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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 |

Frictional force = *Ffr=μkFN* Centripetal force =

Hooke’s law: Elastic PE = EPE =

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.

Areas: Acircle = π r2 Asphere = 4π r2 Arec=length x width; Atriangle= 0.5 x base x height.  
  
Volumes: Vrec=length x width x height Vcyl. = π r2h; Vsphere = (4/3) π r3.

Study Guide for Final

Study the Materials from T1, T2, and T3.

Chapter 17: Waves and Sound  
  
1. Waves: Define and give examples for transverse wave, longitudinal wave, and both.  
2. Periodic wave:   
a. Define periodic wave, period (T), frequency (f), wavelength (λ), and wave speed.  

b. Show a periodic wave as a function of time and distance.

3. Speed of a wave on a string: The **speed of a wave** depends on the properties of the medium in which the wave travels. For a transverse wave on a string that has a tension *FT* and a mass per length *m*/*L*, the wave speed is, (which will be given):

 (given)

4. The nature of sound waves in air: Type, frequency, intensity, and wave form.

, I0 = 10-12 W/m2. (given)

5. Conceptual understanding of Doppler effect: The **Doppler effect** is the change in frequency detected by an observer because the sound source and the observer have different velocities with respect to the medium of sound propagation. (No problems)

6. Problem solving with transverse and longitudinal standing waves.

7. Study the lab hand-out for Labs 12 & 13.