Presentation Of Ideas

Dronfield Henry Fanshawe School

Make a paper aeroplane

* http://youtu.be/lsjdGLwZ1a8

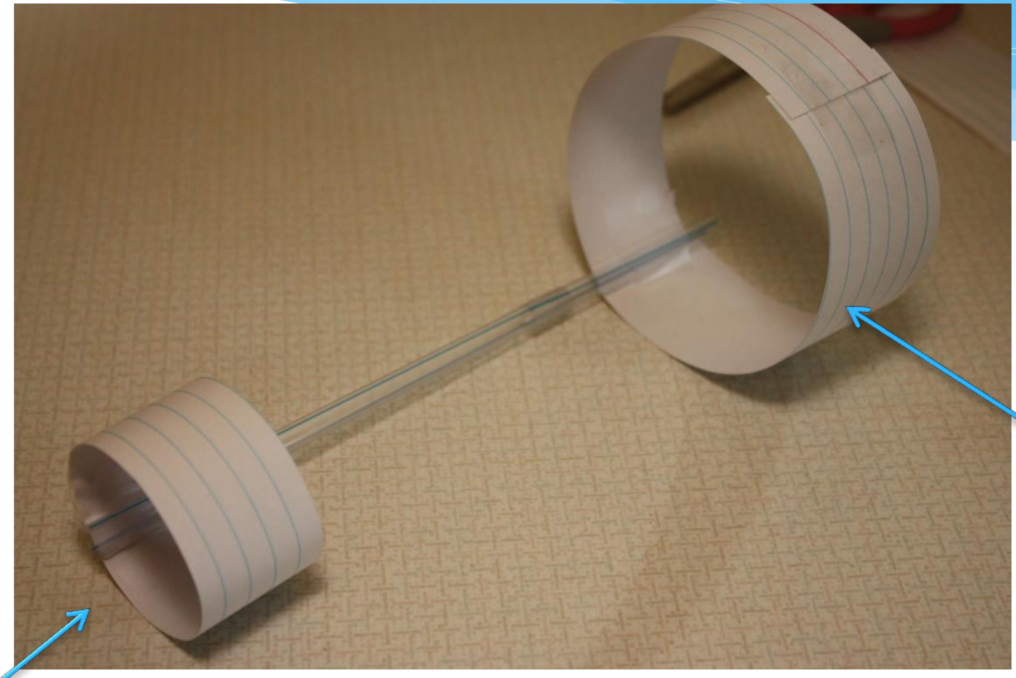
Physics of Paper Aeroplanes

* The 4 aerodynamic forces:
* Thrust – this keeps the plane moving forward
* Aerodynamic lift – acting on the horizontal areas that lifts the plane upwards
* Gravity – goes against lift
* Air resistance – goes against thrust, making the plane’s forward speed slower

Physics of Paper Aeroplanes

* Air over the wing speeds up, creating lower pressure so that the higher pressure from the air which is moving slower under the wing pushes up, trying to make the pressure the same.
* Lift is affected by the angle of the wing and the surface of the wing. Generally, a larger surface means more lift.
* The less the area that is facing to the sideways path of the aeroplane, the less the air resistance.
* The thrust is supplied by the thrower, and cannot be maintained on paper aeroplanes.

The best paper aeroplane?



Big hoop creates drag (air resistance) helping the straw level

Smaller hoop keeps it from turning off course

Since objects of different weight generally fall at the same speed, the hoop keeps its upright position.

* http://www.guinnessworldrecords.com/news/2014/10/has-googles-alan-eustace-beaten-felix-baumgartners-skydive-record-61357/

Falling Objects

* All objects accelerate at 9.8 metres per second per second.
* Terminal velocity is when the upward force (air resistance) becomes equal to the downward force (weight due to gravity) of the object. This means that the speed no longer goes any faster. For an object with a larger mass, it takes longer for terminal velocity to be reached as the downward force is bigger.

