SECTION B

Question Number	Answer		Mark
11(a)			2
	Sum of momenta before (collision) = sum of momenta after (collision) **Or** Total momentum before (a collision) = total momentum after (a collision) **Or** Total momentum remains constant **Or** The momentum of a system remains constant	**(1)**	
	Provided no external/unbalanced/resultant force acts **Or** in a closed/isolated system	**(1)**	
11(b)(i)			2
	Use of $p = m\,v$	**(1)**	
	$m = 8.22 \times 10^{13}$ (kg)	**(1)**	
	<u>Example of calculation</u> 1.80×10^{17} N s $= m \times 2.19 \times 10^3$ m s^{-1} $m = 1.80 \times 10^{17}$ N s $\div 2.19 \times 10^3$ m s$^{-1} = 8.219 \times 10^{13}$ kg		
11(b)(ii)			3
	Use of $p = m\,v$ with combined final mass	**(1)**	
	Use of momentum conservation	**(1)**	
	$v = 3.05 \times 10^3$ m s^{-1} (ecf from (i))	**(1)**	
	<u>Example of calculation</u> 1.80×10^{17} N s $+ (5.90 \times 10^{12}$ kg $\times 15.0 \times 10^3$ m s$^{-1})$ $\qquad\qquad\qquad\qquad = (8.219 \times 10^{13}$ kg $+ 5.90 \times 10^{12}$ kg$) \times v$ $v = 2.685 \times 10^{17}$ N s $\div 8.81 \times 10^{13}$ kg $= 3.048 \times 10^3$ m s^{-1}		
	Total for question 11		7