Date of Lab_____ Date of Submission 1/9

Laboratory Report

Title

Homeroom	Section	Name	
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Summary

In this experiment I was able to deeply understand the law of conservation of mechanical energy. Although there were some errors, it was fun to be able to read from the data that the potential was firmly changing to the kinetic energy. However, I think that the data of experimental results that my group has is very few. I think that it was a better experiment if I was able to take more detailed data.

· Meet a deadline · Write logically · Write clearly · Write with your own words

Teacher's Comments

Clear and beautiful tables and figures.

1	2	3	4	5	6	7	8	9
Due	Summary	Intro.	Method.	Results	Table/Fig.	Discussion	Clearness	General

* Use this form as a cover sheet.
* Submit your reports by the seventh day after your lab.

2. Introduction

Objective

Investigate whether the mechanical energy is conserved in the motion of (1) pendulum and (2) spring

Theory

The sum of kinetic energy (K) and potential energy (U) is always constant, which means that the total energy (=mechanical energy (E)) of before and after is same.
$E=K+U=K'+U'$

Hypothesis

(1) In the motion of the pendulum, the potential energy at the maximum height is equal to the kinetic energy (+the potential energy) at the minimum height.
(2) The elastic potential energy of a spring is equal to the kinetic energy of a object attached to the spring.

3. Experimental

Apparatus

Board, Metal, stick,weight, String, speed meter(BeeSpi V), graph paper, Hooke's Law Apparatus, Spring

Method

Exp1)

1. Measure the mass of weight
2. Set up wooden board with metal stick at the top right hand and put the graph paper on the board
3. Tie string on the metal stick and and make circle that we can hang the weight
4. Hang the weight to the string and make sure that the string is not too long that the weight will not hit the ground
5. Set the speed meter at the point where the weight takes it lowest point (ho)
6. Lift up the weight and measure the height (hl)
7. Release the weight and read the value shown by speed meter
8. Repeat this process by changing the height (hl)

Exp2)

1. Set up all Hooke's Law apparatus
2. Add weight on the string and measure the elongation
3. Increase the mass of weight and record its data
4. Draw a graph and determine the spring constant

Exp3)

1. Set up the C-cramp on the edge of the table
2. Set the ruler on the table
3. Connect a spring and weight with string
4. Let the center of weight place on zero when the spring is at natural length
5. Start speed meter and release the weight and read the value

4. Result

Table 1 : Exp 1

	Maximum Height		Minimum Height					(A-B)/A×100
	h_1	$A=mgh_1$	h_0	v	mgh_0	$1/2mv^2$	$B=mgh_0+1/2mv^2$	
Exp	m	J	m	m/s	J	J	J	%
1	0.298	0.0964	0.078	2.14	0.0252	0.0756	0.101	4.56
2	0.258	0.0834	0.078	1.87	0.0252	0.0577	0.0829	0.645
3	0.208	0.0673	0.078	1.59	0.0252	0.0417	0.0669	0.526
4	0.158	0.0511	0.078	1.34	0.0252	0.0296	0.0548	7.30

Graph 1 Exp 1 Relationship between maximum height of energy and Minimum height of energy

