Question Number	Answer	Acceptable answers	Mark
1(ai)	150 m **(1)**		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(aii)	**B** at 7 s **(1)**		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(aiii)	6 (s) **(1)**		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(aiv)	Substitution: 15 ÷ 6 (1) Evaluation 2.5 (m/s^2) (1)	Allow ecf from 4(aiii) Must be 15 divided by their 4(aiii) ECF allowed from first marking point ie evaluation of 15 divided by their answer from 4(aiii) Award 2 marks for correct answer, no working	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(bi)	100 - 30 (1) 70 (N) (1)	100 + 30 or 130 gains 1 mark Award 2 marks for correct answer, no working	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(bii)	550 (N) (1)	539 (N) allow use of g = 9.8 N/kg 539.55 (N) for use of g = 9.81N/kg Award mark for correct answer, no working	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)	An explanation linking (combined) mass is less (1) smaller force required for same acceleration OR more acceleration from same force (1)	ignore references to weight, friction or backwards force ignore "easier to accelerate" as in stem less force needed (to accelerate)	**(2)**

(Total for Question 4 =10 marks)

Question Number	Answer	Acceptable answers	Mark
2 (a)	B 		**(1)**

Question Number	Answer	Acceptable answers	Mark
2 (b)	**A –** 0 N		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	Substitution (1) 1.2 = (20 – 13) / t Transposition (1) t = (20-13)/1.2 Evaluation 5.8 (s) (1) substitution and transposition can be in either order	1.2 = 7 / t t = 7/1.2 5.833 (etc) Give full marks for correct answer, no working	**(3)**

Question Number	Answer	Acceptable answers	Mark
2(c) (ii)	Substitution 1400 x 1.2 (1) Evaluation 1700 (N) (1)	1680 Allow full marks for correct answer with no working shown	**(2)**

Question Number	Answer	Acceptable answers	Mark
2 (c) (iii)	An discussion to include three of the following points The tow rope does not have to support the weight of the car (1) Tension is caused by accelerating force (plus frictional forces) (1) Tension is 5700 N (in this situation)(1) Forces could be kept below 12,000N (1) If acceleration is kept small (1) Numerical justification using f = m x a (1)	 forces are horizontal not vertical / only needs to overcome friction Force is needed to accelerate / resultant force is 0 at constant velocity Force to accelerate is 1700N Forces could be kept small If truck is driven gently/slowly	**(3)**

(Total for Question 4 = 10 marks)

Question number	Answer	Mark
3(a)(i)	B	(1)

Question number	Answer	Mark
3(a)(ii)	vertical arrow, acting downward through the suitcase	(1)

Question number	Answer	Additional guidance	Mark
3(b)(i)	substitution (1) $(KE =) \frac{1}{2} \times 85 \times 1.5^2$ answer (1) 96 (J)	award full marks for correct numerical answer without working allow 95.625 (J)	(2)

Question number	Answer	Additional guidance	Mark
3(b)(ii)	rearrange (1) force = work done ÷ distance answer (1) (force) = 15 (N)	accept rearrangement with values subst., i.e. (force) = 1200 ÷ 80 award full marks for correct numerical answer without working	(2)

Question number	Answer	Additional guidance	Mark
3(c)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): • the work done is the same for walking and running (1) • because work done depends on force and distance only, not time (1)	allow energy for work done because work done ÷ time is power	(2)

Question number	Answer	Additional guidance	Mark
3(d)	rearrangement (1) (height) = change in GPE ÷ (mass × g) answer (1) 2.2 (m)	accept rearrangement with values, i.e. (h) = 264 ÷ (12 × 10) or = 264 ÷ 120 award full marks for correct numerical answer without working	**(2)**