Q	Marking instructions	AO	Marks	Typical solution
18(a)	Uses $F = ma$ to form at least one equation modelling the van, car or both combined with at least three terms.	3.3	M1	$D - R - T = 2780 \times 0.6$
	Obtains a fully correct equation. Other examples: $D - R - T = 1668$ $T - 0.6R = 972$ $D - 1.6R = 2640$ NB T may have been replaced by kD – 18 at any point.	1.1b	A1	$T - 0.6R = 1620 \times 0.6$ Eliminating R $0.6D - 1.6T = 28.8$
	Forms a second fully correct equation.	3.3	B1	$T = \frac{0.6}{1.6}(D - 48)$
	Eliminates R to form an equation with D and T	3.4	M1	
	Obtains $k = \frac{3}{8}$ OE	1.1b	A1	$k = \frac{3}{8}$
	Subtotal		**5**	

Q	Marking instructions	AO	Marks	Typical solution
18(b)	Describes any valid assumption. For example: • Tow bar has negligible mass. • The car is directly behind the van. • The masses include drivers. • Tow bar is rigid. • Tow bar is inextensible. • Do not accept any reference to resistances, tension being constant, tow bar breaks.	3.5b	B1	Tow bar is horizontal
	Subtotal		**1**	

	Question 18 Total		**6**	