Forces

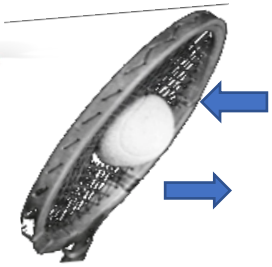
Mass the amount of matter in an object. Wherever you go **mass** stays the same.

Mass doesn't move unless forced

Balanced forces - two or more forces cancel out to give the same result as if there was no force acting on an object

balanced forces

balanced forces cause an object to remain at rest and a moving object to continue at constant speed



Forces change an object's

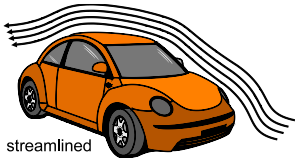
shape, speed, direction

Forces cannot be seen

Unit of Force= NEWTON, N

Weight is the force due to gravity on an object. The force of gravity is caused by mass pulling objects towards other masses
Any mass has a force of gravity but it is usually too small to measure

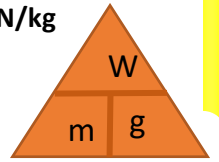
Streamlined shapes Reduce friction



A spring balance measures forces

W = Weight (N) , m = mass (kg)
g = gravitational field strengthth (N/kg)
On Earth 'g' has a value of 10 N/kg

$$W = mg$$
$$3.35 = m \times 10$$
$$m = \frac{3.35}{10} = 0.335kg$$



weight = 3.35N

Use data sheet to find 'g' on other planets

Across Universe, mass constant, weight changes

Twice the force = twice the stretch
Force and extension are directly proportional $F \propto e$

Use Excel to make a table, calculate averages, work out formula and plot a graph

Friction is a force which opposes motion

Reduce friction: Lubricants, rollers, ball-bearings, cushions of air, streamlining
Increase friction: less aerodynamic, greater surface area, increase mass, surface, gritting roads, stickier surface

The rougher the surface the bigger the force of friction.
The heavier the object the bigger the force of friction.

Types of Forces

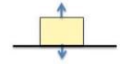
Contact forces: interactions between objects that touch


applied force


spring force


drag force


frictional force


normal force

Non-contact forces: attract or repel, even from a distance


magnetic force


electric force


gravitational force

Friction is helpful: braking, walking, space craft re-entry, writing, opening bottles, rock climbing, steering wheel, striking matches

Friction is unhelpful: wears down tyres, soles of shoes, chaffing from clothes, engines wear away, increases fuel consumption

Air resistance the frictional forces of the air against a moving object.

Unbalanced forces

= 90N to the right

= 20N to the right

Freebody diagrams

mass

weight

Credits

- Balanced forces, Push and Pull images MrsPhysics custom design by presentermedia.com
- Unbalanced free body diagram https://www.tes.com/teaching-resource/free-body-diagrams-lesson-10-forces-and-energy-11374981

Friction is helpful	Friction is unhelpful
braking	shooting (drag slows the bullet)
walking	sledging
space craft re-entry	putting on clothes (chaffing)
running	wears down tyres
writing	engines wear away
opening bottles	rotating machinery slowed down and wears away
rock climbing	Increases fuel consumption in
steering wheel	car
striking matches	
conveyor belts	