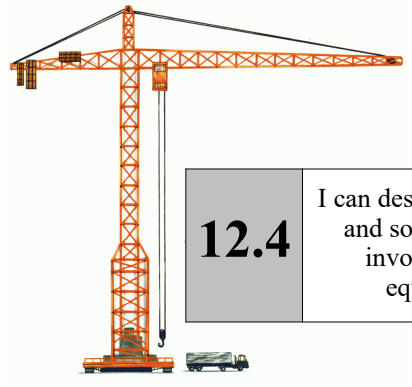
PRACTICE	LABS	TESTS
Unit 12 Problems (1-28)	Paper Car Crash & Balance Labs	Unit 12 Test Tuesday (3/26/19)

Zero Torque and Static Equilibrium



12.4	I can describe, interpret, and solve problems involving static equilibrium.

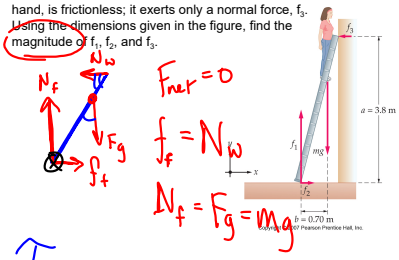
Conditions For Equilibrium

1.) Translational Equilibrium — Net Force = 0

2.) Rotational Equilibrium — Net Torque = 0

STATIC EQUILIBRIUM EXAMPLE

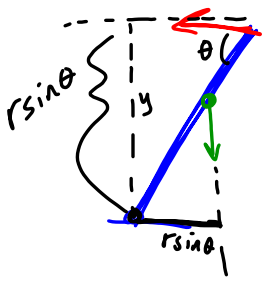
An 85 kg person stands on a lightweight ladder as show in the diagram. The floor is rough; hence it exerts both a normal force f_1, and a frictional force, f_2 on the ladder. The wall, on the other hand, is frictionless; it exerts only a normal force, f_3. Using the dimensions given in the figure, find the magnitude of f_1, f_2, and f_3.



$\tau_{net} = 0$

$\tau_{cc} = \tau_c$

$N_w r_w \sin\theta_w = F_g r_g \sin\theta_g$



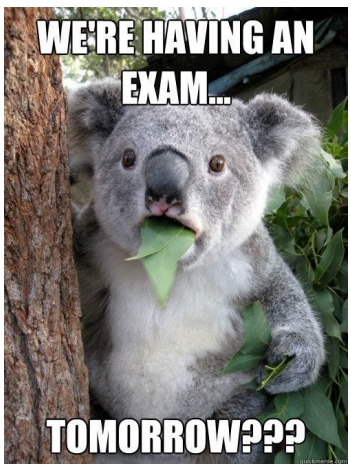
$N_w r_w \sin\theta_1 = F_g r_g \sin\theta_2$

$3.8 \quad 0.7$

$3.8 N_w = mg(0.7)$

ANNOUNCEMENTS

- Unit 12 practice problems due tomorrow
- **UNIT 12 TEST TOMORROW**
  - > You will need...
    - Calculator
    - Reference page



REFERENCE PAGE

$$\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2$$

$$\omega = \omega_0 + \alpha t$$

$$\vec{\alpha} = \frac{\sum \vec{\tau}}{I} = \frac{\vec{\tau}_{net}}{I}$$

$$\tau = r_{\perp} F = rF \sin\theta$$

$$L = I\omega$$

$$\Delta L = \tau \Delta t$$

$$K = \frac{1}{2} I\omega^2$$

F = force
I = rotational inertia
K = kinetic energy
L = angular momentum
r = radius or separation
t = time
α = angular acceleration
θ = angle
τ = torque
ω = angular speed