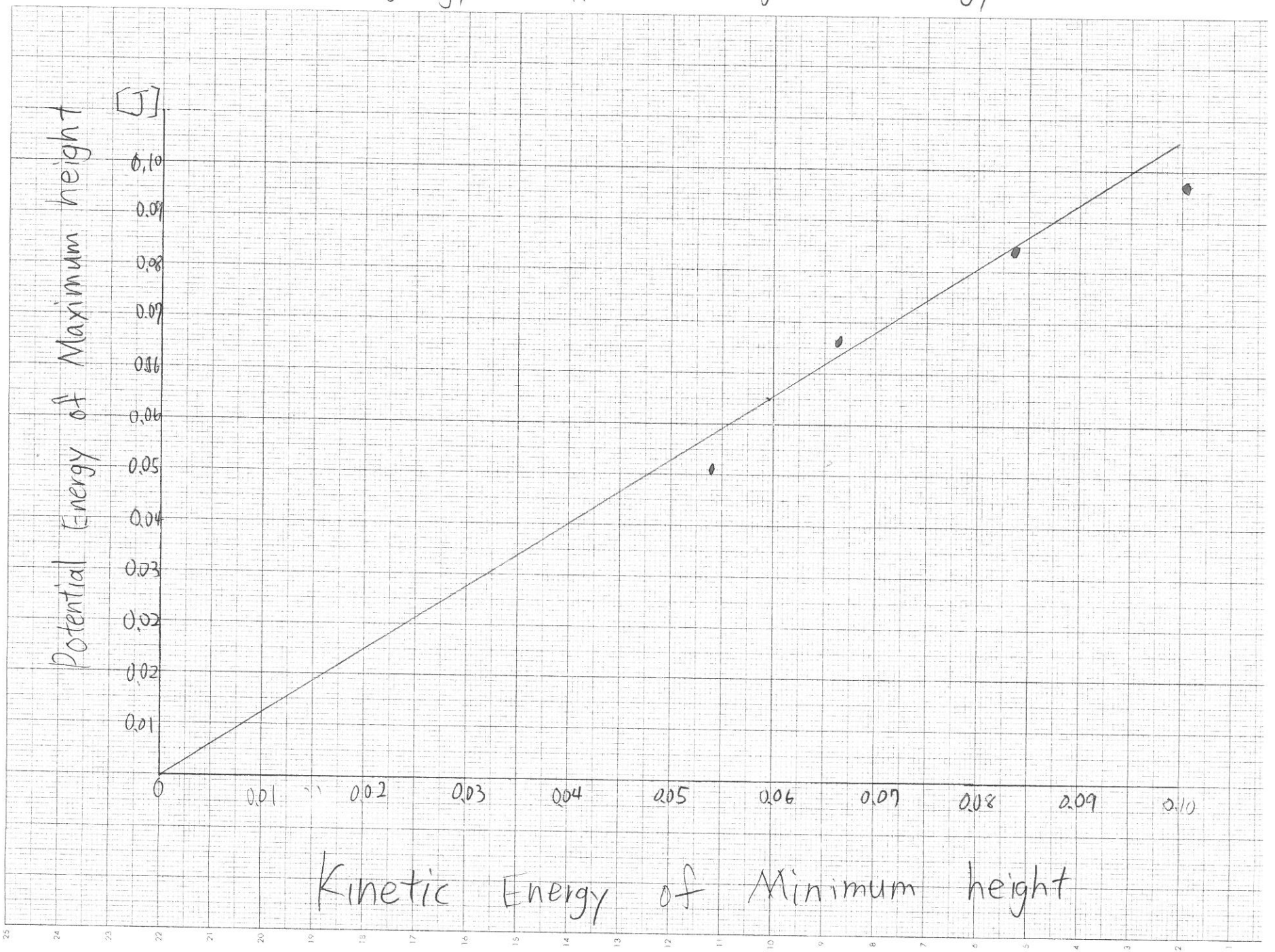


Table 2 : Exp 2

m [kg]	0	0.05	0.10	0.15	0.20	0.25
F [N]	0	0.49	0.98	1.47	1.96	2.45
x [m]	0	0.0125	0.0285	0.0445	0.0600	0.0760
k	0	39.2	34.4	33.0	32.7	32.2

