1) B
2) B
3) D
4) A
5)

$v^2 = u^2 + 2as$ OR use of triangle etc C1
$4.0^2 = 2 \times 9.8 \times s$ OR $s = ½ \times 4.0 \times 0.4$
$s = 0.82$ m OR 0.80 m ..... A1 [2]

6)

(a) **(i)** distance from a (fixed) point.....M1
in a specified direction A1
(Allow 1 mark for 'distance in a given direction')

(ii) (displacement from start is zero if) car at its starting position..... B1 [3]

(b) **(i)1** $v^2 = u^2 + 2as$
$28^2 = 2$ x a x 450 (use of component of 450 scores no marks)..... C1
a = 0.87 m s^{-2} ..... A1 [2]
(-1 for 1 sig. fig. but once only in the question)

(i)2 $v = u + at$ or any appropriate equation
$28 = 0.87t$ or appropriate substitution..... C1
t = 32 s ..... A1 [2]

7)

(a) **(i)** scatter of points (about the line) B1
(ii) intercept (on t^2 axis) B1 **[2]**
(note that answers must relate to the graph)

(b) **(i)** gradient = $\Delta y / \Delta x$ = (100 – 0)/(10.0 – 0.6) C1
gradient = 10.6 (cm s^{-2}) *(allow ±0.2)* A1 **[2]**
(Read points to within $\pm\frac{1}{2}$ square. Allow 1 mark for 11 cm s^{-2}
i.e. 2 sig fig, -1. Answer of 10 scores 0/2 marks)

(ii) $s = ut + \frac{1}{2}at^2$ B1
so acceleration = 2 x gradient B1
acceleration = 0.212 m s^{-2} B1 **[3]**

Total **[7]**

8)

(a) change in velocity/time (taken) B1 **[1]**

(b) velocity is a vector/velocity has magnitude & direction B1
direction changing so must be accelerating B1 **[2]**

9)

(a)		uses a tangent (anywhere), not a single point	C1	
		draws tangent at correct position	B1	
		acceleration = 1.7 ± 0.1	A2	[4]
		(*outside 1.6 → 1.8 but within 1.5 → 1.9, allow 1 mark*)		
(b)	**(i)**	because slope (of tangent of graph) is decreasing	M1	
		acceleration is decreasing	A1	[2]
	(ii)	e.g. air resistance increases (with speed)		
		(angle of) slope of ramp decreases	B1	[1]
(c)	**(i)**	scatter of points about line	B1	[1]
	(ii)	intercept / line does not go through origin	B1	[1]

10)

(a)	**(i)**	$v^2 = 2as$		
		$v^2 = 2 \times 0.85 \times 9.8 \times 12.8$	C1	
		$v = 14.6$ m s^{-1}	A1	[2]
	(ii)	time = 29.3 / 14.6	C1	
		= 2.0 s	A1	[2]
		(*any acceleration scores 0 marks; allow 1 s.f.*)		
(b)		*either* 60 km h^{-1} = 16.7 m s^{-1}		
		or 14.6 m s^{-1} = 53 km h^{-1}		
		or 22.1 m s^{-1} = 79.6 km h^{-1}	M1	
		so driving within speed limit	A1	
		but reaction time is too long / too slow	B1	[3]