

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

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**JUNE 2003**

INTERNATIONAL GCSE

**MARKING SCHEME**

**MAXIMUM MARK: 40**

**SYLLABUS/COMPONENT: 0652/01**

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

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

**TOTAL 40**

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**MARKING SCHEME**

**MAXIMUM MARK: 60**

**SYLLABUS/COMPONENT: 0652/02**

**PHYSICAL SCIENCE**  
**Paper 2 (Core)**

- |    |         |   |     |
|----|---------|---|-----|
| 1. | 15      | 1 |     |
|    | 14      | 1 |     |
|    | 2, 8, 4 | 1 | (3) |

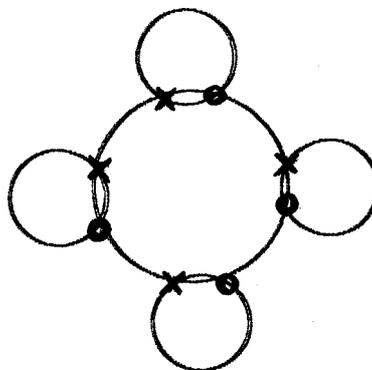
**Total 3**

- |            |  |           |         |
|------------|--|-----------|---------|
| 2. (a) (i) | Any three of:<br>circuit complete<br>current in coil<br>core magnetised<br>armature attracted to the core                  | 1 + 1 + 1 | (3 max) |
| (ii)       | soft iron loses its magnetism easily<br>EITHER steel retains its magnetism<br>OR so that contacts re-open when S is opened | 1         | (2)     |

- |     |  |             |     |
|-----|--|-------------|-----|
| (b) | EITHER use of $R = V/I$ (in any form)<br>OR $R = 12/4$ (in any form)<br>$R = 3$<br>Ohm | 1<br>1<br>1 | (3) |
|-----|--|-------------|-----|

**Total 8**

3. (a) (i)



- |      |          |   |     |
|------|----------|---|-----|
|      |          | 2 |     |
| (ii) | covalent | 1 | (3) |

- |         |  |   |     |
|---------|--|---|-----|
| (b) (i) | $\text{CH}_3\text{OH}$<br>( $\text{CH}_4\text{O}$ or similar = 1 compensation) | 2 |     |
| (ii)    | $12 + 4 + 16 = 32$ (ignore units)  | 1 | (3) |

**Total 6**

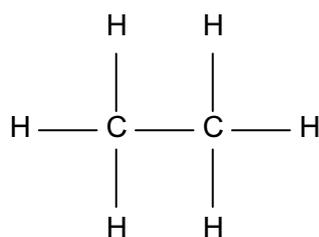
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4. (a) (i) Evidence of both outer rays converging after leaving lens and central ray straight 1  
all three rays pass through a single point on central ray +1  
(ii) focal length correctly marked +1 (3)
- (b) (i)  $i$  correctly marked 1  
(ii) ray reflected so that  $i = r$  1 (2)
- Total 5**

5. (a) Bromine atom takes electron from iodide ion 1  
EITHER to become bromide ion  
OR and replaces iodide/forms potassium bromide 1 (2)

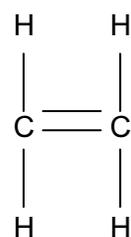
(b) **Ethane**



1

No change in colour 1

**Ethene**



1

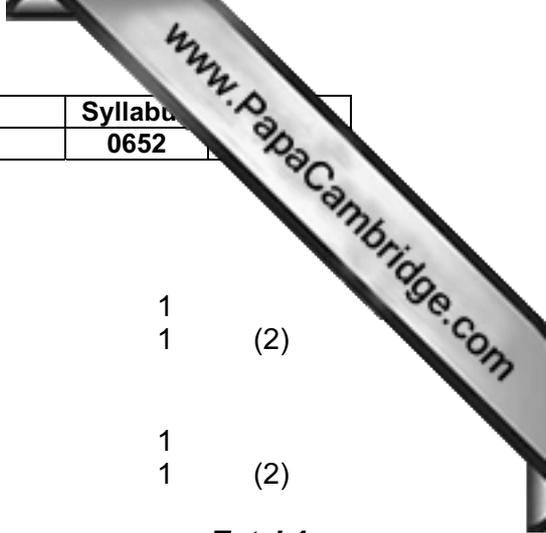
goes colourless 1  
(or correct formula) (4)

**Total 6**

6. (a) (i) mercury or alcohol 1  
(ii)  $35 \pm 1$  1  
(iii) Make Hg move further/increase sensitivity 1 (3)
- (b) (i) cools 1  
liquid contracts 1  
(ii) correct position at 0 1 (3)

