12-12-2017

HOOKE'S LAW

EXPERMENT REPORT

GROUP G

TALHA TALLAT | S00180011

Table of Contents

Objectives

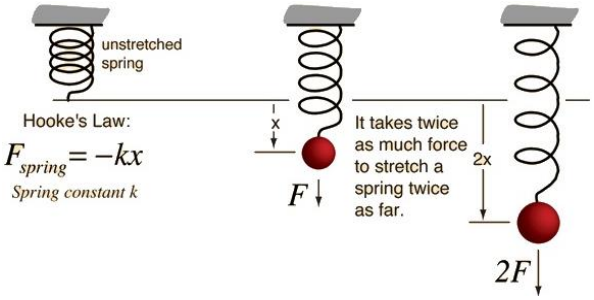
The experiment was carried out to use a spring to get the force(N) that is applied onto the spring by adding the weight(m) onto the spring. The experiment was involved team members of the group to test this experiment and verify Hooke's law.

The main objective of this experiment was to record the extend(mm) of the spring when the mass is applied onto the spring and:

- To measure the length of the 3-different spring stretching.
- To calculate the amount of force applied to the spring.
- To plot the graph of force versus extension.

Theory

Hooke's law describes the relationship between the extension of a spring and the force applied to the spring. A spring balanced uses Hooke's law to enable to measure the force applied to the spring balance by measuring the spring extension.



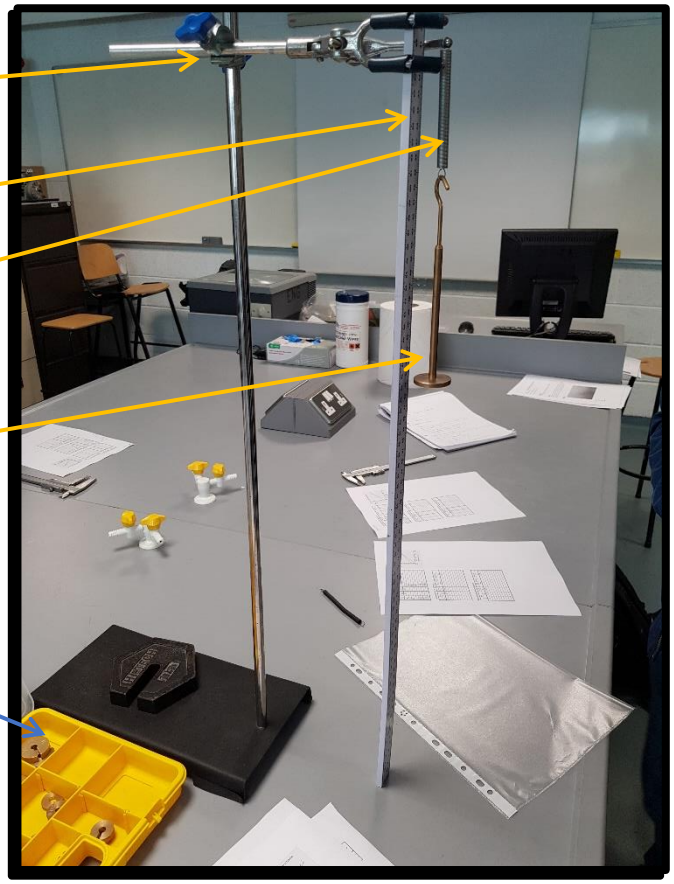
The force is proportional to the extension. As the diagram shows the principle of Hooke's law experiment. Hooke's law is a principle of physics that's states that the force(F) needed to extend or compress a spring by some distance X scales linearly with respect to that distance. That formula is $F = kX$, where k is a spring constant and X is small compared to the total possible deformation of the spring. If the force is pulling double down, then it takes as much force to stretch a spring twice as for.

And, Hooke's law is defined as within the elastic limit the compression or extension of an elastic material is directly proportional to the applied load. Hooke's law can be represented as F=-KX.

