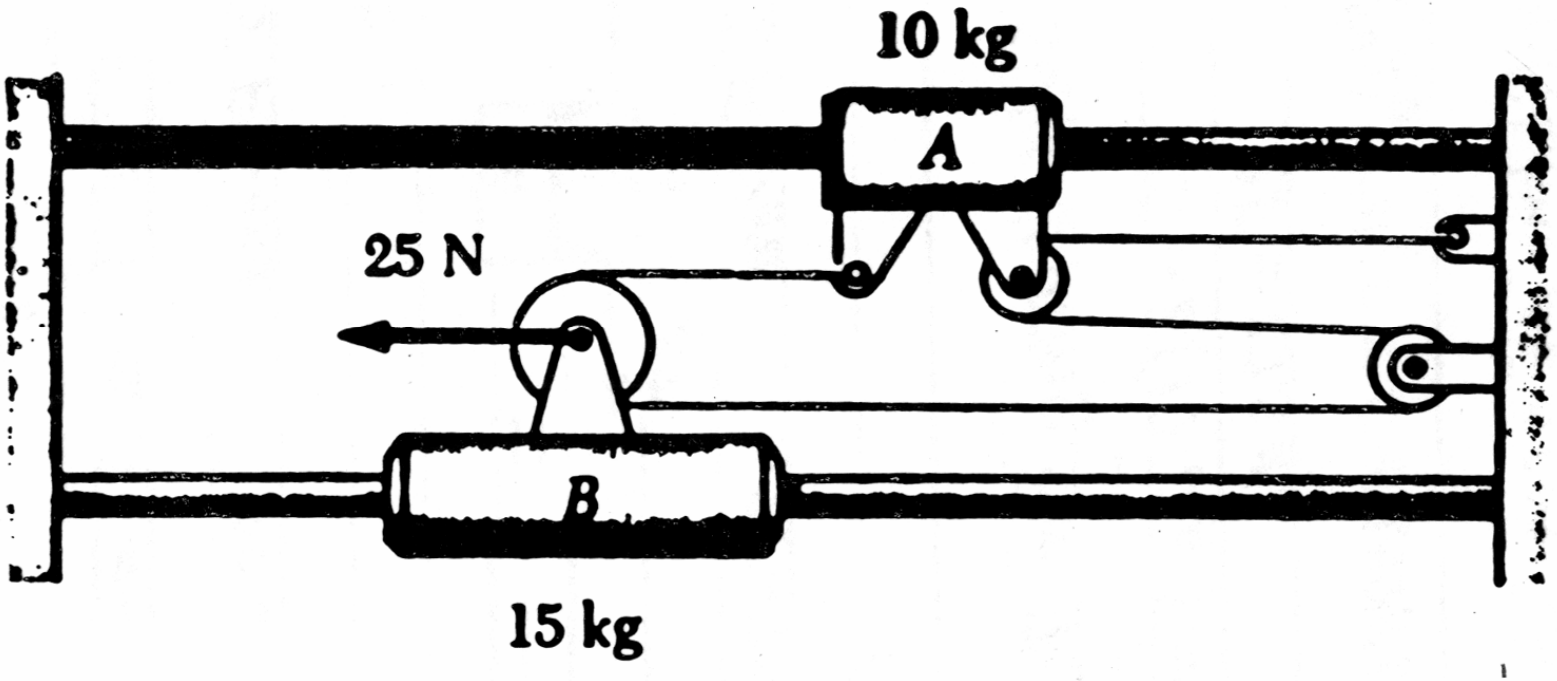
Example Related to Energy Method (Similar to Question No.3)

Knowing that the system starts from rest, find the velocity of block B (a) at time t = 1.2 s, and (b) after the block has moved a distance of 0.5 m.

