Question number	Answer	Notes	Marks
3 (a) (i)	(average) speed = distance / time;	allow standard symbols and rearrangements e.g. v = s/t allow s for speed and d for distance	1
(ii)	substitution; evaluation; e.g. (speed =) 1860 / 5.6 (speed =) 330(m/s)	 allow 332.14…(m/s)	2
(iii)	light travels faster than sound; he sees explosion before hearing it;	allow idea that they travel at different speeds but not that sound travels faster Allow RA	2
(b)	vibrations (of particles) are parallel; to direction the wave travels;	allow oscillations for vibrations DOP allow direction of energy transfer	2
(c) (i)	kinetic energy = ½ × mass × speed^2;	allow standard symbols and rearrangements e.g. KE = ½ × m × v^2	1
(ii)	substitution; evaluation; e.g. (KE =) $0.5 \times 1.25 \times 10^7 \times 19200^2$ (KE =) 2.30×10^{15} (J)	 -1 for POT error allow 2.304×10^{15} (J)	2

Total for Question 3 = 10 marks