Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Mark Schemes

Q1.

Question number	Answer	Additional guidance	Mark
(i)	acceleration = $\frac{\text{change in velocity}}{\text{time (taken)}}$	$a = \frac{v-u}{t}$ $a = \frac{\Delta v}{t}$ $\frac{v}{t}$ allow correct rearrangements seen here or in bii	(1)

Question number	Answer	Additional guidance	Mark
(ii)	substitution (1) $\frac{20 - 2}{12}$ evaluation (1) 1.5 (m/s²)	 $\frac{18}{12}$ -1.5 (m/s²) award full marks (1 in bi and 2 in bii) for the correct answer without working, award 1 mark if 20-2 or 18 or 2-20 is seen and no other marks are scored If (incorrectly) $a = \frac{v^2 - u^2}{t}$ given in 3bi $a = \frac{20^2 - 2^2}{12}$ OR = 33 scores 1 mark	(2)

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Q2.

Question number	Answer	Additional guidance	Mark
	any two from: measure {distance / length of pace} (1) use marks on the track (1) use an electronic timer (1) stand midway between the posts/stand closer to a post (1) place posts further apart/increase distance used or measured (1) use 2 people in the timing (1)	Suitable measuring device including trundle wheel / tape/ GPS light gate(s) idea of reducing systematic error such as parallax Do NOT credit repeats	**(2)**

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Q3.

Question Number		Indicative Content	Mark
QWC	*	An explanation including some of the following points: • Statement of what is meant by stopping distance Factors affecting driver • factors affecting driver's thinking distance/reaction time Factors dependent on the car • factors affecting braking distance e.g. tyre tread, condition of brakes • cars may be carrying different loads • cars may have different masses External factors • road surface • weather • uphill / downhill Use of data • calculation of thinking, braking and or stopping distances for average driver • calculation of thinking, braking and or stopping distances for driver A • calculation of thinking, braking and or stopping distances for driver B	(6)

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Level	0	No rewardable content
1	1 - 2	• a limited explanation of the differences using one fact OR one piece of data from the chart OR factor(s) affecting thinking/braking distance. e.g. A has a longer thinking distance OR B is a longer braking distance OR thinking distance can be affected by a driver using their phone • the 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, giving more than one fact using data from the chart about either car OR at least one piece of data about each OR using one piece of data from the chart about one car AND at least one factor affecting thinking/braking distance OR a statement linking data from the chart to the cause for one car but nothing correct about the other car e.g. A has a braking distance of (about) 33 m, its thinking distance is longer than an average car. OR B has a longer stopping distance. B's reaction time is faster than the Highway code. OR B has a very short thinking time. Car B's brakes may be worn out OR Driver A may have drunk alcohol making his reaction time slower. Car B has better brakes (NB 2nd sentence is incorrect) • 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 linking data from the chart to the cause for one car AND at least one statement about the other OR two statements linking data from the chart to the cause for one car e.g. B has a braking distance of (about) 60 m. This means B might be on a wet road. A has a longer thinking distance. OR B has a shorter thinking distance than A. A has a longer thinking distance compared to the average (in highway code). He may be a drink driver. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

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Q4.

Question number	Answer	Mark
(i)	any value from 19 to 20 inclusive.	(1)

Question number	Answer	Additional guidance	Mark
(ii)	An explanation that combines identification via a judgment (2 marks) to reach a conclusion via justification/reasoning (1 mark): • Idea that (approximately) equal incremental increases in speed cause equal incremental increases in thinking distance • correct reference to figures in table **and** • therefore the student's conclusion is correct	The last marking point can only be achieved if at least one of the other two marks is awarded	(3)

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Q5.

Question Number	Answer	Additional guidance	Mark
(i)	(metre) rule(r) (1)	accept measuring tape/stick tape measure light gate	(1)

Question Number	Answer	Additional guidance	Mark
(ii)	A description that combines the following points to produce a logical method: hang/attach/add/put/increase {masses / weights} (1) on/to (the end of) the string (over the pulley wheel) (1) OR apply a force to the trolley /string (1) (by a) pull / push / rubber band (1) OR putting trolley on a slope (1) allow the trolley to run down (1)	accept on/at/from the pulley wheel ' pull the string' OR push the trolley scores 2 marks slanting the bench (let) gravity pull the trolley	(2) exp

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Question Number	Answer	Additional guidance	Mark
(iii)	Any one from: speed (at the start/end of the run) (1) time (between changes in speed) (1)	 (different/additional) speed / velocity appropriate ticker tape(s)	**(1)**

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Q6.

Question number	Answer	Additional guidance	Mark
	distance = area under graph (1) ½ × 7 × 15 (1) 52(.5) (m) (1)	attempt to find area seen on graph correct area(s) identified including calculation 53 (m) allow 7 × 15 or 105 for 1 mark only award full marks for the correct answer with no working	**(3)**

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Q7.

Question Number	Answer	Additional guidance	Mark
	• direction (1) • size (1)	answers only acceptable in given order or magnitude	**(2)** AO 2 1

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