Apparatus

In this experiment, the materials that are required for this experiment are listed below with pointing the arrows at the materials shown in the photo.

- Retort clamp stand
- Measuring ruler
- Spring
- Hook with pan
- Weights



Procedure

At the very beginning of the experiment, our first action was to:

- Setup the spring onto the stand.
- Measuring the length and the diameter of the spring.
- Setting up all the apparatus as it is shown in the apparatus section.
- Placing the ruler vertically onto the clamp stand which is used for supporting the metre ruler.
- Took the initial reading of the bottom of the spring by using the ruler.
- Putting on the weight with pan onto the spring.
- Putting on different types of masses onto the pan and takedown the lengths of the stretch.
- Organize the order of the result and fill the result.
- Plotting a graph of force(N) verses extension(m) and getting the slope of the graph.
- Try two different springs after the first one and draw the graph again.

Result

Experimental data for spring one

Mass		Force	104 Spring 6 Extension	
(g)	(kg)	(N)	(mm)	(m)
0	0.00	0.00	0	0.000
50	0.05	0.49	130	0.130
60	0.06	0.58	140	0.140
70	0.07	0.68	150	0.150
80	0.08	0.78	160	0.160
85	0.085	0.83	165	0.165
135	0.135	1.32	215	0.215
140	0.140	1.37	220	0.220
190	0.190	1.86	260	0.260
210	0.210	2.06	285	0.285
220	0.22	2.15	290	0.290

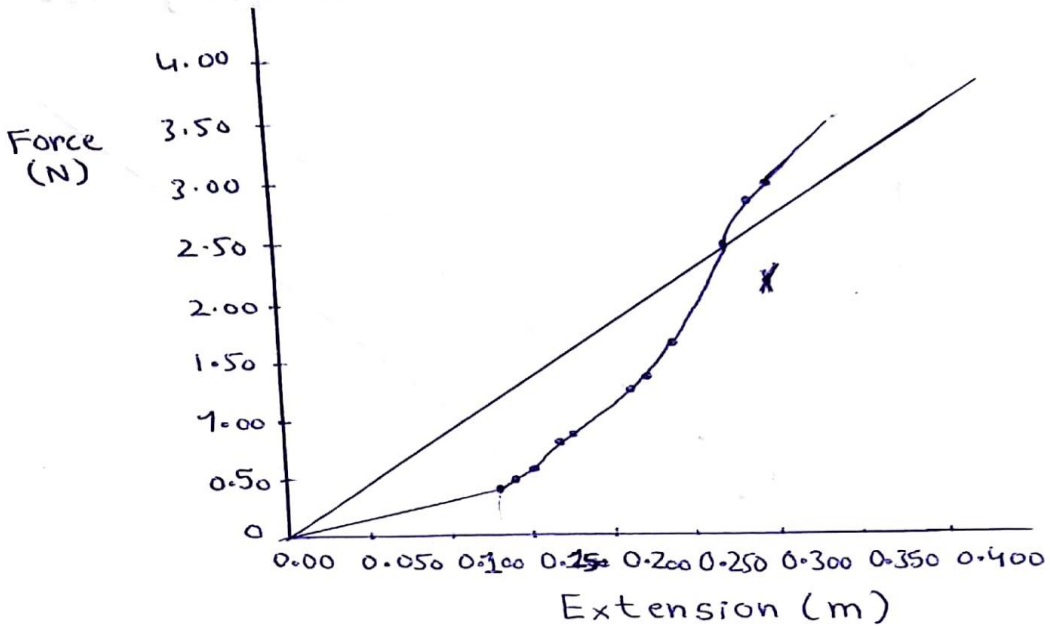
Experimental data for spring two

Mass		Force	183 Spring 5.5 Extension	
(g)	(kg)	(N)	(mm)	(m)
0	0.00	0.00	0	0.000
150	0.15	1.47	18	0.018
200	0.2	1.96	38	0.038
220	0.22	2.15	48	0.048
240	0.24	2.35	56	0.056
250	0.25	2.45	60	0.060
270	0.27	2.64	68	0.068
290	0.29	2.84	78	0.078
300	0.3	2.94	84	0.084
320	0.32	3.13	92	0.092
350	0.35	3.43	105	0.105

