

**Edexcel International**

**London Examinations**

**IGCSE**

**IGCSE Science (Double Award) (4437)**

**Mark Schemes for Specimen Papers**

**Paper 1F (Foundation Tier)**

**MARK SCHEME FOR  
LONDON EXAMINATIONS IGCSE IN SCIENCE  
(DOUBLE AWARD) (4437)  
SPECIMEN PAPER 1F  
FOUNDATION TIER**

**Symbols used in the Mark Scheme**

; indicates separate mark points

/ indicates alternatives

eq allow for correct equivalent

- |    |   |                                  |
|----|---|----------------------------------|
| 1. | (a) C;<br>(b) B;<br>(c) C;<br>(d) C;<br>(e) B;<br>(f) B;<br>(g) C;  |                                  |
|    |   | <b>(Total 7 marks)</b>           |
| 2. | (a)(i) smaller / eq;<br>(ii) reference to muscle;<br>(iris) bigger / eq / (muscle) contracted;<br>(b) damage retina;<br>(c) testosterone;<br>insulin;<br>oestrogen;               | 1<br><br><br>2<br><br>1<br><br>3 |
|    |   | <b>(Total 7 marks)</b>           |
| 3. | (a) arrow towards or through stomata;<br>(b) absorb light / carry out photosynthesis / eq;<br>(c) correctly labelled;,,,;   | 1<br>1<br>4                      |
|    |   | <b>(Total 6 marks)</b>           |
| 4. | (a) all points correctly plotted;; / error lose 1 mark<br>(b)(i) (the amount of oxygen) fell / dropped / eq;<br>(ii) bacteria (in sewage);<br>increase / use up oxygen / respire; | 2<br>1<br><br>2                  |
|    |   | <b>(Total 5 marks)</b>           |
| 5. | (a) fermenter;<br>(b) bacteria / fungus;<br>(c) oxygen;<br>(d) keep other microorganisms out / prevent contamination /<br>prevent competition                                     | 1<br>1<br>1<br>1                 |
|    |   | <b>(Total 4 marks)</b>           |

6.	(a)(i) 10;	1
	(ii) 3;	1
	(b) glucose; oxygen; carbon dioxide; water;	4
		<b>(Total 6 marks)</b>
7.	(a) whole;	1
	(b) skimmed;	1
	(c) less fat;	
	less chance of blocking blood vessels / eq	2
		<b>(Total 4 marks)</b>
8.	(a)(i) rabbit(s);	1
	(ii) correct shape;	
	correct labelling;	2
	(b)(i) numbers decrease / eq;	1
	(ii) no food / grass for rabbits / eq;	
	no food / rabbits for foxes / eq;	2
		<b>(Total 6 marks)</b>
9.	(a)(i) breakdown;	
	large / insoluble (molecules) to small / soluble (molecules);	2
	(ii) fatty acids / glycerol;	1
	(b) B; A;	2
		<b>(Total 5 marks)</b>
10.	(a)(i) anther;	1
	(ii) stigma;	1
	(b) insect;	1
	(c) through style to touch ovule;	1
		<b>(Total 4 marks)</b>
11.	testis / ovary / gonads / eq;	
	liver;	
	lung / placenta;	
	kidney;	
	uterus / womb;	5
		<b>(Total 5 marks)</b>

12. Description could include reference to:  
 bronchitis;  
 ciliated cells stop working;  
 bacteria;  
 infection;  
 emphysema;  
 reduced surface area / fewer alveoli / eq;  
 white blood cells;  
 protease;  
 less gas exchange;  
 cancer;  
 mutation / eq;  
 blocked air tubes / eq;
- max 5  
**(Total 5 marks)**
13. (a)(i) sheep A / udder cell; 1  
 (ii) it is diploid / not haploid / contains more / twice the DNA /  
 contains different DNA / genes; 1  
 (iii) sheep A; 1  
 (b) uses surrogate mother; / does not need sperm; / eq; 2  
 (c) can be used to produce useful chemicals / eq;  
 produce many / that are the same / animals with desired  
 characteristics / eq; 2
- (Total 7 marks)**
14. B; A; C; B; 4
- (Total 4 marks)**

