**Reminders 03-11-10:**

-Quiz 7 on Power Work-Kinetic Energy Thm and Conservation of Energy in Recitation Next Week.

-POW 6 Due Today POW 7 Due Tuesday

-Short Quiz Thursday on Energy Level Diagrams.

**Objectives:**

-Conservation of Energy and External Forces

-Energy Level Diagrams

Review: Cons. Energy

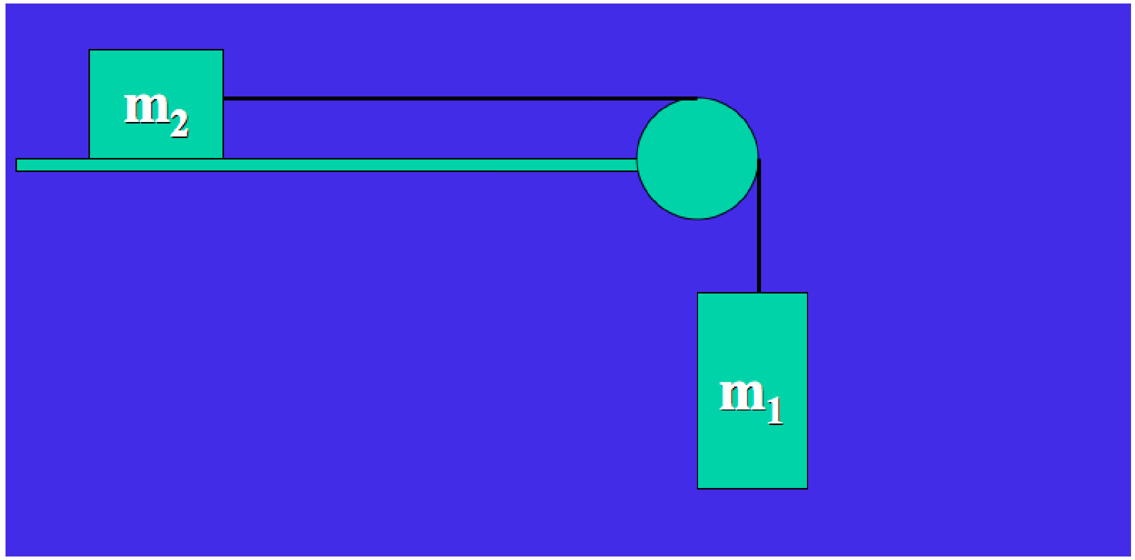
$$\Delta U + \Delta K = 0$$

comes from

$$W_c = \Delta K = -\Delta U$$

$$E_i = E_f$$

only no work is done by Non-conservative forces




$m_1 \,\&\, m_2 \sim 10$

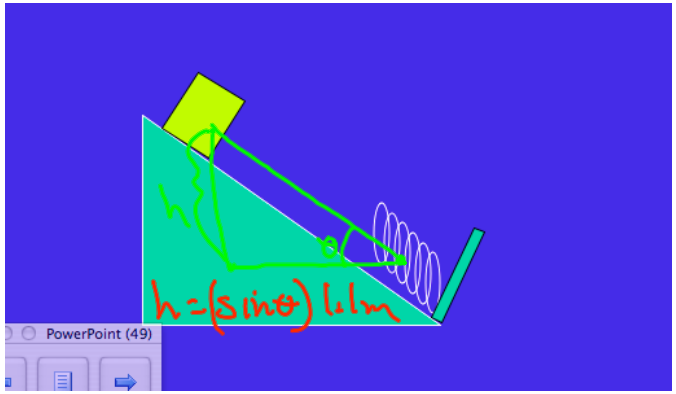
$$W_{nc} = \Delta U + \Delta K$$

$$-\mu_k m_2 g (.5\,m) = -m_1 g(.5\,m) + \frac{1}{2}(m_1 + m_2) V_f^2$$

$$V_f = \sqrt{\frac{2 m_1 g (.5) - 2 m_2 g (.5\,m)\mu_k}{m_1 + m_2}}$$

$$= 1.9\,m/s$$

$$V_f = \sqrt{2(.5)\left[g \frac{(m_1 - \mu m_2)}{m_1 + m_2}\right]}$$




$m = $ kg

$\theta = 30$

$\mu_k = 0.2$

spring compressed 0.1m

distance to spring 1.0m

$k = 100$ N/m

Want v.

