

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

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**June 2003**

INTERNATIONAL GCSE

MARKING SCHEME

MAXIMUM MARK: 40

**SYLLABUS/COMPONENT: 0653/01**

**COMBINED SCIENCE  
Paper 1 (Multiple Choice)**

<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	<b>B</b>	21	<b>B</b>
2	<b>B</b>	22	<b>B</b>
3	<b>A</b>	23	<b>D</b>
4	<b>D</b>	24	<b>C</b>
5	<b>B</b>	25	<b>D</b>
6	<b>A</b>	26	<b>C</b>
7	<b>D</b>	27	<b>C</b>
8	<b>B</b>	28	<b>A</b>
9	<b>D</b>	29	<b>C</b>
10	<b>D</b>	30	<b>C</b>
11	<b>D</b>	31	<b>D</b>
12	<b>C</b>	32	<b>B</b>
13	<b>B</b>	33	<b>D</b>
14	<b>A</b>	34	<b>A</b>
15	<b>C</b>	35	<b>D</b>
16	<b>A</b>	36	<b>B</b>
17	<b>A</b>	37	<b>A</b>
18	<b>D</b>	38	<b>B</b>
19	<b>B</b>	39	<b>C</b>
20	<b>A</b>	40	<b>A</b>

**TOTAL 40**

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**June 2003**

INTERNATIONAL GCSE

MARKING SCHEME

MAXIMUM MARK: 60

**SYLLABUS/COMPONENT: 0653/02**

**COMBINED SCIENCE**  
**Paper 2 (Core)**

<b>1 (a)</b>	ovary; ovule;	2
<b>(b) (i)</b>	water and light;	1
<b>(ii)</b>	two variables changed at the same time in tube B/reference to unfair test; tubes A and C show that a warm temperature is necessary; tube B does not have a warm temperature; so seeds in B would not germinate (anyway) because cold;	2 max
<b>(c) (i)</b>	add iodine (solution);	1
<b>(ii)</b>	navy or dark blue <i>or</i> blue/black <i>or</i> black; ( <i>reject blue</i> )	1
		<b>Total 7</b>

<b>2 (a)</b>	carbon C; hydrogen H; ( <i>reject H<sub>2</sub> and H<sup>+</sup></i> )	2
<b>(b) (i)</b>	water/H <sub>2</sub> O;	1
<b>(ii)</b>	cloudy/ <i>or</i> equivalent; reference to carbon dioxide (produced from the combustion);	2
		<b>Total 5</b>

- 3 (a) beta; 1
- (b) gamma; 1
- (c) alpha; 1
- (d) gamma IR UV (2 marks for all three and 1 mark for two correct); 2

**Total 5**

- 4 (a) reproduction;  
respiration;  
nutrition; (*reject needs food*)  
growth;  
excretion; 2 max

*(four for two marks, three/two for one mark)*

- (b) brain and spinal cord; (both required) 1

- (c) (i) same up to point beyond where he sees the child;  
starts to drop later than first curve;  
drops with same gradient as first curve;  
hits horizontal axis later than first curve; 2 max

- (ii) (alcohol) slows reactions/lengthens reaction time;  
longer time/longer distance to stop (after seeing danger); 2

**Total 7**

5 (a) (i)	oxygen;	1
(ii)	magnesium oxide;	1
(b)	pH = 9; substance/magnesium oxide reacts with water substance/magnesium oxide is basic/alkaline; (metal oxides/nitrides form alkaline solutions);  (allow 1 ecf dependent on pH value given)	3 max
(c) (i)	oxygen;	1
(ii)	mercury oxide → mercury + oxygen; (must be words) (ignore heat on LHS)	1
(iii)	<u>decomposition</u> ;	1
		<b>Total 8</b>
6 (a)	3.4; 16.7;	2
(b) (i)	when 10g was hung/equivalent wording; result does not fit the pattern/OWTTE;	2
(ii)	44.5 ± 0.5 g working shown on graph;	2
(c)	density = mass ÷ volume; 10 ÷ 1.25 = 8;	3
(allow 1 ecf for correct substitution into incorrect DMV equation)		<b>Total 9</b>