**Total 6**

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7. (a)	Increase the potential energy of the molecules OR do work in separating the molecules against intermolecular forces/bonds	1 1	(2)
(b)	Molecules are moving around randomly spread in all directions	1 1	(2)
		<b>Total 4</b>	
8. (a)	(i) refraction	1	
	(ii) arrow drawn at right angles to the refracted waves	1	(2)
(b)	(i) less	1	
	(ii) the same	1	
	(iii) less	1	(3)
		<b>Total 5</b>	
9. (a)	Hydrochloric	1	(1)
(b)	(i) Carbon dioxide	1	(1)
	(ii) Bubble through limewater goes cloudy/milky	+1 +1	(2)
(c)	Filter Evaporate (to dryness)	1 +1	(2)
		<b>Total 6</b>	
10. (a)	Example 2 because force moves (max 1 if box/boy moves) whereas in 1 the force is stationary	1 1	(2)
(Note: there is no credit for correct answer without some form of explanation)			
(b)	18 N	1 1	(2)
(c)	accelerates uniformly/constantly/(steadily?)	1 +1	(2)
		<b>Total 6</b>	

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11. (a) hydrogen loses electron 1  
in the formation of H<sub>2</sub>O molecule 1 (2)
- (b) Energy given out on combustion 1 (1)
- (c) On combustion the only product is water 2 (2)  
(OR no products of combustion/pollutants 1  
except water 1)

**Total 5**

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**JUNE 2003**

INTERNATIONAL GCSE

**MARKING SCHEME**

**MAXIMUM MARK: 80**

**SYLLABUS/COMPONENT: 0652/03**

**PHYSICAL SCIENCE**  
**Paper 3 (Extended)**

Page 1	Mark Scheme	Syllabus
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1	<p>(a) Covalent molecules (N<sub>2</sub>); weak forces between (non-polar) molecules; ∴ low B. Pt. → gas at room temperature</p> <p><i>Marks can be in either (i) or (ii)</i></p>	
	(b) Amphoteric; mid-way between basic and acidic oxides	[2]
	(c) Ions have same charge in same Group; but smaller ions attract electrons more strongly	[2]
	(d) $PCl_3$ <u>OR</u> $PCl_5$	[1]
		<b>Question Total [8]</b>
2	(a) equation	[1]
	correct substitution	[1]
	36.7 m/s <sup>2</sup>	[1]
	(b) k.e. equation	[1]
	working	[1]
	4.5(4) J	[1]
	(c) g.p.e. equation	[1]
	working	[1]
	2.0(3) J	[1]
	(d) (i) loose but correct idea of how well something is done	[C1]
	clear statement of idea of ratio of input to effective output work/energy/power	[2]

- (ii) not efficient  
 clear statement of reason why not  
 first incorrect or missing unit only incurs penalty of -1

**Question Total [13]**

- 3 (a) Light can cause  $\text{Ag}^+$  ions  $\rightarrow$  Ag atoms; bottle keeps out light rays [2]
- (b) Na reacts violently with air and water; paraffin is inert and covers surface [2]
- (c) Easily picks up water vapour  $\rightarrow$  blue hydrate; desiccator keeps air dry [2]
- (d) Volatile so kept cold; poisonous vapour so in fume cupboard [2]

**Question Total [8]**

- 4 (a) correct order: image, object, lens, focus (or reversed) [1]  
 either ray refracted correctly [1]  
 correct construction [1]
- (b) virtual [1]  
 magnified or correctly measured height } Any 3 [1]  
 correct measurement of candidate's distance from lens, upright } [1]
- (c) magnifying glass/lens to correct long sight etc. [1]

**Question Total [7]**

- 5 (a) Mobile electrons (sea of electrons) NOT free electrons
- (b) Unequal sizes of ions in alloy; give uneven (lumpy) layers; which cannot slide past each other easily; hence alloy is less malleable [4]
- (c) (i) Ca, Sr, Ba OR Ra [1]
- (ii) Fizzing }  
 Gradually dissolve } Any 2  
 Allow: Alkaline solution [2]

Question Total [8]

- 6 (a) max voltage = 0.4 V [1]  
 min voltage = 0.5 V [1]
- (b) mention of electromagnetic induction [1]  
 idea of flux cutting or similar [1]
- (c) positive and negative peak [1]  
 flux cuts coil in opposite directions [1]  
 1<sup>st</sup> peak lower [1]  
 rate of flux cutting less [1]  
 1<sup>st</sup> peak wider  
 magnet moving slower – time longer  
 flat middle section  
 zero rate of flux cutting
- Any two pairs of answers, i.e. statement and consistent explanation

Question Total [8]

