

WHERE MATH AND SCIENCE

TAKE FLIGHT

iFLY MAKES LEARNING
FUN WITH STEM

The Science & Engineering of iFLY



STEM is fun!



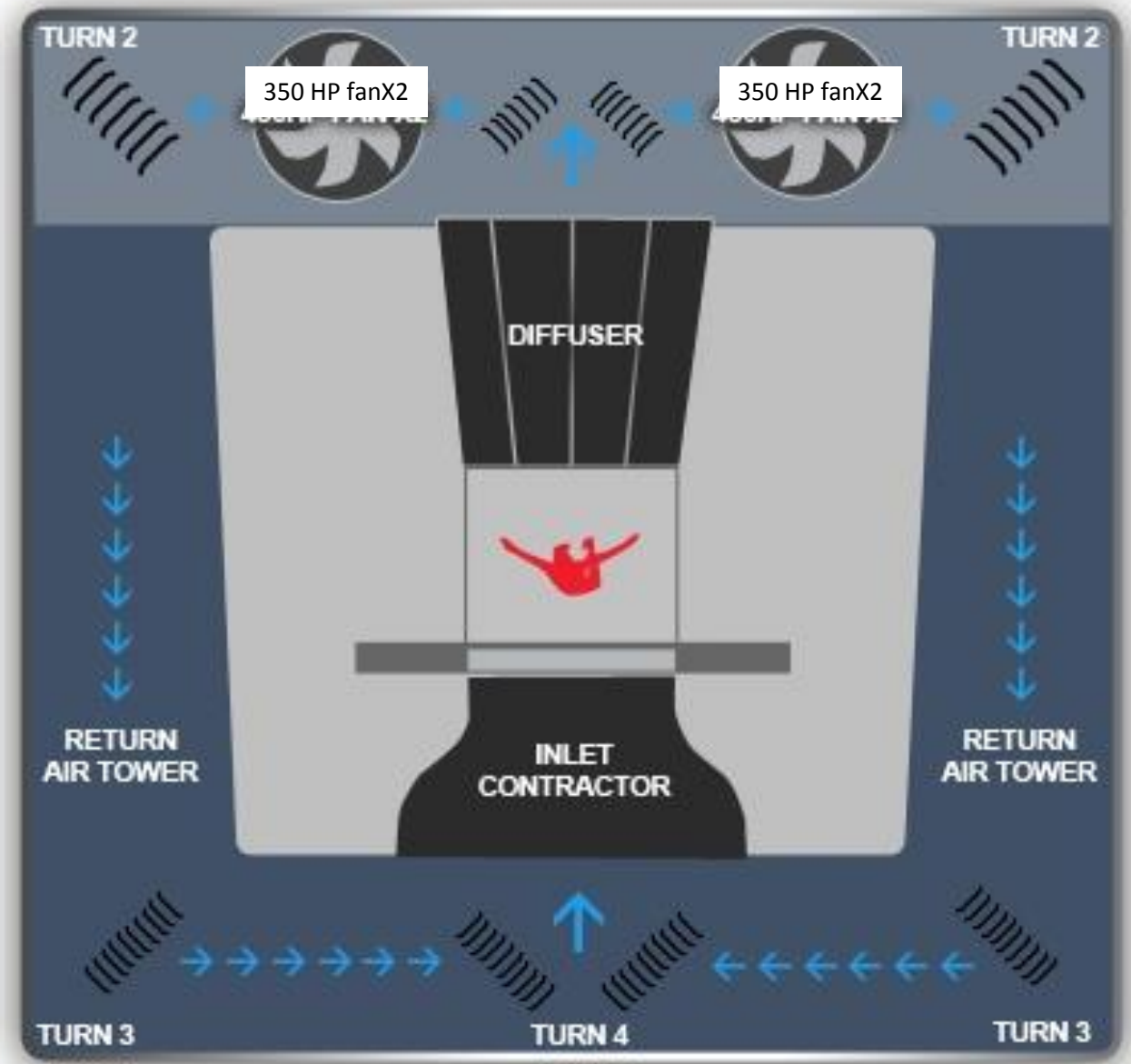
*STEM is used in the real world
to solve problems and
improve lives.*



Exciting futures in STEM await you.

