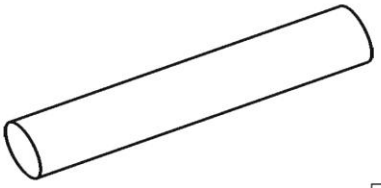
Cardboard Boat Design

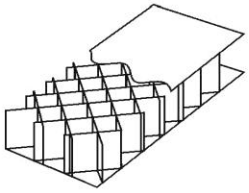
• Consider its size - building & transporting to the water
– Big enough to hold crew, small enough to carry
– Wider is better, but still be able to paddle
• No surfboard style designs are allowed
• Rafts are allowed
– Consider total weight of all materials when wet
– EVERYTHING must be removed from the water

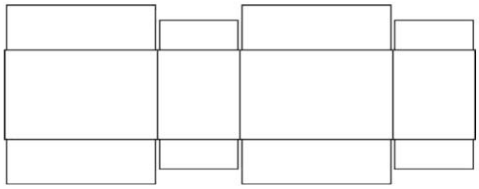
Construction Materials (examples)



Carpet Tube
(about 4 ½" dia.)

Cardboard
Block
(2-3" thick)

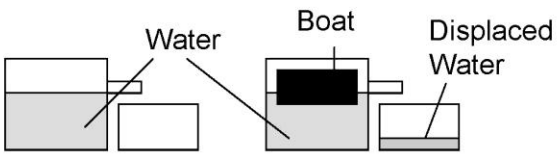


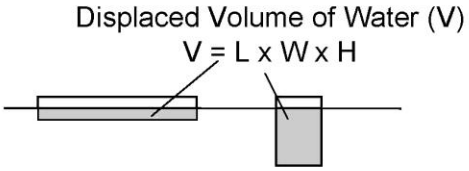


Cardboard Box - cut open

Cardboard Boat 'Physics'

• "How much will you sink?" - Displacement





Weight of Water =
62.4 pounds/cubic-foot

$$\text{Water Displaced}(ft^3) = \frac{\text{Weight-of-boat-\&-people-lbs}}{62.4\ lbs/ft^3\text{-H20}}$$

$$\text{Depth(ft) boat sinks} = \frac{\text{Water Displaced}(ft^3)}{\text{Length X Width of boat}\ (ft^2)}$$

Example:

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

Cardboard Boat Design Suggestions

• Set the Design Goal: Fun, Speed and Appearance
• Sketch out your design
• 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 1 person
– 48" wide for 2 people side by side
• Kneeling is a "power" position but sitting is more comfortable
• 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
• Reinforce the area where you sit, kneel or stand