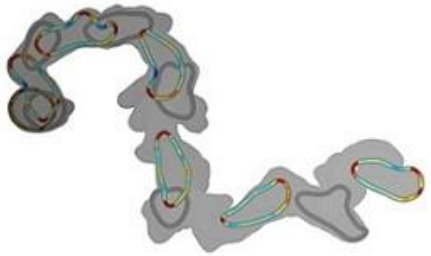
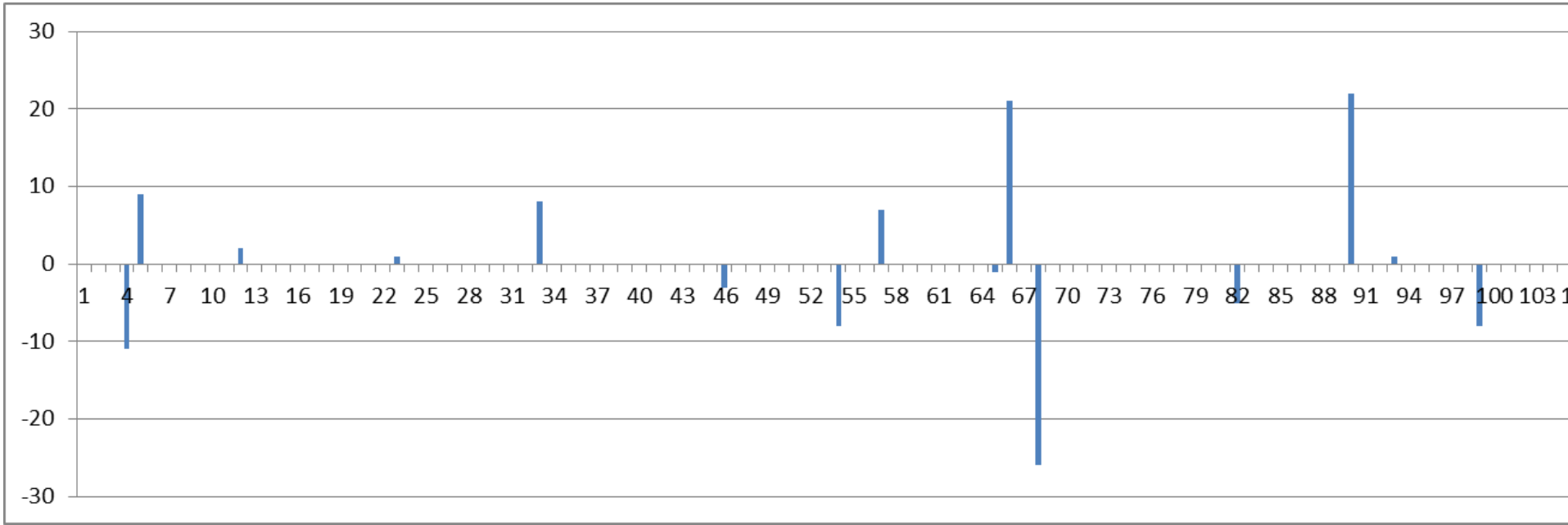
Physics 131- Fundamentals of Physics for Biologists I



