Common exam 3  
April 17th, Friday  
8:30 - 9:45 am (arrive by 8:15 am)  
Room: To Be Announced  
Bring your ID and calculator  
Exam covers B2: Ch. 6, 7 & 8 (Power NOT included)  
(Circular motion, work and energy)

To combat cheating, the provost has stipulated  
while students are taking their exams  
1) students must show their ID upon entering the classroom,  
2) there is no cell phone use,  
3) if a student leaves the room during test time, e.g. Men's/Ladies' room,  
he/she forfeits finishing the exam.

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Work and Energy

Conservative vs. Non-conservative forces

Gravitational Potential Energy

Spring force and spring potential energy

Conservation of Mechanical Energy

Work by Non-conservative force

Power
Conservation of Mechanical Energy with spring and gravity

Spring and gravity force: conservative forces

Mechanical energy:

\[ E_{\text{mech}} = K + U_g + U_s = \frac{1}{2}mv^2 + mgh + \frac{1}{2}kx^2 \]

If \( W_{\text{net}} = W_g + W_s \)

or, if gravity and spring are the only forces that do work,

\[ E_{\text{mech},f} = E_{\text{mech},i} \]

"Conservation of mechanical energy"

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A 60-kg block is dropped from rest a distance of 1.20 m onto a platform of negligible mass supported by a stiff spring. The block sticks to the platform and the block + platform move another 6 cm before their speed become equal to zero for the first time. What is the value of the spring constant?
Mechanical Energy and Non-conservative force

If both non-conservative and conservative forces do work,
(conservative forces: gravity, spring)
(non-conservative forces: Friction, Normal force, Tension, Other applied forces)
then
\[ E_{\text{mech,}f} - E_{\text{mech,}i} = \Delta E_{\text{mech}} = W_{nc} \]

(Work by non-conservative force) = (Change in mech. E.)

Example

Find the work done by friction force.
Height=0

Find the initial and final mechanical energy.
Find the work done by friction force.
I drop a 60-g golf ball from 2.0 m high. It rebounds to 1.5 m. How much energy is lost?