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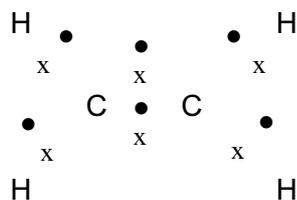
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- 7 (a) (i) Charge on ion is +2 (oxidation number +2)  
Allow: - Valency is 2
- (ii) Calcium has only one possible oxidation number (valency) [1]
- (b) (i) 1000 cm<sup>3</sup> contains 1 mole [1]  
∴ 50 cm<sup>3</sup> contains 0.050 moles
- (ii) 1 mole CuCO<sub>3</sub> → 2 moles acid [1]  
∴ 0.025 moles CuCO<sub>3</sub> → 0.050 moles acid
- (iii) 64 + 12 + 3 x (16) [1] = 124 [1] [2]
- (iv) Mass = Moles x M<sub>r</sub> OR Mass = 0.025 x 124 [1] = 3.1 g [1] [2]
- Question Total [8]**
- 8 (a) idea of voltage [C1]  
max terminal p.d./open circuit p.d. or other definition [2]
- (b) idea of high resistance implies low current [C1]  
idea that voltmeter must drop vast majority of voltage [2]
- (c) (i) equation [1]  
102 Ω used [1]  
1.47 x 10<sup>-2</sup> A [1]
- (ii) use of current in (i) and 100 Ω [1]  
1.47 V (e.c.f.) [1]
- (iii) larger resistance voltmeter [1]  
smaller current [1]  
less voltage dropped across internal resistance [1]  
first incorrect or missing unit only incurs penalty of -1

**Question Total 12**

9 (a)

([1] for C=C, [1] for filled shells)



(b) Alkenes have C=C bond; needs at least 2 carbon atoms [2]

(c) (i)  $C_4H_{10} \rightarrow 2C_2H_4 + H_2$  ([1] for formulae, [1] for balance) [2]

(ii) High temp; high Pressure OR catalyst [2]

Question Total [8]

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**MARKING SCHEME**

**MAXIMUM MARK: 30**

**SYLLABUS/COMPONENT: 0652/05**

**PHYSICAL SCIENCE**  
**Practical**

1 (a) (iii)	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)	axes labelled correctly sensible scale plotting correctly best line drawn goes through or would go through origin	4
(c)	extension read correctly or calculated	1
(d)	proportional (2) allow one if says extension increases by fixed amount for fixed force	2
(e)	line correctly drawn and labelled	1
(f)	read extension use graph calculate in g or kg using correct number, i.e. /10 to kg or x 100 to g	3

**Total 15**

2 (a)	each metal correct as –ve three values of p.d. to be within 0.2V of SV	1 3
(c)	magnesium with a suitable explanation	2
(d)	correct order Mg, Zn, Cu	1
(e)	bubbling, colour fades, black/brown deposit, magnesium disappears or other suitable observation	3
	magnesium is displacing copper ion (some reference to electron movement or ion changes is essential to score both marks)	2
(f)	test with each metal note polarity compare this polarity with the other three	3

**Total 15**

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**MARKING SCHEME**

**MAXIMUM MARK: 60**

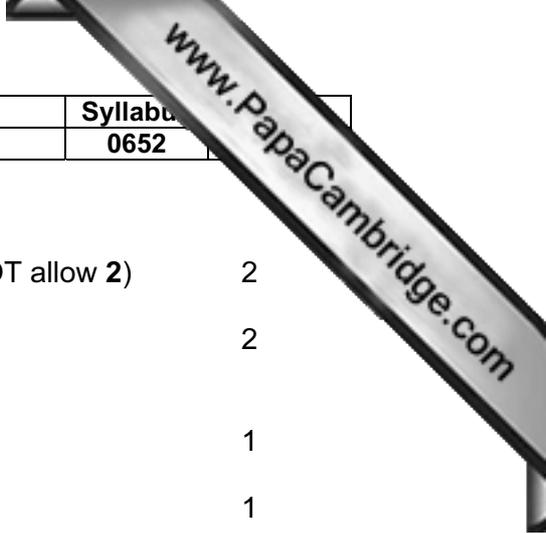
**SYLLABUS/COMPONENT: 0652/06**

**PHYSICAL SCIENCE**  
**Alternative to Practical**

- 1 (a)** Masses:
- |                   |   |                                    |   |
|-------------------|---|------------------------------------|---|
| object A – 41.4g  | } | No tolerance<br>(do not allow 28g) | 3 |
| object B – 64.2 g |   |                                    |   |
| object C – 28.0g  |   |                                    |   |
- (b)** Volumes:
- |                              |   |              |   |
|------------------------------|---|--------------|---|
| object A – 27cm <sup>3</sup> | } | No tolerance | 3 |
| object B – 12cm <sup>3</sup> |   |              |   |
| object C – 56cm <sup>3</sup> |   |              |   |
- (c)** Density of object C =  $28/56 = 0.5$  (allow 1 mark for correct substitution but incorrect answer) (allow ecf from (a) and (b)) 2
- unit g/cm<sup>3</sup> (mark is independent of answer to calculation) 1
- (d)** object C would **float** [1]
- because it is less dense than water (OWTTE) [1] (explanation must relate to relative densities of object C and water) 2
- do NOT allow independent answers, i.e. correct explanation MUST be given to score first mark.
- (allow converse answer if candidate's value for part (c) is >1)
- (e)** some water would be left in the beaker when transferring to the measuring cylinder 1
- do NOT allow 'the experiment/results is/are not accurate'

