

Physics Education

Laboratory

Lecture 08

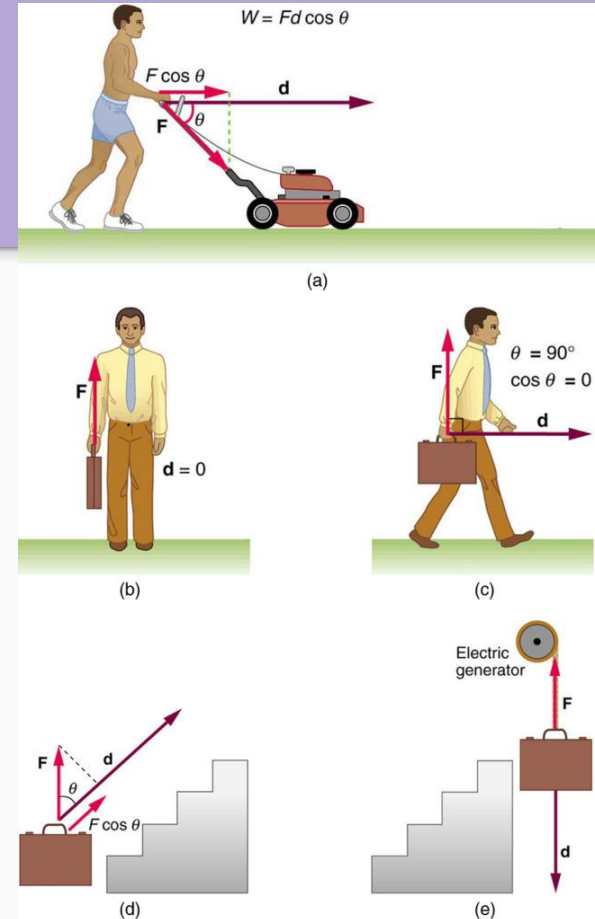
PCK for Dynamics / Energy

Francesco Longo - 18/10/23



key concepts in Work / Energy

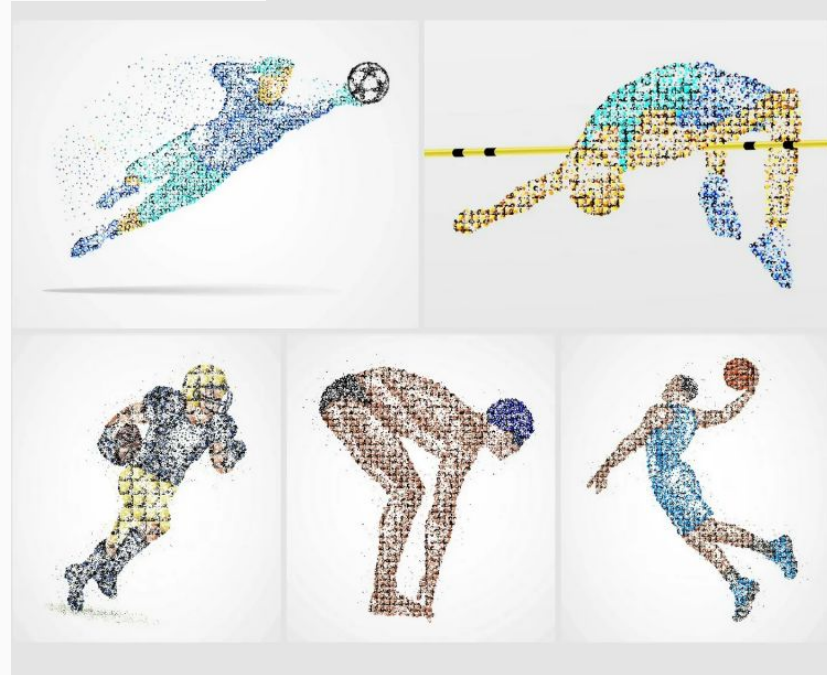
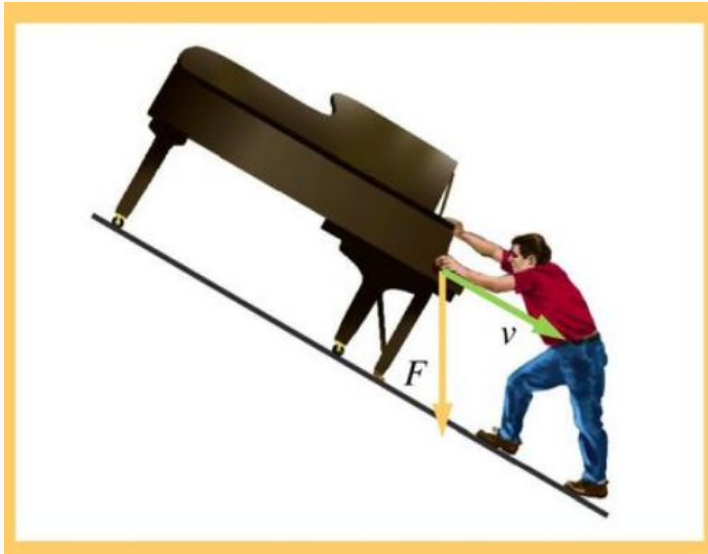
- The concept of Work
- Positive or “Negative” Work
- Kinetic Energy
- Conservative forces and Dissipative forces
- Friction / Air resistance
- Potential Energy
- Power
- Integral along a path ...



key concepts in Work / Energy

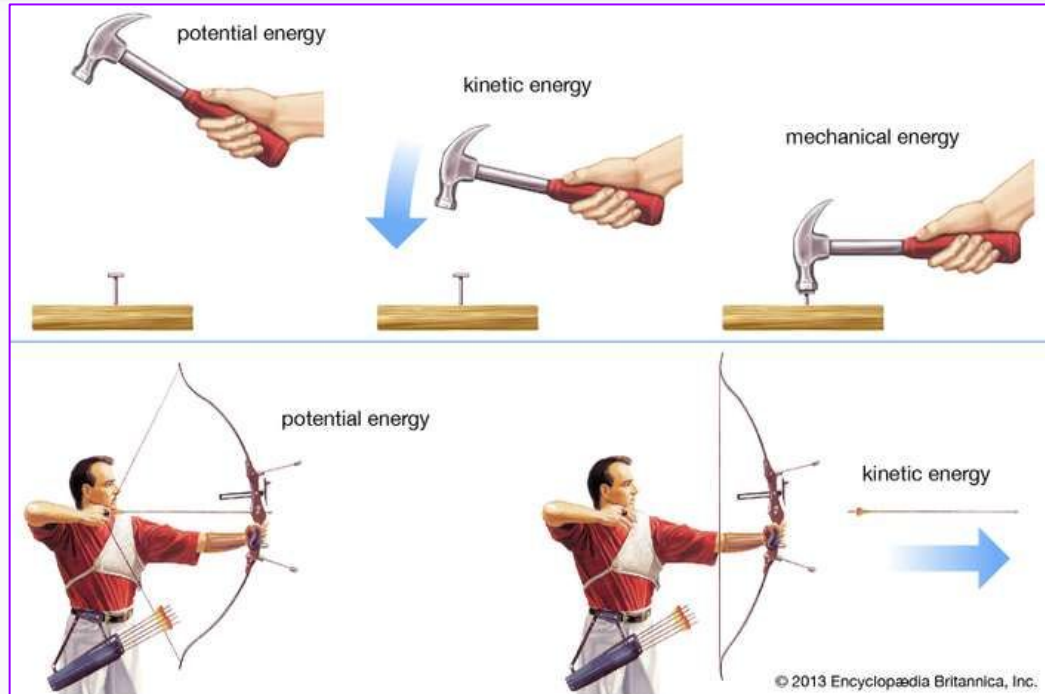
FORCE AND POWER

- The power ...



