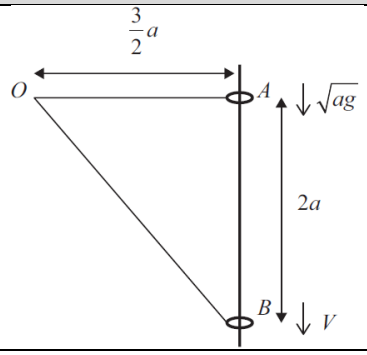
| Question Number | Scheme | Marks |
|---|---|---|
| **3** |  | |
| | Attempt to find final extension: $\sqrt{\left(\left(\frac{3a}{2}\right)^2+(2a)^2\right)}-a$ | M1 |
| | Method to find at least one expression for EPE | M1 |
| | Two correct expressions for EPE (final and initial)<br>$\frac{mg}{2a}\left(\frac{3a}{2}\right)^2$ , $\frac{mg}{2a}\left(\frac{a}{2}\right)^2$ | A1 |
| | GPE Loss = $mg\times 2a$ | B1 |
| | Use of conservation of mechanical energy | M1 |
| | $mg\times 2a+\frac{1}{2}mag+\frac{mg}{2a}\left(\frac{a}{2}\right)^2=\frac{1}{2}mV^2+\frac{mg}{2a}\left(\frac{3a}{2}\right)^2$<br>$\left(2mga+\frac{1}{2}mag+\frac{mga}{8}=\frac{1}{2}mV^2+\frac{9mga}{8}\right)$ | A1 |
| | $(V=)\ \sqrt{3ag}$ | A1 |
| | | **(7)** |
| | **Notes for question 3** | |
| **M1** | Complete method to find the final extension (their $OB-a$). May see use of the 3,4,5 triangle or Pythagoras to find $OB$. May be implied by a correct final extension. | |
| **M1** | Method using EPE formula at least once. EPE must have the form $\frac{\lambda x^2}{k\,a}$ where $\lambda$ is modulus of elasticity, $x$ is their extension and $k$ is a constant (condone $k=1$). | |
| **A1** | Two correct expressions for EPE | |
| **B1** | GPE term seen or implied | |
| **M1** | Use of the principle of conservation of mechanical energy. All required terms present and of the correct structure with no extras (2 EPE, 2KE, GPE). Condone sign errors.<br>Note there are different rearrangements. For example,<br>Initial = Final $mg\times 2a+\frac{1}{2}mag+\frac{mg}{2a}\left(\frac{a}{2}\right)^2=\frac{1}{2}mV^2+\frac{mg}{2a}\left(\frac{3a}{2}\right)^2$ | |