| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 7 (a) | correct substitution KE = ½ (mass) × (speed)$^2$;<br><br>re-arrangement to give v;<br>evaluation to show 5.8(4…) (m/s);<br><br>e.g. KE = ½ m v$^2$<br>0.29 = 0.5 × 0.017 × v$^2$<br>v$^2$ = 0.29 ÷ (0.5 × 0.017) = 34.1176471..<br>v = √34.1176471 = 5.8(4…) (m/s) | allow use of standard symbols e.g. KE = ½ m v$^2$<br>allow mass = 17 at this point | 3 |
| (b) | idea of conservation of momentum;<br>idea that momentum before release was zero;<br><br>evidence of re-arrangement;<br>evaluation of large block speed giving 1.3 m/s;<br><br>e.g. momentum of small block = 17 × 6 = 102 g m/s<br>therefore momentum of large block = 102 g m/s<br>momentum = mass × velocity = 75 v<br>so v = 102/75 = 1.36 m/s | however expressed<br>allow idea that momenta of two blocks is equal in magnitude<br><br>allow 1.4 if $v_{small}$ = 6 m/s<br>ignore mass unit provided both masses consistent<br><br>v=1.31 if $v_{small}$ = 5.8 m/s<br>v=1.32 if $v_{small}$ = 5.84 m/s | 4 |
| (c) | substitution into given equation;<br><br>idea of initial momentum = 0;<br>evaluation;<br>correct answer = 0.93 (N)<br><br>e.g. force = change in momentum ÷ time taken<br>force = ((0.017 × 6) – 0) ÷ 0.11<br>force = 0.102 ÷ 0.11<br>force = 0.9272… (N) | <br>allow use of init velocity = 0 | 3 |
| (d) | substitution and re-arrangement of given equation;<br>conversion of 17.6 cm to 0.176 m;<br>evaluation;<br>correct answer = 0.18(41…) (s)<br><br>e.g. orbital speed=(2π × orbital radius)÷time period<br>6 = (2π × 0.176)÷T<br>T = (2π × 0.176) ÷ 6<br>T = 0.1843… (s) | <br><br><br>accept 0.2 (s)<br>accept use of v=5.84…(m/s)<br>-1 POT error<br><br><br><br>0.092.. (s) for using 17.6 cm as a diameter scores 2 marks | 3 |

Total for Question 7: 13 marks