## Force and acceleration

If the forces acting on an object are unbalanced then the object will accelerate, like these wrestlers:


Force $($ in $N)=$ Mass $($ in kg$) \times$ Acceleration $\left(i n \mathrm{~ms}^{-2}\right)$


## Force, mass and acceleration

1) A force of 1000 N is applied to push a mass of 500 kg . How quickly does it accelerate?
2) A force of 3000 N acts on a car to make it accelerate by $1.5 \mathrm{~ms}^{-2}$. How heavy is the car?
3) A car accelerates forward at a rate of $5 \mathrm{~ms}^{-2}$. If it weighs 500 kg how
 much driving force is the engine applying?
4) A force of 10 N is applied by a boy while lifting a 20 kg mass. How much does it accelerate by?

## Terminal Velocity

Consider a skydiver:

1) At the start of his jump the air resistance is $\qquad$ so he
$\qquad$ downwards.
2) As his speed increases his air resistance will $\qquad$

3) Eventually the air resistance will be big enough to $\qquad$ the skydiver's weight. At this point the forces are balanced so his speed becomes $\qquad$ - this is called TERMINAL VELOCITY

## Terminal Velocity

Consider a skydiver:
4) When he opens his parachute the air resistance suddenly $\qquad$  causing him to start $\qquad$ .

5) Because he is slowing down his air resistance will $\qquad$ again until it balances his $\qquad$ The skydiver has now reached a new, lower $\qquad$ .


## Velocity-time graph for terminal velocity...

Velocity
Parachute opens -
Speed increases...


Time
New, lower terminal
Diver hits the ground velocity reached

## Weight vs. Mass

Earth's Gravitational Field Strength is $9.8 \mathrm{~N} \mathrm{~kg}^{-1}$. In other words, a 1 kg mass is pulled downwards by a force of 9.8 N .

Weight $=$ Mass $\times$ Gravitational Field Strength (in N) (in kg) (in $\mathrm{Nkg}^{-1}$ )


1) What is the weight on Earth of a book with mass 2 kg ?
2) What is the weight on Earth of an apple with mass 100g?
3) Dave weighs 700 N . What is his mass?
4) On the moon the gravitational field strength is $1.6 \mathrm{~N} \mathrm{~kg}^{-1}$. What will Dave weigh if he stands on the moon?
