

**MARK SCHEME for the October/November 2011 question paper
for the guidance of teachers**

0652 PHYSICAL SCIENCE

0652/51

Paper 5 (Practical Test), 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)

compound changes	name and formula	time/s	colour
A	zinc carbonate, ZnCO ₃	e.g. 31	yellow (when hot)
B	magnesium carbonate, MgCO ₃	e.g. 21	(remains) white
C	unknown metal carbonate, XCO ₃	e.g. 28	(green to) black

(ii) **A**: a value of time (in seconds) **AND** yellow/yellow when hot (ignore references to the limewater) ; [1]

(iii) **B**: a value of time **AND** white/no change/same (ignore references to the limewater) ;
C: a value of time **AND** black (ignore references to the limewater) ; [2]

(iv) 1 (fastest) = one with shortest time
2 = one with intermediate time
3 (slowest) = one with longest time ; [1]
(note: this must be consistent with candidates' results)

(v) carbon dioxide/CO₂ ; [1]

(b) (i) **metal observations**
zinc bubbles ;
magnesium fast bubbles/gets hot/metal disappears ;
X no reaction ; [3]

(ii) 1 (most reactive) = magnesium (**B**) ;
2 = zinc (**A**) ;
3 (least reactive) = **X** (**C**) ; [1]
(this response must relate to the results in (b) (i). If there are no results in (b) (i) then the answer must be as above.)

(iii) yes (if answer to (a) (iv) is Mg, Zn, **X** (**B, A, C**) or **X**, Zn, Mg (**C, A, B**))
AND order is same/reverse order compared with order in (b) (i) ;

OR

no (if answer to (a) (iv) is not Mg, Zn, **X** (**B, A, C**) or **X**, Zn, Mg (**C, A, B**))
AND not in same/reverse order compared with order in (b) (i) ; [max 1]

(c) (i) blue ppt./grey-blue ppt./green-blue ppt. ; [1]

(ii) brown/black solid **OR** zinc turns brown/black ;
bubbles/effervescence/colourless solution/solution less blue/gets hot ; [2]

Page 3	Mark Scheme: Teachers' version	Syllabus
	IGCSE – October/November 2011	0652

(iii) X = copper/Cu ; (note: do **not** allow copper(II)/Cu²⁺)

evidence 1 and evidence 2:

any two for one mark

- blue ppt. with NaOH (in (c) (ii)) **and/or** blue solution in (c) ;
- copper carbonate is green ;
- copper oxide is black ;
- brown solid (in (c) (ii)) ;
- displacement by zinc gives brown solid ;
- X is brown ;
- X does not react with acid ;

[max 1]

[Total: 15]

- 2 (a) any five readings (allow full reading from clock) ;
 any complete column of readings (allow full reading from clock) ;
 all 15 readings entered (allow full reading from clock) ;
 average of readings increasing from $\theta = 10^\circ$ to 30° ;
 all readings recorded to 0.1 s ; [5]
- (b) (i) all 3 averages correctly calculated to at least 1 decimal place ; [1]
- (ii) all 3 T values calculated correctly to at least 1 decimal place (average $\div 10$) ; [1]
- (iii) T increases as angle of swing increases
OR a relationship consistent with results [max 1]
- (iv) when θ is doubled T is not doubled/T not changing by same factor/other correct statement consistent with candidates' results ; [1]
- (c) use of $l = 0.30$ m ;
 correct calculation of g to at least 1 decimal place using correct T from table which must be squared (allow ecf for l in cm in which case answer is 100 times greater) ;
 units of $m\ s^{-2}$ or m/s^2 ; [3]
- (d) (i) any errors are reduced (divided by ten)/reduced effect of timing error ; [1]
- (ii) simultaneous release of pendulum and starting stop clock ;
 judging completion of oscillations ;
 timing of 10 oscillations / human reaction time (do **not** allow just 'timing') ;
 measuring length of pendulum to centre of bob ;
 measuring angle accurately / protractor not positioned correctly ; [max 1]
- (iii) light gate or auto release timer ;
 more oscillations ;
 measure bob with callipers and measure cotton accordingly ;
 set up protractor with a plumb line to check alignment ; [max 1]

[Total: 15]