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| PHYSICS 201  Equations Sheet | Translational Motion | Rotational Motion |
| LINEAR | ANGULAR |
| Time | t | t |
| Displacement | x; (x = rθ) | θ |
| Velocity | v = Δx/Δt; (v = rω) | ω = Δθ/Δt |
| Acceleration | a = Δv/Δt; (a = rα) | α = Δω/Δt |
| Kinematic Equations | v = v0 + at | ω = ω0 + αt |
| x = ½(v + v0)t | θ = ½(ω + ω0)t |
| x = v0t + ½ at2 | θ = ω0t + ½ αt2 |
| v2 = v02 + 2ax | ω2 = ω02 + 2αθ |
| Inertia | *m* = mass | *I* = Rotational inertia; |
| To create | force = F | torque = τ = LA·F |
| Newton's second law of motion | Σ**F** = m**a** | Σ**τ** = I**α** |
| Σ**F** = Δ**p**/Δt | Σ**τ** = Δ**L**/Δt |
| Work | *F·x* | *τ·θ* |
| Kinetic Energy | Translational Kinetic Energy = TKE = ½ mv2 | Rotational Kinetic  Energy = RKE = ½ Iω2 |
| Momentum | **p** = m·**V** | **L** = I·**ω** |
| Conservation of momentum | Σmivi = Σmfvf | ΣIiωi = ΣIfωf |

Pressure = Force/Area Pabs = Patm + PG Density = Mass/Volume

Pressure (P) due to depth h of fluid of density ρ; P = ρgh.  
1 atm = 1.013 x 105 N/m2 = 76 cm.Hg = 760 mm.Hg

The density of the air is 1.29 kg/m3; Density of water = 1000 kg/m3 = 1 g/cm3; Acceleration due to gravity = g = 9.8 m/s2.

Area of a circle of radius r, Acircle = π r2 .Area of a rectangle of length l, and width w, Arec=l x w; Area of a triangle, Atriangle= 0.5 x base x height.  
  
Volume of a cylinder of radius r and height h; V= π r2h; Volume of a sphere = (4/3) π r3.

Frictional force = *Ffr=μkFN* Buoyant force: GPE = mgh

Hooke’s law: Elastic PE = EPE =   
Period of a simple pendulum:

Chapter-10: Rotational Motion

Rotational Kinematics

1. Angular displacement, angular velocity, and angular acceleration.
2. Solving rotational motion problems using kinematic equations.
3. Relating linear quantities with angular quantities using radius.

Rotational Dynamics

1. Torque, center of gravity, moment of inertia, rotational work, rotational kinetic energy, and angular momentum.
2. Solving problems involving objects in equilibrium using the conditions for equilibrium.
3. Applying Newton’s second law for rotational motion.
4. Conservation of angular momentum.

Chapter-16: Hooke’s law and Simple Harmonic Motion

1. Hooke’s law, period, frequency, and amplitude.
2. Elastic potential energy.
3. Pendulum and resonance.
4. Oscillating mass on a spring.

Chapter 9: Statics

Understanding the conditions for equilibrium.

Solving problems in static equilibrium.

Chapter 11: Fluid Statics

Density, pressure, pressure at depth h, barometer, atmospheric pressure, gauge pressure, absolute pressure, Pascal’s principle, and Archimedes’ principle.

1. Distinguishing absolute pressure from gauge pressure.
2. Measuring the atmospheric pressure.
3. Calculating pressure due to depth of fluid.
4. Study the problems in the Archimedes’ principle lab hand-out.

Chapter 12: Fluid Dynamics  
 1. Equation of continuity:



2. Bernoulli’s equation  
 

Study the following lab handouts: Lab 8: Torque, Lab 9: Rotational Motion, Lab 10: Hooke’s law and SHM, and Lab 11: Archimedes’ Principle.