Constant [k] average = 34.3

Graph 2 Exp2 Relationship between Elastic Force and Elongation

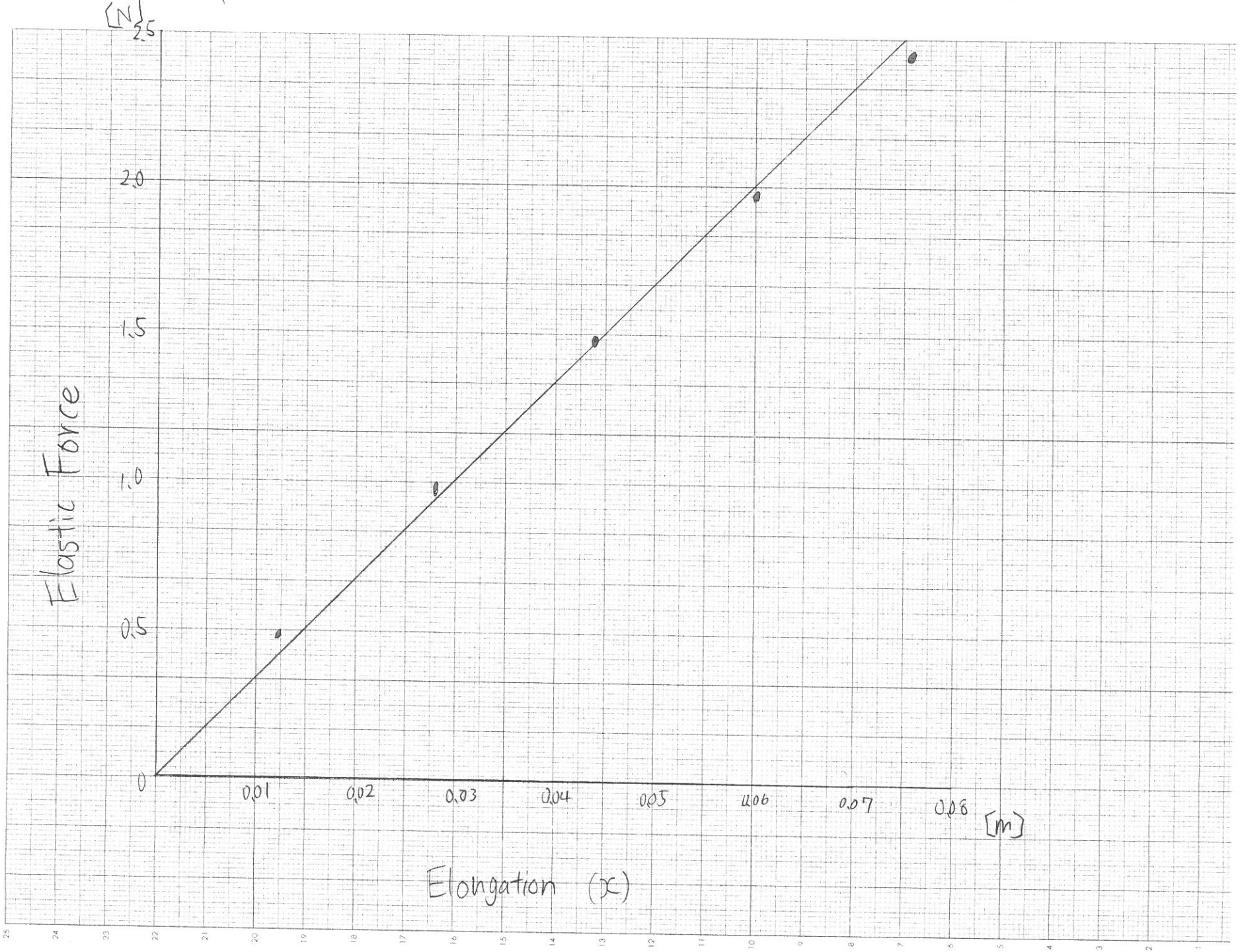


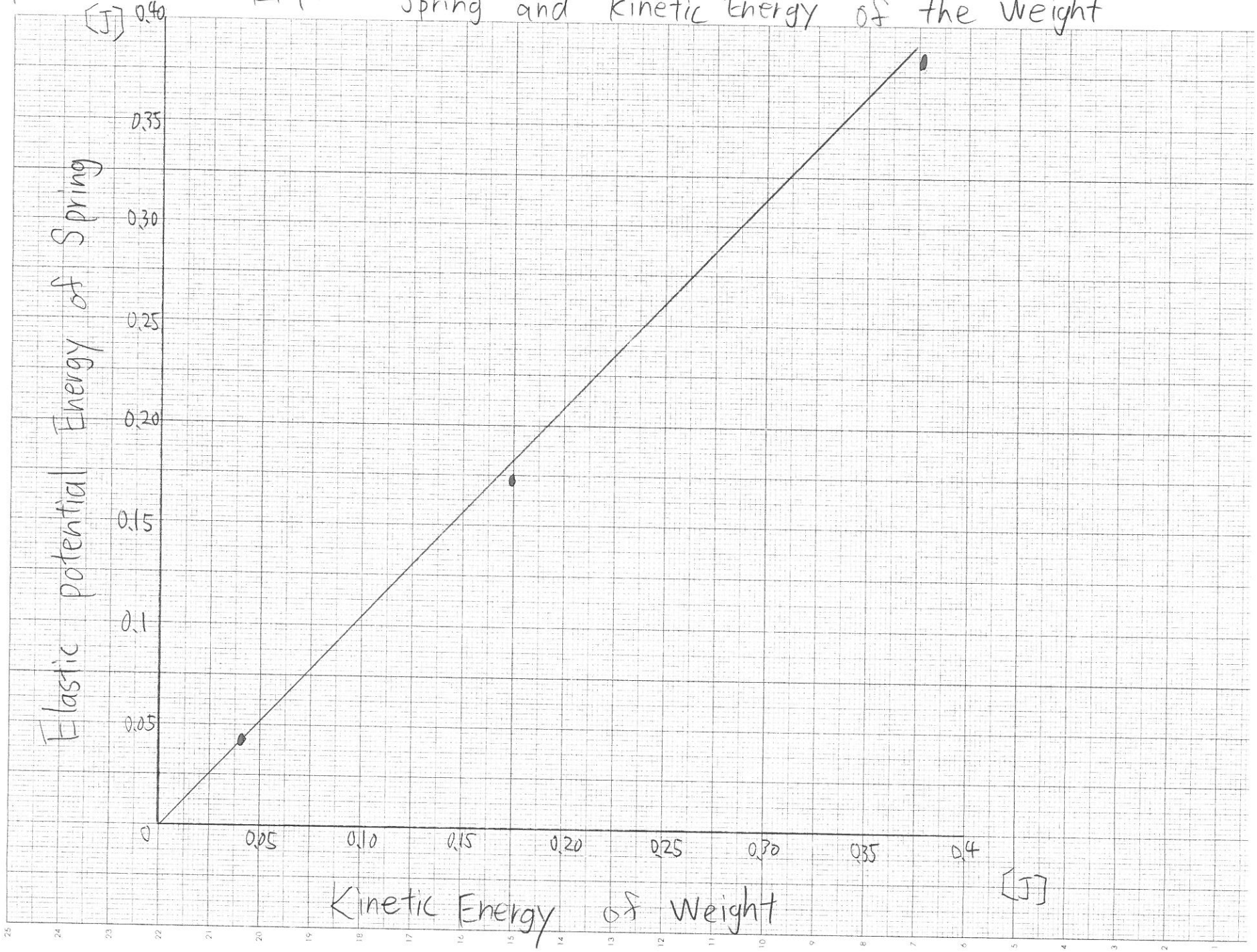
Table 3 : Exp 3

	Spring		Weight		
	x	$A=1/2kx^2$	v	$B=1/2mv^2$	(A-B)/A×100
Exp	m	J	m/s	J	%
1	0.15	0.386	4.82	0.383	0.658
2	0.1	0.172	3.27	0.176	2.88
3	0.05	0.0429	1.64	0.044	3.51

Graph 3

Exp. 3

Relation between Elastic potential Energy of Spring and kinetic Energy of the Weight



5. Discussion

In experiment 1, we experimented with a pendulum. In checking the law of conservation of energy, we considered based on the position energy of the starting point of the weight. The sum of the kinetic energy and the potential energy at the lowest point of the pendulum weight was almost equal to the kinetic energy of the highest point. Although there was some error, it may be said that it is the size of the same energy. The same thing can be said regardless of dropping from this height. In Experiment 2, we conducted experiments using springs and weights. Although there are some errors from the graph, the potential energy of the spring and the kinetic energy of the object connected to the spring are equal. This can be said in common with any spring.

6. Conclusion

From Experiment 1, the sum of kinetic energy and potential energy at the lowest point of the pendulum is equal to the potential energy at the highest point. From Experiment 2, the potential energy of the spring and the kinetic energy of the object connected to the spring are equal. Energy is always the same value in any situation.

7. Opinion

I was able to understand kinetic energy when I studied mechanical energy in class, but I could not understand potential energy. Also I could not imagine that the mechanical energy would always be the same. However, when calculated based on the results of this experiment, it was found that the law of dynamic energy conservation was established and it was able to understand more deeply. I think the experiment is important for deepening my understanding.

8. Reference

Lab Report of Nagisa Shionoya