

PVC Boats

Objective:

- To build a boat out of canvas – PVC pipes and a thin plastic sheet capable of holding two people that can be launched and paddled for one lap of a pool.
- To research and apply Archimedes' Principle, density, displacement, surface area volume, scale models in the creation of your boat.

You will work in student teams of up to six students. This will be a multi-week assignment.

Boats are due 5/26/11 (fill in date)

Materials:

1. 8' x 10' canvas/tarp
2. ¾" x 10' PVC pipes
3. Duct tape
4. 1 mil plastic drop cloth

Design Parameters: Boats will be subject to a technical inspection and must follow these guidelines:

1. The maximum length is 6 feet. The dimensions of the boat must be such to permit it to enter the doors to the pool area.
2. The passengers of your boat may not be enclosed above the shoulders of the occupants. Both people must be visible while the boat is in the water.
3. Boats must be free of sharp edges, objects with pointed edges, or any other menace.
4. All occupants of a boat must be good swimmers. A lifeguard will be present.
5. Canoe or kayak paddles will be provided.
6. No arms or legs may be in the water to assist with stability or propulsion.
7. To qualify as a finisher, both teammates must be in the boat at the end of the race.

Grading Guidelines:

Assignment	Points Possible	Points Received
Log	50	
Group Grade for Boat	100	
Group Evaluation	20	
Summary	50	
Design Parameters Rubric	30	
TOTAL ----->	250	

Log – worth 50 points

Each group member must keep an individual personal log of progress. Record work done individually or as a group in the accomplishment of your boat project. Keep a detailed record of date, time, members present and a through list of steps including what was accomplished at each session. The log is to be turned in on the day of the race. (May 26)

Group Grade for Boat – worth 100 points

- Any boat that makes it off the starting line will earn 80 points.
- Any boat that successfully negotiates one-quarter of a lap will receive 85 points.
- Any boat that successfully negotiates one-half of a lap (a length) will receive 90 points.
- Any boat that successfully negotiates three-quarters of a lap will receive 95 points.
- Any boat that successfully negotiates an entire lap will receive 100 points.

Group Evaluation – worth 20 points due Friday (May 27) after boat race.

Each group member will receive an evaluation form to evaluate your groups' ability to work together in the construction of your boat.

Individual Summary of Project (typed) – worth 50 points due Tuesday(May 31) after boat race.

1. 2-3 paragraph description of how you would change your design. In other words, what part of your design was effective? What part of your design did not work? How would you change it? *25 points*
2. Describe three things that you saw other students do that you consider being very effective. *25 points*
3. Archimedes Principle states that "The buoyant force on a body immersed in a fluid is equal to the weight of the fluid displaced by that object." An object floats when its weight is equal to the buoyant force. Write a one-paragraph description of how this principle applies to the floatation of your boat. (Diagrams and sketches could be very helpful) *25 points*
4. Describe calculations involved in making your boat. How did you determine how much water needs to be replaced? How would you calculate the buoyant force exerted on your boat by the water? What measurement would you take and how would you interpret them? (It is also expected that a good deal of this information is in your personal log) *25 points*

Boat Design – To ensure groups follow the aforementioned design parameters, the following rubric will be used in grading boat design.

Design Parameters Rubric	Points Possible	Points Received
Materials provided used. No excess material used,	10	
Maximum length is 6 feet. The dimensions of the boat are such to permit it to enter the doors to the pool area	10	
Passengers of boat may not be enclosed above the shoulders of the occupants. Both people must be visible while the boat is in the water.	5	
Boats must be free of sharp edges, objects with pointed edges, or any other menace.	5	
TOTAL	30	

Group Evaluation

Your Name _____

Group Members: _____

On a scale of 1 to 10, rate how your group worked together (10 being high functioning): _____

Do you feel all members of your group were able to contribute a fairly equal amount to the groups' project? Explain your answer.

What were some obstacles your group faced in working together?

Do you think your group had an understanding of the concepts necessary to build a boat? Explain.

What were some things you liked about this project?

What would be your suggestions for your teacher or future physics students if we are to do this project again in the future?

PVC Boats – Scoring Sheet

Name _____

Block ____ Date _____

Design Parameters Rubric	Points Possible	Points Received
Materials provided used. No excess material used,	10	
Maximum length is 6 feet. The dimensions of the boat are such to permit it to enter the doors to the pool area	10	
Passengers of boat may not be enclosed above the shoulders of the occupants. Both people must be visible while the boat is in the water.	5	
Boats must be free of sharp edges, objects with pointed edges, or any other menace.	5	
TOTAL	30	

	Points Possible	Points Received
Log	50	
Group Grade for Boat	100	
Group Evaluation	20	
Summary	50	
Design Parameters Rubric	30	
TOTAL ----->	250	

