A stick of dynamite explodes.
Is energy conserved in this situation?

A) Yes B) No

Spring 2014
PHYS-2010
Guest Lecturer:
Dr. Michael Dubson

Lecture 27

Announcements:

- **CAPA Set # 9** due Tues
- Written HW Fri.
- Friday is last day to drop a course.

- There is a prelab this week!

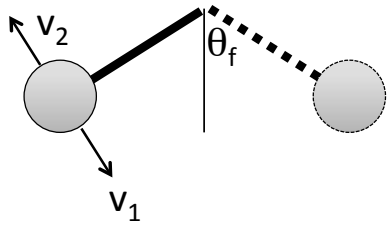
- Start reading **Giancoli Ch 7**. (7.1- .3)

You can "launch" a pendulum by either starting it with initial velocity $\mathbf{v}_1$ "down" or $\mathbf{v}_2 = -\mathbf{v}_1$ (i.e. "launch it up" to start off)

Which launch brings it to a larger final angle?

A) Higher with $\mathbf{v}_1$ B) Higher with $\mathbf{v}_2=-\mathbf{v}_1$

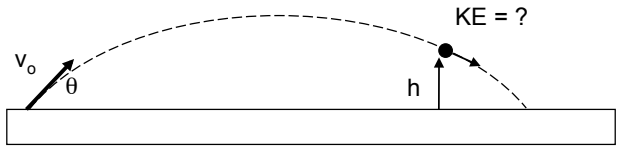
C) No difference!



Two marbles, one twice as massive as the other, are dropped to the ground from the roof of a building. (Assume no air resistance.) Just before hitting the ground, the heavier marble has..

A) As much KE as the lighter marble
B) Twice as much KE as the lighter marble
C) Half as much KE as the lighter marble
D) Four times as much KE as the lighter marble
E) Impossible to determine

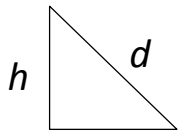
A projectile is launched (speed v_0, angle θ)
What is its KE on the way DOWN,
at height h above the ground?



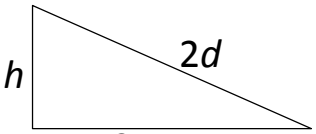
A) ½ mv_0^2 + mgh
B) ½ mv_0^2 – mgh
C) mgh
D) mgh – ½ mv_0^2
E) other…

You are pushing boxes up two different hills.
Path #2 is twice as long but less steep.
Ignore friction, and assume the boxes move with constant speed. How much more gravitational potential energy is gained if you take path #2?

A) no difference B) twice as much
C) 4x D) half as much E) It depends!!



#1



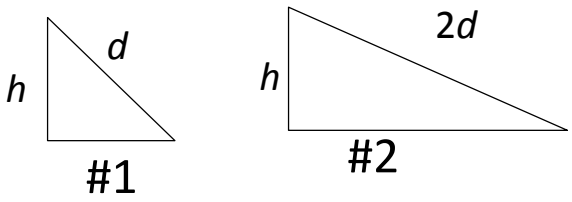
#2

Conservative forces

Now assume there is *friction.*
How much more gravitational potential energy is gained if you take the longer path?