**TOTAL FOR PAPER: 75 MARKS**

**Edexcel International**

**London Examinations**

**IGCSE**

**IGCSE in Science (Double Award) (4437)**

**Mark Scheme for Specimen Paper**

**Paper 2F (Foundation Tier)**

**MARK SCHEME FOR  
LONDON EXAMINATIONS IGCSE IN SCIENCE  
(DOUBLE AWARD) (4437)  
SPECIMEN PAPER 2F  
FOUNDATION TIER**

- |    |  |                         |
|----|--|-------------------------|
| 1. | (a) Any Gp1 element name / symbol  | 1                       |
|    | (b) Copper / Cu  | 1                       |
|    | (c) Any element from boron to neon name / symbol   | 1                       |
|    | (d) Iodine / I or Astatine / At  | 1                       |
|    | (e) Aluminium / Al   | 1                       |
|    |  | <b>(Total 5 marks)</b>  |
|    |  |                         |
| 2. | (a) metals   | 1                       |
|    | (b) allotropes   | 1                       |
|    | (c) alkalis  | 1                       |
|    | (d) ions   | 1                       |
|    | (e) isotopes   | 1                       |
|    |  | <b>(Total 5 marks)</b>  |
|    |  |                         |
| 3. | (a) solid <input type="checkbox"/>   |                         |
|    | liquid <input type="checkbox"/>  |                         |
|    | gas <input type="checkbox"/>   |                         |
|    | (one correct = 1 mark, all correct = 2 marks)  | 2                       |
|    | (b) air – gas  | 1                       |
|    | iron – solid   | 1                       |
|    | water – liquid   | 1                       |
|    | (c) 0  | 1                       |
|    | noble gases  | 1                       |
|    | (d)(i) solid to liquid   | 2                       |
|    | (ii) gas to liquid   | 2                       |
|    | (iii) liquid to gas  | 2                       |
|    |  | <b>(Total 13 marks)</b> |
|    |  |                         |
| 4. | (a) A description to include three from: <ul style="list-style-type: none"> <li>• fizzes / bubbles</li> <li>• moves about</li> <li>• floats on water</li> <li>• white smoke</li> <li>• burns with <b>yellow</b> flame</li> <li>• dissolves / gets smaller</li> </ul> | 3                       |
|    | (b) hydrogen   | 1                       |
|    | (c)(i) alkaline  | 1                       |
|    | (ii) blue  | 1                       |
|    | (d) increases  | 1                       |
|    |  | <b>(Total 7 marks)</b>  |

5.	(a)	55%	1
	(b)(i)	carbon	1
	(ii)	CO <sub>2</sub>	
	(g)		2
	(iii)	D	1
			<b>(Total 5 marks)</b>
6.	(a)(i)	hydrogen	1
	(ii)	ethane	1
	(iii)	hexane	1
	(iv)	propane	1
	(b)(i)	fractional distillation	2
	(ii)	Any two from:	
		• petrol	
		• naphtha	
		• kerosine	
		• diesel (oil)	
		• fuel oil	2
	(c)	oxygen	
		water / steam / hydrogen oxide	2
			<b>(Total 10 marks)</b>
7.	(a)	Nitrogen / N <sub>2</sub> and hydrogen / H <sub>2</sub>	1
	(b)(i)	A substance that speeds up a reaction but is not used up	1
	(ii)	Greater surface area / more room for reacting molecules	1
	(c)	Phosphorus	1
		Any potassium salt	1
	(d)(i)	2	1
	(ii)	80	1
			<b>(Total 8 marks)</b>
8.	(a)	diffusion	1
	(b)	diffuse more quickly	1
	(c)	particles have more energy so move faster	1
	(d)	movement in short straight lines only random directions	1
			1
			<b>(Total 6 marks)</b>
9.	(a)	correct covalent bonding shown	1
	(b)(i)	methane + oxygen → carbon dioxide + water	1
	(ii)	poor supply of air / oxygen	1
	(iii)	carbon monoxide is poisonous	1
			<b>(Total 4 marks)</b>

