Spring Force Activity

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1 Observations

Table 1: Force and Displacement Data for Two Springs

Mass (kg)	**Force (N)**	**Spring A Displacement (cm)**	**Spring B Displacement (cm)**
0.20	1.96	2.20	0.270
0.40	3.92	10.3	0.450
0.60	5.67	19.1	0.920
0.80	7.85	28.1	1.43
1.0	9.81	37.6	1.91
1.2	11.8	45.1	2.40

2 Analysis

Figure 1: Force Vs. Displacement for Spring A

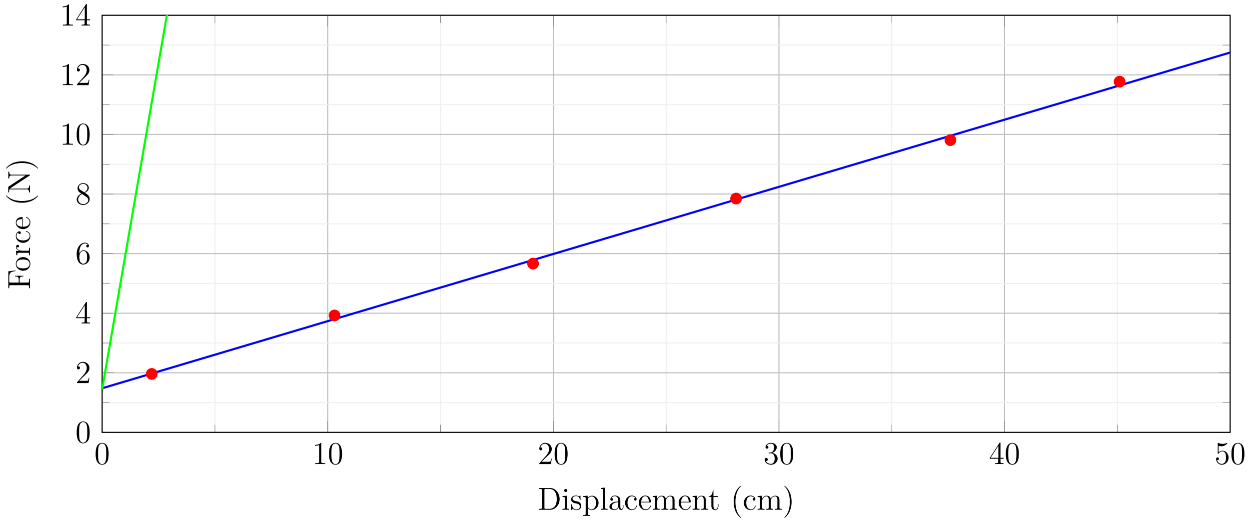
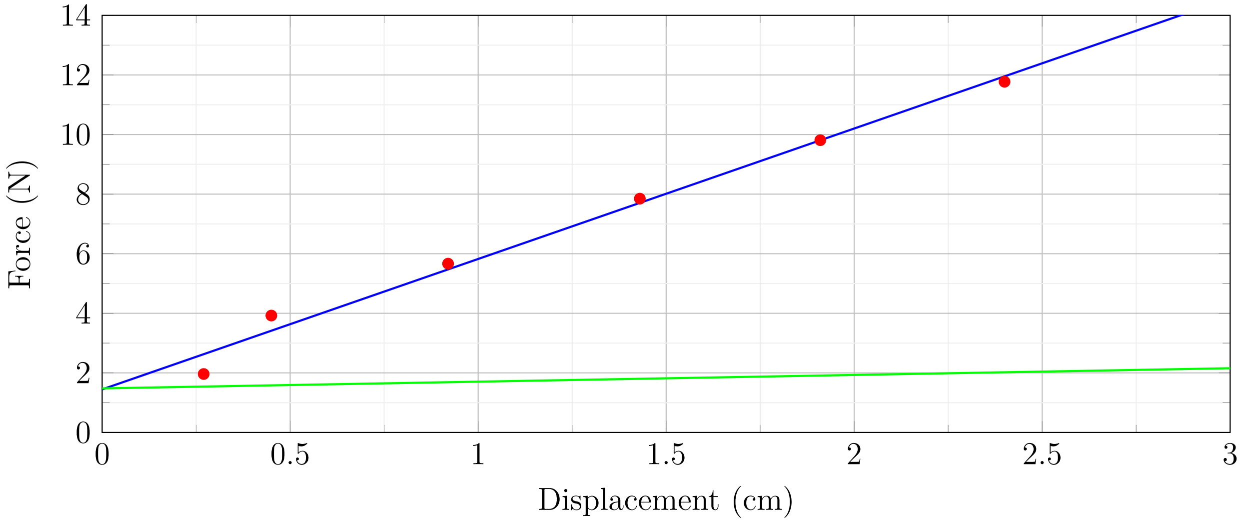


Figure 2: Force Vs. Displacement for Spring B



1. **Calculating Slope of Each Graph:**

   (a) <u>Spring A</u>

   The trendline's equation for Spring A is: $\boldsymbol{y = 0.225x + 1.48}$

   $\therefore$ The slope of trendline is 0.225.

   (b) <u>Spring B</u>

   The trendline's equation for Spring B is: $\boldsymbol{y = 4.38x + 1.44}$

   $\therefore$ The slope of trendline is 4.38.

2. **Relationship Between Force and Displacement:**

   There is a linear relationship between force and displacement, where force is directly proportional to displacement ($\vec{F} \propto \vec{\Delta d}$).

3. **Physical Quantity the Slope Represents:**

   The physical quantity the slope represents is the spring constant, which determines the stiffness of the spring. The two springs have different values because each spring has a different spring constant, where a higher slope value represents a stiffer spring. This holds true because Spring B has a larger slope than Spring A, meaning it is more stiff, evident through Spring B's smaller displacement values.

4. **Equation of Line from Proportionality Statement:**

   Let k represent the slope of the line.

   $\vec{F} = k\vec{\Delta d}$

5. **Properties of an "Ideal Spring":**