key concepts in Work / Energy

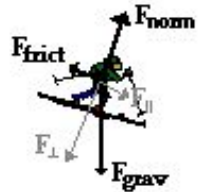
- Conservation of Energy



key concepts in Work / Energy

- Not conservative forces

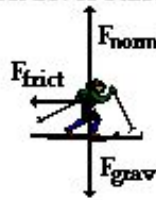
On Incline



$$F_{\text{frict}} = \mu_1 \cdot F_{\text{norm}}$$

$$F_{\text{frict}} = \mu_1 \cdot m \cdot g \cdot \cos\Theta$$

On Level Surface

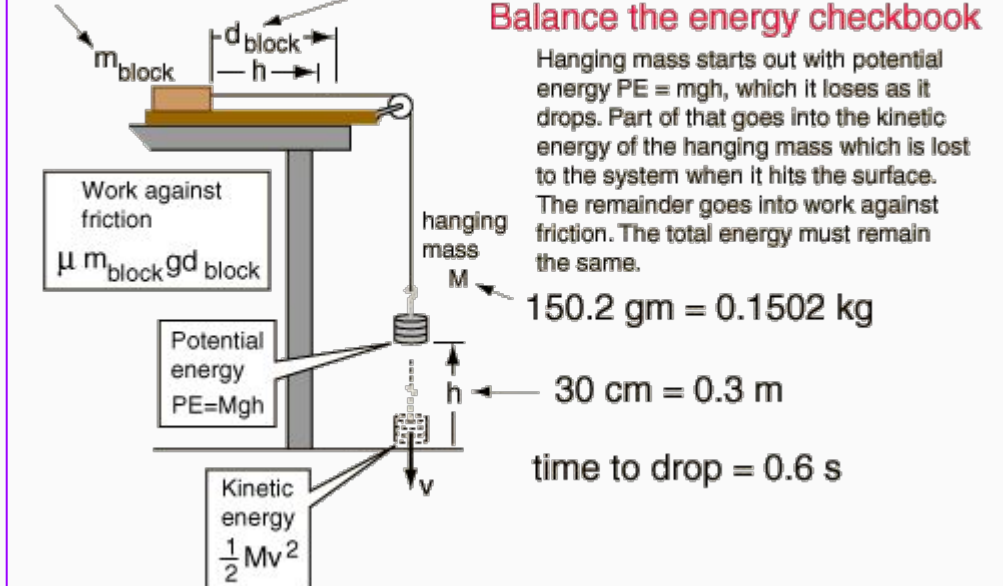


$$F_{\text{frict}} = \mu_2 \cdot F_{\text{norm}}$$

$$F_{\text{frict}} = \mu_2 \cdot m \cdot g$$

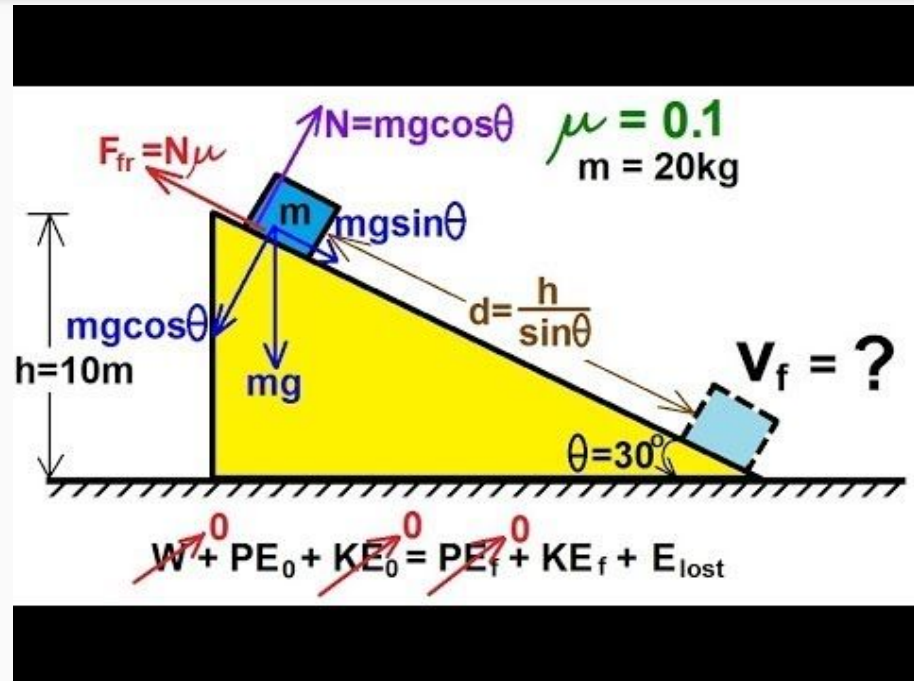
274 gm = .274 kg

58.2 cm = 0.582 m



key concepts in Work / Energy

- Dynamics “problems” ...



key concepts in Work / Energy

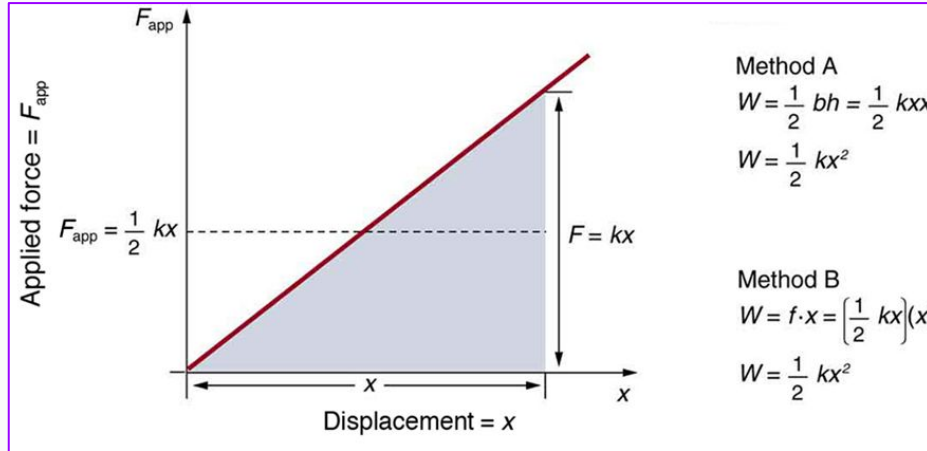
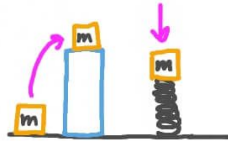
- Potential Energy

Elastic Potential Energy

- A stretched or compressed spring has **potential energy**.