10.	(a)(i)	Particle A – electron	
		Particle B – neutron	
		Particle C – proton	3
	(ii)	7	1
	(iii)	one electron in outer shell	1
	(b)(i)	C	1
	(ii)	A	1
	(c)(i)	protons – 17	1
		neutrons – 18	1
		electrons – 18	1
	(ii)	2.8.7	1
	(iii)	2.8.8	1
			<b>(Total 12 marks)</b>

**TOTAL FOR PAPER: 75 MARKS**



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**IGCSE**

**IGCSE in Science (Double Award) (4437)**

**Mark Scheme for Specimen Paper**

**Paper 3F (Foundation Tier)**

**MARK SCHEME FOR  
LONDON EXAMINATIONS IGCSE IN SCIENCE  
(DOUBLE AWARD) (4437)  
SPECIMEN PAPER 3F  
FOUNDATION TIER**

- |    |        |   |                        |
|----|--------|---|------------------------|
| 1. | (a)    | 12(m)   | 1                      |
|    | (b)    | increases<br>cyclist moves further in same time interval / each time  | 1<br>1                 |
|    | (c)    | $20 < X < 28$   | 1                      |
|    |        |   | <b>(Total 4 marks)</b> |
| 2. | (a)(i) | torch <b>and</b> lamp (either order)  | 1                      |
|    | (ii)   | vacuum cleaner  | 1                      |
|    | (iii)  | vacuum cleaner <b>and</b> lamp (either order)   | 1                      |
|    | (iv)   | torch   | 1                      |
|    | (b)(i) | 3   | 1                      |
|    | (ii)   | symbol correct (circle with a V inside only)<br>position correct (in parallel with battery)   | 1<br>1                 |
|    | (iii)  | would get less bright   | 1                      |
|    |        |   | <b>(Total 8 marks)</b> |
| 3. | (a)(i) | become compressed / compacted / smaller / squashed /<br>decrease in size / go down / pushed together  | 1                      |
|    | (ii)   | shortest spring circled   | 1                      |
|    | (iii)  | most compressed / shortest spring   | 1                      |
|    | (b)    | use more springs (in the middle)<br>use stiffer / stronger springs (in the middle)<br>sensible use of material<br>more coils in spring                    ANY TWO | 2                      |
|    | (c)(i) | arrow pointing down (ignore point of action)  | 1                      |
|    | (ii)   | downward<br>Earth   | 1<br>1                 |
|    |        |   | <b>(Total 8 marks)</b> |
| 4. | (a)    | D   | 1                      |
|    | (b)(i) | I clearly behind mirror<br>I in line with the nose and the same distance (by eye)<br>from the mirror  | 1<br>1<br>1            |
|    | (ii)   | same size, upright, virtual<br>(no marks for contradictory answers e.g. real and virtual)<br>deduct one mark for each response in excess of three                 | 3                      |
|    |        |   | <b>(Total 6 marks)</b> |

5. (a)(i) cooker  
highest power / most current 2
- (ii) 5A  
5A > 4A 2
- (b) each lamp has its own circuit  
each lamp can be switched separately  
each lamp has the same voltage  
each can operate at own power ANY TWO 2  
*accept reasons for rejection of series circuit*
- (Total 6 marks)**
6. (a)(i) points plotted correctly 3  
smooth curve drawn 1
- (ii) about 3 (km/h) *depends on candidate's graph* 1
- (iii) 1160 (W) 1
- (iv) not always windy / variable output / too much land needed 1
- (b) kinetic 1  
electrical 1
- (Total 9 marks)**
7. (a) gamma 1
- (b)(i) beta 1
- (ii) alpha – will not penetrate foil 1  
gamma – radiation detected will not be affected by  
thickness of foil 1
- (Total 4 marks)**
8. (a) (electromagnet) induction – not mutual, magnetic 1
- (b) greater / larger / increases 1  
reference to number of field lines cut 1  
reference to rate of cutting 1  
*dependent on previous mark*  
(greater motion between field and cable scores 1 out of 2)
- (Total 4 marks)**
9. (a) moving gas particles 1  
hitting container walls 1
- (b) increases 1  
increases 1  
stays the same 1  
stays the same 1
- (c)(i) increases / linearly / steady rate 1
- (ii) correctly indicated – intercept with horizontal axis 1
- (iii) zero / minimum 1
- (Total 9 marks)**