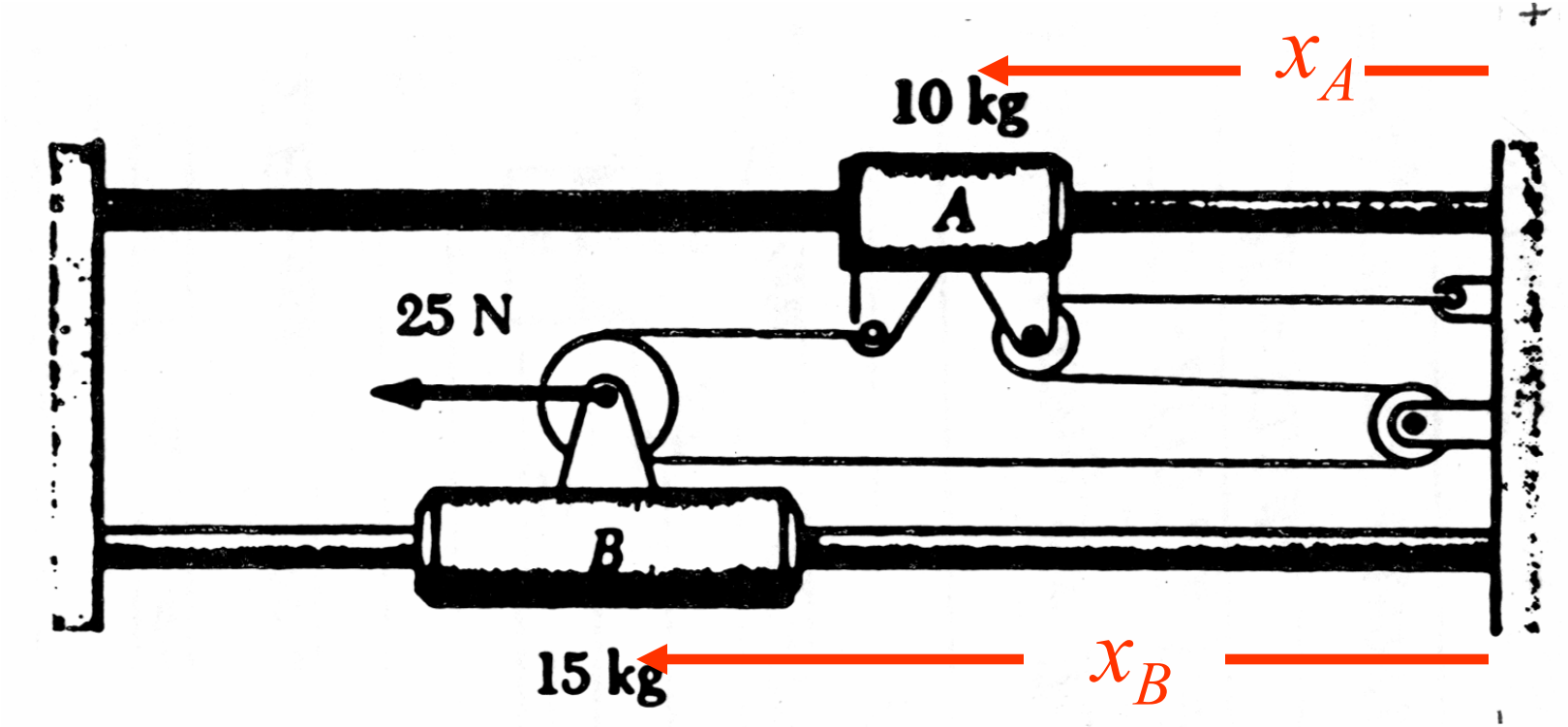


Example Related to Energy Method

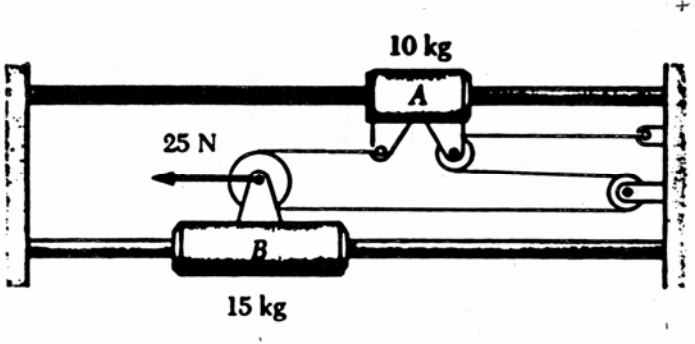
Length of the string = $2x_A+x_B+(x_B-x_A)$

