PHYS 201 Study Guide for Test #3 Chapters 9 and 10

|  |  |  |
| --- | --- | --- |
| 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 |

Conversion factors:
1 H = 3600 s, 1 Mile = 1608 m, 1 inch = 2.54 cm, 1 foot = 12 inch, 1 m = 3.281 ft, 1 kg = 1000 g.
1 m = 100 cm, 1 cm = 10 mm, 1 m = 1000 mm, 1 km = 1000 m, 1 LB (pound) = 4.448 N

Acceleration due to gravity = g = 9.8 m/s2. 1 Revolution = 2π rad.

Frictional force = *Ffr=μkFN* GPE = mgh
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.



Blackboard Home works: Hwk 11, Hwk 12, and Hwk 13

Chapter 9: Statics

Understanding the conditions for equilibrium.

Write down equations by balancing the forces in X and Y directions.

Write down the torque equation for objects in static equilibrium.

Solving problems in static equilibrium.

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.