Name of the Student:_____

Max. Marks : 17 Marks **Time : 17 Minutes**

Mark Schemes

Q1.

Question number	Indicative content	Mark
	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO1 strand 1 (6 marks)** factors concerning driver • change in reaction time • tiredness • effect of drugs • type of footwear • how hard the driver presses the pedal effect of any of the above on stopping distance, • increased stopping distance • increased thinking distance • increased reaction time factors concerning car or road • mass / weight of car • speed of car • state of brakes • state of tyres • state of road effect of any of the above on stopping distance, e.g. • increased thinking/braking distance • increased stopping distance	**(6)**

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Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3-4	• Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

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SUMMARY, for guidance

Level	Mark	Additional Guidance	General additional guidance – the decision within levels e.g. - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	Additional guidance Elements of physics, i.e. isolated factor(s) about **either** car **or** driver	Possible candidate responses worn tyres / tired driver worn tyres and icy road
Level 2	3–4	Additional guidance Some understanding shown, i.e. **either** link between factor and effect **or** a driver factor **and** a car factor	Possible candidate responses worn tyres cause increased stopping distance. **or** worn tyres and tired driver
Level 3	5–6	Additional guidance Understanding is detailed and fully developed, i.e. link between factor and effect - both for driver **AND** for car	Possible candidate responses worn tyre causes increased stopping distance. **and** tired driver causes increased stopping distance

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Q2.

	Answer	Additional guidance	Mark
(i)	an explanation linking **two** from: (wet road means) less / no friction (between tyres and road) (1) (wet weather means) increased stopping distance (1) (slower speed means) shorter braking / stopping distance (1) (dry weather / slower speed) reduces possibility of skidding / sliding / idea of losing control / crashing (1)	accept reverse arguments throughout accept road more slippery / less grip accept idea of reduced visibility accept braking or thinking distance in this context accept takes longer to slow down / stop ignore harder to brake	**(2)** **AO1**

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	Answer	Additional guidance	Mark
(ii)	convert **either** distance or time (1) (31 m =) $\frac{31}{1000}$ (km) or 0.031 (km) **OR** (1 s =) $\frac{1}{3600}$ (h) = $\frac{1}{60\times60}$ (h) or 0.000 28 (h) evaluation (1) (31 m/s =) 110 (km/h)	 (130 km =) 130 × 1000 (m) or 130 000 (m) **OR** (1 h =) 60 x 60 (s) or 3600 (s) (130 km/h =) 36(.1) (m/s) accept 111.6 or 112 (km/h) for 2 marks if no other marks awarded accept 1860 m/min and 2167 m/min for 1 mark each award full marks for the correct answer without working	**(2)** **AO2**

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	Answer	Additional guidance	Mark
(iii)	select and substitute into distance travelled = average speed x time (1) 46 = 31 x t rearrangement and evaluation (1) (t=) 1.48(3) (s) evaluation given to 2 sf (1) (t =) 1.5 (s)	 $31 = \frac{46}{t}$ $(t =) \frac{46}{31}$ award two marks for the correct evaluation without working any answer written to 2 sf independent mark 1.5 scores 3 marks 1.4 scores 2 marks 1.50 scores 2 marks 0.67 scores 2 marks 1400 scores 2 marks 0.673(9) scores 1 mark 1426 scores 1 mark	**(3)** **AO2**

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Q3.

Question number	Answer	Additional guidance	Mark
	an explanation linking any **two** from shorter reaction time (of computer-controlled car) (1) shorter thinking distance (1)	allow reverse arguments computer (reaction time) not affected by other relevant factors shorter distance (travelled) **before brakes applied**	**2** **AO3.1**

Q4.

	Answer	Acceptable answers	Mark
	An explanation linking • acceleration of sports is 2x / time to reach 30 m/s is ½ that of family car / RA (1) • mass of sports car LESS than ½ that of family car or RA (1)(so resultant force required is less)	Attempt to use f = m × a scores one mark e.g. 4200 OR 3600 scores 1 Correct numerical comparison scores both marks e.g. 4200:3600 numerically or in words scores 2 marks	**(2)**

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