

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0653 COMBINED SCIENCE

0653/61

Paper 6 (Alternative to Practical), maximum raw mark 60

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) outline concave on one side and projections on the other ; [2]

2 circles shaded and labelled ;

(ii) xylem ; [2]

transport of water ;

(b)

test solution	observation	conclusion
Benedict's solution	orange	reducing sugar/glucose (present) ;
biuret solution	blue	protein absent ;
iodine solution	orange	starch absent ;

[3]

(c) Any 3 from 4 [3]

(celery in dyed water and) measure distance dye moves ;

minimum 3 different temperatures ;

time for coloured water to appear at top of (cut) stalk/ set time and measure distance moved for each T;

all other conditions/ named condition kept constant ;

[Total: 10]

2 (a) 14 and 16 ; [1]

(b) (i) 0.7(0) 0.8(0) ; [3]

0.49 and 0.64 ;

T² to 2 d.p. ;

Allow ecf

(ii) 4 plots correct $\pm 1/2$ small square ; [2]
best fit straight line through origin $\pm 1/2$ small square ;

(iii) gradient shown clearly on graph (triangle at least $1/2$ of graph); [2]
1.6 ;

(iv) $39.5/\text{gradient from (b)(iii)} = 25$; [2]
quoted to 2 sig figs ;

[Total: 10]

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- 3 (a) (i) blue/purple **AND** (pH between) 8 to 14 ; [1]
- (ii) calcium hydroxide/limewater ; [2]
- calcium oxide ;
- (b) (i) (sodium hydroxide) (light) blue ppt ; [3]
- (ammonia) (light) blue ppt ;
- (ammonia) dark blue solution (in excess) ;
- (ii) CuO (not name) ; [1]
- (c) react with (e.g.) sulphuric acid ; [3]
- add sodium hydroxide (soln)/ ammonia (soln) ;
- white ppt (dissolves in excess) ;

[Total: 10]

- 4 (a) (i) **A** white blood cell ; [4]
- B** red blood cell ;
- C** platelet ;
- D** plasma ;
- (ii) 8 ; [1]
- (iii) 0.008 ; ; [2]
- ecf

(b) (i)

activity	average pulse rate for 15 seconds	average heart rate (beats per minute)
resting	17	68
jogging	35	140

[1]

- (ii) heart rate increases ; [max 1]
- increased or faster blood flow ;
- need more oxygen/respiration/removal of carbon dioxide ;
- (iii) average calculated/identify anomalies/confirms similar values/repeats ; [1]

[Total: 10]

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5 (a) use of cell / battery / power supply and connections ; [3]

connect in circuit ;

(first two marks can be from a diagram)

lamp works if lamp lights ;

(b) ammeter symbol correct and in series with lamp; [3]

voltmeter symbol correct and in parallel with lamp ;

circuit ;

(c) [3]

(lamp)	eg A	B	C	D	E
current / A					
potential difference / V					

table with headings (allow p.d.) ;

correct units (allow name or symbol) ;

room for 5 lamps may be labelled with letters, numbers or not at all ;

(d) resistance = potential difference (voltage) / current ; [1]

[Total: 10]

6 (a) hydrogen ; [3]
lighted splint ;
pop (etc.) ;

(b) conical flask with delivery tube ; [2]
(connected to) syringe or measuring cylinder over water ;

(c) (i) rate decreases ; [2]
(then) stops ;

(ii) Mg or acid or reactant(s) used up / all Mg or acid or reactant reacted ; [1]

(d) line T to left of original ; [2]
line T reaches same height. ;

[Total: 10]

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- 1 (a) 20.5 [1]
15.5
10.5
all three averages correct ;

- (b) axes labelled with units ; [4]
vertical axis linear ;
points plotted correct $\pm$ half small square ;
best fit straight line going through the origin $\pm$ half small square ;
ecf on (a)

- (c) lines on graph ; [2]
correct reading from graph $\pm$ half small square ; ecf

- (d) potato will take longer to rise / there will be fewer bubbles ; [1]

OR

potato will not rise / no bubbles ;

- (e) glowing splint ; [2]
relights ;

[Total: 10]

- 2 (a) (i) (dilute) hydrochloric acid ; [2]
carbon dioxide ;

- (ii) limewater ;
white ppt / milky ;
allow ecf for incorrect gas in (a)(i). [2]

- (b) sodium chloride ; [1]

(c)

	C	D
barium chloride solution	white ppt AND	white ppt ; [1]
ammonia solution	white ppt ; [1] dissolves (in excess) ; [1]	blue ppt ; [1] (dissolves in excess to) deep blue solution ; [1]

[5]

[Total: 10]

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- 3 (a) 17 (mm) ; [1]
- (b) 13 and 10 ; [1]
- (c) 1.47, 1.00, 0.76, 0.59, 0.47 ; [2]
all results to 2 dp ;
- (d) (i) plots correct $\pm 1/2$ square ; ecf [2]
straight line of best fit ;
- (ii) **clear** indication of use of graph (triangle at least $1/2$ of graph); [2]
correct value 0.07 ;
- (iii) 14.3 (ecf from gradient value) ; [1]
- (e) Any **one** from: [1]
use of darkened room / mark position of centre of lens in holder / place metre rule
on bench / clamp ruler in position or keep in same position / ensure the centre of
lens and the object are the same height above bench / card or lens or screen
perpendicular to table ;

[Total: 10]

