Date of Lab 12/12/18 Date of Submission 1/9/19

Laboratory Report

Title
表題 Conservation of Mechanical Energy

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Summary

We examine the relationship between potential energy and kinetic energy and mecanical energy is conserved or not. In experiment 1, we changed the maximum height and compared with minimum height's potential energy. In experiment 2 and 3, we used spring and weight to examine the enegy We could know those energys almost equal. In conclusion, we could say that mechanical energy is conserved.

・Meet a deadline ・Write logically ・Write clearly ・Write with your own words
・締切り守って ・論理的に ・わかりやすく ・自分のことばで

Teacher Comments

Clear and beautiful tables and figures

1 Due 提出期限	2 Summary 要旨	3 Intro. 序	4 Method. 方法	5 Results 結果	6 Table/Fig. 表/図	7 Discussion 考察	8 Clearness わかりやすさ	9 General 全般

* Write your report in Japanese or in English * Use this form as a cover sheet.
* Submit your reports by the seventh day after your lab.

lab date 12/12/18 **Conservation of Mechanical Energy** due date 1/9/19

Results

Exp.1 Relationship between maximum height energy and minimum height of energy

**m= $33 \times 10^{-3} kg$

**error=(A-B)/A×100

	h_1	$A = mgh_1$	h_0	v	mgh_0	$\frac{1}{2}mv^2$	$B = mgh_0 + \frac{1}{2}mv^2$	$error$
Exp.1	m	J	m	m/s	J	J	J	%
1	32.1×10^{-2}	0.1038	6.00×10^{-2}	2.19	0.0194	0.0791	0.0985	5.106
2	24.4×10^{-2}	0.0789	6.00×10^{-2}	1.90	0.0194	0.0596	0.079	-0.1267
3	16.3×10^{-2}	0.0527	6.00×10^{-2}	1.41	0.0194	0.0328	0.0522	0.9488
4	4.60×10^{-2}	0.0149	6.00×10^{-2}	0.50	0.0194	0.00413	0.0235	-57.72

**Exp.1-4, we mistook calculating h_1, because it is impossible we get 4.60×10^{-2}, if we set h_0 is 6.00×10^{-2} as the bottom.

Exp. 2 Determination of the spring constant from relationship between elongation and mass

Exp.2						
m [kg]	0×10^{-3}	50×10^{-3}	100×10^{-3}	150×10^{-3}	200×10^{-3}	250×10^{-3}
F [N]=mg	0	0.49	0.98	1.47	1.96	2.45
x [m]	0×10^{-2}	1.1×10^{-2}	2.6×10^{-2}	4.2×10^{-2}	5.8×10^{-2}	7.8×10^{-2}

Exp.3 Relationship between spring and weight

** $0.49 = k \times 1.1 \times 10^{-2}$ k=44.5454...

Exp.3	Spring		weight		
	x	$A = \frac{1}{2}kx^2$	v	$B = \frac{1}{2}mv^2$	$error$
	m	J	m/s	J	%
1	0.0×10^{-2}	0	0	0	0
2	5.0×10^{-2}	0.0569	1.80	0.0534	6.15
3	10.0×10^{-2}	0.228	3.32	0.182	20.2
4	15.0×10^{-2}	0.512	3.43	0.194	62.1

Discussion

In the theory, we supposed to get the result that energy in the highest point in the rest equals to the sum of kinetic energy and potential energy in the move from Exp.1 (A=B; A is potential energy and B is kinetic energy). Our result was not equal completely, but there were 0.1% to 5% errors. Therefore, we could say that our experiments were succeed. I supposed that we got those little errors because of air resistance. From Exp.2 and Exp.3, we measured the spring's spring constant; k by using the result of Exp.2. Then we tried to prove that relationship of potential energy and kinetic energy. But we got big error in (3) and (4) of Exp.3. In the theory, we supposed to get A=B, but there were 20% to 60% errors.