A) no difference B) twice as much

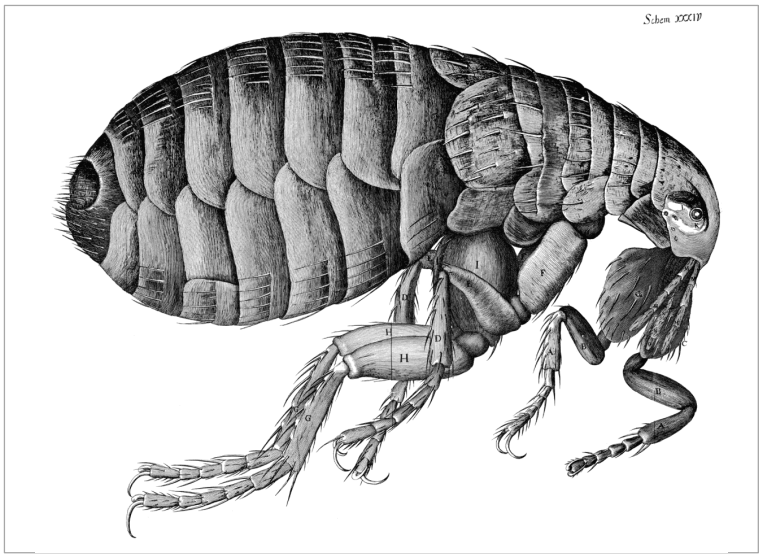
C) 4x D) half as much E) It depends!!



Springs

Force = - kx

k = "spring constant"
units = N/m
x = displacement of spring


Schem XXXIV

Springs

Elastic potential energy
(stretching or compressing by "x")

$PE = \frac{1}{2} k x^2$

You hang a mass m from a spring, it stretches by distance x (and stores some potential energy).
If you hang a mass 2m from the same spring, it stores …

A) The same amount of energy

B) Double the amount of energy

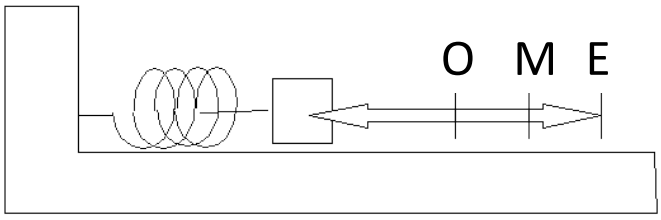
C) Half the amount of energy

D) Four times the amount of energy

E) Something else/???

A mass m oscillates on a frictionless surface by a spring. Position "O" is the relaxed (unstretched) position of the spring.

At which point is the FORCE on the mass max?

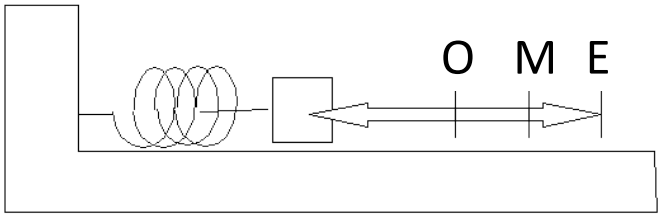


A) 0 B) M C) E

D) More than one/Other/…??

A mass m oscillates on a frictionless surface by a spring. Position "O" is the relaxed (unstretched) position of the spring.

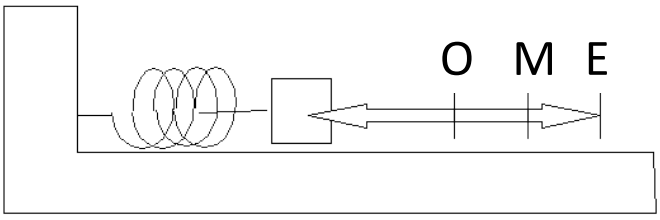
At which point is acceleration of the mass max?



A) 0 B) M C) E

D) More than one…

A mass m oscillates on a frictionless surface by a spring. Position "O" is the relaxed (unstretched) position of the spring.
At which point is potential energy max?



A) 0 B) M C) E

D) More than one…

Power

$$\bar{P} = \text{average power} = \frac{\text{work}}{\text{time}}$$

Elevator #1 can lift mass m up distance h in time t.
Its power output is P_1.

Elevator #2 can lift mass m up distance 2h in time 2t.
What is P_2?

A) P_1 B) $2P_1$ C) $4P_1$
D) Something else

If you leave a 100 W bulb on all day,
how much does it cost?
In CO, Excel charges about 10 cents per kW*hr.

A) Less than a penny
B) A couple of cents
C) About a quarter
D) Over $2
E) What's a kw*hr again?