

**MARK SCHEME for the October/November 2010 question paper  
for the guidance of teachers**

**5054 PHYSICS**

**5054/41**

Paper 4 (Alternative to Practical), maximum raw mark 30

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.

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- 1 (a) (i) ruler drawn perpendicular to floor close to end of rule  
at least as tall as horizontal dotted line B1
- (ii) eye drawn level with end of rule looking towards rule  
dotted line (extended) must pass through representation of eye B1
- (b) (i) 0.5 1.3 2.1 2.8 3.5 4.3 cao all correct B1
- (ii) axes B1
- scales  $x: 2 \text{ cm} \equiv 20 \text{ g}$   $y: 2 \text{ cm} \equiv 0.5 \text{ cm}$  B1
- plotting points B1
- best fit straight line NOT through (0,0)  
ignore outside plotted points B1
- (iii) line does not pass through the origin B1
- (c) (i) at least  $\frac{1}{2}$  grid used,  
e.g. triangle drawn on graph  $> \frac{1}{2}$  length of line or values seen  
 $0.038 \pm 0.003$  (other units may be used) NOT 0.04 C1  
A1
- (ii) 0.85 m / 85 cm cao unit required B1
- (iii) 11.6 ecf (c)(i) and (ii) ignore unit B1

[Total: 12]

- 2 (a) (i) 1.7(1) (s) B1
- (ii) 2.924 m/s ecf (i) unit required C1  
2.9 or 2.92 m/s ecf (i) A1
- (b) (i) student not in line with end of rule /  
distance between rule and spring / students or between spring and students  
allow lines drawn on diagram B1
- (ii) start stopwatch after wave has passed start /  
stop stopwatch before wave gets to end /  
observed distance is smaller (than 5 m) B1
- (iii) students have different reaction times / students in different positions B1
- (iv) how to start stopwatch accurately B1  
e.g. teacher / student says 'go' as wave starts; student stands at start of spring /  
rules  
how to stop stopwatch accurately e.g. student (at end) says stop B1  
NOT just student stands closer to rule

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(c) immerse in fluid, e.g. water / oil / foam / decrease the tension in the spring /  
teacher closer to student / spring shorter B1

**[Total: 9]**

3 (a) circuit containing thermistor and power supply M0  
allow picture of thermistor  
ammeter in series B1  
voltmeter in parallel with thermistor B1

OR

circuit with ohmmeter and thermistor with no power supply M0  
ohmmeter symbol correct or labelled B1  
no other component in circuit B1

(b) thermometer and water / oil bath used (allow oven, max 2) B1  
waterbath heated / how temperature changed B1  
thermometer close to thermistor (even in air) /  
stir water / allow to settle B1

(c) it may not be linear / does not show shape / curve of graph B1  
accept to get a good line of best fit / make graph / result more accurate

**[Total: 6]**

4 (a) how force is produced B1  
how force is the same B1  
e.g. balance weight / mass on top of pencil / drop pencil  
same weight used on both pencils / drop from same height

(b) correctly shaped indentations in the plasticine and pointed deeper B1

**[Total: 3]**