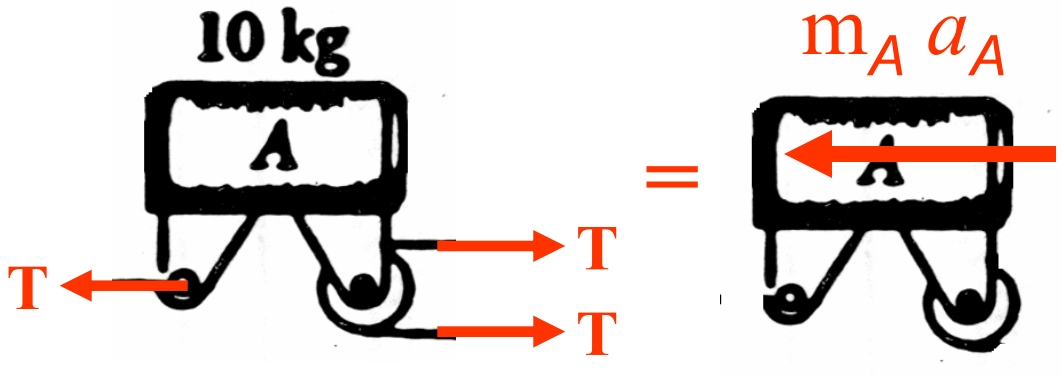
$x_A+2x_B=constant$

$$a_A+2a_B=0$$

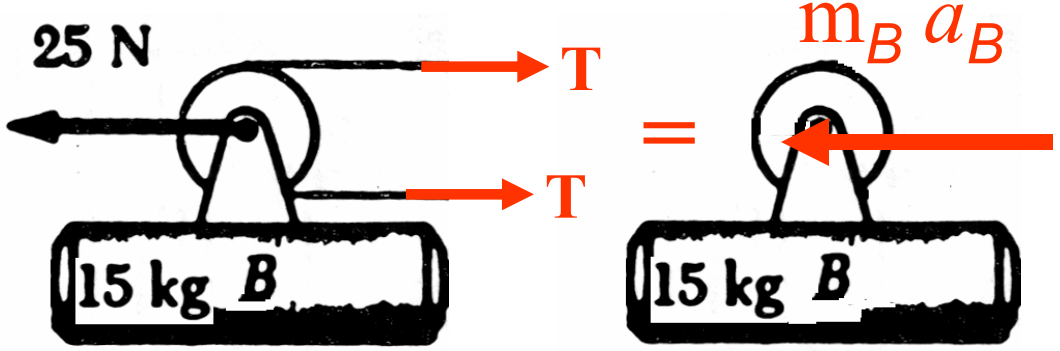


Kinematic: $a_A + 2a_B = 0$





$\leftarrow$: $-T = 10\, a_A = -20\, a_B$



$\leftarrow$: $25 - 2T = 15\, a_B$

$a_B = 25/55 = 0.4545\ \text{m/s}^2$

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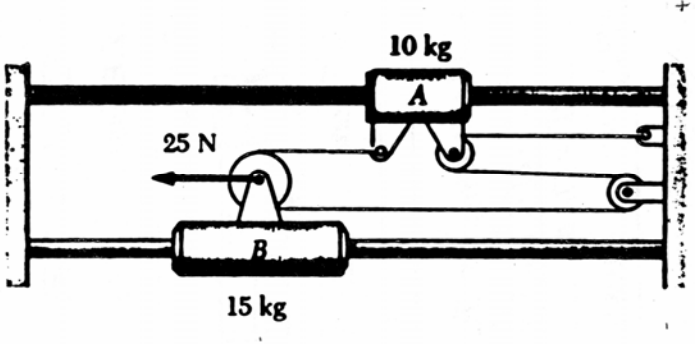

(a) Find velocity of B after lapse of time t = 1.2 s

$$\frac{dv}{dt} = a$$

$v_B = 0.4545 \text{ x } 1.2 = 0.545 \text{ m/s}$

(b) Find velocity of B after displacement of $x_B = 0.5$ m

$$a = \frac{dv}{ds}\frac{ds}{dt} = \frac{dv}{ds}v = \frac{d}{ds}\left[\frac{1}{2}v^2\right] = a$$

$$\frac{d}{ds}\left[\frac{1}{2}v^2\right] = a$$

$\frac{1}{2} v_B^2 = 0.227 \text{ m}^2/\text{s}^2$