

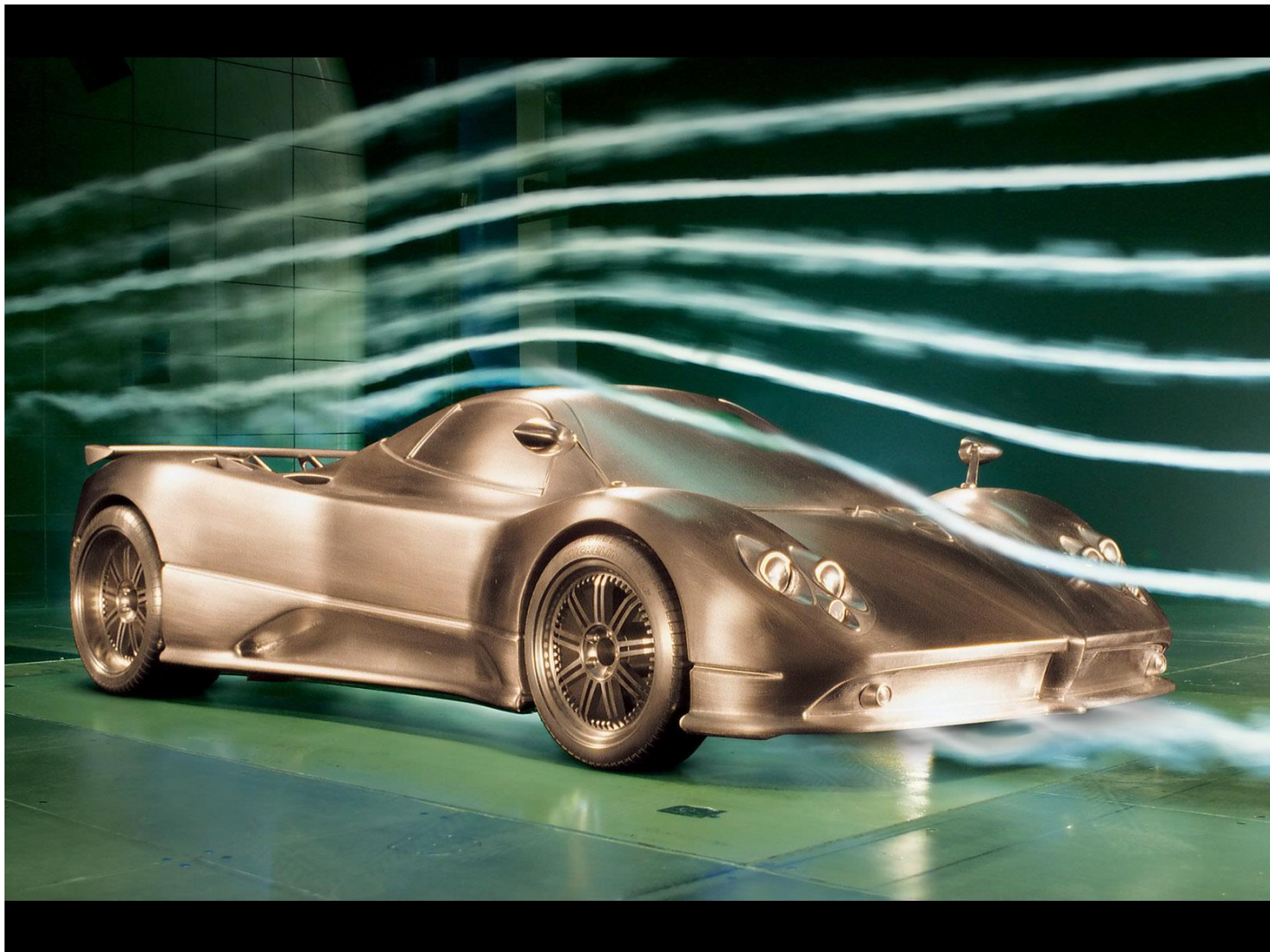
Slow Boat

Kari Clase, Bryan Hubbard, Alyssa Panitch, Evan Rebar, Tahira Reid and
Nancy Tyrie

