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**PHYSICS**

**0625/62**

Paper 6 Alternative to Practical

**October/November 2016**

MARK SCHEME

Maximum Mark: 40

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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>Page 2</b> | <b>Mark Scheme</b>                             | <b>Syllabus</b> | <b>Paper</b> |
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| <b>Question</b> | <b>Answer</b>  | <b>Marks</b>         |
|-----------------|--|----------------------|
| 1(a)(i)         | $x = 30.2(\text{cm})$  | <b>1</b>             |
| 1(a)(ii)        | <p>Measure width <math>w</math> of load<br/>Place <math>w/2</math> either side of desired position</p> <p>OR</p> <p>draw centre line on load / find centre (of mass) of load<br/>and mark <b>side</b> of rule in desired position</p> <p>OR</p> <p>take readings on both sides of the load<br/>and find the mean</p> | <b>1</b><br><b>1</b> |
| 1(b)            | $W = 3.95 (\text{N})$  | <b>1</b>             |
| 1(c)            | new $x$ at least 5 cm different from original and in the range 10 cm–45 cm   | <b>1</b>             |
| 1(d)            | <p><b>two</b> from:<br/>difficult to judge the best position of 'almost balanced'<br/>is the centre of mass of the ruler exactly over the pivot / has the ruler slipped on the pivot?<br/>the load(s) obscure the scale<br/>the position of the centre of the load(s) is difficult to judge</p>                      | <b>2</b>             |
| 1(e)            | <p>3.995 or 4 seen<br/>2 or 3 significant figures (whatever the answer)</p>  | <b>1</b><br><b>1</b> |
|                 | <b>Total:</b>  | <b>9</b>             |

|               |  |                 |              |
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| <b>Question</b> | <b>Answer</b>  | <b>Marks</b>             |
|-----------------|--|--------------------------|
| 2(a)(i)         | $V_1 = 1.7 \text{ (V)}$<br>$I_1 = 0.32 \text{ (A)}$  | <b>1</b><br><b>1</b>     |
| 2(a)(ii)        | $R = 5.3125 \Omega$  | <b>1</b>                 |
| 2(b)            | statement YES<br>justification to include the idea of within the limits of experimental accuracy | <b>1</b><br><b>1</b>     |
| 2(c)(i)         | variable resistor / rheostat   | <b>1</b>                 |
| 2(c)(ii)        | correct symbol for variable resistor<br><br>circuit correct                                      | <b>1</b><br><br><b>1</b> |
|                 | <b>Total:</b>  | <b>8</b>                 |

|               |  |                 |              |
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| <b>Question</b> | <b>Answer</b>  | <b>Marks</b>                     |
|-----------------|--|----------------------------------|
| 3(a)            | any two from:<br>length of spring / number of coils<br>diameter / thickness of spring<br>material / type / stiffness / elasticity / spring constant of spring<br>how far spring is displaced / amplitude (of oscillations) | <b>2</b>                         |
| 3(b)(i)         | increases<br>has no effect on<br>has no effect on  | <b>1</b><br><b>1</b><br><b>1</b> |
| 3(b)(ii)        | one from:<br>repeats<br>large number of oscillations and divide<br>timing sensor / light gate<br>use a fiducial mark (however expressed)<br>counting down to zero (before starting the timer)                              | <b>1</b>                         |
|                 | <b>Total:</b>  | <b>6</b>                         |

|               |  |                 |              |
|---------------|--|-----------------|--------------|
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| <b>Question</b> | <b>Answer</b>   | <b>Marks</b> |
|-----------------|---|--------------|
| 4               | clock/stopwatch <u>and</u> source of heat                                 | 1            |
|                 | heat to boiling with <u>and</u> without lid                               | 1            |
|                 | measure time taken to reach <b>boiling point/boil</b>                     | 1            |
|                 | same volume / mass / amount of water                                      | 1            |
|                 | same starting temperature   | 1            |
|                 | suitable table with column headings <u>and</u> units (seconds or minutes) | 1            |
|                 | conclusion drawn  | 1            |
|                 | <b>Total:</b>   | <b>7</b>     |

|               |  |                 |              |
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| <b>Question</b> | <b>Answer</b>   | <b>Marks</b>                                 |
|-----------------|---|--|
| 5(a)(i)         | 8.4 cm / 84 mm  | <b>1</b>                                     |
| 5(a)(ii)        | initial BP <sub>2</sub> distance at least 5.0 cm  | <b>1</b>                                     |
| 5(b)            | graph:<br><br>axes correctly labelled<br>suitable scales<br>all plots correct to ½ small square<br><br>good line judgement, thin, continuous line   | <b>1</b><br><b>1</b><br><b>1</b><br><b>1</b> |
| 5(c)            | statement to match graph – expect NO<br>justification to match statement with reference to graph line   | <b>1</b><br><b>1</b>                         |
| 5(d)            | any <b>two</b> from:<br><br>difficult to judge when pins are exactly in line<br>difficult to ensure that pins are vertical/straight<br>thickness of lines<br>thickness of pins<br>protractor only measures to ±1° | <b>2 × 1</b>                                 |
|                 | <b>Total:</b>   | <b>10</b>                                    |