

Question		Answer	Notes	Marks
4 (a) (i)		Momentum = mass x velocity	Allow abbreviations and rearrangements e.g. $p=mv$, mass = $\frac{\text{momentum}}{\text{velocity}}$	1
(ii)		Substitution into correct equation; Calculation; e.g. $17\,000 \times 13$ $220\,000 \text{ (kg m/s)}$	Allow 221 000	2
(b) (i)		Answers should be in the context of momentum (when the lorry stops) the load still has momentum; Idea that lorry stops in a shorter time; OR Idea that load takes more time to stop;	Allow: $(mv - mu) = Ft$ Allow for TWO marks lorry loses momentum more quickly;; OR load loses momentum more slowly;;	2
(ii)		MP1 Centre of gravity is closer to the front of the lorry; MP2 Clockwise and anticlockwise moments equal; MP3 Increase in force related to decrease in distance (to provide balancing moment);	Ignore action and reaction arguments Allow: centre of mass nearer front of lorry there is more weight near the front of the lorry / near B C of G further from rear (wheel) Allow: <ul style="list-style-type: none"> Moments are balanced total moment = 0 	3
(c) (i)1		Pressure = $\frac{\text{force}}{\text{area}}$;	Allow abbreviations and rearrangements, e.g. $P=F/A$, force = pressure x area	1
(ii)2		Substitution into correctly rearranged formula; Calculation; e.g. $53\,000 \div 390\,000$ $0.14 \text{ (m}^2\text{)}$	0.136 0.135897 Allow 1400 cm^2	2

Total for question 4 = 11 marks