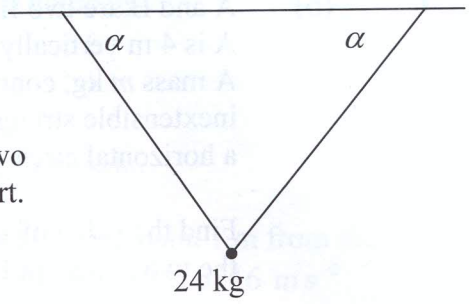
2011

7. **(a)** A particle of mass 24 kg is attached to two light elastic strings, each of natural length 33 cm and elastic constant k.

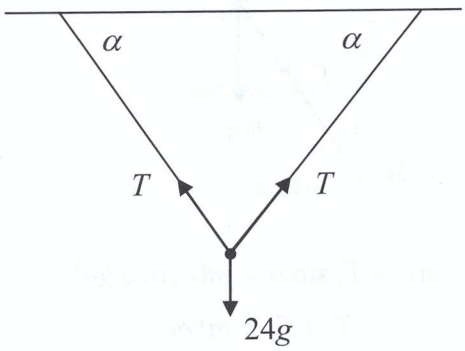


The other ends of the strings are attached to two points on the same horizontal level 64 cm apart.

Each string makes an angle α with the horizontal, where $\tan\alpha = \frac{3}{4}$.

(i) Show that the extension of each string is 7 cm.

(ii) Find the value of k.



(i) $\cos\alpha = \dfrac{32}{33+x}$ 5

$\dfrac{4}{5} = \dfrac{32}{33+x}$

$x = 7$ cm 5

(ii) $2T\sin\alpha = 24g$ 5

$2T\left(\dfrac{3}{5}\right) = 24g$

$T = 20g$ 5

$T = kx$

$20g = k(0.07)$

$\Rightarrow k = 2800$ N m^{-1} 5

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