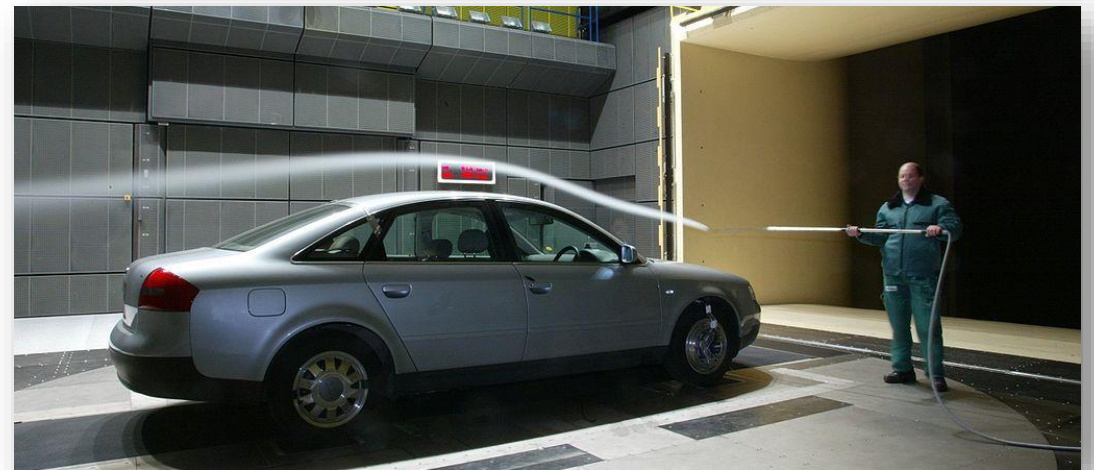


This is a Closed Loop Vertical Wind Tunnel.



