One dimension:

$$U = \frac{10}{x} \text{ J}$$

Force:

$$F_x = -\frac{dU}{dx} = -\frac{d}{dx}(10x^{-1})$$

$$= -(-10x^{-2})$$

So, $$F_x = \frac{10}{x^2}$$

$x = 2\text{m}$, $F_x = \frac{5}{2}$ N

$x = 5\text{m}$, $F_x = = \frac{10}{(5)^2} = \frac{10}{25}\text{ N} = \frac{2}{5}\text{ N}$

$x = 8\text{m}$, $F_x = \frac{10}{64}\text{ N} = \frac{5}{32}\text{ N}$