Work –Energy Theorem

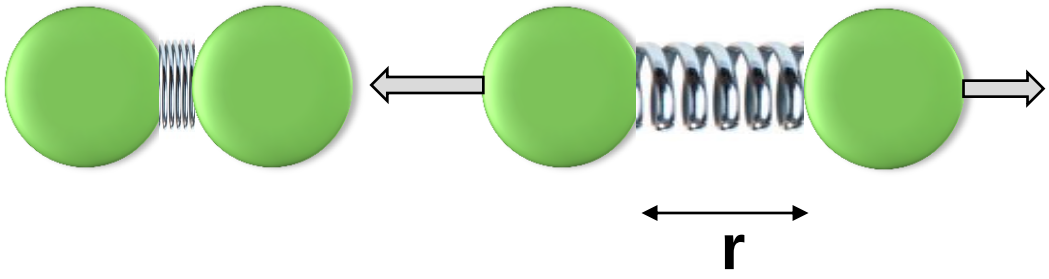
Potential Energy

Makeup Midterm: Average 1 point gain

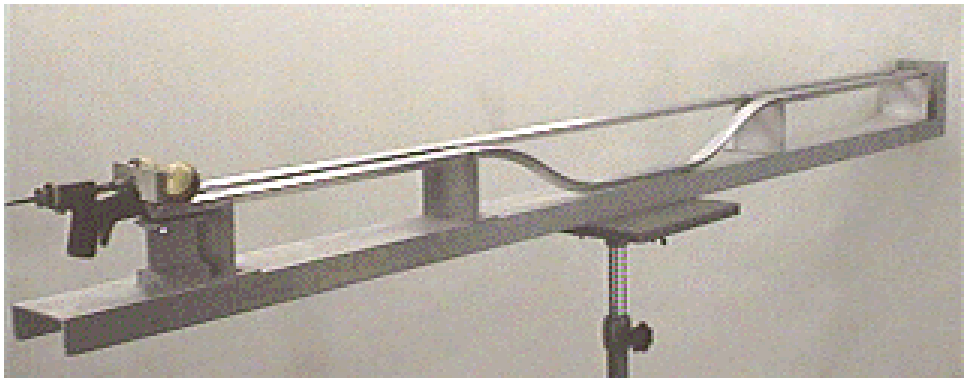


Comparing the “before” state at rest with a compressed spring and the “after” state with moving balls, which of the following is true

1. The momentum of the system is the same before and after
2. The total energy of the system is the same before and after
3. Both balls have the same momentum and energy in the “after” state
4. 1 &2
5. 1&3
6. 2&3
7. All

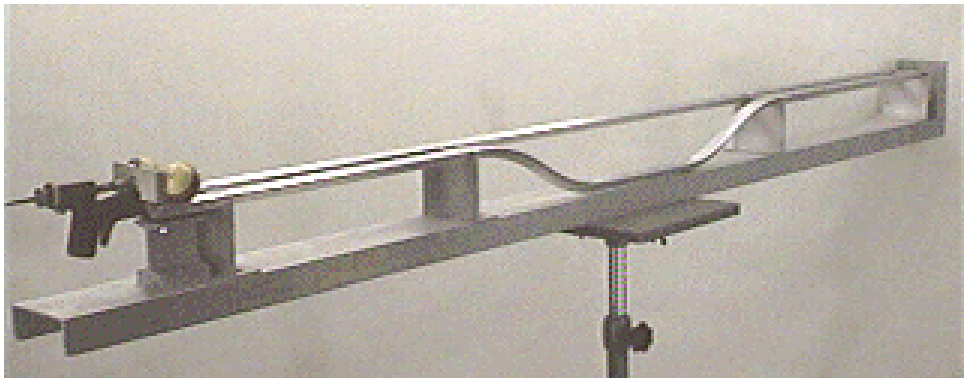


Both balls are launched at the same speed. Which one moves faster at the end?



1. The one on the straight track.
2. The one on the dipped track.
3. They have the same speed.

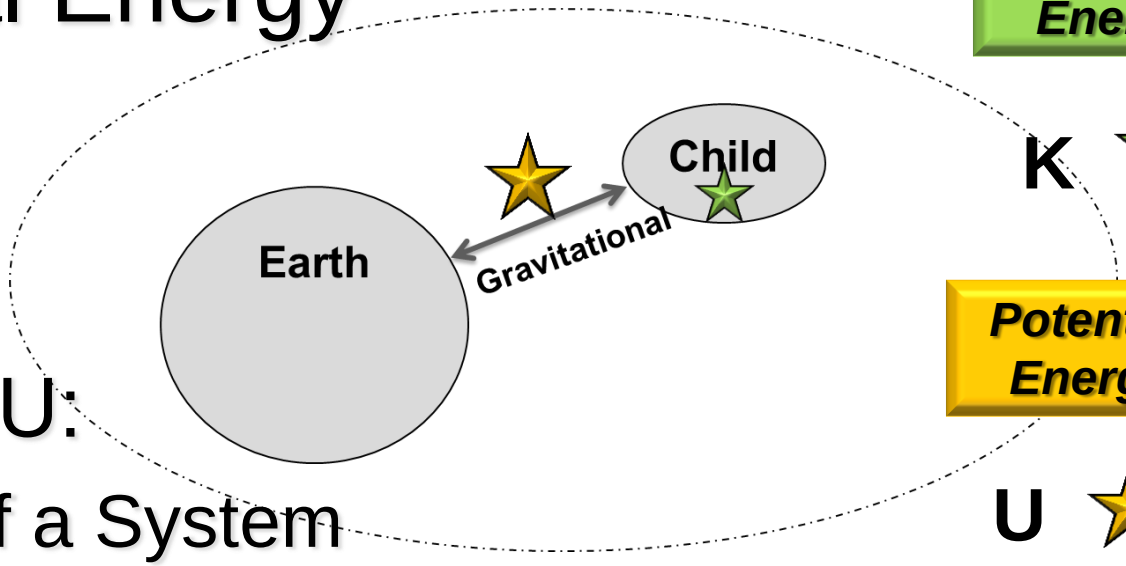
Both balls are launched at the same speed. Which one gets to the end first?