**Total 12**

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- 2 (a)** Magnesium copper [1] pd = 2.0 [1] (do NOT allow 2) 2  
 Zinc copper [1] pd = 1.1 [1] 2
- (b)** most negative = magnesium 1  
 most positive = copper 1
- (c)** magnesium, zinc, copper 1
- (d)** find the p.d. with each of the other metals [1]  
 note which metal is positive/negative [1]  
 metal X is positive with a more reactive metal and vice versa [1] 3
- Answers must relate to the experiment used in the question.

**Total 10**

Page 3	Mark Scheme	Syllabus
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- 3 (a)**  $h_3 = 160$  (mm)       $h_4 = 122$  (mm)       $h_5 = 85$  (mm)      2  
(tolerance  $\pm 1$ mm)
- (2 marks if all three values correct, reduce by one mark for each error to minimum 0)
- (b)** Forces      1.5      2.0      2.5(N)      2  
(1 only if 2 or more incorrect)  
Extensions      110      148      185 (mm)  
(e.c.f. – 1 for each error)
- (c)** Plotting points [2] – 5/6 points plotted correctly – 2 marks  
3/4 points plotted correctly – 1 mark  
1/2 points plotted correctly – 0 marks      2
- Straight line passing through the origin [1]      1
- (d)** (Directly) proportional      1  
(do NOT allow ‘as mass increases, extension increases’)
- (e)** place mass on hanger and record extension [1]
- use graph to find force (or plot new graph if extension greater than values already plotted) [1]
- multiply Force by 100 to find mass of object [1]      (2 of 3)      2

**Total 10**

Page 4	Mark Scheme	Syllabus
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- 4 (a) (i) Blue/Dark green (must be **COLOUR** i.e. *NOT pH number*) (do NOT allow 'purple') 1
- Ammonia/gas is alkali(ne) (allow 'basic/base') 1
- (a) (ii) Red 1
- (b) (Light) Green 1
- Gases **neutralise** each other (**NOT** one gas is acidic and the other is alkaline) 1
- (c) (i) Ammonia moves faster 1
- (c) (ii) Because it has smaller particles (allow converse) 1
- (d) Spreading out of particles (OWTTE) 1

**Total 8**

Page 5	Mark Scheme	Syllabus
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- 5 (a) (i)** Crystal dissolved [1] (do NOT allow 'melted')  
 Particles spread out/diffused into the liquid [1] 2
- (a) (ii)** Any TWO from:  
 Stir [1]  
 Heat/warm [1]  
 Shake [1] 2
- (b)** Alkali(ne)/has pH greater than 7 1
- (c) (i)** Mixed with water/water has been added 1
- (c) (ii)** Alkali and acid have reacted [1] so the solution is neutral/pH 7 [1] 2
- (c) (iii)** Alkali is in excess (OWTTE) (do NOT allow 'the acid has not reached the alkali') 1
- (c) (iv)** Calcium Hydroxide + Ethanoic Acid  $\longrightarrow$  Calcium Ethanoate + Water 1

**Total 10**

Page 6	Mark Scheme	Syllabus
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<b>6 (a)</b>	Mass of beaker = 43.4g	1
	Mass of beaker + water = 93.6g	1
	Mass of beaker + sodium chloride solution = 108.6g	1
<b>(b) (i)</b>	Mass of sodium chloride solution = $108.6 - 43.4 = 65.2\text{g}$ (allow ecf from (a))	1
<b>(ii)</b>	Mass of sodium chloride crystals = $108.6 - 93.6 = 15.0\text{g}$ (allow ecf from (a)) (do NOT allow 15g)	1
<b>(c)</b>	Volume = $55\text{ cm}^3$	1
<b>(d)</b>	(b) (i) and (c) (both required for mark)	1
	(accept values quoted (allow ecf)) (allow calculated value of density e.g. $65.2/55$ or $1.19\text{g/cm}^3$ (allow ecf from candidate's values))	
<b>(e)</b>	Place hexane in measuring cylinder to a known volume [1]	
	Add 15g of sodium chloride to the hexane [1]	
	Note new volume in measuring cylinder and subtract original volume of hexane [1]	3

**Total 10**

**Grade thresholds** taken for Syllabus 0652 (Physical Science) in the June 2003 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 1	40	-	27	21	17
Component 2	60	-	32	21	18
Component 3	80	47	29	-	-
Component 5	30	21	17	13	11
Component 6	60	54	43	27	24

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.