10.	(a)(i)	65%	1
	(ii)	door – draught excluder / curtains	1
		floor – carpets / wooden floors	1
		(damp proofing scores 1 out of 2)	
	(b)(i)	108	1
	(ii)	$224 \times 60$ (or $224 \times 1$ i.e. energy $\times$ time)	1
		$\times 60$	1
		= 806 400 (J)	1
			<b>(Total 7 marks)</b>
11.	(a)	(gravitational) potential to kinetic	1
		kinetic to electrical	1
	(b)	1440 / 2000	1
		= 72% or 0.72	1
		(70 or 0.7% scores 1 out of 2)	
	(c)	friction in the (generator / wheel) / heat due to friction	1
		water missing the blades OR	
		resistance in the generator wires OR	
		converted / changed to heat energy (ignore sound)	
		heat lost surroundings (0)	
		air resistance (0)	
		water stays on wheels (0)	
			<b>(Total 5 marks)</b>
12.	(a)	similarity – number of protons / proton number / atomic number	1
		difference – number of neutrons / atomic mass (number)	1
		nucleon number	
	(b)(i)	number of neutrons and protons are the same	1
	(ii)	X marked at (7,8)	1
	(iii)	unstable	1
			<b>(Total 5 marks)</b>

**TOTAL FOR PAPER: 75 MARKS**

**Edexcel International**

**London Examinations**

**IGCSE**

**IGCSE Science (Double Award) (4437)**

**Mark Schemes for Specimen Papers**

**Paper 4H (Higher Tier)**

**MARK SCHEME FOR  
LONDON EXAMINATIONS IGCSE IN SCIENCE  
(DOUBLE AWARD) (4437)  
SPECIMEN PAPER 4H  
HIGHER TIER**

**Symbols used in the Mark Scheme**

; indicates separate mark points

/ indicates alternatives

eq allow for correct equivalent

- |    |  |                  |                        |
|----|--|------------------|------------------------|
| 1. | (a)(i) breakdown; large / insoluble (molecules)<br>to small / soluble (molecules);<br>(ii) fatty acids / glycerol;<br>(b) B; A;  | 2<br>1<br>2      | <b>(Total 5 marks)</b> |
| 2. | (a)(i) anther;<br>(ii) stigma;<br>(b) insect;<br>(c) through style to touch ovule;   | 1<br>1<br>1<br>1 | <b>(Total 4 marks)</b> |
| 3. | testis / ovary / gonad / eq;<br>liver;<br>lung;<br>kidney;<br>uterus / womb;   | 5                | <b>(Total 5 marks)</b> |
| 4. | Description could include reference to:<br>bronchitis;<br>ciliated cells stop working;<br>bacteria;<br>infection;<br>emphysema;<br>reduced surface area / fewer alveoli / eq;<br>white blood cells;<br>protease;<br>less gas exchange;<br>cancer;<br>mutation / eq;<br>blocked air tubes / eq; | max 5            | <b>(Total 5 marks)</b> |

5. (a)(i) sheep A / udder cell; 1  
(ii) it is diploid / not haploid / contains more / twice the DNA / contains different DNA / genes; 1  
(iii) sheep A; 1  
(b) uses surrogate mother; / does not need sperm; / eq; 2  
(c) can be used to produce useful chemicals / eq; produce many / that are the same / animals with desired characteristics / eq; 2  
**(Total 7 marks)**
6. B; A; C; B; 4  
**(Total 4 marks)**
7. (a)(i) 2880 kJ; 1  
(ii) respiration / heat / movement / urine / faeces / eq; 1  
(b) 4%; 1  
(c) eaten by other organisms / decomposed / broken down by other organisms / eq; 1  
**(Total 4 marks)**
8. (a) both J and K half shaded; 1  
(b) do not have cystic fibrosis / abnormal mucus / disease; have the cystic / recessive allele; can be passed on / eq; max 2  
(c) 3; 1  
(d) female with cystic fibrosis; 1  
(e) 1 in 4 /  $\frac{1}{4}$  / 0.25 / 25% / 1:3; (reject 1:4) 1  
(f) 1 in 8 /  $\frac{1}{8}$  / 0.125 / 12.5% / 1:7; (reject 1:8) 1  
**(Total 7 marks)**
9. (a) A – sensory; 1  
(b) reflex / reflex arc; 1  
(c) less time (to respond) / less distance / does not need to go to brain / no need to think / less damage / eq; 1  
(d) D; C / motor; A / sensory; 3  
**(Total 6 marks)**
10. (a) X – ciliary muscle / body; Y – retina; 2  
(b)(i) bend / refract light; 1  
(ii) needs to be clear / transparent / to let light through / eq; 1  
(c) diffusion; from air / from aqueous humour; 2  
(d) lactic acid; 1  
(e) mitosis; 1  
(f) converted to glucose; for respiration; 2  
**(Total 10 marks)**