1. The one on the straight track.
2. The one on the dipped track.
3. They are the same.

Whiteboard, TA & LA

Foothold Principle: Potential Energy



Potential energy U:

- Internal energy of a System
- Related to interactions (forces) within the System
- Can turn into kinetic energy (or other energy) when the objects in the system move
- Stored in INTERACTION (line between objects)
- **The object that moves more gets/supplies more of the potential energy!**

1. Draw System Schema for Before and After state
2. Identify main Energies in System Schema
3. Define a system boundary so that mechanical energy is conserved in the system

Two Balls with Spring

Ball dropped on Board

Conservation of Mechanical Energy

- Total of kinetic plus potential energy are conserved if resistive forces can be ignored

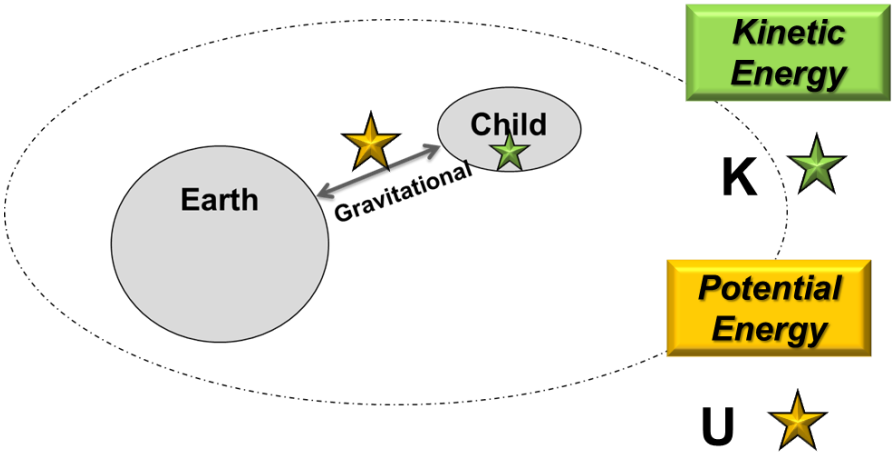
Mathematical Representation

$$\Delta(\tfrac{1}{2}mv^2) = \Delta U$$

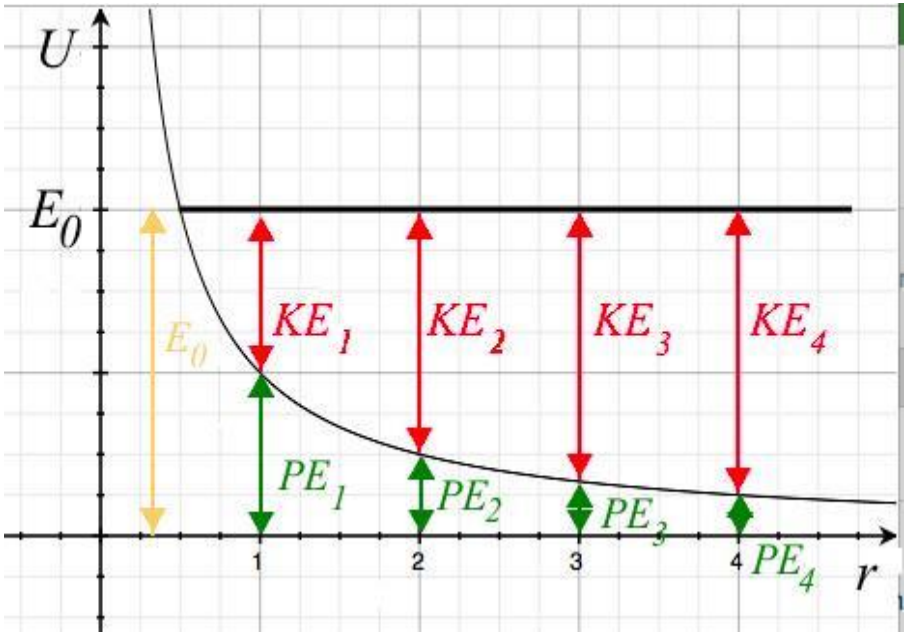
$$\Delta(\tfrac{1}{2}mv^2 + U) = 0$$

$$\tfrac{1}{2}mv^2_{initial} + U_{initial} = \tfrac{1}{2}mv^2_{final} + U_{final}$$

Graphical Representation I

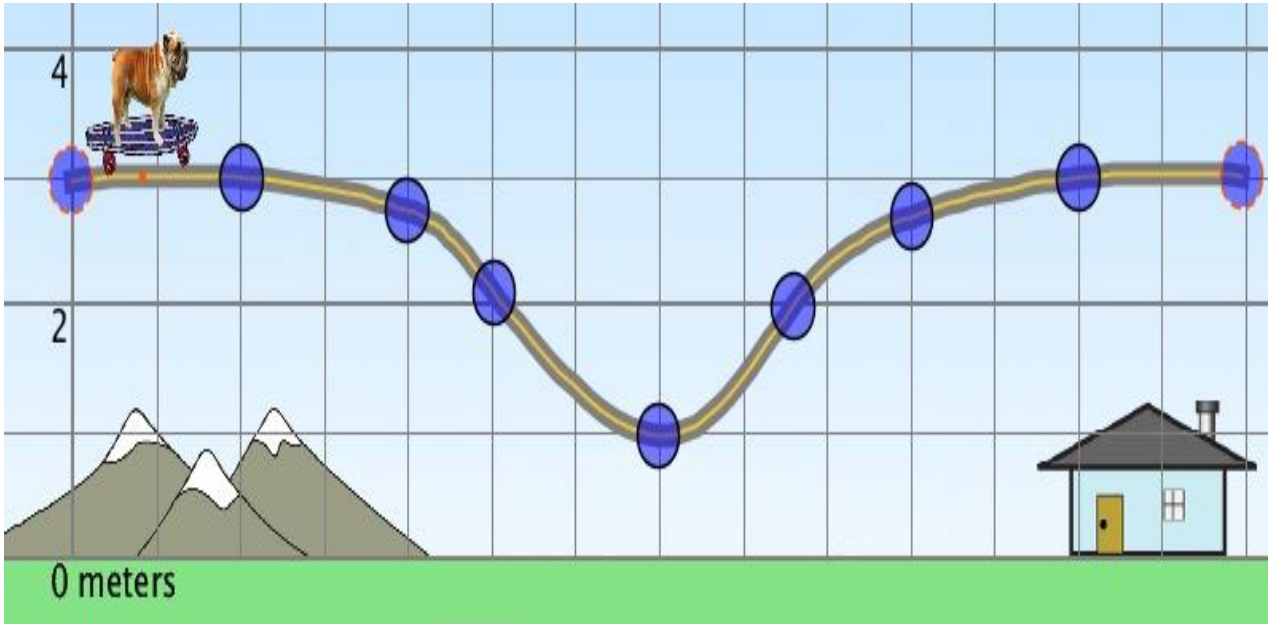


Graphical Representation II



A bulldog on a skateboard is moving very slowly when he encounters a 2 m dip. How fast will he be going when he is at the bottom of the dip? The bulldog and skateboard combined have a mass of 20 kg.
Friction and air drag can be ignored.

1. Very slowly
2. About 2 m/s
3. About 6 m/s
4. You can't tell from the information given.
5. Other



Whiteboard, TA & LA