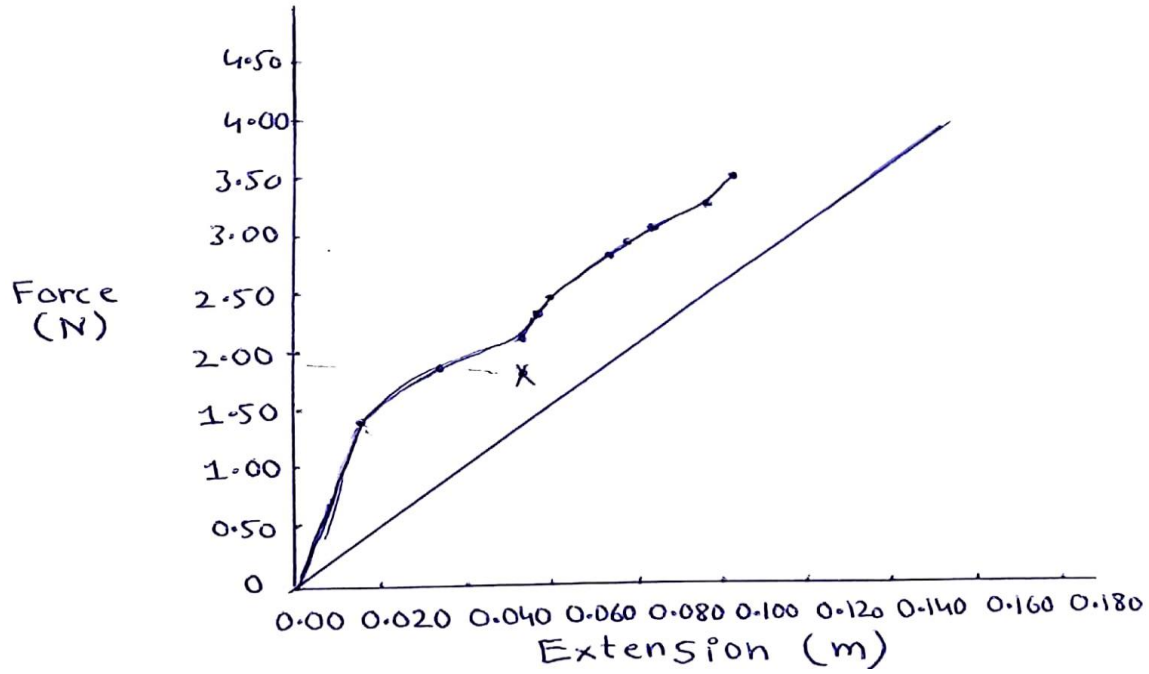
Experimental data for spring three

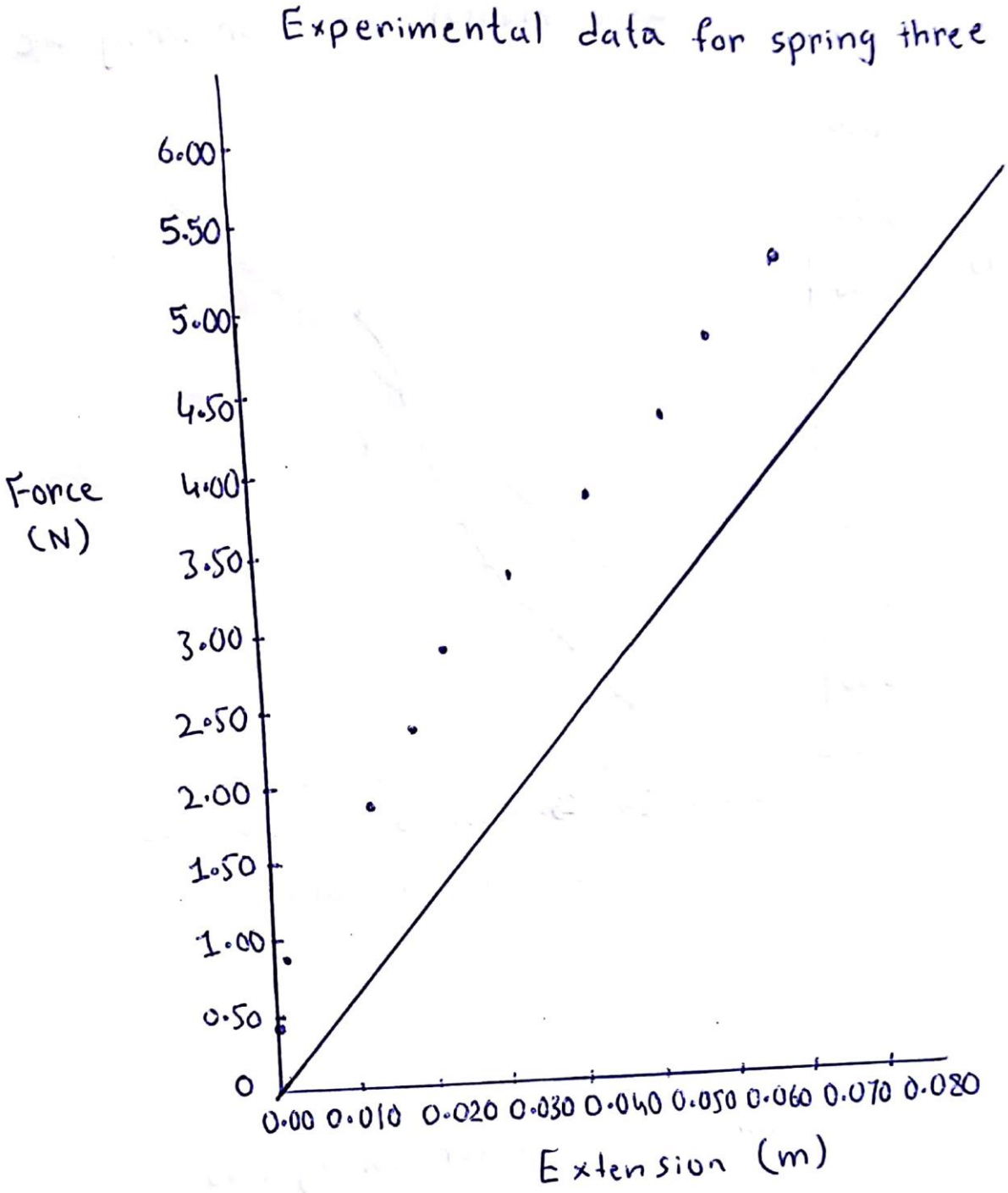
Mass		Force	73 Spring 7.1 Extension	
(g)	(kg)	(N)	(mm)	(m)
0	0.00	0.00	0	0.000
50	0.05	0.49	0	0.000
100	0.1	0.98	1	0.001
200	0.2	1.96	11	0.011
250	0.25	2.45	17	0.017
300	0.3	2.94	22	0.022
350	0.35	3.43	33	0.033
400	0.4	3.92	43	0.043
450	0.45	4.41	53	0.053
500	0.5	4.90	57	0.057
550	0.55	5.39	65	0.065

Experimental data for Spring One



Experimental data for spring two




Experimental data for spring three
Force (N)
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0
0.00 0.010 0.020 0.030 0.040 0.050 0.060 0.070 0.080
Extension (m)

Discussion of result

The discussion that was taken place during the experiment between members of the group was about setting up the experiment. One of the members of the team put on the masses onto the pan and the second member of the team read the stretch of the spring when the mass is added onto it and the third member of the group was writing down the weight and length of the stretch onto the results due to the second persons call.

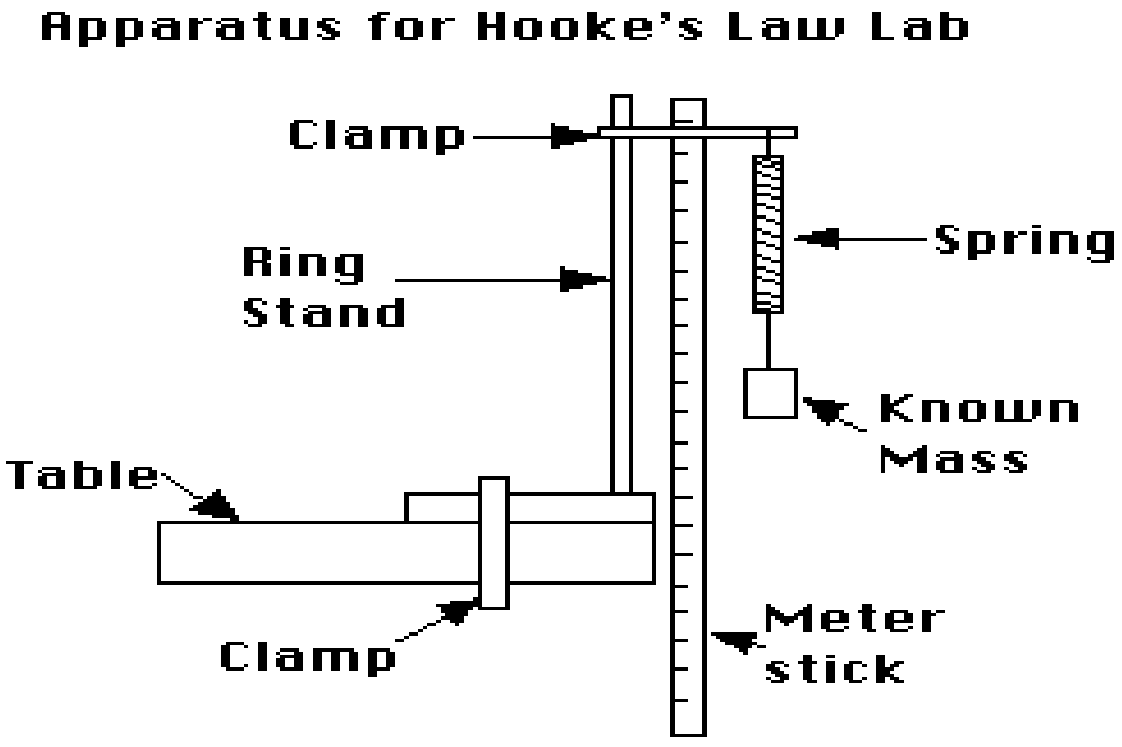
So that was a discussion that was involved between members of the group to perform this experiment.

Conclusions

This experimental data was collected and analysed using calculations and graphs. This experiment states that when more mass is added onto the pan which is connected to the spring, the stretch of the spring increases and depends on the spring materials and thickness.

Because we used 3 different kinds of springs to test it for the experiment and one the spring was larger than the other and tough, which required great masses to get the stretch of the spring.

Hooke's law says that the stretch of a spring is directly proportional to the applied force and it can also be written as stress is proportional to strain. In symbols, F = kx, where F is the force, x is the stretch, and k is a constant of proportionality.



Appendices

This experiment will improve our skills in the future where Hooke's law is required especially the spring is used in engineering a lot where all this information can be used.

By doing this project:

- We improved our knowledge about Hooke's law.
- We improved our communication skills.
- Improved our practical skills.

References

There are some of the websites that were used for practical uses and some theory parts of the experiment.

1. November 6, 2002, by "JL STANBROUGH"
   http://www.batesville.k12.in.us/physics/phynet/mechanics/newton3/labs/SpringScale.html

2. 28 November 2017 by "Wikipedia" "Wikimedia"

   https://en.wikipedia.org/wiki/Hooke%27s_law

3. Published on Jul2,2016 by "learnwithmac"

   https://www.youtube.com/watch?v=zJs27xNdKOM