Question Number	Answer		Mark
14(a)	Total momentum before an interaction = total momentum after interaction	**(1)**	**2**
	If no (external) unbalanced / resultant force acts **Or** in a closed system	**(1)**	
14(b)(i)	Use of $E_K = ½ mv^2$	**(1)**	**3**
	Correct value for one object	**(1)**	
	Not elastic collision because total E_k before ≠ E_k after **Or** elastic collision total E_k before is (about) the same as E_k after (**all** values must have been correctly calculated)	**(1)**	
	<u>Example of calculation</u> Before $E_K = ½ mv^2$ $= ½ \times 0.85 \text{ kg} \times (1.30 \text{ m s}^{-1})^2 = 0.72 \text{ J}$ After $E_K = ½ mv^2$ $= ½ \times 0.85 \text{ kg} \times (0.98 \text{ m s}^{-1})^2 = 0.41 \text{ J}$ $E_K = ½ mv^2$ $= ½ \times 1.70 \text{ kg} \times (0.54 \text{ m s}^{-1})^2 = 0.25 \text{ J}$ Total = 0.66 J		
14(b)(ii)	Use of $p = mv$	**(1)**	**5**
	Use of trigonometry to find a component of momentum after collision	**(1)**	
	Shows momentum before in x direction = momentum after in original direction	**(1)**	
	Shows perpendicular component of A = perpendicular component of B **Or** Shows total momentum in perpendicular direction after collision is approximately zero	**(1)**	
	Conclusion that momentum before = momentum after (in both directions) so conservation of momentum is demonstrated successfully (**all** values must have been correctly calculated) **Or** Conclusion that momentum before ≠ momentum after (in either direction) so conservation of momentum is not demonstrated successfully (**all** values must have been correctly calculated)	**(1)**	
	<u>Example of calculation</u> Before $p = mv$ $= 0.85 \text{ kg} \times 1.30 \text{ m s}^{-1} = 1.11 \text{ kg m s}^{-1}$ horizontal, 0 vertical After – original direction $p = 0.85 \text{ kg} \times 0.98 \text{ m s}^{-1} \times \cos 54.5° = 0.484 \text{ kg m s}^{-1}$ $p = 1.70 \text{ kg} \times 0.54 \text{ m s}^{-1} \times \cos 48.0° = 0.614 \text{ kg m s}^{-1}$ Total = 1.11 kg m s^{-1} After – perpendicular to original direction $p = 0.85 \text{ kg} \times 0.98 \text{ m s}^{-1} \times \sin 54.5° = 0.68 \text{ kg m s}^{-1}$ $p = -1.70 \text{ kg} \times 0.54 \text{ m s}^{-1} \times \sin 48.0° = -0.68 \text{ kg m s}^{-1}$		
	Total for question 14		**10**