

LAB 05 - WORK ENERGY

1 Objective

1-2 lines

2 Theory

Detail the theory of the materials relevant to the experiments in this lab.

3 Experimental data

NO PRINT OUT.

3.1 Section 3.6 - Does $W = \Delta KE$? Analysis

1) Take 5 different measurements - Give the value of v_i , v_f and calculate ΔKE for each measurements. Finally, report the value of the integration also for each measurements.

run number	v_i	v_f	ΔKE	Integration (W)
1				
2				
3				
4				
5				

2) For ΔKE and W (integration), calculate the respective average value: $\Delta \tilde{K}E$ and \tilde{W} .

3) Calculate $\sigma_{\Delta \tilde{K}E}$ and $\sigma_{\tilde{W}}$ the standard deviation associated with ΔKE and W. Write your final result in the following format:

$$\Delta KE = \Delta \tilde{K}E \pm \sigma_{\Delta \tilde{K}E} \text{ and,}$$

$$W = \tilde{W} \pm \sigma_{\tilde{W}}.$$

4) Compare the change of kinetic energy and the work done within the range of uncertainty.

3.2 Section 4.2- $W = \Delta KE$ Applied to a system - Analysis

Question 1: Explain the minus sign before the T in the expression of the work done on M_1 : $(M_1g - T)(x_f - x_i)$?

Question 2: Explain clearly why T does not appear in the expression of the work done on the system $M_1g(x_f - x_i)$.

3.3 Section 4.5- $W = \Delta KE$ Applied to a system - Analysis

Summarize your data in a table for $M_1 = 50\text{g}$:

run	x_i	x_f	v_i	v_f	$W(M_1)$	$\Delta KE(M_1)$	$W(M_2)$	$\Delta KE(M_2)$	$W(\text{system})$	$\Delta KE(\text{system})$
1										
2										
3										
4										
5										

Calculate the average $\Delta \tilde{K}E$ and average \tilde{W} of M_1 , M_2 and of the system.

Calculate $\sigma_{\Delta KE}$ and σ_W , the standard deviation of ΔKE and W for M_1 , M_2 and the system.

For M_1 , M_2 and the system, write your final result in the following format:

$\Delta KE = \Delta \tilde{K}E \pm \sigma_{\Delta \tilde{K}E}$ and,

$W = \tilde{W} \pm \sigma_{\tilde{W}}$.

Compare ΔKE and W within the range of uncertainty for M_1 , M_2 and the system.

Question4: Is the velocity vs distance curve a straight line? If not, what do you think it is?

4 Sources of Error

4.1 Section 3.7-Repeat

Question4: Discuss random errors which contribute to the scatter of your results from run to run, and systematic errors which will affect all your runs in the same way.

5 Conclusion