NAME _____ DATE _____

Scenario

Carlos and Dominique hang a spring with an unknown spring constant from a ceiling. The students connect objects with different amounts of mass m *to the spring and measure the oscillation period* T *of each object. Their data are shown in the table to the right. Note that the square of each period is also calculated.*

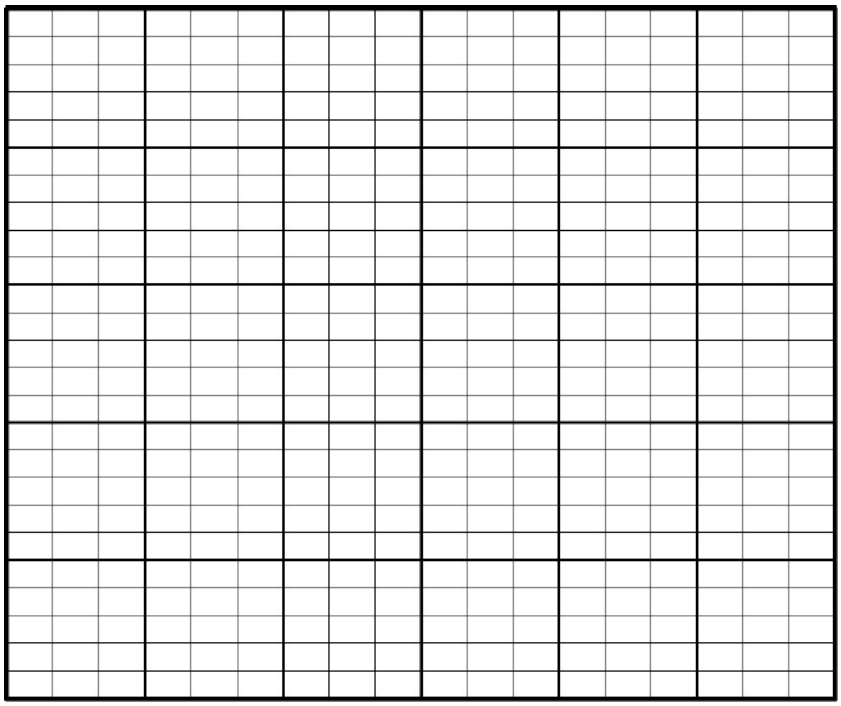
Mass m [kg]	Period T (sec)	T^2 (sec^2)
1.15	0.78	0.61
2.32	1.21	1.46
3.51	1.61	2.59
4.75	1.87	3.49
5.89	2.06	4.24

Argumentation

PART A: The students did not take care to ensure that the object oscillated with the same amplitude on each trial. Their teacher informs them that this oversight will not invalidate their experimental results. Briefly explain why this is the case.

Using Representations

PART B: On the grid below, plot a graph of T^2 vs. m. Draw a best-fit line.



Data Analysis

PART C: An unknown object hung on the spring oscillates with a period of 1.47 seconds. Using your best-fit line, calculate the mass of this object. Explain your method using words in addition to showing mathematical steps.

PART D: Using your best-fit line (not merely a single data point or average), calculate the spring constant of the spring. Explain how you determined what the slope of the line represents algebraically.

PART E: Suppose Carlos and Dominique also made a graph of T^2 vs. m. However, the graph they made has a best-fit line with a slightly steeper slope than the line you drew on the graph in Part B.

i. How would this affect their experimental value for the spring constant compared to yours in Part D? Explain.

ii. How would this affect their value for the mass with a period of 1.47 seconds compared to yours in Part C? Explain.