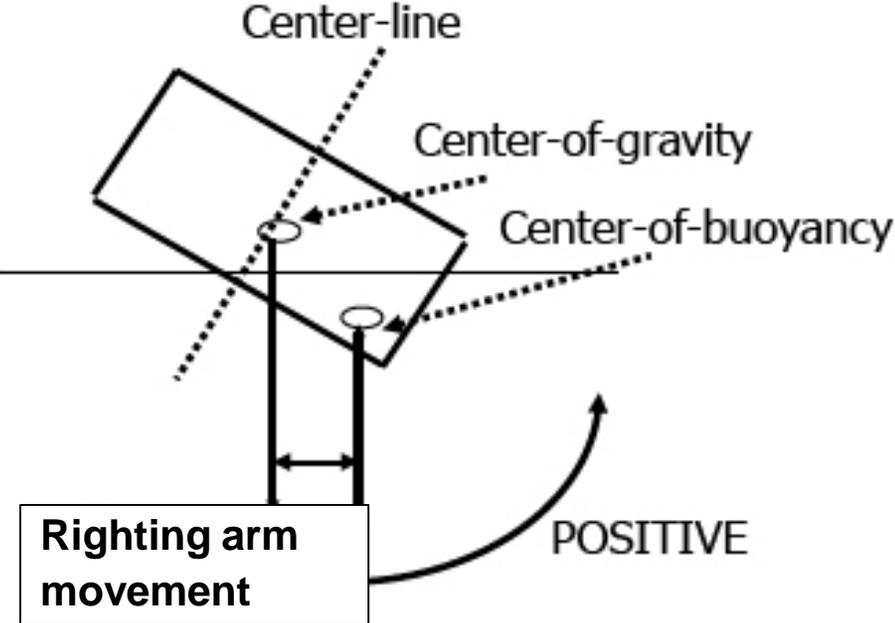
Depth (ft) boat sinks _____

EXAMPLE:

Box boat, 3ft x 6ft, 1 ft tall (high)
 Boat volume= 3' x 6' x 1' = 18 ft³
 Boat displacement= 18 ft³ x 62.4 lbs/ft³ = 1123.2 lbs
 Which equates to 93.6 lbs per inch of boat height

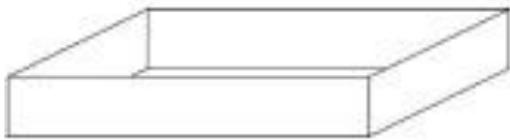
More Cardboard Boat Physics

“Wider is Better” – Center of Buoyancy

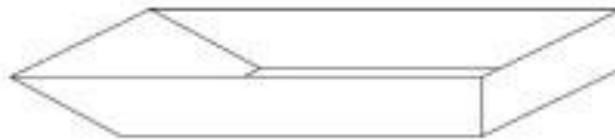


Even More Cardboard Boat Physics

Movement Through the Water



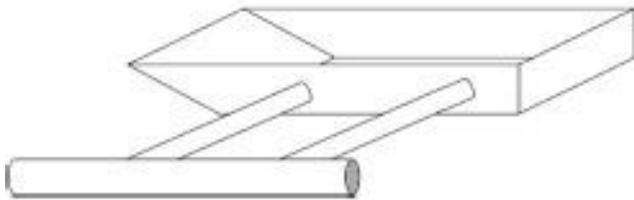
Simple
Box



Slanted
Box



V-Shaped
Bow



Outrigger
Design



Pontoon
Design



Raft
Design

Construction Tips And Techniques I

Cover all edges of cardboard – Openings act like a siphon

Cardboard tubes make great frames:

- **Cut for joining & bending**
- **Fasten tubes together**

Cardboard Hull:

- **1-2 layers, fasten & cover the seams**
- **Width 2 layers, overlap the seams & polyurethane in between**
- **Decorate, paint & varnish**

Reinforce the area where you sit, kneel or stand



Construction Tips And Techniques II

Carpenter's glue and liquid nails work well:

- **Hot glue melts in the heat and sun**

Duct tape only non-painted surfaces (tubes or frame that will be covered)

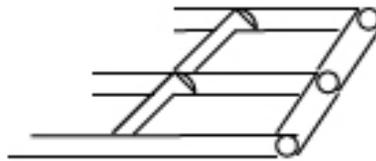
- **Duct tape shrinks when painted**
- **Duct tape should be covered with masking tape if you need to paint it**
- **Clear tape melts when painted**
- **Masking tape works well on glued edges & seams**
- **Craft paper with spray adhesive may also be used**



Construction Tips and Techniques III



Solid Tube
Frame

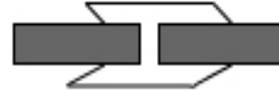


Center/Cross
Beam
Frame

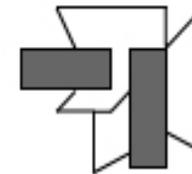
FRAMES

CONNECTING TUBES

Cardboard
Wrapper for Tubes
End-to-End

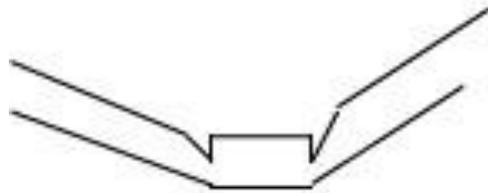


Cardboard
Wrapper for Tubes
At Right-Angles

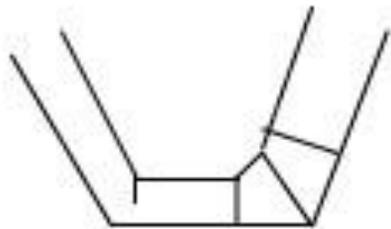


Construction Tips And Techniques IV

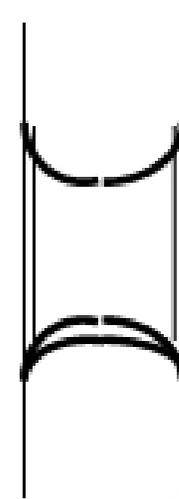
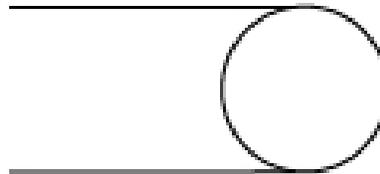
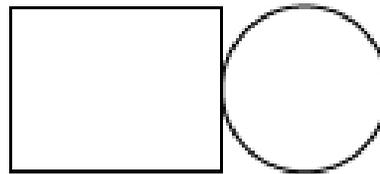
FRAME ANGLES



V-Shaped Cuts

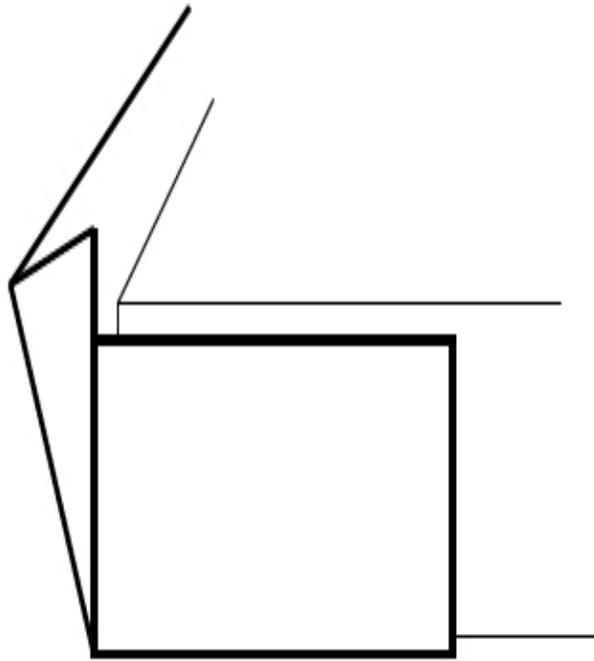


Multiple Cuts
for Sharper Angles



TUBE CUTTING
TEMPLATE

Construction Tips and Techniques V

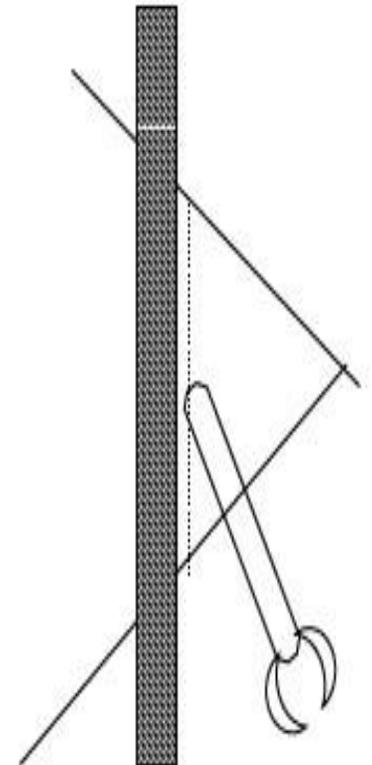


FOLD & OVERLAP
CARDBOARD
AROUND CORNERS

Construction Tips And Techniques VI

Crease/Score a line
for a nice

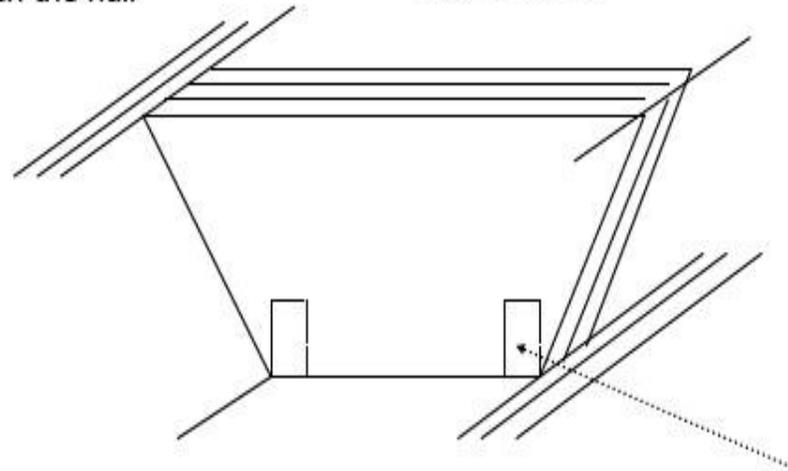
STRAIGHT
FOLD



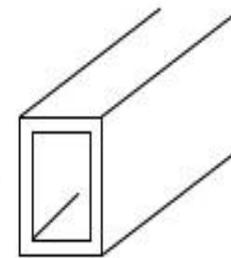
Construction Tips and Techniques VII

Multiple cardboard layers
"glued" together on the sides
strengthen the hull

Multiple trapezoid-shaped pieces
"glued" together to form a
"support block"



A sheet of cardboard
could be folded &
"glued" together to
form *tubes/beams*



Go Build Your Boat!

Most of all...Have Fun!!!

WE'LL SEE YOU AT THE ARNOLD OUTDOOR POOL

Saturday November 7th, 2020

RACE DAY SCHEDULE:

11am- 1pm Boat Build

1pm- 2pm BOAT FLOAT

Note: Prizes given for best decorated boat overall all three divisions and first place prizes in each division

With questions please contact

**Pat Aubuchon (Arnold Recreation Center) 636.282.6649 or
paubuchon@arnoldmo.org**