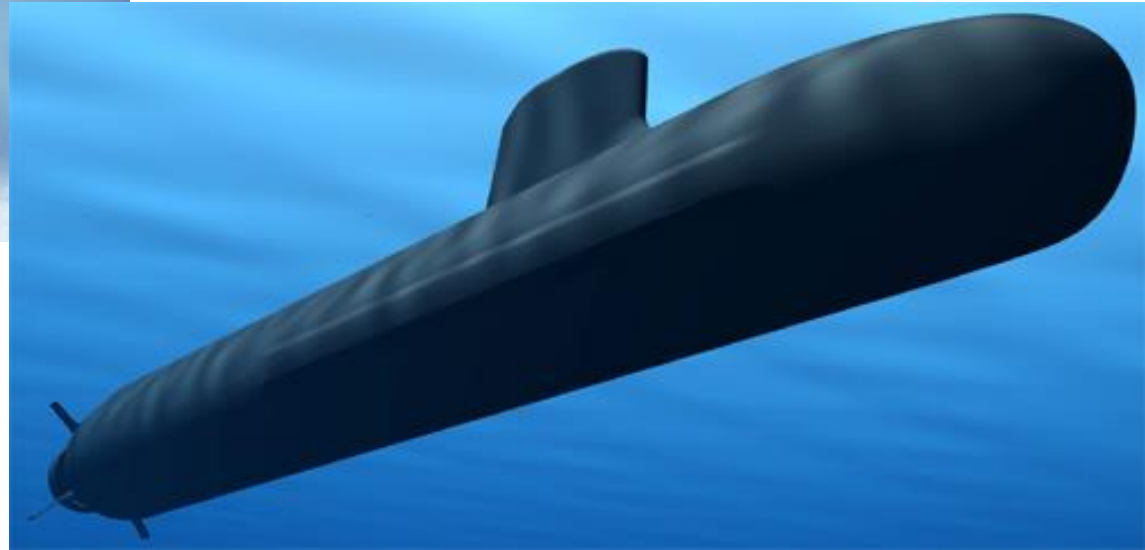
Feel the Power of the Force!

- A little exercise!
- Run with a small piece of cardboard in front of you
- Did you feel a force pushing back on you?
- Are there other times you have felt this type of force?
- The force the students are feeling from the cardboard is termed a “drag” force. Movement of an object through a gas or liquid can create a drag force.

Low, Medium and High Drag



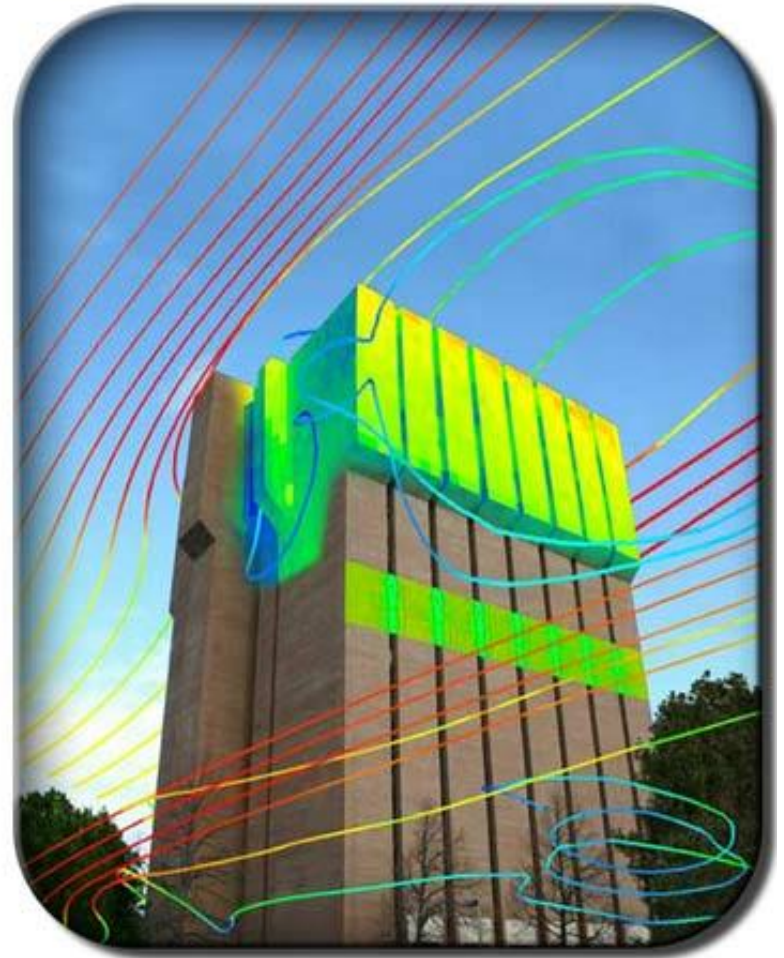
Low Drag (Easily moves through air and water)



http://cloud.empowerednews.net/wp-content/uploads/2013/03/boeing_787_dreamliner_3.jpg

