

- 3** One end of a light elastic string, of natural length a and modulus of elasticity kmg , is attached to a fixed point A . The other end of the string is attached to a particle P of mass $4m$. The particle P hangs in equilibrium a distance x vertically below A .

(a) Show that $k = \frac{4a}{x-a}$. [1]

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An additional particle, of mass $2m$, is now attached to P and the combined particle is released from rest at the original equilibrium position of P . When the combined particle has descended a distance $\frac{1}{3}a$, its speed is $\frac{1}{3}\sqrt{ga}$.

(b) Find x in terms of a . [6]

This image shows a full page of a worksheet designed for handwriting practice. It features 18 horizontal rows. Each row consists of three parallel lines: a solid top line, a dashed middle line, and a solid bottom line. The rows are evenly spaced and extend across the entire width of the page, providing a guide for letter formation and alignment.