Wind tunnel testing





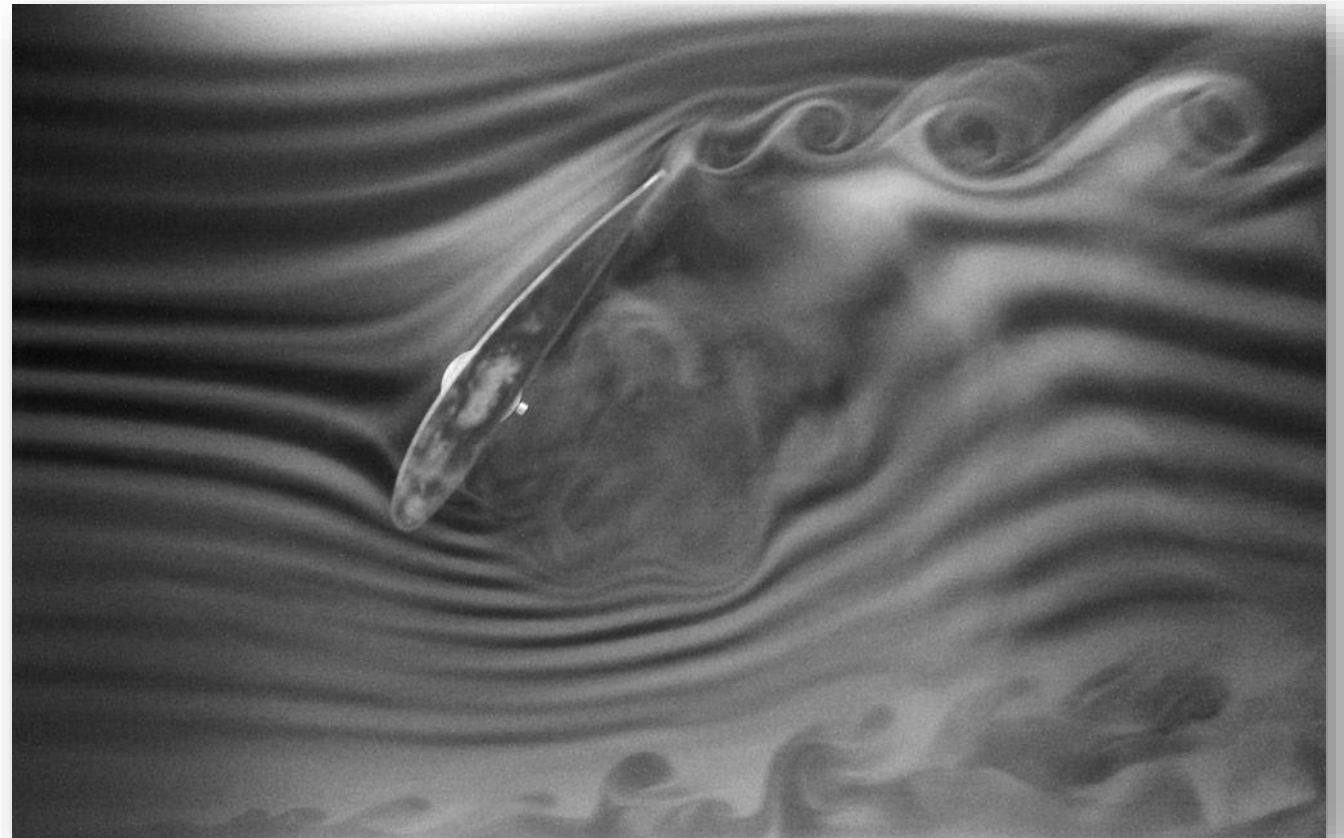


Fluids

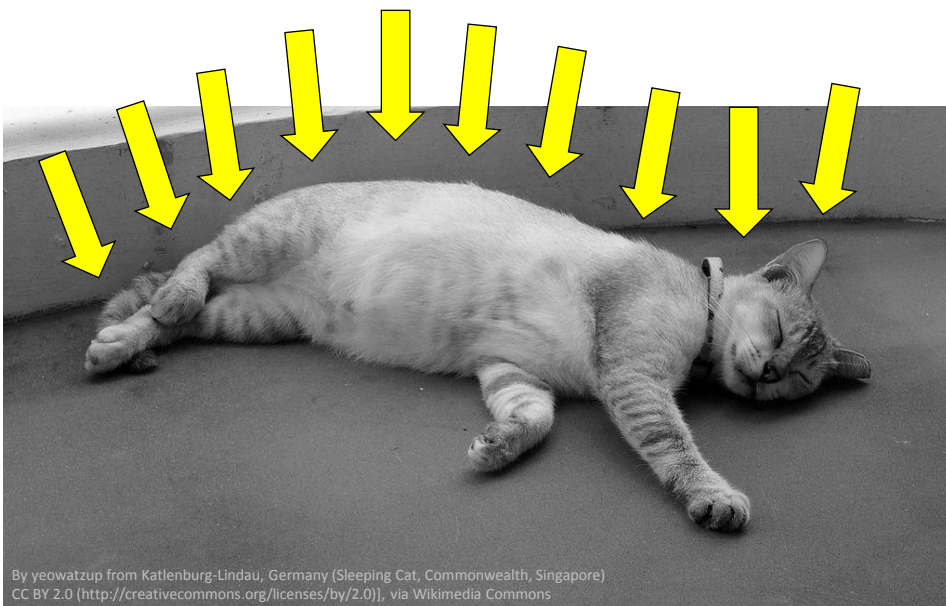
VS.

Solids

Air
is a
fluid.



Fluids exert pressure forces



Static air pressure

Dynamic air pressure



**force of air
pushing you up**



**gravity
pulling you down**

**force of air
pushing you up**



**gravity
pulling you down**

force of air



gravity

force of air



gravity

When **drag force = gravity**, you reach *terminal velocity*.



iFLY





A smaller
frontal area
increases
your **velocity**.



iFLY






A smaller
frontal area
increases
your **velocity.**





A skydiver in a red and blue suit is shown in a horizontal, spread-eagle position, falling through a dark sky at night. The skydiver is wearing a black helmet with "iFLY" written on it and goggles. The background is a dark, starry sky with some blurred lights and structures, suggesting an urban or industrial setting. The skydiver's arms are spread wide to the sides, and his legs are also spread apart, maximizing his frontal area.

A larger
frontal area
decreases
your velocity.



**How fast
does the air have
to move
to support
your weight ?**

Engineers and scientists use mathematics to **quantify** physical principles
...because...

we want to be able to **predict** what's going to happen.

Now lets go flying!

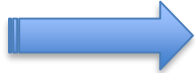


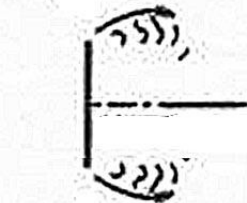
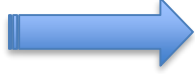



Additional Slides

The experiment plan:
predict your terminal velocity

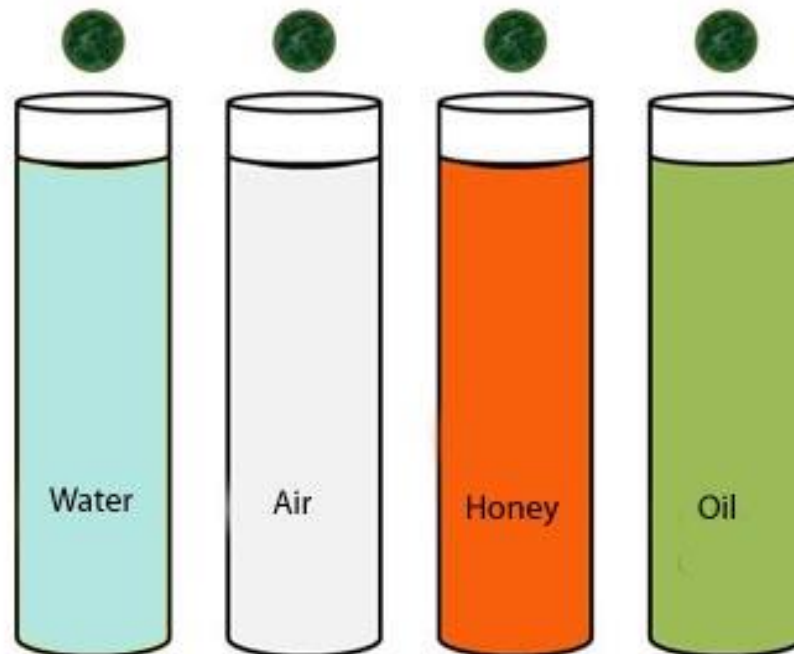
$$v = \sqrt{\frac{2mg}{A_f C_D \rho}}$$

Drag coefficients for simple objects

		C_D	
		1.17	Cylinder
		1.98	Flat plate
		0.47	Sphere

What would you guess the drag coefficient of your body is in free flight?

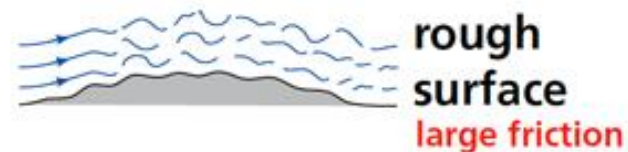
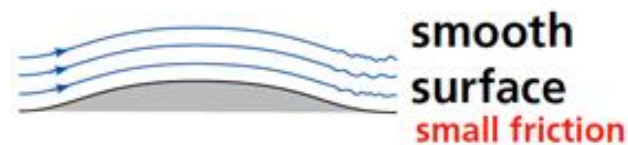
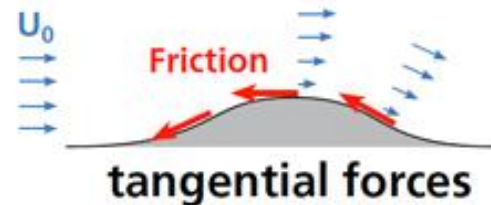
Fluids also have *viscosity*, which produces *friction* forces



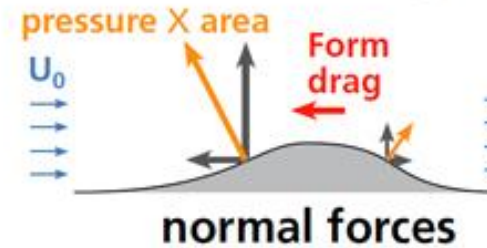
Which type of fluid has the higher viscosity, liquids or gases?