<http://www.naval-technology.com/projects/barracuda/images/1-submarine.jpg>

Medium Drag



High Drag



visualphotos.com



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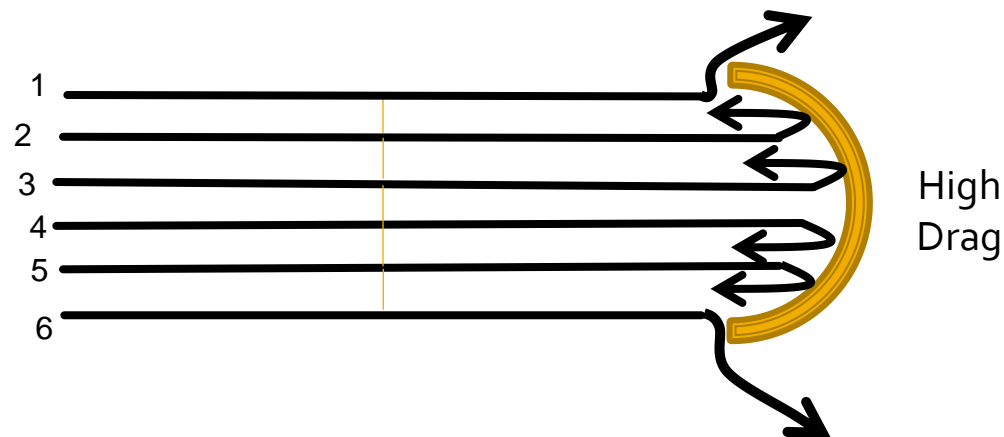
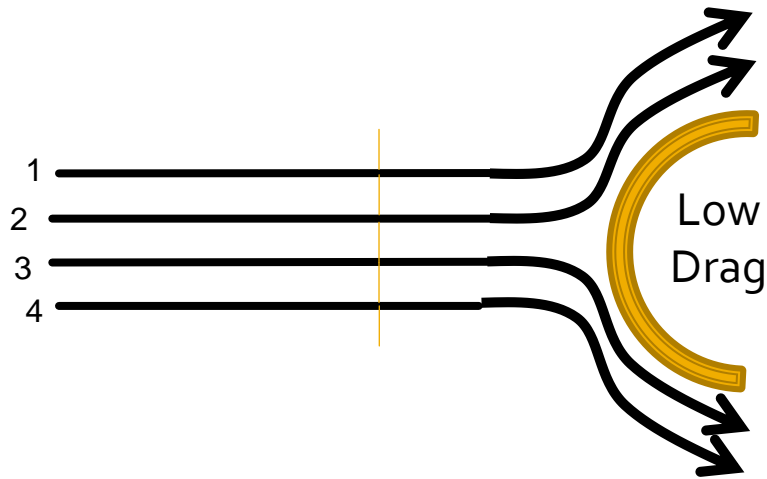
<http://transforminggrace.files.wordpress.com/2011/10/parachute2.jpg>

http://www.visualphotos.com/photo/2x3189533/girl_playing_with_umbrella_in_the_wind_FAN2018388.jpg

Science Inquiry

- Low, medium, and high drag objects being pulled through the water

Visuals of Low – High Drag Air Flow



Look at the lines that represent how air or fluid flows over the different shapes.

Which shape allows the most air or liquid to flow over it? This one has **LOW** drag. There is little force acting on this shape which is why it flows easily over it.

