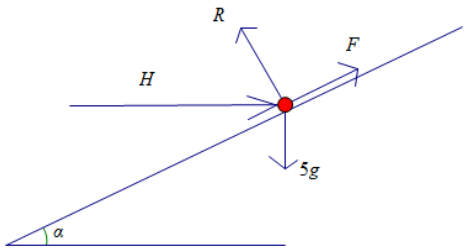
| Q | Scheme | Marks | Notes |
|---|---|---|---|
| 6a |  | | $\tan\alpha = 0.75$<br>**N.B**. If they use 5*m* consistently, can score<br>Max M1A0M1A0 B1A0 in (a)<br>Max B0B1M1A0M1A0 in (b) |
| | First equation e.g. resolve perpendicular to the slope | M1 | Need all terms. Condone sign errors and sin/cos confusion. |
| | $R = 5g\cos\alpha + H\sin\alpha$ | A1 | Correct unsimplified equation |
| | Second equation e.g. resolve parallel to the slope | M1 | Need all terms. Condone sign errors and sin/cos confusion. |
| | $H\cos\alpha + F = 5g\sin\alpha$ | A1 | Correct unsimplified equation |
| | **N.B**. Consistent omission of *g* from both equations, penalise ONCE so can score max:<br>M1A0M1A1B1A0 | | |
| | Alternative equations:<br>Resolve horizontally: $H + F\cos\alpha \left(= H + \mu R\cos\alpha\right) = R\sin\alpha$<br>Resolve vertically: $5g = R\cos\alpha + F\sin\alpha \left(= R\cos\alpha + \mu R\sin\alpha\right)$ | | |
| | **N.B**. If they use the wrong values for $\sin\alpha$ and $\cos\alpha$, still allow the A marks for the equations, provided it's clear that the correct ratios have been used. | | |
| | $F = \frac{1}{4}R$ | B1 | Seen or implied.<br>Allow $F \le \frac{1}{4}R$ |
| | $H =$ 20.6 or 20.7 or 21 or $\frac{40g}{19}$ | A1 | Must be 3 sf or 2 sf or exact multiple of *g*.<br>A0 for $\frac{392}{19}$ |
| | | **[6]** | |
| | | | **N.B. No marks available in (b) if they use *R* and *F* from (a).** |
| 6b | **N.B**. If they use the wrong values for $\sin\alpha$ and $\cos\alpha$, still allow the A marks for the equations, provided it's clear that the correct ratios have been used.<br>**N.B**. If *g* is omitted consistently, can score max : B0B1M1A1M1A0 | | |
| | $S = 5g\cos\alpha \left(= 4g\right)$ | B1 | Seen or implied |
| | $F = \frac{1}{4}S$ | B1 | Used with a **new** value for the reaction. |
| | Equation of motion for *P*:<br>$5g\sin\alpha - g \left(= 3g - g\right) = 5a$ oe | M1 | Need all terms. Condone sign errors and sin/cos confusion. |

| | | | |
|---|---|---|---|
| | | | |
| | $a = \frac{2g}{5}$ or 3.92 | A1 | Correct value for $a$<br>**N.B.** Allow -ve value provided it's clear that their $a$ was up the plane. |
| | $1.5 = \frac{1}{2} \times \frac{2g}{5} \times T^2$ | M1 | Complete method to form an equation in $T$ only. Follow their $a \neq g$. |
| | ($T$) = 0.875 or 0.87 | A1 | 3 sf or 2 sf<br>**N.B.** Only penalise overaccuracy after $g$ = 9.8, ONCE for the whole question. |
| | | **[6]** | |
| | | **(12)** | |