Opinion

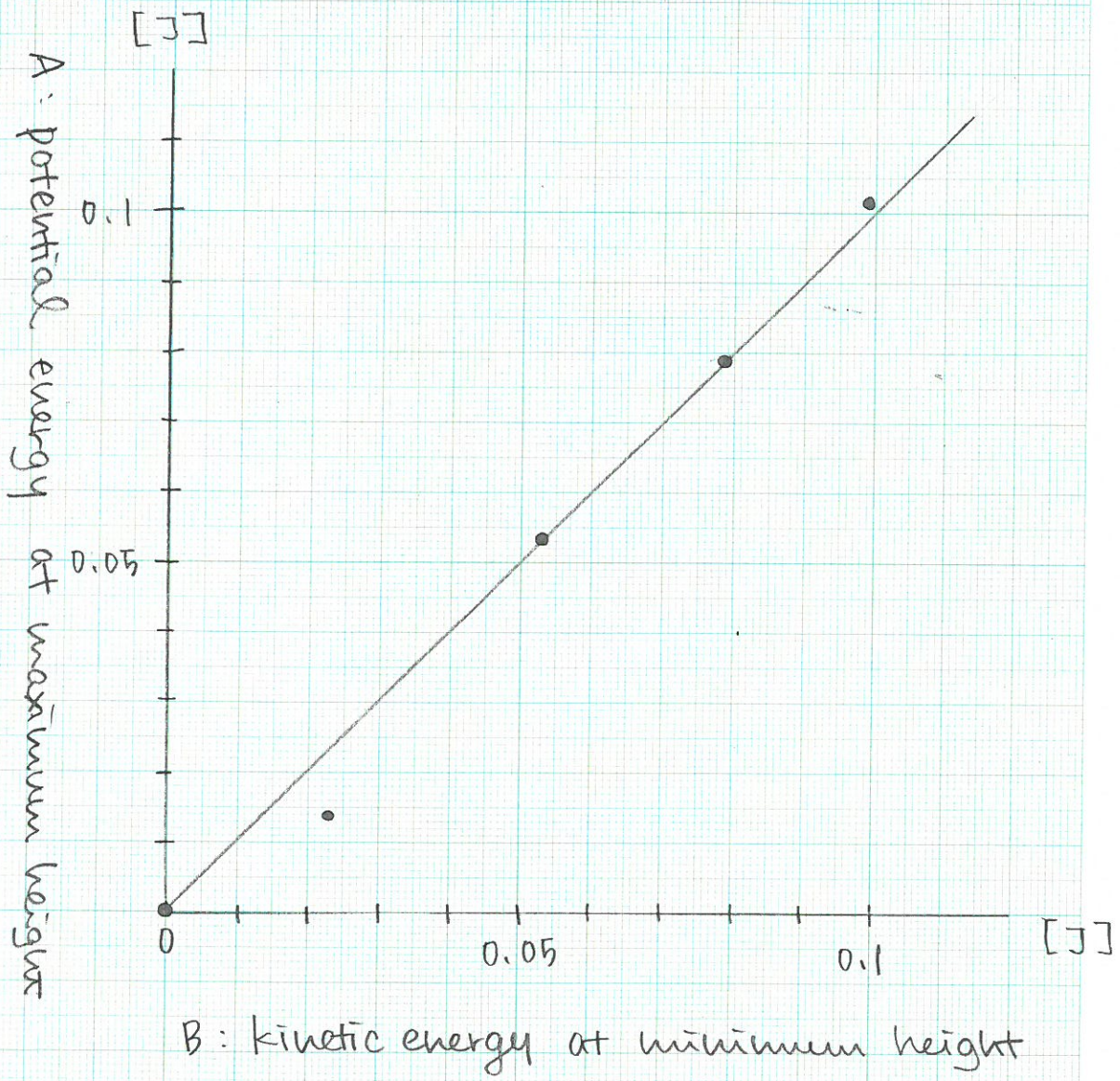
It was difficult to use speed mater because we got different results each time we did. Therefore we had big errors in Exp.3. I thought that we should have measured several times to get more accurate results if we had time.

Reference

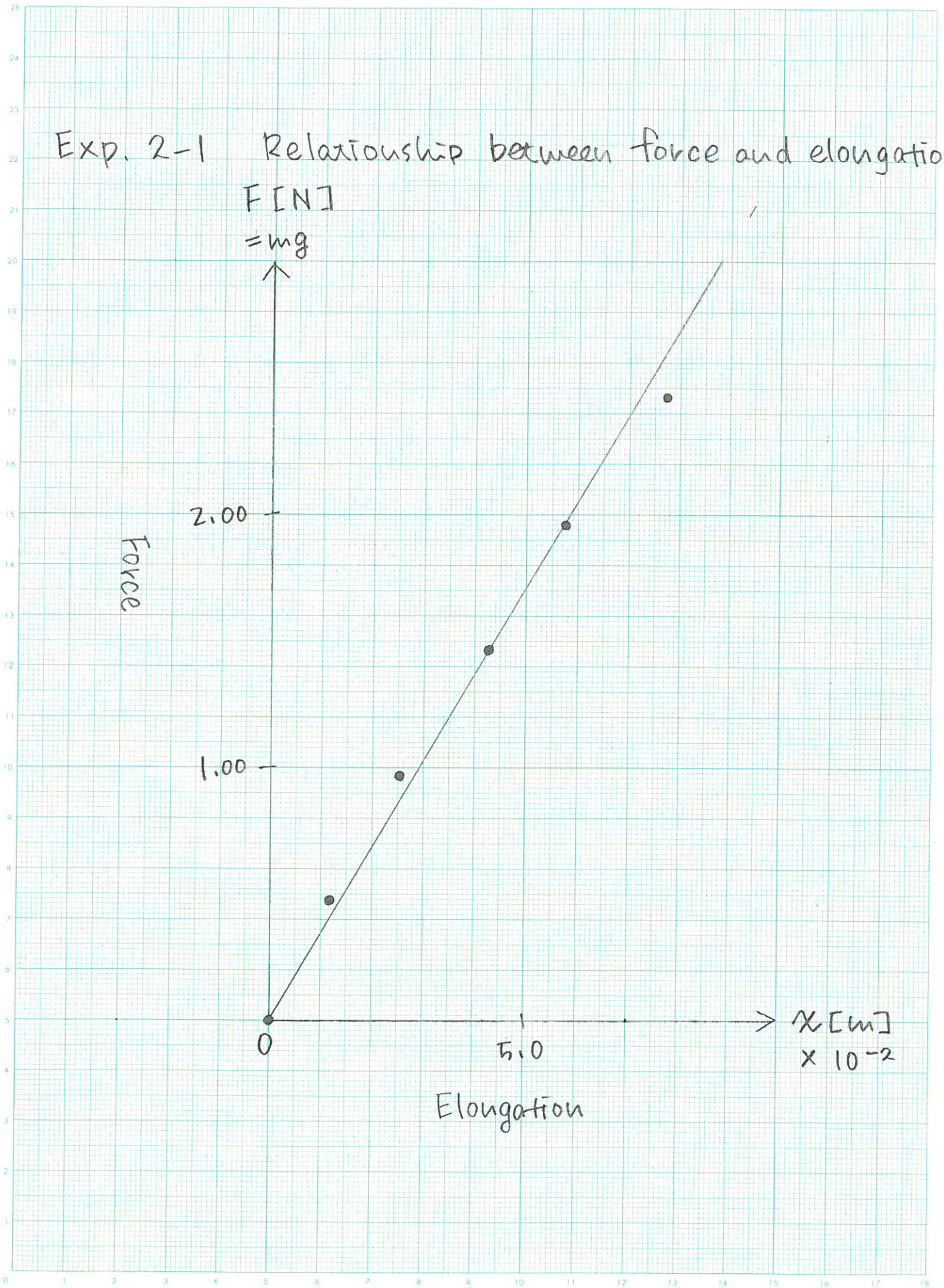
Ms. Airi Kitagawa (2017J)

