

Question			Expected response	Max mark	Additional guidance
4.	(a)		0.5 m s^{-1}	1	Ignore minus sign if given in final answer.
	(b)		1.8 m s^{-1}	1	Ignore minus sign if given in final answer.
	(c)	(i)	$3.00 \times 10^8 \text{ m s}^{-1} \text{ or } c \quad (1)$ Speed of light is the same for all observers (1)	2	JUSTIFY Accept: $3 \times 10^8 \text{ m s}^{-1}$ If the numerical value for speed is given, then unit is required, otherwise 0 marks. Accept: Speed of light is the same in all (inertial) frames of reference or equivalent.
		(ii)	$l' = l \sqrt{1 - \left(\frac{v}{c}\right)^2} \quad (1)$ $l' = 142 \sqrt{1 - \left(\frac{0.9c}{c}\right)^2} \quad (1)$ $l' = 61.9 \text{ m} \quad (1)$	3	Accept: 62, 61.90, 61.896 Accept: $l' = 142 \sqrt{1 - (0.9)^2}$