Reminders 11-07-07:

-Chapter 8 Homework Due 11/8, skip problems 9 and 13!!!

-Use Torque Conceptual Questions to study for next exam, key is posted.

-Fluid Conceptual Questions due Today or you can email document with answers by Tuesday.

-Take home problem in PowerPoint Due Today.

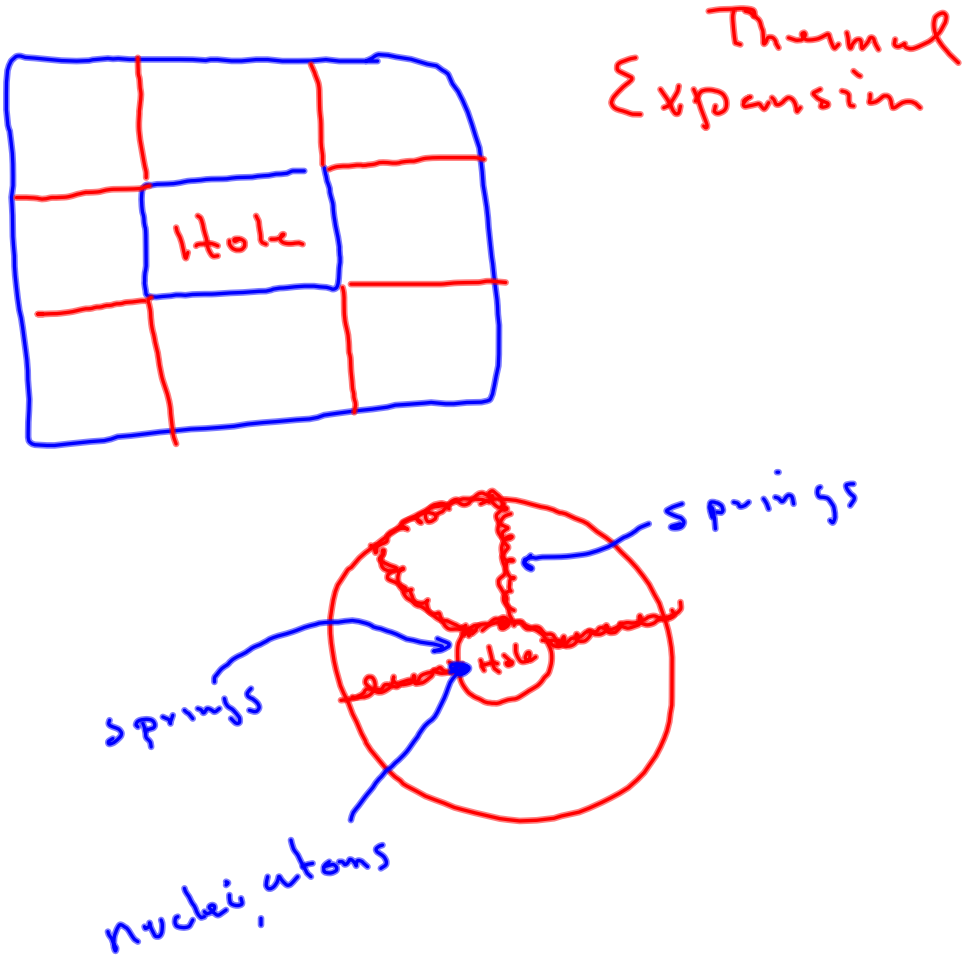
-Exam 3 Wednesday.

Objectives:

-Temperature

-Thermal Expansion

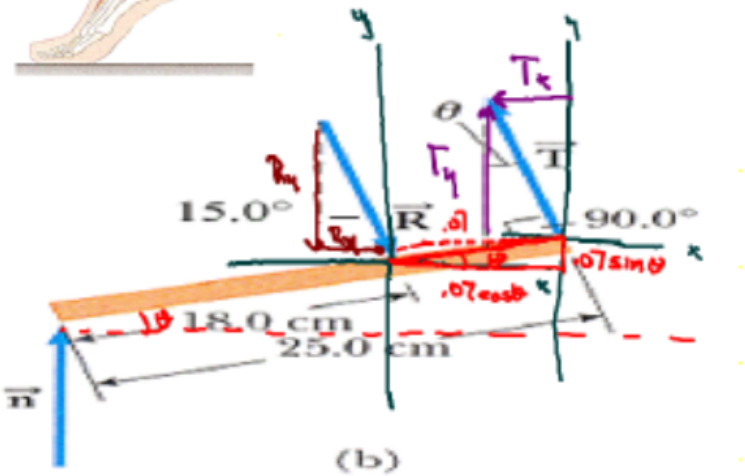
-Ideal Gases


Thermal Expansion
Hole
springs
springs
Hole
nuclei, atoms

When a person stands on tiptoe (a strenuous position), the position of the foot is as shown in Figure P8.16a. The total gravitational force on the body, $\vec{F}_g$, is supported by the force $\vec{n}$ exerted by the floor on the toes of one foot. A mechanical model of the situation is shown in Figure P8.16b, where $\vec{T}$ is the force exerted by the achilles tendon on the foot and $\vec{R}$ is the force exerted by the tibia on the foot. Find the magnitudes of $\vec{T}$, $\vec{R}$, and θ when F_g = 785 N. You may not assume that $\vec{R}$ is parallel to $\vec{T}$.

$T_x = T\sin\theta$ $R_x = R\sin 15$

$T_y = T\cos\theta$ $R_y = R\cos 15$



$\Sigma F_y = n - R\cos 15 + T\cos\theta = 0$

$\Sigma F_y = R\sin 15 - T\sin\theta = 0$

Choose pivot at T; sum torques

$-n(25)\cos\theta + R_y(.07)\cos\theta + R_x(.07)\sin\theta = 0$

$\sin\theta = \frac{R\sin 15}{T}$; $\cos\theta = \frac{R\cos 15 - n}{T}$

$[n(25) + R_y(.07)]\left[\frac{R\cos 15 - n}{T}\right] + R_x(.07)\frac{\sin 15\, R}{T} = 0$

T's cancel

$[n(26) + R\cos 15(.07)][R\cos 15 - n] + R^2\sin^2 15(.07) = 0$

Simplify then use quadratic formula to solve for R

finally use the force equations to solve for T & θ. Be careful with algebra, it's easy to make a mistake

$R = 2240$ N

$\theta = 21.2°$

Nov 6-3:01 PM