Drag is the combination of friction and pressure forces

Frictional drag:

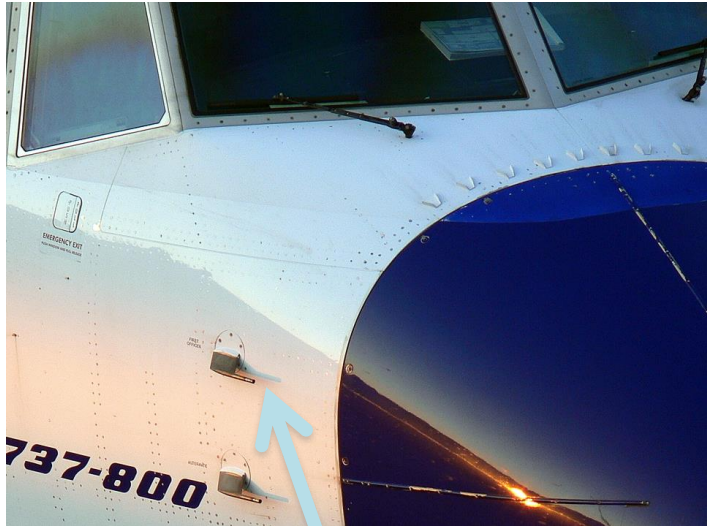


Form drag:



Which kind of drag do you think is more important for air flows?

How do we know the air speed? ...we measure it...



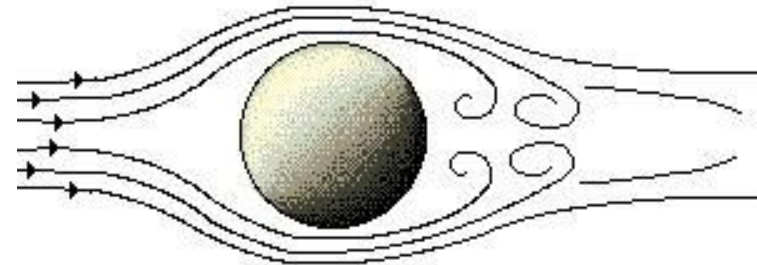
...with a Pitot Static Tube.



Can you find them in our wind tunnel?

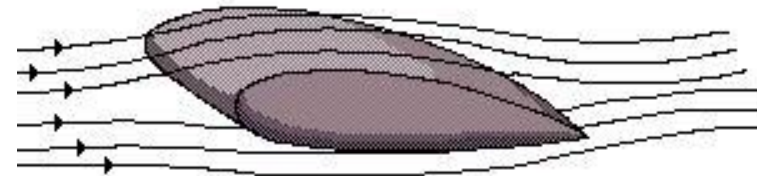
Drag of an object depends on its shape, its size, and the velocity of the air stream

Shape:



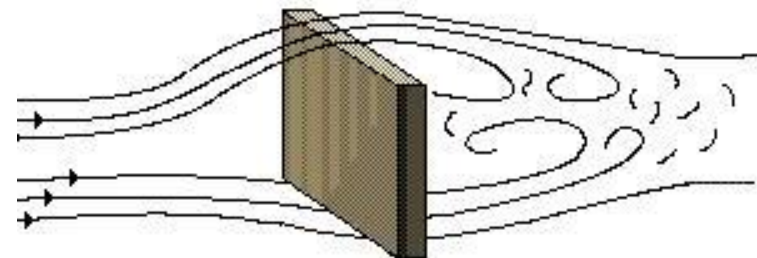
Sphere

Round objects such as baseballs experience a medium amount of drag.



Airfoil

The shape of an airplane wing minimizes drag.



Square

Flat, edged objects such as boxes experience a high amount of drag.

WHERE MATH AND SCIENCE

TAKE FLIGHT

iFLY MAKES LEARNING FUN WITH STEM

The Science & Engineering of iFLY

