Question Number	Answer	Acceptable answers	Mark
1 (a) (i)	8 – 0 (m/s)	8	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	substitution 8 / 5 (1) evaluation (1) 1.6 (m/s^2)	ecf from (i) full marks for correct answer (or ecf) with no working shown.	 **(2)**

Question Number	Answer	Acceptable answers	Mark
1(a)(iii)	0	Nil / nothing / zero / none (no mark for no response)	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	substitution F = 1200 x 0.8 (1) evaluation (1) 960 (N)	 full marks for correct answer with no working shown.	 **(2)**

Question Number		Indicative Content	Mark
QWC	*)	an explanation linking some of the following points: compared to a car with just the driver, a fully loaded car will • have a greater mass / be heavier • greater kinetic energy / momentum • experience the same braking force (when brakes are applied) • require a greater braking force (than available) to stop (in the same distance) • have a smaller acceleration / deceleration • take a longer time to come to rest (from given speed) • travel greater distance in this time • needs to do more work with same amount of force • use of relevant equations such as F = ma, work done = F x d • consequence of driver distractions	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation using one idea from the indicative content eg fully loaded car is heavier. • in answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation which links ideas from the indicative content eg it is heavier and so it takes a longer distance to stop • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed explanation which links several ideas from the indicative content e.g. It has more momentum and so it will take a longer time to stop. This means that it will travel a further distance. The answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
2(a)	Description including 3 of the following: • (Gravitational) potential energy (transferred) to KE(1) • Idea of energy transfer to heat/sound whilst descending (1) • Chemical energy is transferred to heat energy in Andrew (1) • Idea of energy dissipated on stopping (1)	(G)PE (transferred) to KE Allow gravitational energy for GPE Energy transferred to heat because of air resistance/ friction The energy goes to heat as he stops. Energy is transferred to the surroundings	**(3)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	substitution (1) 67 × 31 evaluation (1) 2077 (kg m/s)	 2080, 2100 working backwards using 2000 (v=) 29.85, 30 (m=) 64.52, 65 67 X 31=2000 scores only one mark	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	substitution (1) 2000 ÷ 2.3 evaluation (1) 870 (N)	 answer to (b)(i)) ÷ 2.3 900, 869.6, 869.5 903	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(iii)	an explanation linking two of the following • Force on Andrew is quite small (1) • Because impact time is long (1) • The acceleration/deceleration is quite small (1) • Because impact distance is far (1)	 force is reduced/ less /not as strong slows down/changes momentum gradually acceleration = 1.35 'g' or 13.5 m/s^2 slows down (rate of) change of momentum scores 2 marks	**(2)**

Total question 2 = 8 marks

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	D 23 m		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	A the driver is tired		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)	substitution (1) 800 x 3 evaluation (1) 2400 (kg m/s)	Give full marks for correct numerical answer, even if no working bald 2.4×10^{n} gains 1 mark (BOD for correct substitution) eg bald 240 = 1 mark In all calculations if the candidate gives two different methods and writes the wrong answer in the answer space award no marks If the candidate writes correct answer they will gain full marks.	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	substitution (1) 600 x 15 evaluation (1) 9000 (J)	bald 9.0×10^{n} gains 1 mark eg bald 900 = 1 mark (BOD for correct substitution) give full marks for correct numerical answer, 9000 (J) even if no working	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	A the energy transferred		**(1)**