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**PHYSICS**

**5054/31**

Paper 3 Practical Test

**October/November 2017**

MARK SCHEME

Maximum Mark: 30

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**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Question	Answer	Marks
1(b)(i)	correct description of one oscillation in relation to the rod	<b>B1</b>
1(b)(ii)	$T_1$ in the range 9.0 to 16.0 s with at least one repeat measurement and average correctly calculated with correct unit	<b>B1</b>
1(b)(iii)	$T_1$ calculated correctly to 2 / 3 s.f. with unit seen somewhere for $T$ or $t$	<b>B1</b>
1(c)	$T_2 < T_1$	<b>M1</b>
1(d)	ratio calculated correctly with no unit and in the range 0.67 to 0.75	<b>A1</b>
	for Q1 penalise incorrect notation for time once	
	apply unit penalty once in the question	

Question	Answer	Marks
2(a)	$V_1$ in the range 3.0 (V) to 4.5 (V) to 0.1 (V) or better, with unit	<b>B1</b>
2(b)	<b>(i)</b> $V_2 < V_1$ to 0.1 V or better with consistent correct unit seen here or in <b>(a)</b> or <b>b(ii)</b> <b>and</b> <b>(ii)</b> $V_3 < V_2$ to 0.1 V or better with consistent correct unit seen here or in <b>(a)</b> or <b>(b)(i)</b>	<b>B1</b>
2(c)(i)	correct plots and best fit line	<b>B1</b>
2(c)(ii)	correct trend in results: $V$ reduces as the concentration of the solution increases	<b>B1</b>
	$V$ reduces as the volume of blue liquid is increased / concentration of the solution increases <b>wtte</b> <b>or ecf</b> : statement relating volume and concentration consistent with the candidate's results	<b>B1</b>

Question	Answer	Marks
3(a)	vertical check by alignment with a vertical reference line or use of a set square between the rule and the bench	<b>B1</b>
3(b)(i)	x in the range 15.0 to 35.0 cm measured to the nearest mm with unit	<b>B1</b>
3(b)(ii)	height from the bottom of the ball to the ramp or height between two common points on the ball	<b>B1</b>
3(b)(iii)	lift the sphere / ball vertically / upwards out of the sand tray (without disturbing the sand)	<b>B1</b>
3(b)(iv)	x from at least two readings correctly averaged	<b>B1</b>

Question	Answer	Marks
4	<b><u>Preliminary results</u></b>	
4(a)	$x_0$ in the range 15.0 to 25.0 cm measured to nearest mm with unit	<b>B1</b>
4(c)	look down from vertically above the measuring cylinder and see that there is water all away around the clay cylinder <b>or</b> displace the clay cylinder vertically and see that it oscillates in the measuring cylinder	<b>B1</b>
4(d)	s in the range 6.0 cm to 10.0 cm measured to the nearest mm with unit	<b>B1</b>
4(e)	new s larger than value of s obtained for <b>4(d)</b>	<b>B1</b>
	$x < x_0$ by about 2 cm measured to nearest mm with unit	<b>B1</b>

**Table**

4(f)	table with headings(quantities) and units and results from <b>(a)</b> , <b>(d)</b> and <b>(e)</b> included	<b>B1</b>
	range of x values , largest is $x_0$ and smallest $\leq 4.0$ ( but not zero)	<b>B1</b>
	at least 5 sets of results showing a general trend of s increasing as x decreases	<b>B1</b>
	approximately linear increase in s as x decreases	<b>B1</b>

Question	Answer	Marks
<b><u>Graph</u></b>		
4(d)	axes labelled with units and correct orientation	<b>B1</b>
	suitable scale, not based on 3, 6, 7 etc. with plotted data occupying $\geq$ half the grid in both directions	<b>B1</b>
	points plotted correctly and all points plotted	<b>B1</b>
	best fit fine <b>straight line</b>	<b>B1</b>
<b><u>Calculations</u></b>		
4(e)	use of two points that are on the straight line	<b>M0</b>
	correct calculation of $G$ <i>with the correct sign</i>	<b>A1</b>
	from a triangle that uses more than half the drawn line with answer to 2 / 3 s.f.	<b>A1</b>