k - min p - max

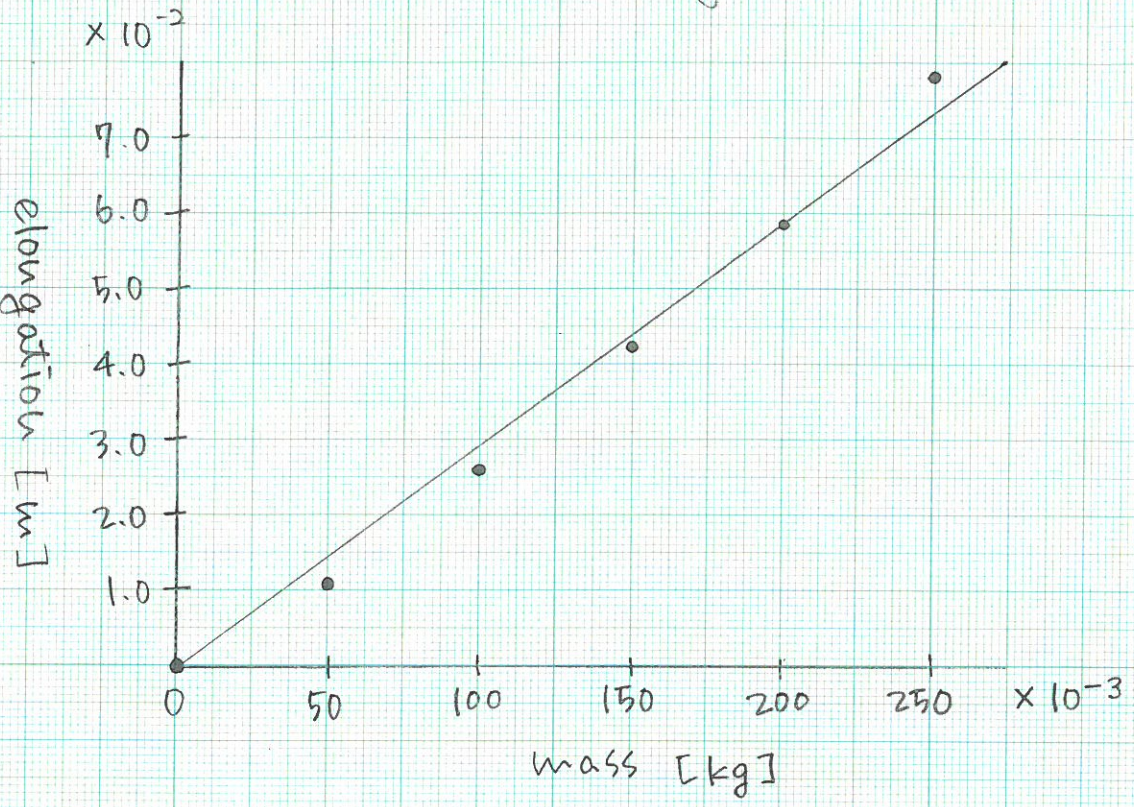
Exp. 1 Relationship between max height energy and min height energy



Exp. 2-1 Relationship between force and elongation



Exp. 2-2 Relationship between elongation and mass



Exp. 3 Relationship between spring and weight