11. (a) ladybirds eat insects / potato plants produce insecticide; 1  
 (b) not all killed / 50% survive / eq; 1  
 (c) fields that contain normal potato plants; 1  
 (d) resistant insects will increase in number /  
 ladybird numbers will fall; 1  
 (e) potato DNA cut;  
 specific sites / eq;  
 restriction enzyme;  
 gene for (natural) insecticide;  
 inserted / put in / eq;  
 ligase;  
 vector / plasmid / virus; max 5  
**(Total 9 marks)**
12. (a)(i) scale – more than half of each axis used;  
 points – all plotted accurately;;  
 line – neatly drawn through all points / line of best fit; 4  
 (ii) 150 (kg per hectare); 1  
 (b) amino acids / protein; 1  
 (c) more / increased algae / (water) plants grow (at surface) / eq;  
 light blocked / eq;  
 plants lower cannot photosynthesise / no photosynthesis;  
 die / algae die / eq;  
 bacteria / decomposers / fungi rot them down / eq;  
 use oxygen / less oxygen (must be linked to bacteria or  
 decay) / eq;  
 fish / animals die / suffocate / cannot breathe / respire / eq;  
 food chain consequences / eq;  
 eutrophication; max 5  
**(Total 11 marks)**
13. (a) dancing generates heat / eq;  
 heat transferred out of body / eq;  
 cools / prevents overheating / eq;  
 avoids enzyme denaturation / eq; max 3  
 (b)(i) pituitary; 1  
 (ii) kidney; 1  
**(Total 5 marks)**
14. (a) transpiration; 1  
 (b) potometer; 1  
 (c) increased kinetic energy / molecules diffuse /  
 move faster / eq;  
 stomata open; 2  
**(Total 4 marks)**



15. (a) water entered;  
by osmosis;  
from high water concentration to low water  
concentration / eq;

3

(b)

Mass of water absorbed in g	Percentage increase in mass	Tick
More	Lower	✓;
Less	Lower	
Less	Higher	
More	Higher	

