Date of Lab 12/3/14 Date of Submission 12/10/14

Physics Laboratory Report

Title 表題

Friction

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Co-workers 共同実験者 Miri Ishida

Summary
Measure the friction by using spring scales. Slide the wooden Brick on the slope created by the board (smooth + rough). Through this lab I was able to conclude that the texture of the ground + the weight affects the friction

Addition/Correction 追加／修正		

・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

* Write your report in Japanese or in English * Use this form as a front cover.
* Submit your reports by the seventh day after your lab. You can add to or correct your report: note when you have done this.

Friction

11I Yukiko Hibi

Purpose:

To calculate the maximum static friction force and coefficient of dynamic friction. Also to compare and contrast the relationship between mass and friction and how they affect one another.

Experiment:

Materials:
Board (smooth and rough)
Spring scale
Wooden brick
Pulley
Thread
Weights (250g)

Procedure:

1) Set the spring scale to zero, then measure the weigh of the wooden brick and the weight that will be placed on top of the wooden brick when performing experiment. Also, by using the ruler measure the size of each sides of the wooden brick
2) Set up the materials so the lab can be performed. Make sure to place the pulley on the right height. The thread that connects the wooden brick and the board (smooth) must be parallel to each other. Set up the spring scale to the fixed place; the spring scale and the thread must be perpendicular to each other.
3) Pull the board (smooth) gently, and the brick moves, observe the measurement that are shown on the spring scale. You must precede this with caution and lab partner should keep the eyes on the brick to make sure the brick has not moved. After the brick moves, record the number on the spring scale again. Repeat this process three times, and calculate the average of all three experiments.
4) Put the weights (250g) on the brick and repeat process 3). Change the number of weights placed on top of the wooden brick in each performance.
5) Place the wooden brick in a different angle (sideways), and repeat the process 3) and 4).

6) Turn the board so it has the rough texture on the surface. Repeat the process.
7) Tilt the board to find the friction angle. Observe the effects on weights and the area of the brick that's facing the ground.
8) Measure the length and the height of the angle formed when the board is tilted.
9) Compare and contrast the μ used in $\mu = \tan\theta$.

Discussion:

After performing the lab my partner and I realized that the maximum static friction force exceeded. This proves the acceptance of the size of the kinetic friction force, which is $F=\mu N$, and the size of the static friction. There was a small error, but by looking at procedure 5) and 6), $\mu = \tan\theta$ matches with the procedure 1); this suggests that the weight of the material (brick and the weight) and the friction doesn't have a particular relationship to one another.
Also, the texture of the board was rough has more friction than friction observed by the smooth board. This states that the maximum static friction force and normal force（垂直抗力） are proportional to each other.

