

2 J of work are needed to increase the extension x from $.3 - .3 = 0\text{m}$ to $0.42 - 0.3 = 0.12\text{m}$. Hence if k is the spring constant,

$$\int_0^{0.12} kx \, dx = 2$$

$$\Rightarrow \frac{1}{2} kx^2 \Big|_0^{0.12} = 2 \Rightarrow \frac{1}{2} k(0.12^2 - 0^2) = 2 \Rightarrow k = \frac{4}{(0.12)^2}$$

So the work required to increase its extension from $0.35 - 0.3 = 0.05\text{m}$ to $0.4 - 0.3 = 0.1\text{m}$ is

$$\begin{aligned} \int_{0.05}^{0.1} kx \, dx &= \frac{1}{2} kx^2 \Big|_{0.05}^{0.1} \\ &= \frac{1}{2} k(0.1^2 - 0.05^2) \end{aligned}$$

$$= \frac{2}{0.12^2} \{0.1^2 - 0.05^2\} = \frac{25}{24} \approx 1.04 \text{ J}$$