2.

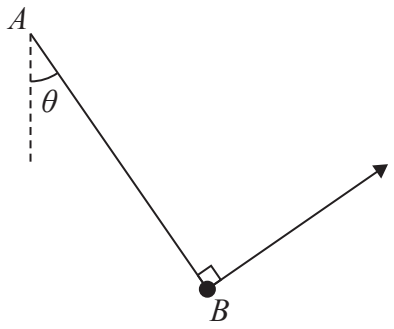


Figure 2

A light elastic string AB has modulus of elasticity $2mg$ and natural length ka, where k is a constant.
The end A of the elastic string is attached to a fixed point. The other end B is attached to a particle of mass m. The particle is held in equilibrium, with the elastic string taut, by a force that acts in a direction that is perpendicular to the string. The line of action of the force and the elastic string lie in the same vertical plane. The string makes an angle θ with the downward vertical at A, as shown in Figure 2.

Given that the length $AB = \frac{21}{10}a$ and $\tan\theta = \frac{3}{4}$, find the value of k.

(6)

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(Total for Question 2 is 6 marks)