Page 4	Mark Scheme	Syllabus	Number
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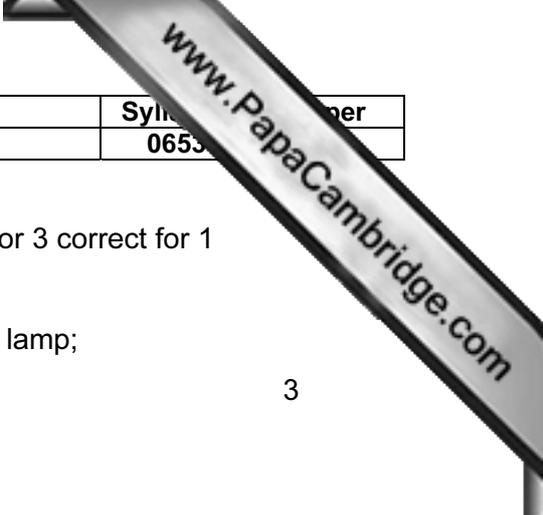
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<b>7 (a)</b>	species diversity; soil erosion; carbon dioxide; global warming;	4
<b>(b)</b>	break down carbohydrates/organic molecules/wastes; reference to respiration (of the decomposers); release of carbon dioxide; ( <i>reject carbon</i> )	2 max
<b>Total 6</b>		

<b>8 (a) (i)</b>	107 protons; 160 neutrons;	2
<b>(ii)</b>	$BhO_3Cl$ ; (symbols + correct formula; ignore order of symbols)	2
<b>(b)</b>	G; B; D;	3
<b>Total 7</b>		

Page 5	Mark Scheme	Syllabus	Number
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- 9 (a) correct symbols; (all four correct for 2 marks, 2 or 3 correct for 1 mark)  
ammeter in series and voltmeter in parallel with lamp; 3
- (b) resistance = voltage  $\div$  current/ $R = V \div I$ ;  
 $1.5 \div 0.1 = 15$ ; (no ecf on incorrect equation) 2
- (c) water conducts electricity/or similar. 1
- Total 6**



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INTERNATIONAL GCSE

MARKING SCHEME

MAXIMUM MARK: 80

**SYLLABUS/COMPONENT: 0653/03**

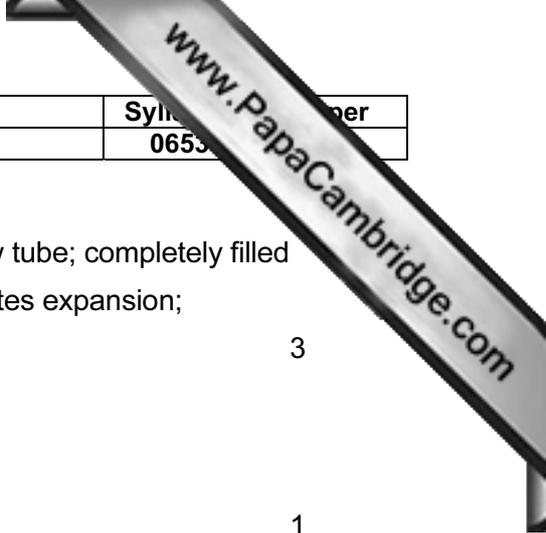
**COMBINED SCIENCE  
Paper 3 (Extended)**

Page 1	Mark Scheme	Syllabus	Number
	IGCSE EXAMINATIONS – JUNE 2003	0653	

- 1 (a) (i) ref to 11 protons and 10 electrons;  
 protons are positive and electrons are negative;  
 1 extra proton;
- max 2
- (ii) differ in number of electrons/by one electron;  
 electrons have insignificant/zero/very low mass;
- 2
- (b) (i) *chloride* ions negative and anode positive/*chloride* ion and anode have  
 opposite charges;  
 opposite charges attract;
- 2
- (ii) they lose (one) electron;
- 1
- (c) hydrogen;  
 sodium hydroxide.
- 2
- Total 9**

Page 2	Mark Scheme	Syllabus	Number
	IGCSE EXAMINATIONS – JUNE 2003	0653	

- 2 (a) suitable apparatus, i.e. sealed and with a narrow tube; completely filled with water and heated; water rise up tube indicates expansion; 3
- (b) more and less (in that order); 1
- (c) (i) normal drawn and looks approximately at  $90^\circ$ ; angle of refraction labelled; 2
- (ii) straight line drawn as extension of refracted ray and indication of where object appears to be. 1
- Total 7**



- 3 (a) a protein;  
that acts as a catalyst; 2
- (b) (i) it would take too long/reaction would continue while testing being  
carried out/also gives positive result for lactose/have to boil so would  
change temperature; 1
- (ii) B - any time below 250s;  
C - never/time longer than 300s; *not 0* 2
- (iii) lactase/enzyme, denatured/damaged/destroyed (at high temperature). 1
- Total 6**

