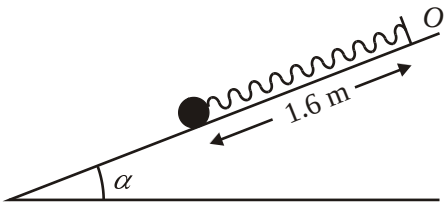
1.

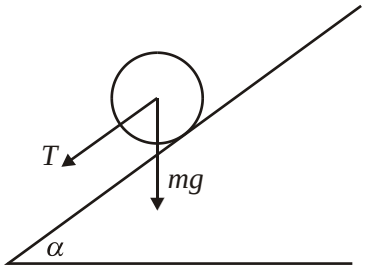


A particle of mass 0.8 kg is attached to one end of a light elastic spring, of natural length 2 m and modulus of elasticity 20 N. The other end of the spring is attached to a fixed point *O* on a smooth plane which is inclined at an angle α to the horizontal, where $\tan \alpha = \frac{3}{4}$. The particle is held on the plane at a point which is 1.6 m down a line of greatest slope of the plane from *O*, as shown in the diagram. The particle is then released from rest.

Find the initial acceleration of the particle.

(Total 6 marks)

1.



HL $t = \dfrac{20 \times 0.4}{2} (= 4)$ M1 A1

accept –4

[$mg \sin \alpha + T = ma$ M1 A1

$0.8 \times 0.6 + 4 = 0.8a$ M1

$a = 10.88 \approx 10.9$ (m s^{-2}) A1

accept 11

[6]

1. Nearly all candidates could apply Hooke's Law successfully, although a few confused this law with elastic energy. Virtually all candidates then knew how to use Newton's Second Law to complete the question but many failed to realise that a spring under compression produces a thrust and is not in tension. The majority of candidates did not give their final answer to an appropriate degree of accuracy. In questions involving a numerical value of g, answers should be given to 2 or 3 significant figures. Despite these comments, the great majority of candidates gained at least 4 of the 6 marks available for this question.