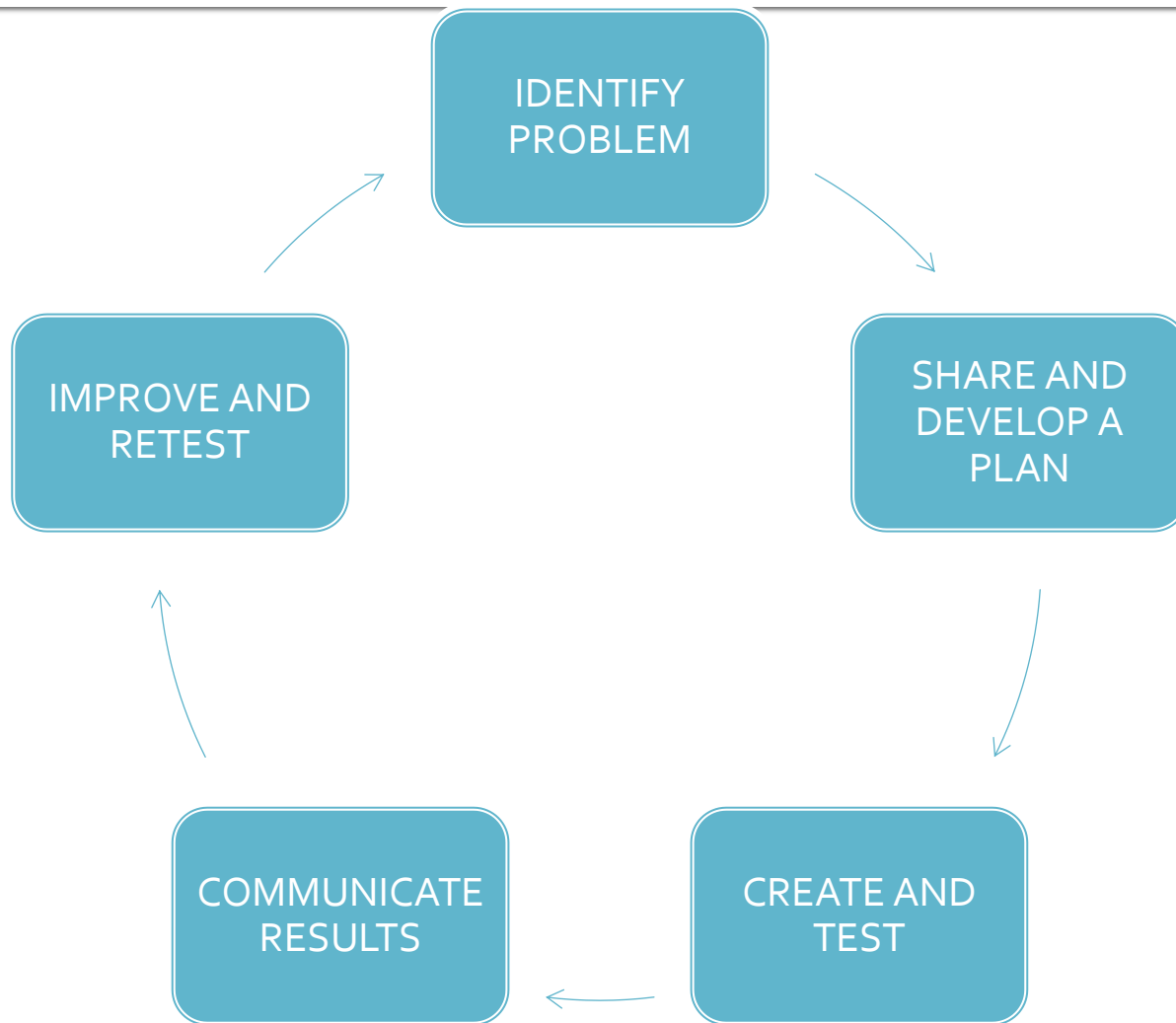
Which shape allows the least amount of air or liquid to flow over or past it? This one has **HIGH** drag. There is a lot more force acting on this shape and has a hard time flowing over the object.

