Question number	Answer	Notes	Marks
12 (a)	use of u=0 (m/s); correct substitution into '$v^2 = u^2 + 2aS$'; correct evaluation of v^2; correct evaluation of v; correct answer = 160 (m/s) e.g. $v^2 = u^2 + 2aS$ $v^2 = 0^2 + (2 \times 10 \times 1300)$ $v^2 = 26000$ v = 161.245… (m/s)	accept loss of GPE = gain in KE reject use of v=0 for this MP $v^2 = 26000$ accept 25506, 25480 reject $v^2 = 2600$ if no a=10 seen. ignore sign accept 159.7059..,159.62....	4
(b) (i)	any THREE from: MP1. reference to weight **and** air resistance; MP2. air resistance larger than weight (when parachute opens); MP3. reference to 'F = ma'; MP4. acceleration is upwards; MP5. air resistance decreases as parachutist slows down;	ignore 'upthrust' accept drag for AR accept 'resultant or unbalanced force is upwards ' allow idea of increased AR ignore 'decelerates' or 'slows down'	3
(ii)	any THREE from: MP1. GPE reduces as height above ground reduces; MP2. KE reduces as speed reduces; MP3. friction force does mechanical work on parachutist; MP4. thermal store of parachutist increases; MP5. thermal transfer between (warm) parachutist and (cold) air; MP6. thermal transfer happens by conduction or radiation;	 accept 'works mechanically' accept 'energy lost to the surroundings' accept idea of conversion to heat energy via friction	3

(Total for Question 12 = 10 marks)