

Mechanical Energy

Lesson Notes

Learning Outcomes

- What is the significance of the term mechanical energy?
- How can the total amount of mechanical energy be determined?

Work Changes Energy

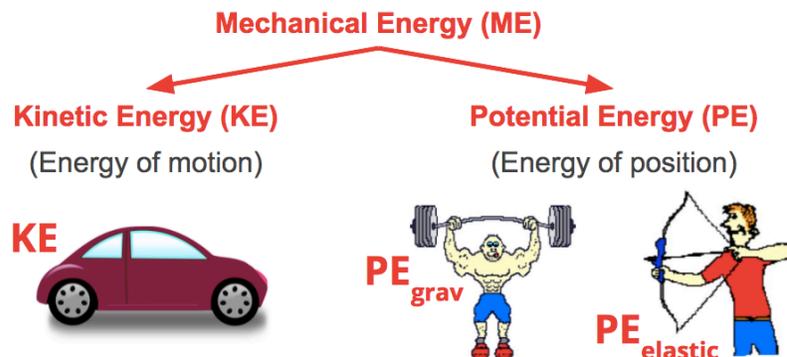
Work occurs whenever a force is exerted with or against the motion of an object. The object upon which work is done often experiences a gain (for + work) or a loss (for - work) of energy.

Examples:

- A weightlifter applies a force to lift the weights upward, **adding potential energy** to the weights.
- A pitcher applies a force to a baseball to accelerate it from rest, **adding kinetic energy** to the ball.

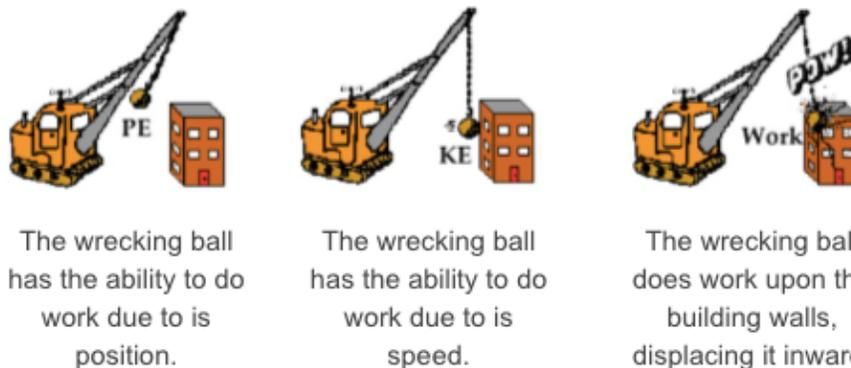
Mechanical Energy

Mechanical energy is the energy possessed by an object as a result of its motion or its position.



The Ability to Do Work

Objects with **mechanical energy** have the ability to do work - to apply a force to another object to cause a change in energy of that object



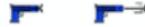
Any object with mechanical energy (KE or PE or both) has the ability to do work on other objects.



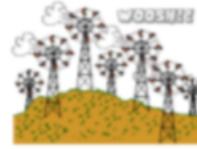
The **KE** of the hammer gives it the ability to do work on the nail.



The **KE** of the ball gives it the ability to do work on the pins.



The **PE** of the springs gives them the ability to do work on the dart.



The **KE** of the moving air gives it the ability to do work on the blades of the windmill.

Total Mechanical Energy

- The total amount of mechanical energy (TME) is the sum of the kinetic energy (KE) and the potential energy (PE).
- **$TME = KE + PE$**
- TME is a quantity that we can “keep track of.”
- By keeping track of the total amount of mechanical energy, we can make predictions about how fast an object will move, how high an object will go, and how far an object will skid.

