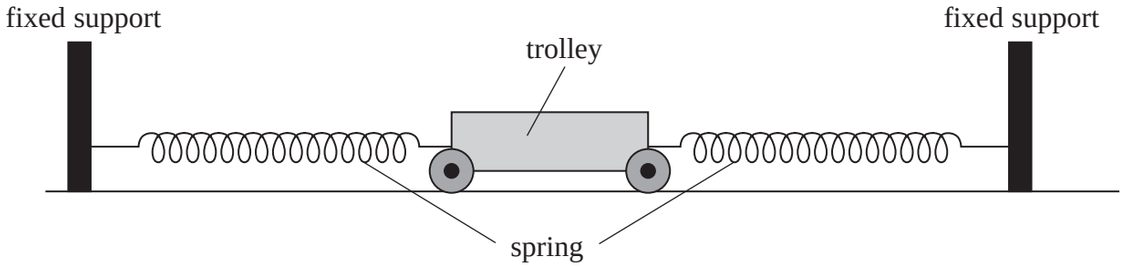
5 A student used springs to attach a trolley between two fixed supports, as shown.



When displaced horizontally, the trolley oscillated with simple harmonic motion.

To determine the time period T of oscillation of the trolley, the student displaced the trolley from its equilibrium position and released it. As she released the trolley, she started a stopwatch. She stopped the stopwatch when the trolley had returned to its starting point.

(a) Explain how the procedure used by the student to determine T could have been improved.

(6)

(b) The mass of the trolley was M. The student added a small mass m to the trolley and determined the new value of T. She repeated the procedure for a range of values of m.

She plotted a graph of T^2 against m.

Explain how she could use her graph to determine a value for M.

(4)

(Total for Question 5 = 10 marks)