Page 4	Mark Scheme	Syllabus Number
	IGCSE EXAMINATIONS – JUNE 2003	0653

- 4 (a) (i) effervescence/bubbles/gas given off/calcium carbonate disappears; 1
- (ii) carbon dioxide;  
calcium chloride; 2
- (b) (i) gas/carbon dioxide, produced;  
(gas) is lost/material is lost/goes into the air;  
less material on the balance; max 2
- (ii) volume of acid; concentration of acid; size/surface area of calcium  
carbonate pieces; max 2
- (iii) (acid) particles have greater kinetic energy/moving faster in C;  
greater frequency of collisions/collide more often; not just collide more,  
collide with more energy. max 2
- Total 9**

- 5 (a) (i) air resistance/friction, upwards;  
gravity/weight, downwards; 2
- (ii) gravity because she is accelerating/not yet fast enough for large air resistance; 1
- (b) (i) air resistance upwards and gravity downwards; 1
- (ii) gravity is the same;  
air resistance is greater because of increased surface area; 2
- (c) (i) A to B or C to D; 1
- line, not straight/change in velocity not constant; 1
- (ii) C;  
velocity begins to drop; 2
- (iii) 16/15s;  
time between C and E/35-20/35-19. 2
- Total 12**

**6 (a)**      **A** contains chlorophyll;  
 which absorbs light;  
 (light) energy needed (for photosynthesis to occur);  
 this is where carbon dioxide combines with water;  
**B** allows gases/named gas to diffuse (to cells inside leaf);  
 carbon dioxide needed (for photosynthesis);

max 4

**(b) (i)**      cellulose;

1

**(ii)**      nitrogen/magnesium;

1

**(iii)**      as ions/as nitrate;  
 from the soil;  
 into roots;

max 2

**(c)**      phloem has been removed; *not if xylem also removed*  
 sugars/food, not passing down to roots.

2

**Total 10**

Page 7	Mark Scheme	Syllabus	Number
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- 7 (a) (i) increases;  
exothermic reaction/reaction gives out heat (energy);
- 2
- (ii)  $2K + 2H_2O \rightarrow 2KOH + H_2$
- 1
- (iii)  $OH^-/K^+$  (one for symbol, one for charge);
- 2
- (iv) two shared pairs;  
all else correct (*elements identified, oxygen's other outer electrons*);
- 2
- (b) (metal) displacement occurs in A;  
reaction in A because zinc more reactive than copper;  
no reaction in B and C because zinc less reactive than magnesium  
and sodium.
- max 2
- Total 9**

8 (a) useful energy output is less than energy input/a lot of energy is wasted;

1

(b) 100 J;

1

(c) (i) 6  $\text{k}\Omega$ ;

1

(ii) 120 V;

1

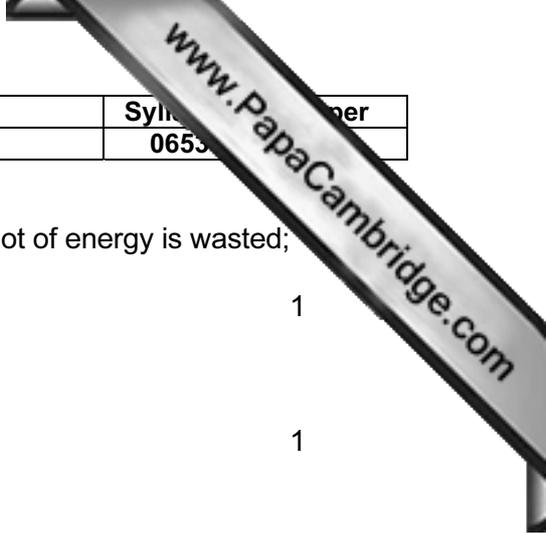
(d) (i) working;  
1.5  $\text{k}\Omega$ ;

2

(ii) 240 V.