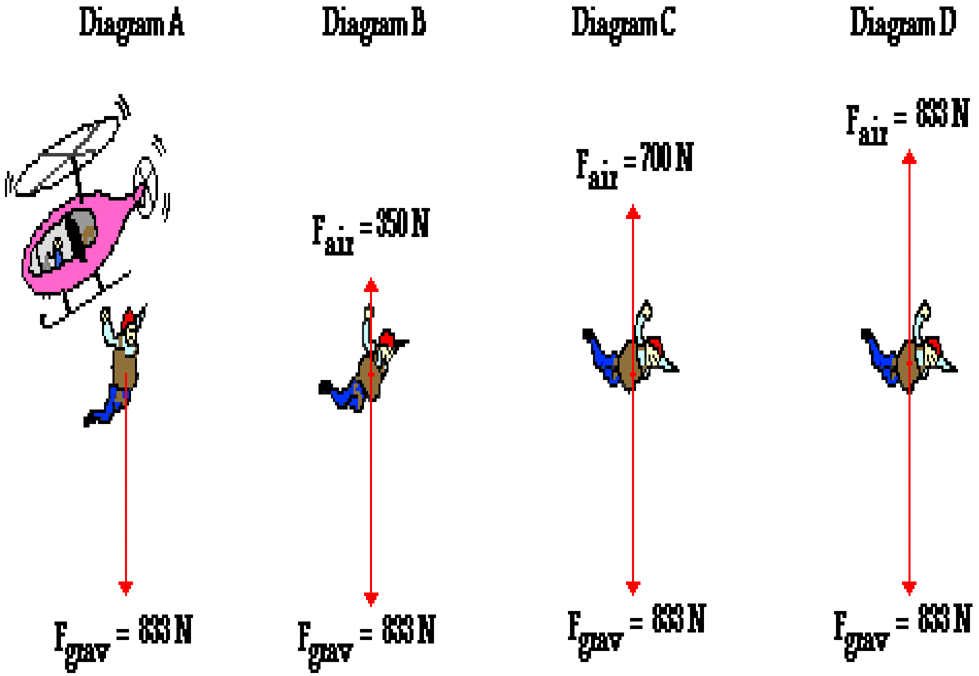
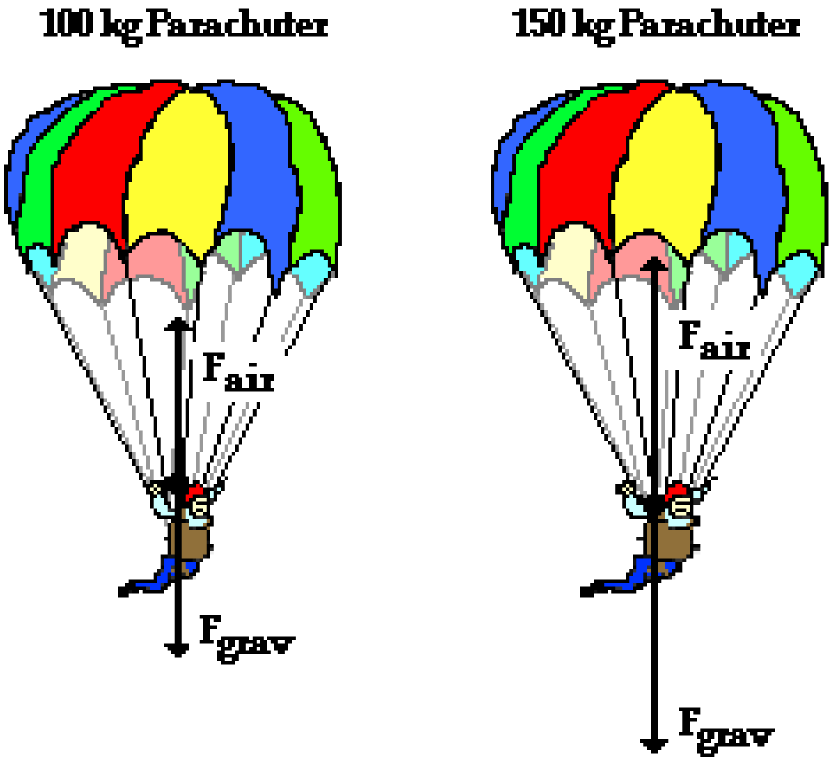
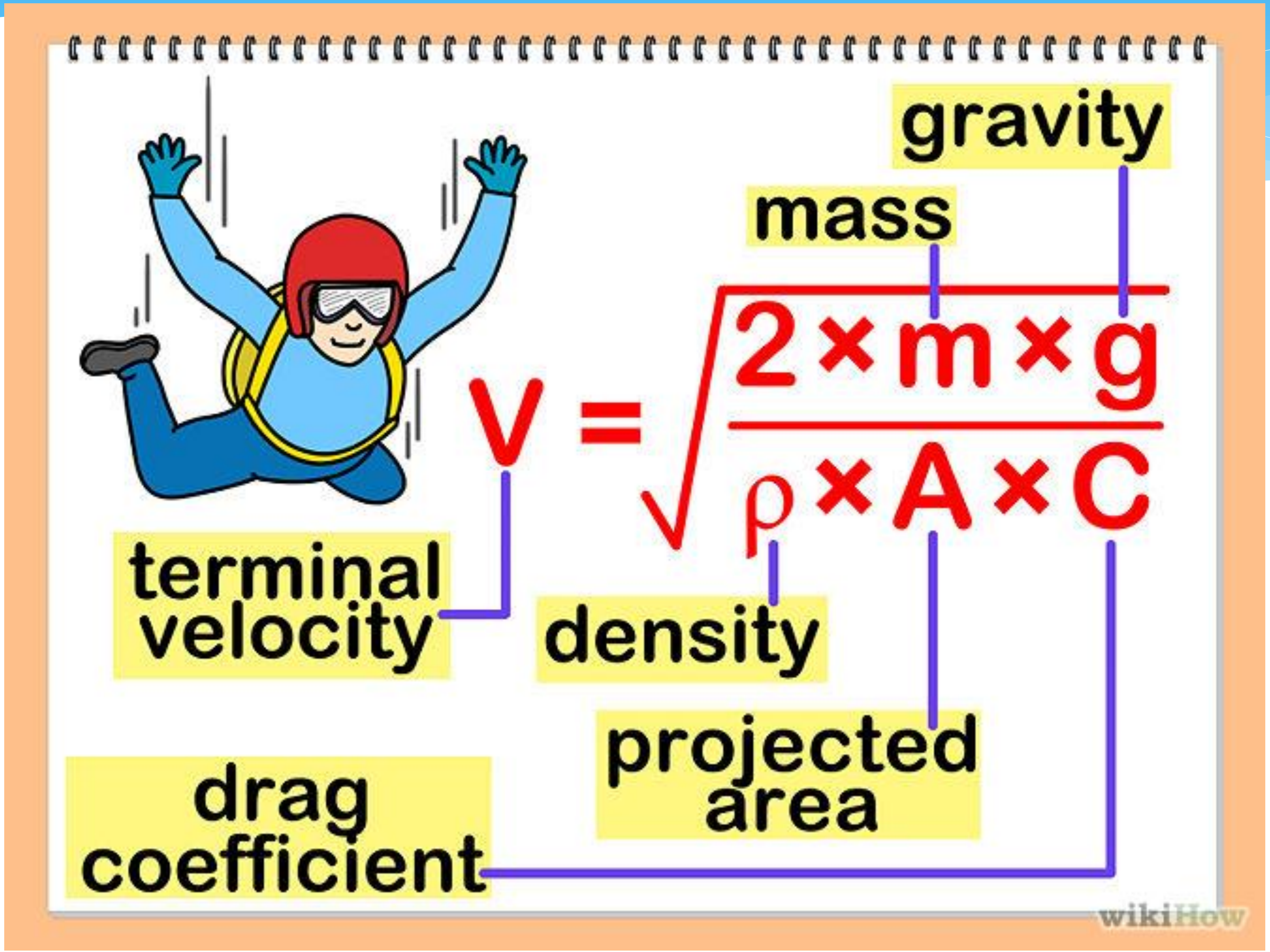


Diagram A
Diagram B
Diagram C
Diagram D
F_{air} = 350 N
F_{air} = 700 N
F_{air} = 833 N
F_{grav} = 833 N
F_{grav} = 833 N
F_{grav} = 833 N
F_{grav} = 833 N


100 kg Parachuter
150 kg Parachuter
F_{air}
F_{grav}
F_{air}
F_{grav}

How to calculate Terminal Velocity



* A Skydiver’s Terminal Velocity = 130mph
* A Tennis ball’s = 60mph
* A Ping Pong ball’s = 20mph
* A penny’s = between 30 to 50mph

In England…

* We plan to test what really is the best shape for a paper aeroplane.
* Perhaps construct gliders, using the physics of flight that we already know about.
* And test the terminal velocity of objects of different weights by dropping them from a height.
* And much, much more!

Thank you for listening!