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**PHYSICS**

**5054/41**

Paper 4 Alternative to Practical

**May/June 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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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
1(a)(i)	decelerating	<b>B1</b>
1(a)(ii)	less distance travelled in equal time / 0.020 s	<b>B1</b>
1(b)	table of two columns – one with heading time / s (or t / s)	<b>B1</b>
	second column with heading distance / cm (or d / cm or s / cm)	<b>B1</b>
	correct data in table – any 3 correct lines	<b>C1</b>
	4 correct lines	<b>A1</b>
1(c)	$12 / .06 = 200 \text{ cm / s}$ or $2 \text{ m / s}$	<b>B1</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
2(a)	35.4 (s)	<b>B1</b>
2(b)	axes labelled quantity and unit axes correct way round	<b>B1</b>
	scales linear, not awkward, start from (0,0)	<b>B1</b>
	points plotted accurately	<b>B1</b>
	smooth best fit curve drawn	<b>B1</b>
2(c)	31.06 / 31.1	<b>B1</b>
	31 cao	<b>A1</b>
2(d)	curved line of similar shape below original line	<b>B1</b>
2(e)	takes a long time (for last few cm) / would not empty completely / difficult to judge when empty / low pressure	<b>B1</b>

Question	Answer	Marks
3(a)(i)	line through each pair of dots to mirror and line joined between mirrors – correct by eye	<b>B1</b>
3(a)(ii)	described: line through P <sub>1</sub> and P <sub>2</sub> <b>and</b> line through P <sub>3</sub> and P <sub>4</sub>	<b>B1</b>
	described: joining the two lines in the middle at the points where the lines meet the mirror	<b>B1</b>
3(a)(iii)	lines through the centre of the blobs / a thin line drawn / use of a sharp pencil / any sensible precaution	<b>B1</b>
3(b)(i), (ii)	normal drawn at Q by eye	<b>B1</b>
3(b)(iii)	$i = 44^\circ \pm 1^\circ$	<b>B1</b>
3(b)(iv)	$r = 47^\circ \pm 1^\circ$	<b>B1</b>
3(c)	P <sub>3</sub> and P <sub>4</sub> further apart / line up the bases of the pins / ensure pins are vertical	<b>B1</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
4(a)	top box – ammeter bottom box – voltmeter	<b>B1</b>
4(b)	meter 1 – current meter 2 – voltage / p.d / emf	<b>B1</b>
4(c)	meter 1 = 0.24 A	<b>B1</b>
	meter 2 = 7.2 V	<b>B1</b>
4(d)	R = 30 ohms	<b>B1</b>
4(e)	check zero error / tap to avoid sticking / switch off to prevent overheating / parallax in reading scale / tight connections any other sensible precaution	<b>B1</b>