GAMSAT Physics Equations

A selection of physics equations you may find it helpful to be familiar with for GAMSAT. If you have any additional equations to suggest, please email me.

Forces and Motion

F = ma

- F is force
- m is mass
- a is acceleration

W = mg

- W is weight
- m is mass
- g is the acceleration of gravity (A.K.A. gravitational field strength)

p = mv

- p is momentum
- m is mass
- v is velocity

Work done = Fd

- F is force
- d is displacement

Power = Work done / time

Moment = Fd

- F is force
- d is distance between the pivot and the point where the force is acting

Friction or drag = - work done (i.e. thermal energy released)

GAMSAT Physics Equations

$KE = ½ mv^2$

- KE is kinetic energy
- m is mass
- v is velocity

$GPE = mgh$

- GPE is gravitational potential energy
- m is mass
- g is the acceleration of gravity (A.K.A. gravitational field strength)
- h is height

$GPE_i + KE_i = GPE_F + KE_F$

- GPE_i is initial gravitational potential energy
- GPE_F is final gravitational potential energy
- KE_i is initial kinetic energy
- KE_F is initial kinetic energy

Kinematic (SUVAT) equations

$$v = u + at$$
$$s = ut + \frac{1}{2}at^2$$
$$s = \frac{1}{2}(u + v)t$$
$$v^2 = u^2 + 2as$$
$$s = vt - \frac{1}{2}at^2$$

- s is the body's displacement
- u is the body's initial velocity
- v is the body's final velocity
- a is the body's acceleration
- t is the time

GAMSAT Physics Equations

Electricity

Electric field strength = F / q

- F is force
- q is charge

Electrical potential energy = qV

- q is charge
- V is voltage

V = IR

- I is current
- R is resistance

V = k Q/r

- Q charge magnitude
- r distance of charge from point charge
- k is a constant = 8.99 x 10^9 N m^2/C^2

I = ΔQ / t

- I is current
- Q is charge
- t is time

R = ρ L / A

- R is resistance
- ρ is resistivity
- A is area of conductor
- L is length of conductor

GAMSAT Physics Equations

$\sigma = 1 / \rho$

- σ is conductivity
- ρ is resistivity

$C = q/V$

- C is capacitance
- q is charge
- V is voltage

$P = VI$

- P is power
- V is voltage
- I is current

$P = V^2 / R$

- P is power
- V is voltage
- R is resistance

$P = I^2R$

- P is power
- I is current
- R is resistance

Lenses

$1 / F = 1 / d_0 + 1 / d_i$

- F is focal length
- d_0 is distance of object from lens
- d_i is distance of image from lens

GAMSAT Physics Equations

$1 / F = 1 / h_0 + 1 / h_i$

- F is focal length
- h_0 is height of object
- h_i is height of image

$M = - d_i / d_0$

- M is magnification
- d_0 is distance of object from lens
- d_i is distance of image from lens

$M_{tot} = M_1 M_2$

- M_{tot} is total magnification
- M_1 is magnification of the first lens
- M_2 is magnification of the second lens

$P = 1 / F$

- P is optical power
- F is focal length

Density and Pressure

Pressure = F / A

- F is force
- A is area

Density = m/V

- m is mass
- V is volume

GAMSAT Physics Equations

Units breakdown

Force and Motion	
Joule	Nm
Newton	$Kgms^{-2}$
Pascal	Nm^{-2}
Electricity	
Joule	CV
Siemens (unit of conductance)	Ω^{-1}
Amp	Cs^{-1}
Volt	JC^{-1}
Coloumb	6.242×10^{18} electrons
Faraday	CV^{-1}
Lenses	
Dioptre (unit of optical power)	m^{-1}