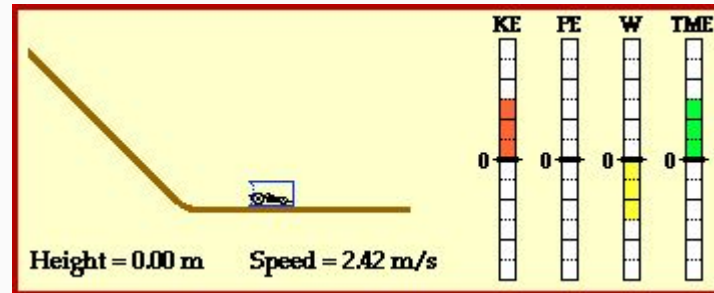
- $PE_s = \frac{1}{2} kx^2$

- Elastic PE is like gravitational PE

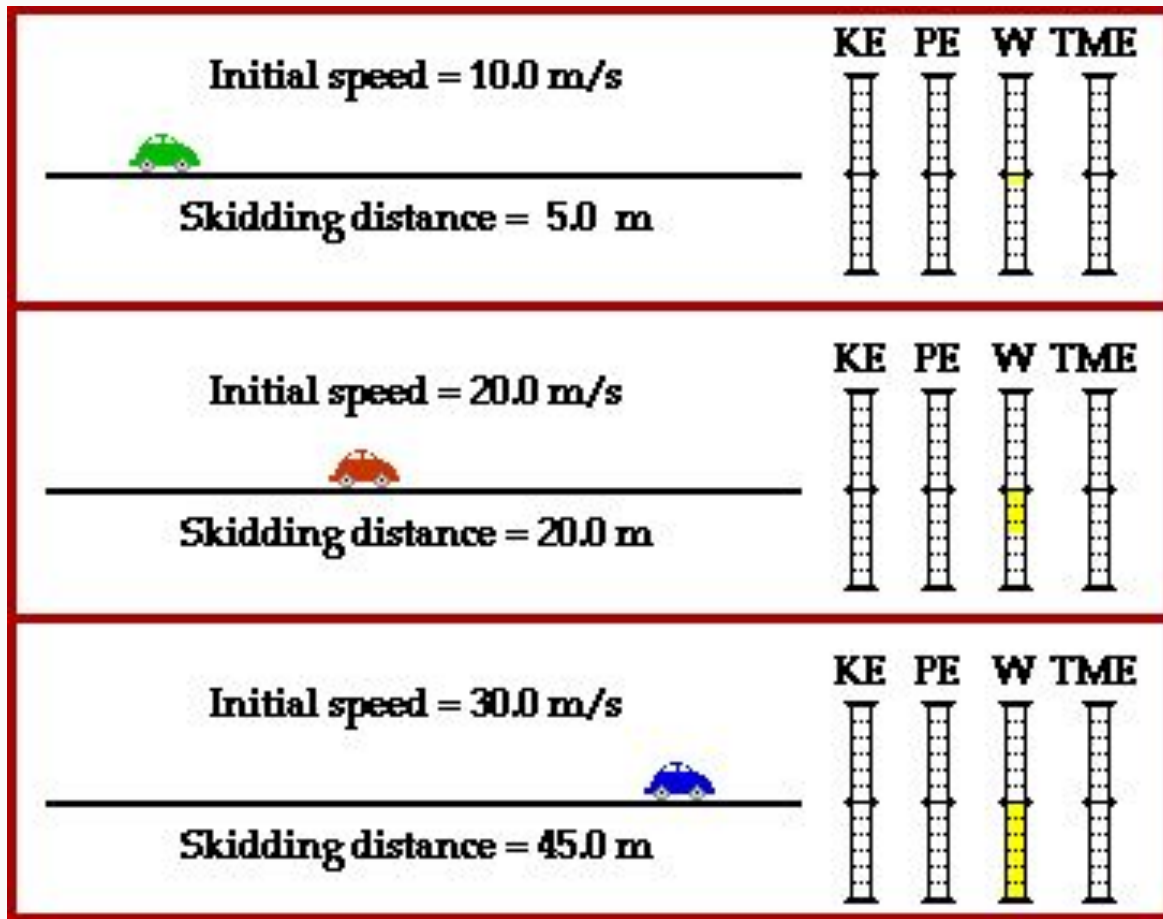


Qualitative work – energy bar charts that serve the same role for analyzing work – energy processes as motion diagrams and force diagrams serve when analyzing kinematics and dynamics problems.

The use of these bar charts helps students think more about the physics of a work – energy process rather than relying on formula-centered techniques that lack qualitative understanding.



View animation: <https://www.physicsclassroom.com/mmedia/energy/hw.cfm>



View animation: <https://www.physicsclassroom.com/mmedia/energy/cs.cfm>