**Angular Dynamics Noteguide**

**Angular Quantities:**

|  |  |
| --- | --- |
| Linear:  (m) s  (m/s) u  (m/s) v  (m/s/s) a  (s) t  (N) F  (kg) m | Angular:  θ - Angle (Radians)  ωi - Initial angular velocity (Rad/s)  ω f  - Final angular velocity (Rad/s)  α - Angular acceleration (Rad/s/s)  t - Uh, time (s)  Γ - Torque (mN)  I - Moment of Inertia (kg m2) |

**Angular Kinematics:**

|  |  |
| --- | --- |
| Linear:  u + at = v  ut + 1/2at2 = s  u2 + 2as = v2  (u + v)t/2 = s  ma = F | Angular:  ωf = ωi + αt  θ = ωit + 1/2αt2  ωf 2 = ωi2 + 2αθ  θ = (ωi + ωf)t/2  Γ = Iα |

**Torque - twisting force that can cause angular acceleration**

Γ = rxF = rFsin(θ)

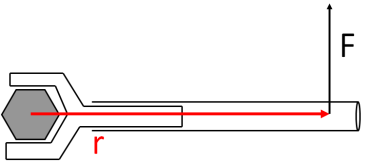
Γ - Torque (mN)

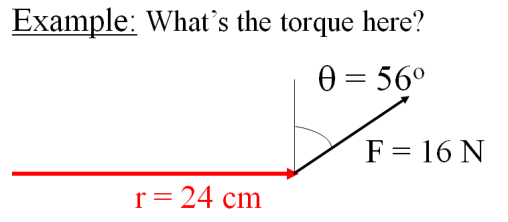
r - radius (m)

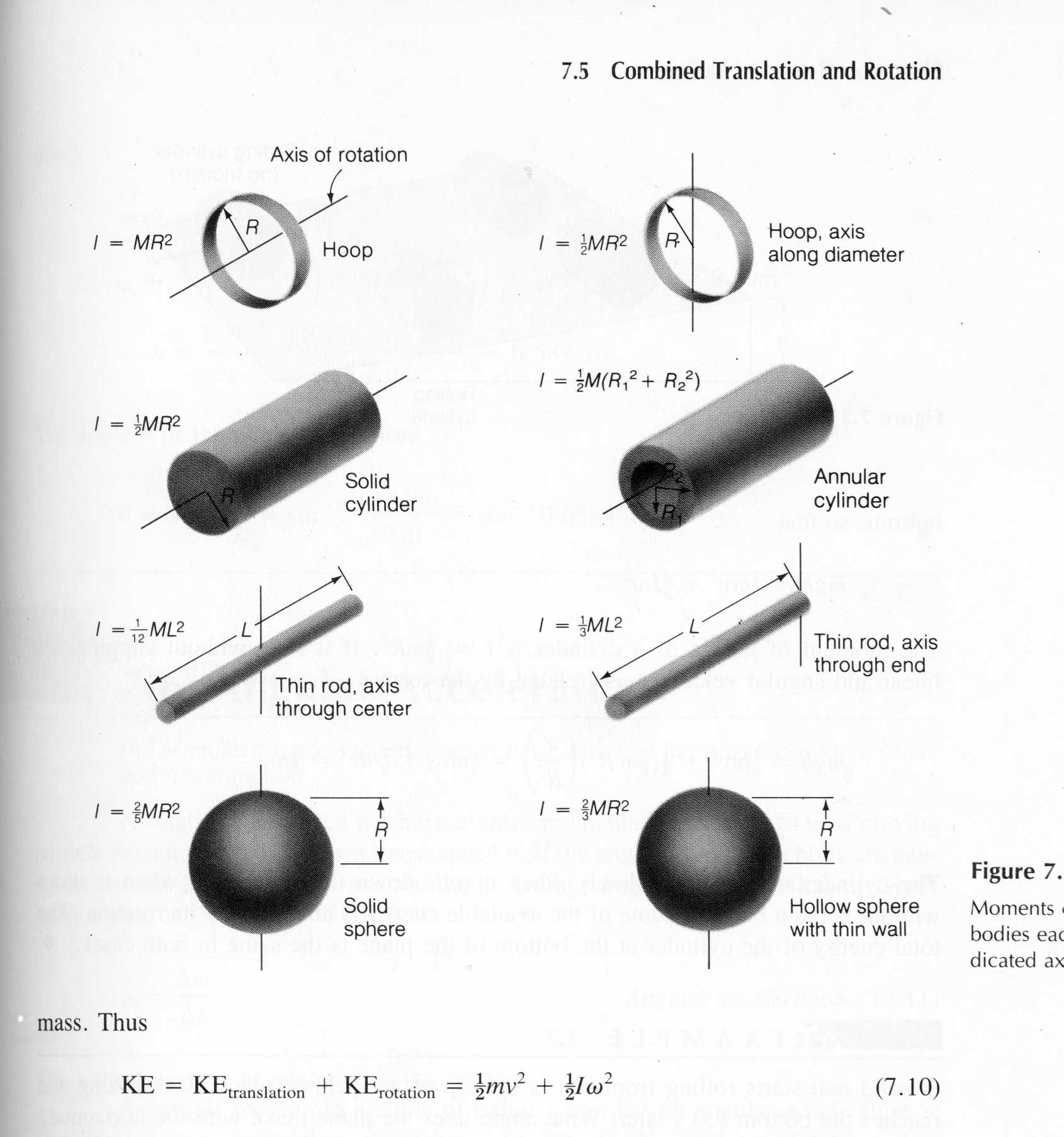
F - force (N)

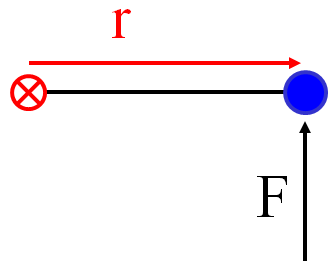
Example:

If r = 0.50 m, and F = 80 N





**Moment of Inertia:**

F = ma

Γ = Iα

Example: Three 40. kg children are sitting 1.2 m from the center of a merry-go-round that is a uniform cylinder with a mass of 240 kg and a radius of 1.5 m. What is its total moment of inertia?

Example: A string with a tension of 2.1 N is wrapped around a 5.2 kg uniform cylinder with a radius of 12 cm. What is the angular acceleration of the cylinder? How many rotations will it make before it reaches a speed of 2300 RPM from rest?

1. Find torque: 2. Find I:

3. Find α: 3. Solve suvat: