Question Number	Answer		Mark
19(a)	Use of $p = mv$	(1)	4
	Use of trigonometrical function for *x* or *y* component of momentum for either stone	(1)	
	Applies conservation of momentum in *x* direction or *y* direction	(1)	
	$v = 1.32$ (m s^{-1}) (3 sf reqd) if *x* components considered Or $v = 1.33$ (m s^{-1}) (3 sf reqd) if *y* components considered	(1)	
	Example of calculation $p = 19.1 \text{ kg} \times 0.87 \text{ m s}^{-1} = 16.6 \text{ kg m s}^{-1}$ y component for upper stone $= 16.6 \text{ kg m s}^{-1} \times \sin 50^{o} = 12.7 \text{ kg m s}^{-1}$ y component for lower stone $= 12.7 \text{ kg m s}^{-1} = 19.1 \text{ kg} \times v \sin 30^{o}$ $v = \frac{12.7 \text{ kg m s}^{-1}}{0.5 \times 19.1 \text{ kg}} = 1.33 \text{ m s}^{-1}$		
19(b)	Use of $E_k = \frac{1}{2}mv^2$ **Or** use of $E_k = \frac{p^2}{2m}$	(1)	3
	Correct calculation of one kinetic energy (e.c.f from (a))	(1)	
	Comparison and conclusion consistent with correctly calculated values of kinetic energy	(1)	
	Example of calculation $E_k = \frac{1}{2} \times 19.1 \text{ kg} \times (1.7 \text{ m s}^{-1})^2 = 27.6 \text{ J}$ before $E_k = \frac{1}{2} \times 19.1 \text{ kg} \times (0.87 \text{ m s}^{-1})^2 + \frac{1}{2} \times 19.1 \text{ kg} \times (1.33 \text{ m s}^{-1})^2$ $\therefore E_k = 7.2 \text{ J} + 16.9 \text{ J} = 24.1 \text{ J}$ after Initial $E_k = 28$ J so kinetic energy is not the same and collision is not elastic		
	Total for question 19		7