

Measurement

- ① Base units 10^{-3} m Measuring tape
(m)(s)(K)(A) Metre rule
(kg)(cd)(mol) 10^{-4} m Vernier calipers
- ② Prefixes 10^{-5} m Micrometer screw gauge
 $n=10^{-9}$ $d=10^{-1}$
 $M=10^{-6}$ $k=10^3$ atom Earth
 $m=10^{-3}$ $M=10^6$
 $c=10^{-2}$ $G=10^9$ 10^{-10}
- ④ Zero error
(+) positive vernier scale / right
(-) negative thimble to the left
of '0' mark on main scale

Period

- ⑤ ↑ length of pendulum
↓ m/s^2 due to gravity
⑥ Period (T) in s = time taken
no. of oscillations
- ⑪ Newton's 1st Law
At R=0N, speed is constant
- ⑫ Newton's 2nd Law
 $F=ma$
- ⑬ Newton's 3rd Law → For every action, an

Kinematics

- ⑦ Acceleration = $\frac{\text{final } v - \text{initial } v}{\text{time taken}}$
- ⑧ Graph Area Gradient
- | | | |
|-----|--------------|--------------|
| S-T | Distance | Acceleration |
| V-T | | |
| D-T | Displacement | Velocity |

Power

- ⑭ Power = $\frac{\text{Work done (W)}}{\text{time}}$
- ⑮ Efficiency = $\frac{\text{Useful Power Output}}{\text{Total Power Input}} \times 100\%$

Energy

- ③③ KE(J) = $\frac{1}{2}mv^2$
- ③④ GPE(J) = mgh
gravitational field strength
- ③⑤ Principle of Conservation of Energy
↳ energy cannot be created or lost
↳ total energy remains constant

Work

- ③⑥ Work done (J)
= Force × Distance
= useful work + wasted work
↳ work done against friction

Forces

Contact Forces		
Normal Reaction	Friction	Tension
Non-Contact Forces		
Gravitational Force	Electric Force	Magnetic Force

Effects

- ↳ change direction of motion
↳ change speed
↳ change shape
↳ turning effect
- ⑭ Characteristics
↳ occur in pairs
↳ act on diff. bodies

Moments

- ⑪ Moment of force (Nm)
= Force × ⊥ distance
- ⑫ By POM, clockwise moment = anti-clockwise moment

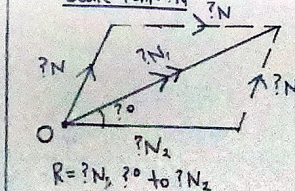
Friction

- ⑮ Wood > glass
↑ roughness
↑ forces pressing surfaces in contact
- ⑮ Effects
✓ grip
X wear & tear
X ↓ efficiency of machinery
- ⑮ Reducing friction
↳ roller bearings
↳ separate surfaces by a lubricant

Air Resistance

- ↑ speed
↑ surface area
↑ air density

Skew Vectors: Law of Parellelogram



Mass

- ⑮ Inertia: resists change from its state of motion to rest, ∴ continue moving
- ⑮ ↑ mass, ↑ inertia

Vector Addition

- ⑮ Parallel Vectors
Same direction → addition
opp direction → subtraction

Stable

- line of action of weight lines within base of object
↓ C.G.
↑ Base area

Slight push

- Stable equilibrium → C.G. ↑, then ↓
Unstable equilibrium → C.G. continues ↓
Neutral equilibrium → C.G. at same height

Density

- ⑮ Density (kg/m³)
= mass/volume
- ⑮ Must-know Densities
Water = 1000 kg/m³
Mercury = 13600 kg/m³
- ⑮ ↑ density, higher the object floats (in liquid)

Temperature

- ↑ temp = $\frac{\text{mass}}{\text{vol}}$ = ↓ density

Avg. density

- = $\frac{\text{total mass}}{\text{total volume}}$

Weight

- ⑮ Weight (N)
= mass × gravitational field strength (N/kg)