

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

Total for Question 7: 13 marks