Physics 17

Base your answers to questions 68 through 71 on the information and data table below.

The spring in a dart launcher has a spring constant of 140 newtons per meter. The launcher has six power settings, 0 through 5, with each successive setting having a spring compression 0.020 meter beyond the previous setting. During testing, the launcher is aligned to the vertical, the spring is compressed, and a dart is fired upward. The maximum vertical displacement of the dart in each test trial is measured. The results of the testing are shown in the table below.

Data Table

Power Setting	Spring Compression (m)	Dart's Maximum Vertical Displacement (m)
0	0.000	0.00
1	0.020	0.29
2	0.040	1.14
3	0.060	2.57
4	0.080	4.57
5	0.100	7.10

Directions (68–69): Using the information in the data table, construct a graph on the grid *in your answer booklet,* following the directions below.

68 Plot the data points for the dart's maximum vertical displacement versus spring compression. [1]

69 Draw the line or curve of best fit. [1]

70 Using information from your graph, calculate the energy provided by the compressed spring that causes the dart to achieve a maximum vertical displacement of 3.50 meters. [Show all work, including the equation and substitution with units.] [2]

71 Determine the magnitude of the force, in newtons, needed to compress the spring 0.040 meter. [1]