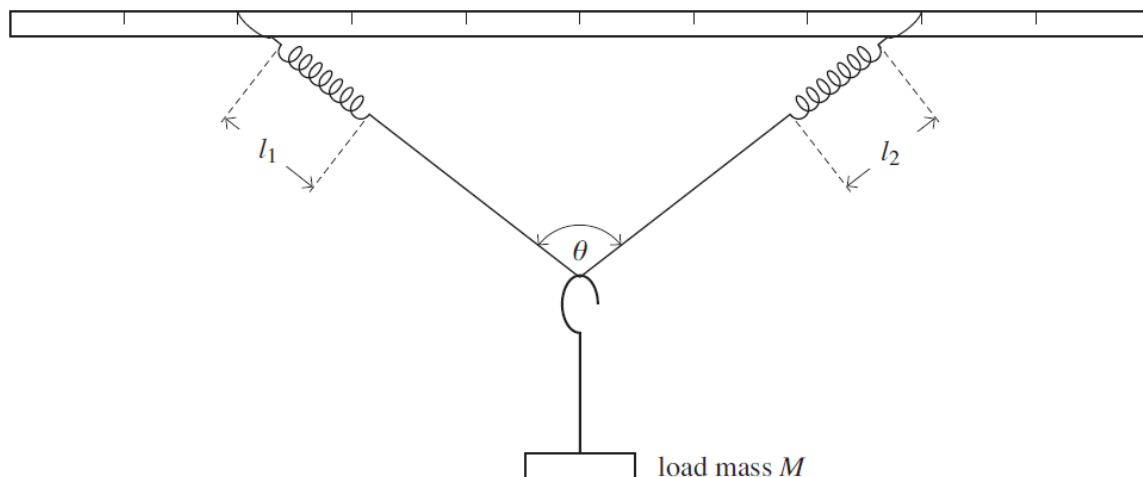


Investigating the three forces in equilibrium

As part of this practical we had to complete an experiment where we had to make a table in advance before hand where we had our first reading, second reading and derived data. The experiment consisted of measuring the angle on the strings whilst adding 100g on each time. The diagram of the experiment can be seen in the image below.

Figure 1



The first step to our experiment was to make sure that everything in the experiment was level to make sure that it goes as fair and accurate as possible using a spirit level. The second step was to measure the length of both springs (l_1, l_2) as accurate as possible with no weight hanging from the string, then to measure the angle of the string from the centre (θ) using a protractor. The next step is to add 100g on the centre of the string (load mass M) and repeat the following measuring steps as accurate as possible using a ruler. I repeated these steps adding on 100g of weight each time until reaching 600g of weight hanging from the string. Once I had completed this I then did the whole experiment from the beginning to get a second reading to let me get an average.

Below are all the results I had for both of my readings:

Mass/g		Reading 1			Reading 2		
	L1	L2	θ		L1	L2	θ
0	24	24	180		23	24	180
100	46	50	120		43	46	117
200	70	75	105		71	76	107
300	94	99	99		91	96	94
400	116	117	90		113	119	87
500	131	138	86		135	139	82
600	152	159	81		156	160	76

As you can tell by the graph above both readings are close which means the experiment was accurate. And that each time the mass would increase the length of the spring would increase but the angle of the strings would decrease

After completing the table of results, we then had to go on to make a derived data table where we had to get the average of the length and angle with each level of mass. That table can be seen below:

Derived data	
Lm	θ_m
24	180
46	119
73	106
95	97
116	89
136	84
157	79

Our final task was to work out M for each measurement using the formula $\frac{M}{\cos\left(\frac{\theta_m}{2}\right)}$. These were the results I received:

Mass/g	Derived data	
	θ_m	M
0	180	0
100	119	197.03
200	106	332.22
300	97	452.75
400	89	560.81
500	84	672.82
600	79	777.58

This table proves that every time the mass would be increased the value of M would also increase and the angle of the string would decrease.

Then by using these results I then created a scatter chart for M:

