Work-Energy Theorem: Compare W to ΔE

TOPICS AND FILES

Mechanics Topic

Work-energy theorem, conservation of energy

Capstone File

32 Work and Energy.cap

EQUIPMENT LIST

Qty	Items	Part Numbers
1	PASCO Interface (for two sensors)	
1	Force Sensor	CI-6746
1	Photogate/Pulley System	ME-6838
1	1.2 m Dynamics Track	ME-9435A
1	Dynamics Cart	ME-9430
1	Balance	SE-8723
1	Mass and Hanger Set	ME-9348
1	Universal Table Clamp	ME-9376B
1.2 m	String	SE-8050
1	Meter Stick	

INTRODUCTION

The purpose of this lab is to compare the work done on an object to the change in kinetic energy of the object. Use the force sensor to measure the force applied to the cart. Use the photogate/pulley system to measure the motion of the cart as it is pulled by the weight of the hanging mass. Use *Capstone* to record and display the force, motion, work done, and the calculation of kinetic energy. Compare the work done to the change of kinetic energy.

BACKGROUND

For an object with mass m that experiences a net force F_{net} over a distance d that is parallel to the net force, the equation below shows the work done.

$$W = F_{\text{net}} d \tag{1}$$

If the work changes the object's vertical position, the object's gravitational potential energy changes. However, if the work changes only the object's speed, the object's kinetic energy changes as shown in the second equation where W is the work, v_{f} is the final speed of the object and v_{i} is the initial speed of the object.

$$W = \Delta\text{KE} = \text{KE}_{\text{f}} - \text{KE}_{\text{i}} = \frac{1}{2} m v_{\text{f}}^2 - \frac{1}{2} m v_{\text{i}}^2 \tag{2}$$

