PARACHUTES

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The Physics of Motion during a parachute jump!

Is it all it is cracked up to be?

W

- The instant the parachutist leaves the plane his vertical speed is zero!
- Friction is zero
- There is a force acting downwards -WEIGHT
- The weight is an unbalanced force on the parachutist
- The parachutist accelerates downwards according to Fw=ma.
- The parachutist accelerates at 9.8 ms^{-2}

F

F_{un}

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As the parachutist falls his speed increase
AIR RESISTANCE/ DRAG increases
WEIGHT remains constant

- There is still an unbalanced force on the parachutists but this is less than before.
- The parachutist accelerates downwards but the acceleration is much less than 9.8 ms^{-2}

The parachutist does not slow down but speeds up slower!

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Finally the magnitude of the AIR RESISTANCE is equal to WEIGHT

- The forces on the parachutist are now BALANCED (overall effect ZERO)
- The parachutist travels at CONSTANT VELOCITY (acceleration is zero)
- The parachutist travels at TERMINAL VELOCITY

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- As the parachute opens
AIR RESISTANCE/ DRAG INCREASES
WEIGHT remains constant

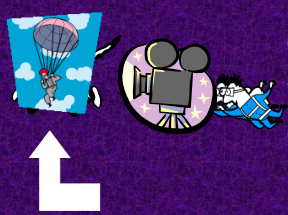
AIR RESISTANCE>>WEIGHT

- There is an unbalanced force on the parachutist upwards

The parachutist decelerates (slows down very quickly)

IT IS TRUE THAT YOU GO UPWARDS
WHEN YOU OPEN YOUR PARACHUTE

WHY DOES IT LOOK LIKE THAT ON THE TV?



The CAMERA MAN hasn't opened his parachute yet! So he will be falling faster than the parachutist and will have to raise his camera up.

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As the parachutist slows down AIR RESISTANCE DECREASES until is equal to the weight

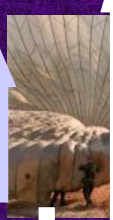
- The forces on the parachutist are now BALANCED (overall effect ZERO)

The parachutist travels at CONSTANT SPEED
(acceleration is zero)

The parachutist travels at a new TERMINAL VELOCITY

(obviously less than before but still enough to break a leg on impact!)

F_g



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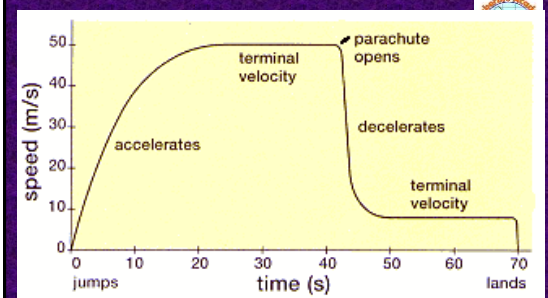
- As the parachutist lands WEIGHT remains constant but there is a very big force from the ground

There is an unbalanced force on the parachutist upwards

The parachutist decelerates to a stop!

PHEW!



http://www.darvill.clara.net/enforcemot/friction.htm
http://www.physicsclassroom.com/mmedia/newtlaws/sd.cfm