

FORCE!

a force is a push or a pull

- SI unit is: Newton (N)
- Spring balance used to measure force

contact force

elastic
friction
tension

non-contact force

magnetic

mass vs weight

definition amt of matter in an object

SI unit kilograms (kg)

* remains the same regardless of location

$$m = \frac{W}{g}$$

definition amt. of gravitational force acting on an object

SI unit newton (N)

* change with location (depending on gravitational field strength)

$$W = mg$$

$\frac{N}{kg} \rightarrow \frac{N}{kg} [10 \frac{N}{kg}]$

EFFECTS OF FORCES

change in size or shape of an object

* mass usually no change

change in state of rest or motion of an object

- stop moving
- start moving
- $\uparrow/\downarrow$ speed
- Δ direction

changes due to turning effect of a force on an object about a fixed position

- rotate clockwise/anticlockwise about a point
- eg.
 - opening lid of container
 - using spanner
 - bicycle pedal

change in pressure on an object $\rightarrow$ amount of force acting per unit area.

$$P = \frac{F}{A}$$

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

SI unit (N/m²) / Pascal (Pa)

* 1cm: 0.01m

1cm²: 0.0001m²

* sharp knife cuts easier

* stand on one foot vs stand on two feet

* construction truck w large wheels

Pressure in liquid
as depth increases,
pressure increases

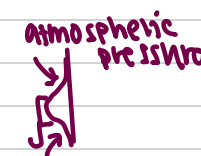
Atmospheric pressure

Air also exerts a pressure on Earth's surface

* $\sim 1.01 \times 10^5$ Pa

* suction cups

* straw



ENERGY

ability to do work

SI unit joule (J)

types of energy (common)

kinetic
electrical
sound
light

heat
chemical potential
gravitational potential

* conservation of energy

- ① energy cannot be created/destroyed
- ② it can be converted from one form to another
- ③ total energy in the system is constant.

Sources of energy	conversion	advantage	disadvantage
fossil fuel	CPE (fossil) $\rightarrow$ heat $\rightarrow$ KE (steam) $\rightarrow$ KE (turbine) $\rightarrow$ electric	easy to generate	produce greenhouse gas $\rightarrow$ global warming
solar	light (sun) $\rightarrow$ electric	$\downarrow$ greenhouse gas	not always available
hydroelectric	CPE (water) $\rightarrow$ KE (water) $\rightarrow$ KE (turbine) $\rightarrow$ electric	$\downarrow$ greenhouse gas	large land needed animals/ecosystem destroyed
wind	KE (air) $\rightarrow$ KE (turbine) $\rightarrow$ electric	$\downarrow$ greenhouse gas	large land needed animals/ecosystem destroyed + noise pollution
geothermal	heat (Earth) $\rightarrow$ kinetic (steam) $\rightarrow$ kinetic (turbine) $\rightarrow$ electric	stable, not dependent on weather	large land needed greenhouse gas emitted
bio-fuels	CPE (biofuel) $\rightarrow$ heat $\rightarrow$ KE (steam) $\rightarrow$ KE (turbine) $\rightarrow$ electric	readily available	greenhouse gas emitted
nuclear	nuclear $\rightarrow$ heat $\rightarrow$ KE $\rightarrow$ electric	less space req a lot of energy	cosmic/hazardous leakage