1

**Total 7**



- 9 (a) (i) pulse is (the variation in pressure) caused by heart beat;  
veins are further from heart than arteries;  
pressure is more constant (in veins than in arteries);
- 2 max
- (ii) artery walls have to withstand high pressure;  
elasticity allows them to expand and recoil;  
*(allow converse for any point)*
- 2
- (b) (i) lymphocyte/B cell;
- 1
- (ii) anywhere between 0 and just before 4 days;
- 1
- (iii) antibody level stays high/ref. to memory cells;  
if virus gets in again will immediately be destroyed;
- 2
- (iv) chicken pox antibodies, work only against chicken pox virus/do not work  
against other viruses/different antibody needed for each virus;
- 1
- (v) he will be given immunosuppressant drugs;  
to prevent rejection (of the transplanted organ);  
so his immune system will not be able to destroy viruses/bacteria.
- 2 max

**Total 11**

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MARKING SCHEME

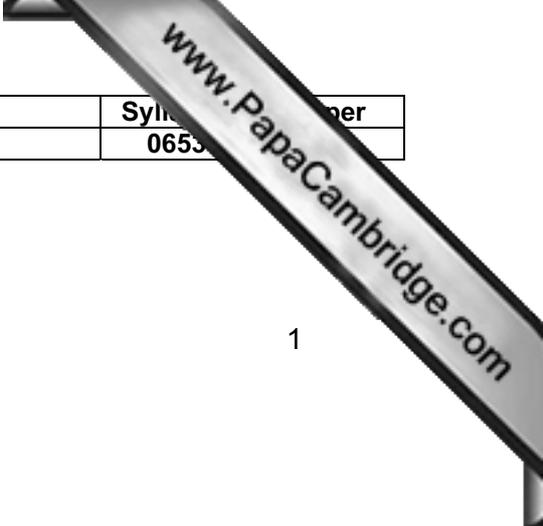
MAXIMUM MARK: 30

**SYLLABUS/COMPONENT: 0653/05**

**COMBINED SCIENCE**  
**Practical**

<b>1 (a) (i)</b>	feels warm;			1
<b>(ii)</b>	condensation/water/clear liquid;			1
<b>(iii)</b>	goes cloudy/milky/white; carbon dioxide is produced;			2
<b>(b) (i)</b>	A - pale blue, B - purple/mauve/lilac;	(1)		
<b>(ii)</b>	B;	(1)		2
<b>(c) (i)</b>	colour change to red/green/yellow;			1
<b>(ii)</b>	(reducing) sugar;			1
<b>(iii)</b>	yes;			1
<b>(iv)</b>	starch catalysed/changed/broken down to sugar.			1
				<b>Total 10</b>

<b>2 (a) (iii)</b>	a reading for $h_0$ ;			
	5 readings taken (-1 if not in g);			
	force calculated correctly;			
	extension calculated (deduct 1 if not in mm);			
				4
<b>(b)</b>	sensible scale and labelled;			
	plotting correct;			
	best line drawn goes through or would go through origin;			
				3



- (c) extension read (correctly) (allow calculation);
- 1
- (d) read extension;  
use graph;  
calculate in g (x100) or kg (/10) (all three points score two, two points score one).
- 2
- Total 10**

- 3 (a) each metal correct as –ve;
- 1
- three values of pd to be within 0.2V of SV;
- 3
- (c) magnesium with a suitable explanation;
- 2
- (d) correct order Mg, Zn Cu;
- 1
- (e) find p.d. with each metal  
note polarity  
compare this polarity to the other three
- 3
- Total 10**



**June 2003**

INTERNATIONAL GCSE

MARKING SCHEME

MAXIMUM MARK: 60

**SYLLABUS/COMPONENT: 0653/06**  
**COMBINED AND CO-ORDINATED SCIENCE**  
**Alternative to Practical**

- 1 (a)** correct headings (1) data entered accurately (1)  
time 0 entered (1) 3
- (b)** elder: average water loss =  $6.6 - 1.6$  (or  $6.6 - 2.4$ )  
divided by 90 (80) = 0.056 cm/s. (0.525) (2)  
pyrocantha: average water loss =  $18.8 - 0.8$  ( or  $18.8 - 2.5$ )  
divided by 90 (80) = 0.19 (0.20) cm/s (2)  
part marks: any length divided by any time (1)  
correct time used in calculation (ecf from table) (1)  
correct distances used in calculation (2) 4
- (c)** different leaf area (shape) (1) gives smaller/larger  
area for transpiration/evaporation OWTTE (1)  
OR different numbers/density of stomata (1) OR waxy cuticle  
(on pyrocantha) gives lower rate of transpiration/evaporation (1) 2
- (d)** (change in) air movement/temperature/humidity/light intensity 1
- Total 10**

- 2 (a)** magnesium    copper (1)            2.0 (1) (MUST be 2.0)  
zinc              copper (1)            1.1 (1) 4
- (b)** most negative = magnesium  
most positive = copper 2
- (c)** magnesium, zinc, copper 1
- (d)** Find p.d. with each of the other metals (1)  
note which metal is positive/negative OR note p.d.(1)
- Metal X will be positive with a more reactive metal/vice-versa OR  
judge position in reactivity series by potential differences (1)  
OR react metals with acid (1) reference to conditions of  
reaction (1) rate of reaction judged by bubbling (1)  
OR react metal with solutions (1) of salts (1) of the other metals, it  
displaces metals that are less reactive (1) 3
- Total 10**

<b>3 (a)</b>	160,122,85 +/- 1 mm, recorded in correct column (-1 for each error)	2
<b>(b)</b>	forces: 1.5, 2.0, 2.5 N (-1 only if 2 or more incorrect) extensions: 110, 148, 185 (ecf) (-1 for each error)	2
<b>(c)</b>	sensible scales used (1) plotting points including origin (2)	3
<b>(d)</b>	proportional OR obeys Hooke's Law (1) (reject "as mass increases, extension increases" OWTTE)	1
<b>(e)</b>	place mass on hanger instead of masses and find the extension (1) factor to convert extension or weight to mass in grams OWTTE (1)	2
<b>Total 10</b>		

<b>4 (a) (i)</b>	heat/thermal energy produced (1) turns cloudy/milky (1)	2
<b>(ii)</b>	lower temperature/enzyme catalysed/lowered activation energy slower process/energy transferred by ATP/can be anaerobic/uses glucose not starch (any 1)	1
<b>(b) (i)</b>	blue (1) lilac/purple/mauve (1)	2
<b>(ii)</b>	add iodine (solution) (1) turns blue-black/black/blue (1)	2
<b>(c) (i)</b>	(reducing) sugar present	1
<b>(ii)</b>	starch had been turned to sugar (1) by hydrolysis/breakdown of (long chain) molecules (1) (0 mark for "yes" without explanation)	2
<b>Total 10</b>		

<b>5 (a) (i)</b>	crystal dissolved (in the water) or explanation of particles separating (1); reject "melted" particles diffused or dispersed (to fill the liquid) (1)	2
<b>(ii)</b>	warm/heat (1) stir (1) grind up crystal (1) (any 2)	2
<b>(b)</b>	alkaline/alkali/pH higher than 10	1
<b>(c) (i)</b>	dilute = mixed with water/water added OWTTE; reject "not concentrated"	1
<b>(ii)</b>	alkali reacted with acid (vice-versa) (1) pH = 7, neutralised (1)	2
<b>(iii)</b>	the alkali is in excess OWTTE; reject "the acid has not reached the alkali"	1
<b>(iv)</b>	calcium hydroxide + ethanoic acid - + salt (or any name) + water	1
		<b>Total 10</b>

<b>6 (a)</b>	43.4 g, 93.6 g, 108.6 g (max 1 if the readings have been "inverted" but otherwise correct)	3
<b>(b) (i)</b>	$108.6 - 43.4 = 65.2 \text{ g}$ (ecf)	1
<b>(ii)</b>	$108.6 - 93.6 = 15 \text{ g}$ (ecf)	1

(note: if the mass of salt is found by subtracting the mass of water (50g) from 65.2, the answer is 15.2)

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- (c) 55 cm<sup>3</sup> 1
- (d) (c) and (b) (i) (both correct)  
accept (b) and (c) if mass and volume are mentioned (or  $D = M/V$ )  
(accept 65.2g and 55cm<sup>3</sup> or  $65.2/55 = 1.19 \text{ g/cm}^3$ ) 1
- (e) Place hexane in measuring cylinder to a known volume (1) (weigh out 15g sodium chloride) and add to the hexane (1) note the new volume and subtract (1)  
Use of displacement can and measuring cylinder correctly described  
can get full marks 3
- Total 10**

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**Grade thresholds** taken for Syllabus 0653 (Combined Science) in the June 2003 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 1	40	-	26	21	17
Component 2	60	-	44	31	24
Component 3	80	50	32	-	-
Component 5	30	23	17	13	11
Component 6	60	45	33	22	14

The threshold (minimum mark) for B is set halfway between those for Grades A and C.  
The threshold (minimum mark) for D is set halfway between those for Grades C and E.  
The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.  
Grade A\* does not exist at the level of an individual component.