Slow Boat Design Activity

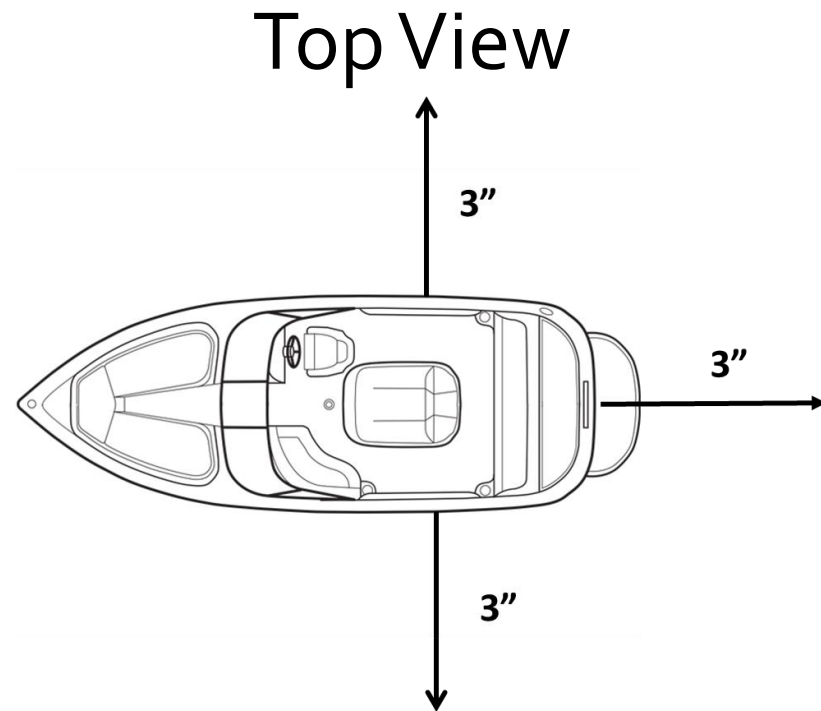
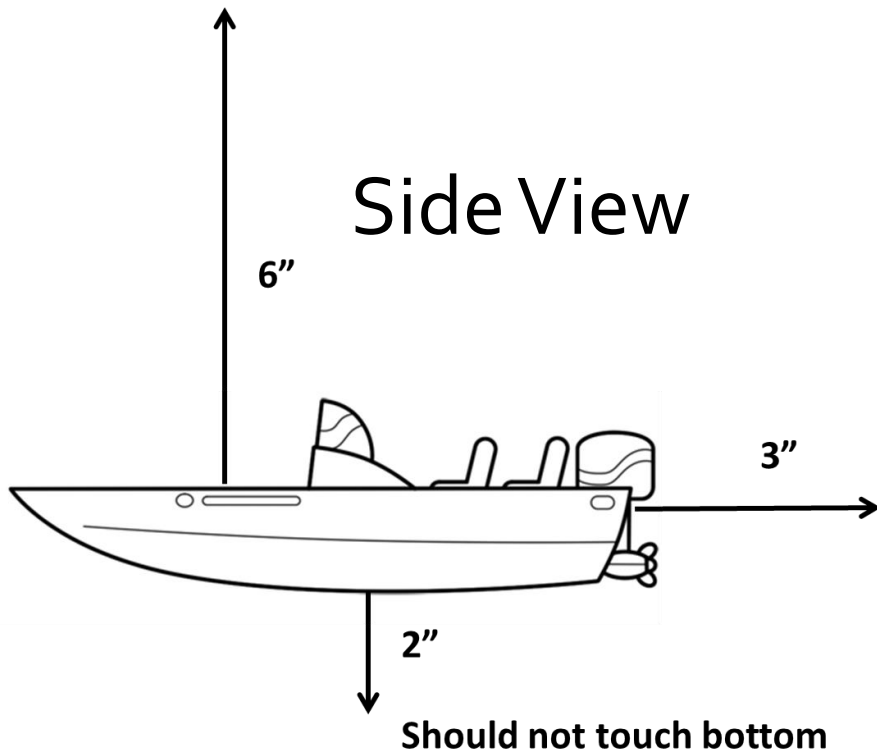


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SLED Model for Engineering Design



Constraints



Test the components – carefully!

- Paper towels for clean up! \$3 (each)
- Foam core board \$2
- Small plastic cup \$1
- Duct tape (per 2' strip) \$0.25
- Lightweight foam \$0.50
- Small foam plates \$1
- Pieces of cloth \$1
- Zip ties \$0.50
- Craft sticks \$0.10
- Spoons \$0.10

Books

Main Standard

- Science, Engineering and Technology Science
4.4.1
 - Investigate transportation systems and devices that operate on or in land, water, air and space and recognize the forces (lift, drag, friction, thrust and gravity) that affect their motion.

Secondary Standards

- Science, Engineering and Technology Science 4.4.2
 - Make appropriate measurements to compare the speeds of objects in terms of the distance traveled in a given amount of time or the time required to travel a given distance.
- Science, Engineering and Technology Science 4.4.3
 - Investigate how changes in speed or direction are caused by forces: the greater the force exerted on an object, the greater the change.
- Science, Engineering and Technology Science 4.4.4
 - Define a problem in the context of motion and transportation. Propose a solution to this problem by evaluating, reevaluating and testing the design. Gather evidence about how
 - well the design meets the needs of the problem. Document the design so that it can be
 - easily replicated. Choose and use the appropriate tools to estimate and measure length, mass and temperature in SI units.

Workshop order

- 1st inquiry, Running with the card board, debrief (Evan)
- Discuss low, medium, and high drag (Tahira) (possible video, Tahira)
- 2nd inquiry, Water drag (ball, cone, and square), which moved slower – why?? (Bryan)
- Introduce design task (Alyssa)
- Design process (put in wheel) and Constraints(Nancy)
- (Group)
 - Allow student to test objects carefully (Kari)
 - Design (paper)
 - Build
 - Test
 - Redesign
- Books (Nancy)