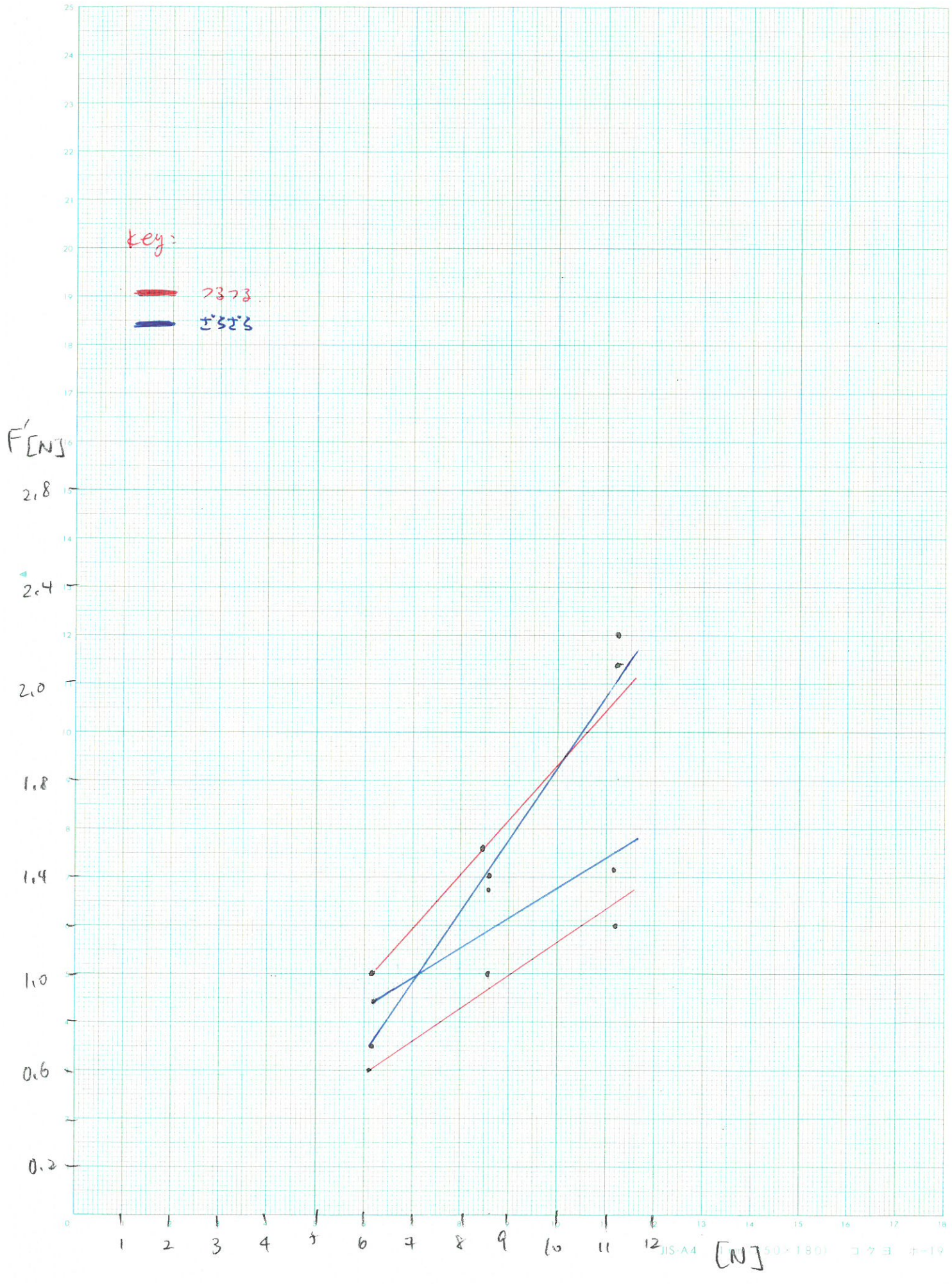
Conclusion:

The weights of the object are not depended on the friction. The texture (rough or smooth) matters, however, and this is what causes the friction to occur when the object is moved on the surface. Also, the equation $\mu = \tan\theta$ and $\mu = u$ are proven.

Opinion:

My partner and I were able to perform this experiment with no big errors. However, the small errors bugged the graph a bit; next time I would like to handle the lab with extra caution to observe the perfect data as possible.
Overall, I enjoyed performing this lab, especially when sliding the wooden brick on slope formed by the board (smooth and rough).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Types of the board	rough			smooth			rough			smooth			rough			smooth		
Area [m^2]	2.28	2.28	2.28	2.28	2.28	2.28	2.28	2.28	2.28	2.28	2.28	2.28	0.64	0.64	0.64	0.64	0.64	0.64
Mass [$x10^3$]	1.13	0.88	0.63	1.13	0.88	0.63	1.13	0.88	0.63	1.13	0.88	0.63	1.13	0.88	0.63	1.13	0.88	0.63
N [N}	11.1	8.62	6.17	11.1	8.62	6.17	11.1	8.62	6.17	11.1	8.62	6.17	11.1	8.62	6.17	11.1	8.62	6.17
F_0 [N]	2.4	1.5	0.9	2.3	1.5	1.2	1.8	1.5	1.0	1.3	1.2	0.8						
F' [N]	2.2	1.3	0.7	2.1	1.3	1.0	1.4	1.3	0.9	1.2	1.0	0.6						
$\mu = F_0/N$	0.22	0.17	0.15	0.21	0.17	0.19	0.16	0.17	0.16	0.12	0.14	0.13						
$\mu = F'/N$	0.20	0.15	0.11	0.19	0.15	0.16	0.13	0.15	0.15	0.11	0.12	0.10						
H/L													13.6/ 62.5	21.3/ 62.5	22.6/ 62.5	13.0/ 62.5	14.7/ 62.5	15.3/ 62.5
θ													0.22	0.34	0.36	0.21	0.24	0.24
$\mu = \tan\theta$													12.4	18.8	19.8	11.9	13.5	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F'[N]
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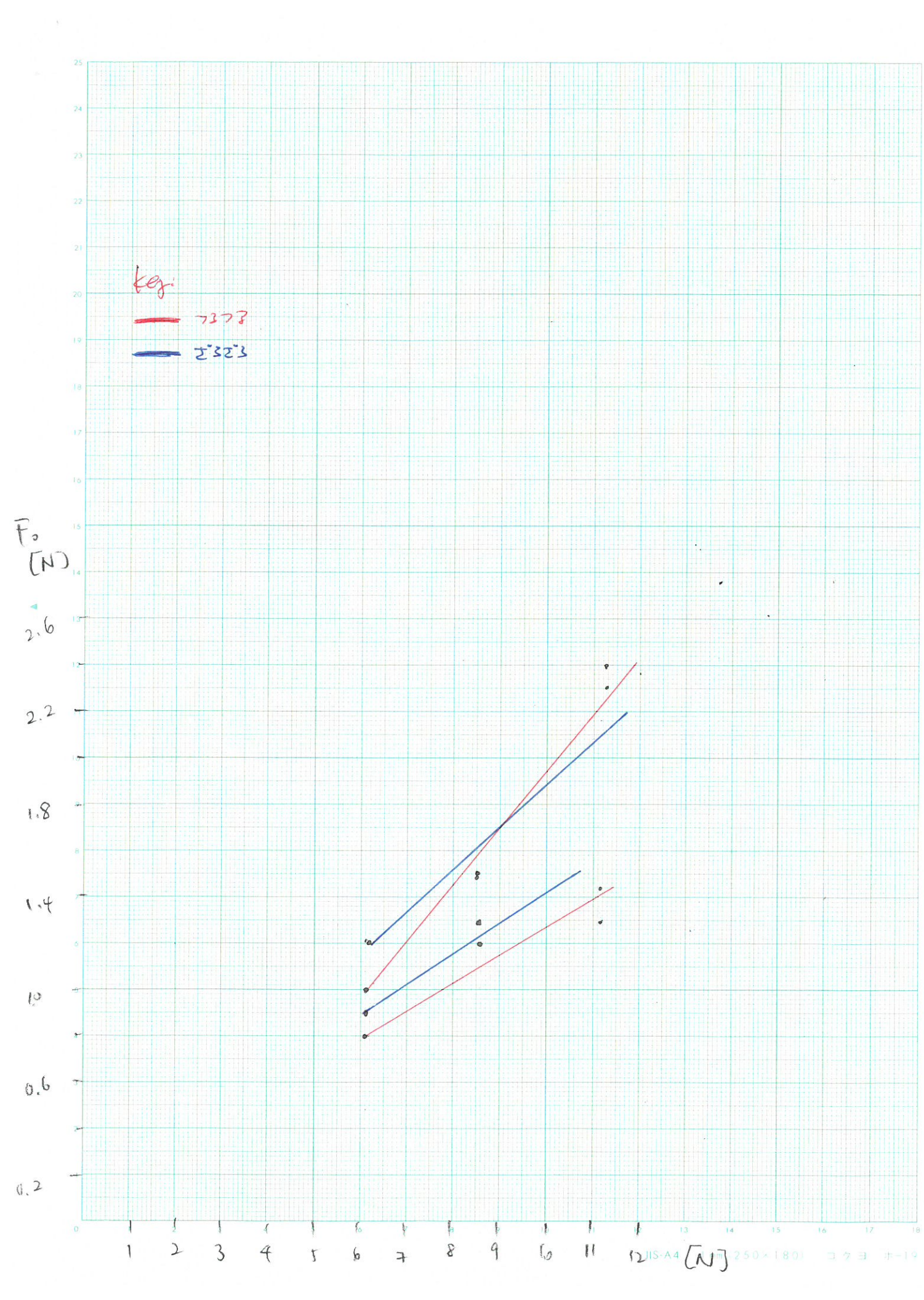
key
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スラスラ
F_0 (N)
2.6
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0.2
1 2 3 4 5 6 7 8 9 10 11 12
(N)