- 4 (a) (i) repeats ; [1]
- (ii) (experiment 1 is) anomalous result / one result is different from the [1]
others / one result doesn't fit the pattern / range is high(est) / range 1 and 2
very high ;
- (iii) do not include experiment 1 in average / carry out 4th experiment / repeat [1]
again ;
- (b) control / baseline / normal rate / needed for comparison / normal habitat ; [1]
- (c) (i) increases heart rate ; [1]
- (ii) agree – similar / close to pond water result / removal of anomaly gives mean [max 1]
of 306
OR
disagree – 304 is an increased heart rate to 275 ;
- (d) axes labelled with units ; [2]
bar for each solution with heights correct ;

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(e) (i) 80 (mm) ; [1]

(ii) 2 (mm) ; [1]

[Total: 10]

5 (a) (damp) red litmus paper ; [2]
turns blue ;
OR
hydrogen chloride ;
white fumes / smoke ;

(b) universal indicator / litmus ; [2]
(turns) red / pink ;

(c) **two** properties of non-metals **from**: [1]
dull / brittle / low density / low melting point / poor conductor of heat ;

(d) (i) circuit including a cell and a lamp / ammeter ; [2]
metal in circuit / some means of connecting a metal in ;

(ii) use of water or steam (before acid) ; [3]
use of acid ;
comparing rate of gas evolved with other metals ;
OR
add bismuth to salts of other metals ;
in solution ;
if displaces it is more reactive **ORA** ;

[Total: 10]

6 (a) time x swings and divide by x ; [1]

(b) 104.5 ; [1]

(c) (no effect) (very) close together ; [2]
no trend or pattern ;

(d) 103.7 ; [1]

(e) 9 ; [1]

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(f) one result/61 cm obviously wrong ; [3]
 others show a trend ;
 shorter the thread shorter the period ;

(g) repeat experiment (at each length) **and** take average ; [max 1]
or repeat the 61 cm length (as anomalous reading) ;
 use different (specified in numbers) lengths ;

[Total: 10]

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1 (a) yeast dead / (enzyme) no longer active / denatured ; [1]

(b)

time / mins	colour in tube A	colour in tube B	colour in tube C
1	blue	blue	blue
2	colourless	blue	blue
3	colourless	blue	blue
4	colourless	blue	blue
5	colourless	colourless	blue
6	colourless	colourless	blue

time / mins ;

A correct ;

B correct ;

C correct ;

ALLOW decolourised IGNORE transparent

[4]

(c) (i) constant volume / concentration ;

[1]

(ii) A changes quicker / changes first / respire faster ;
(more) glucose / substrate available in A ;

[2]

M2 dependent on times being considered

(d) (colour changes back to) blue ;
methylene blue oxidised / reacts with oxygen / oxygen introduced ;
oxygen from air above solution ;

[max2]

[Total: 10]

2 (a) make a solution in water ;
add (aqueous) sodium hydroxide / (aqueous) ammonia ;
green (gelatinous) ppt / solid ;

[3]

(b) add sodium hydroxide (solution) and heat ;
damp ;
(red) litmus turns blue ;

[3]

(c) make a solution in water ;
add hydrochloric / nitric acid ;
add barium chloride / nitrate (solution) ;
white ppt ;

[4]

[Total: 10]

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- 3 (a) correct symbol for voltmeter ;
connected in parallel between **X** and **Y** or equivalent ; [2]
- (b) (i) values in table: [2]
1.81 ; ALLOW range 1.80 – 1.82
0.70 ;
- (ii) headings: V, A, Ω (all three required) ; [1]
- (iii) 3.91, 8.00, 2.59 (allow ecf on third value)
all values to 2 d.p ;
all correct values ; [2]
- (c) use of 3.91 and 2.59 ;
statement matches results (expect NO)
AND
justification: e.g. values are too different/not close enough, even allowing
for experimental error/is 1.5 times ; [2]
- (d) the lamps are at different temperatures/lamps have different resistances or currents
than expected/this could explain why teacher statement not supported ; [1]

[Total: 10]

- 4 (a) (i) 61 ; [1]
- (ii) 433 ; [1]
- (iii) 0.0023 ; [1]
- (b) (i) Correct plotting (allow 1 error) ;
SMOOTH curve ; [2]
- (ii) 52 ± 2 ; [1]
- (iii) Do not know the rate either side of 52°C /need more results
in range e.g. 40°C to 60°C ; [1]
- (c) repeat experiment with water instead of acid ;
 1 cm^3 ;
solution will remain cloudy ; [3]

[Total: 10]

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- 5 (a) (i) lamp / bulb / ammeter ; [1]
- (ii) correct symbol for cell (or battery) ; [1]
- (iii) (explanation) does not react ;
(material) e.g. carbon / platinum ; [2]
- (b) (i) gives red-brown ppt ; [1]
- (ii) damp litmus ;
(red then) bleached ; [2]
- (iii) hydrogen ;
lit splint ;
“pops” ; [3]

[Total: 10]

- 6 (a) (i) 21.5 ; 20.5 ; [2]
- (ii) axes correct and labelled ;
vertical axis NOT starting at zero ;
points correct (allow 1 error) ; (e.c.f. from part (i)) [3]
- (iii) no, points scattered / no pattern / no straight line ; (e.c.f. from parts (i) and (ii))
(ignore any line drawn) [1]
- (b) (any **three** of)
rods should be same length and width ;
amount of wax should be the same ;
experiment repeated and average taken ;
water should be stirred ; [3]
- (c) (answer depends upon (b))
keep thickness / length (etc.) means only variable is % magnesium ;
repeating identifies anomalous results ; [1]

[Total: 10]