GradReady Physics® Formula Sheet

CONSTANT ACCELERATION FORMULAE

$$V = u + at$$

$$S = ut + 0.5at^2$$

$$S = vt - 0.5at^2$$

$$S = \frac{(u + v) \times t}{2}$$

$$v^2 = u^2 + 2as$$

v = final velocity (m/s)
u = initial velocity (m/s)
a = acceleration (m/s^2)
s = displacement (m)
t = time (s)

TORQUE

$$T = F \times d \times \sin(\theta)$$

T = Torque (Nm)
F = Force applied on lever (N)
d = Distance that the force is applied from the axis of rotation (m)
θ = Angle between force vector and distance vector, sin(θ) is equal to 1 if perpendicular

NEWTON'S 2ND LAW OF MOTION

$$\Sigma F = m \times a$$

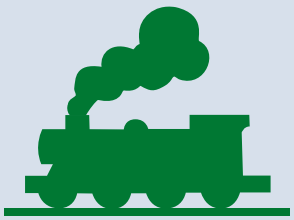
ΣF = net force acting on an object (N)
m = mass of object (kg)
a = acceleration of object (m/s^2)

MECHANICAL ENERGY

$$ME = U_s + U_g + KE$$

ME = mechanical energy (J)
Us = spring potential energy, a.k.a elastic potential energy (J)
Ug = gravitational potential energy (J)
KE = kinetic energy (J)

MOMENTUM



$$p = mv$$

p = Momentum (kg x m/s)
m = Mass (kg)
v = Velocity (m/s)

GRAVITATIONAL POTENTIAL ENERGY

$$U_g = mgh$$

Ug = gravitational potential energy (J)
m = Mass of object (kg)
g = Acceleration due to gravity = 9.8 m/s^2 = gravitational field strength = 9.8 N/kg
h = Vertical height above a reference level (m)

TEMPERATURE CHANGE

$$Q = m \times C \times (T_{final} - T_{initial})$$

Q = heat energy applied (J)
m = mass of object (kg)
c = specific heat capacity of object (J/kg/K)
T = initial and final temperatures of object (K)

KINETIC ENERGY

$$KE = \frac{1}{2} mv^2$$

KE = Kinetic energy of object (J)
m = Mass of object (kg)
v = Velocity of object (m/s)

FORCE ON A MOVING CHARGE

$$F = qvb$$

F = Magnetic Force
q = Charge of the particle
v = Velocity of the charged particle
b = Magnetic Field Strength

GRAVITATIONAL FORCE

$$F = \frac{G \times m_1 \times m_2}{r_2}$$

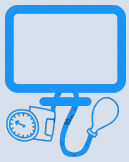
F = gravitational force of attraction from the center of mass of the two objects (N)
G = gravitational constant 6.674×10^{-11} Nm kg
m1 = mass of one of the objects (kg)
m2 = mass of the other object (kg)
r = distance between the center of the mass of the two objects (m)

OHM'S LAW

$$V = IR$$

V = Voltage (volts)
I = Current (amps)
R = Resistance (ohms)

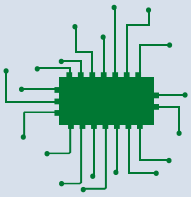
PRESSURE



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

P = Pressure (N/m or Pascals)
F = Force applied on a surface (N)
A = Area of surface (m^2)

ELECTRICAL POWER



$$P = IV = I^2R = \frac{V^2}{R}$$

P = Power
V = Voltage (volts)
I = Current (amps)
R = Resistance (ohms)

ARCHIMEDES PRINCIPLE

$$F_b = F_{g\ of\ object} = F_{g\ of\ fluid\ displaced} = p_{fluid} \times V_{g\ of\ fluid\ displaced} \times g$$

F_b = Force of buoyance (N)
$F_{g\ of\ object}$ = Weight of object (N)
$F_{g\ of\ fluid\ displaced}$ = Weight of fluid displaced (N)
P_{fluid} = Density of fluid (kg/m^3)
$V_{fluid\ displaced}$ = Volume of fluid displaced by the object in the fluid (m^3)
g = gravitational field strength, a.k.a acceleration due to gravity = 9.8 N/kg = 9.8 m/s^2

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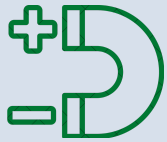
ELECTROSTATIC FORCE



$$F = \frac{k \times q_1 \times q_2}{r^2}$$

F = electrostatic force acting between two charged objects (N)
k = Coulomb's constant = 9.0* 10 NmC
q1 = magnitude of one of the charged object (C)
q2 = magnitude of the other charged object (C)
r = distance between the center of the two charges (m)

WORK

$$W = F \times d \times \cos(\theta)$$

W = Work done (J)
F = Force applied on object (N)
d = Distance object moves due to the application of the force (m)
θ = Angle between force vector and displacement vector, cos(θ) is equal to 1 when the force vector is in the same direction as the movement of the object

or

$$W = F \times d$$

W = Work done (J)
F = Component of the force that acts parallel to the distance only (N)
d = Distance object moves due to the application of the force (m)