Answer on Question #42984 – Math – Calculus

Suppose that 2 Joules of work is needed to stretch a spring from its natural length of 37 cm to a length of 48 cm. How much work is needed to stretch it from 48 cm to 71 cm?

Solution.

The work needed to stretch a spring on x equals $A = \frac{1}{2}kx^2$, where k is a constant factor characteristic of the spring.

$$2 = \frac{1}{2}k(48 - 37)^2,$$

as 2 J is the work needed to stretch a spring from its natural length of 37 cm to a length of 48 cm Hence

$$k = \frac{4}{121}\frac{N}{m}.$$

The work needed to stretch this spring from 48 cm to 71 cm equals

$$A = \frac{1}{2}k(71 - 48)^2 = \frac{1058}{121}\,J \approx 8{,}743\,J$$

Answer: $\frac{1058}{121}\,J \approx 8{,}743\,J.$