$$W_{nc} = \Delta U + \Delta K$$

$$\Delta U = -mg\sin\theta(1.1m) + \frac{1}{2}k(0.1)^2$$

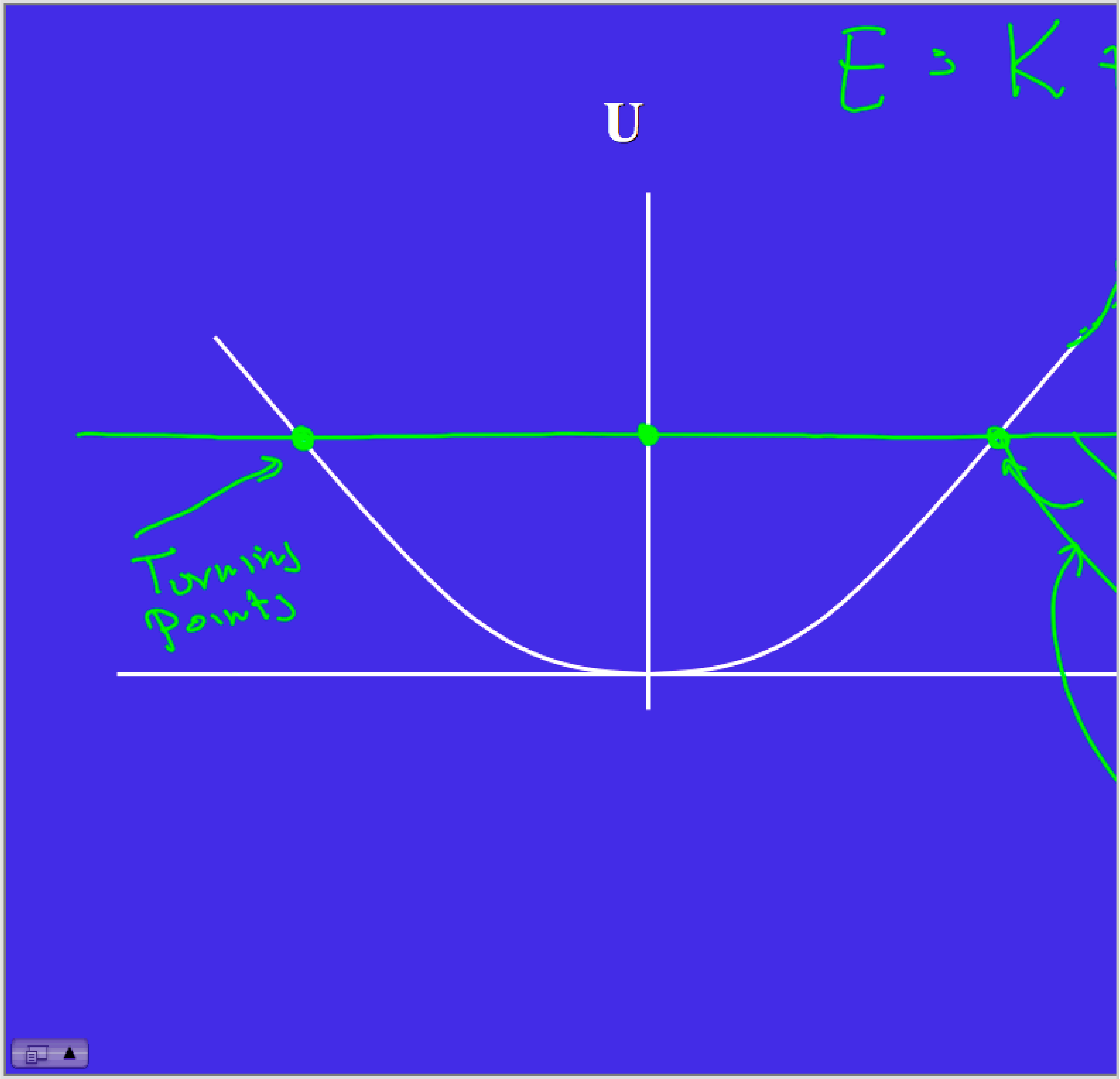
$$W_{nc} = -\mu_k mg\cos\theta\,(1.1)$$

$$-\mu_k mg\cos\theta\,(1.1m) = -mg\sin\theta\,(1.1) + \frac{1}{2}k(0.1)^2 + \frac{1}{2}mv_f^2$$

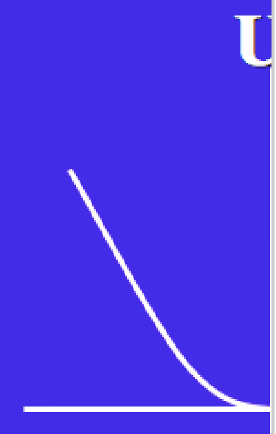
$$mg\sin\theta\,(1.1) - \mu mg\cos\theta(1.1) - \frac{1}{2}k(0.1)^2 = \frac{1}{2}mv^2$$

$$v = \sqrt{2\left[\frac{mg\sin\theta(1.1) - \mu_k mg\cos\theta(1.1) - \frac{1}{2}k(0.1)^2}{m}\right]}$$

$$= 1.7 \text{ m/s}$$


U
E = K
Turning points

**What does the slope of a tangent line represent?**




**Where is a stable equilibrium point?**

$$dW = \vec{F} \cdot d\vec{S} = -dU$$

**Recall:**

$$dU = -\vec{F} \cdot d\vec{S}$$

$$F = -\frac{dU}{ds}$$

$$\frac{dU}{ds}$$

# Example (Textbook Problem):

A particle moves along a line where the potential en
depends on position as shown in the graph below
large r, U = 2 J.

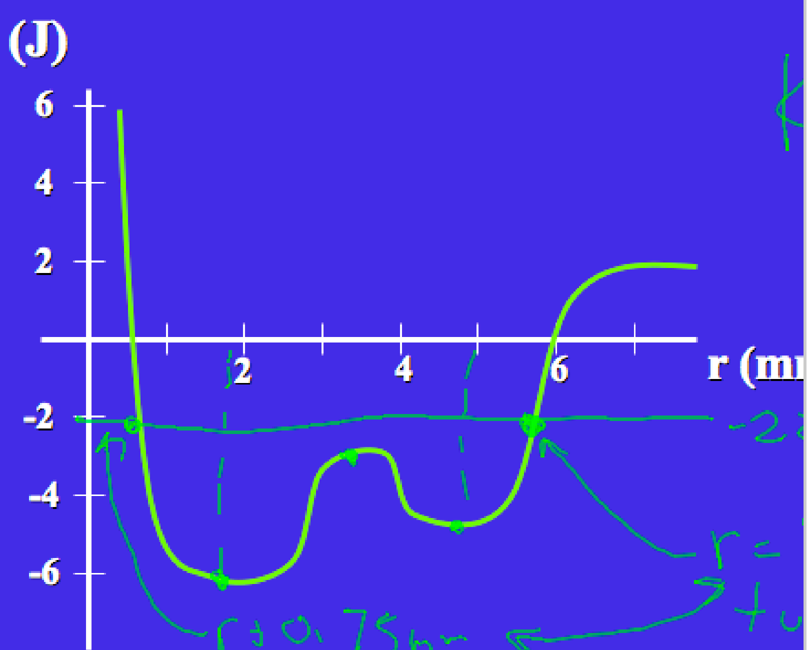
a) Where and what type are the equilibrium points
b) For what range of total energies will the particle
c) If the particle has a total energy E = - 2 J, where
turning points (is the motion **bound** or **free**) and
maximum KE?

Stable eq

$\frac{d^2U}{dx^2} > 0$

unstable

$\frac{d^2U}{dx^2} < 0$

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