1

**(Total 4 marks)**

**TOTAL FOR PAPER: 90 MARKS**



**Edexcel International**

**London Examinations**

**IGCSE**

**IGCSE in Science (Double Award) (4437)**

**Mark Scheme for Specimen Paper**

**Paper 5H (Higher Tier)**

**MARK SCHEME FOR  
LONDON EXAMINATIONS IGCSE IN SCIENCE  
(DOUBLE AWARD) (4437)  
SPECIMEN PAPER 5H  
HIGHER TIER**

- |    |   |                         |
|----|---|-------------------------|
| 1. | (a) Nitrogen / N <sub>2</sub> and hydrogen / H <sub>2</sub>                 | 1                       |
|    | (b)(i) A substance that speeds up a reaction<br>but is not used up          | 1<br>1                  |
|    | (ii) Greater surface area / more room for reacting molecules                | 1                       |
|    | (c) Phosphorus<br>Any potassium salt  | 1<br>1                  |
|    | (d)(i) 2  | 1                       |
|    | (ii) 80   | 1                       |
|    |   | <b>(Total 8 marks)</b>  |
|    |   |                         |
| 2. | (a) diffusion   | 1                       |
|    | (b) diffuse more quickly  | 1                       |
|    | (c) particles have more energy<br>so move faster                            | 1<br>1                  |
|    | (d) movement in short straight lines only<br>random directions              | 1<br>1                  |
|    |   | <b>(Total 6 marks)</b>  |
|    |   |                         |
| 3. | (a) correct covalent bonding shown  | 1                       |
|    | (b)(i) methane + oxygen → carbon dioxide + water                            | 1                       |
|    | (ii) poor supply of air / oxygen  | 1                       |
|    | (iii) carbon monoxide is poisonous  | 1                       |
|    |   | <b>(Total 4 marks)</b>  |
|    |   |                         |
| 4. | (a)(i) Particle A – electron<br>Particle B – neutron<br>Particle C – proton | 3                       |
|    | (ii) 7  | 1                       |
|    | (iii) one electron in outer shell   | 1                       |
|    | (b)(i) C  | 1                       |
|    | (ii) A  | 1                       |
|    | (c)(i) protons – 17<br>neutrons – 18<br>electrons – 18                      | 1<br>1<br>1             |
|    | (ii) 2.8.7  | 1                       |
|    | (iii) 2.8.8   | 1                       |
|    |   | <b>(Total 12 marks)</b> |

5. (a) An explanation to include:
- the more carbon atoms, the higher the boiling point
  - more energy needed to separate larger molecules
- 2
- (b)(i) A description to include two from:
- high temperature
  - catalyst
  - absence of air
- 2
- (ii) A description to include:
- bromine (water)
  - is decolourised
- 2
- (c)(i)
- $$\begin{array}{c}
 \text{H} \quad \text{H} \quad \text{H} \\
 | \quad | \quad / \\
 \text{H}-\text{C}-\text{C}=\text{C} \\
 | \quad \quad | \\
 \text{H} \quad \quad \text{H}
 \end{array}$$
- [Allow one mark for C=C]
- 2
- (ii)  $\text{C}_{10}\text{H}_{22} \rightarrow 2\text{C}_3\text{H}_6 + \text{C}_4\text{H}_{10}$
- [Allow one mark for  $\text{C}_{10}\text{H}_{22} \rightarrow \text{C}_3\text{H}_6 + \text{C}_7\text{H}_{16}$ ]
- 2
- (d)(i) double bond
- 1
- (ii)
- $$\begin{array}{c}
 \text{H} \quad \text{CH}_3 \\
 | \quad | \\
 -\text{C}-\text{C}- \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}$$
- 2
- (iii) poly(propene) stronger
- 1
- (Total 14 marks)**
6. (a)(i) copper (chloride);
- 1
- (ii) transition metal (compound);
- 1
- (b)(i) Name – aluminium (chloride);
- Equation –  $3\text{Mg}(\text{s}) + 2\text{AlCl}_3(\text{aq}) \rightarrow 3\text{MgCl}_2(\text{aq}) + 2\text{Al}(\text{s})$
- correct formulae;
- balancing;
- correct state symbols;
- [If Ca chloride:
- formulae **and** balancing;
- state symbols;]
- 4
- (ii) loses electron(s);
- 1
- (iii) • calcium is higher in reactivity series/more reactive than magnesium
- cannot be displaced (from its salts by magnesium);
- 2
- (Total 9 marks)**

7. (a)(i) difficult to see the exact end point 1  
(ii) methyl orange 1  
(iii) start = yellow, end = pink/peach/orange 2  
(b)  $2\text{NaOH}(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$   
species 1  
balanced 1  
state symbols 1  
(c)(i) a gelatinous blue precipitate 1  
(ii)  $\text{Cu}^{2+}(\text{aq}) + 2\text{OH}^{-}(\text{aq}) \rightarrow \text{Cu}(\text{OH})_2(\text{s})$   
reactant ions 1  
product 1  
**(Total 10 marks)**
8. (a)(i) No current flowing in diagram A 1  
(ii) C 1  
(b) electrolysis 1  
(c) bromine 1  
 $2\text{e}^{-}$  1  
**(Total 5 marks)**
9. (a) A calculation to include:  
**either**  
1.  $2 \times 31 \rightarrow 2 \times 137.5$ ;  
2.  $0.93 \text{ g} \rightarrow \frac{2 \times 137.5}{2 \times 31} \times 0.93$ ;  
3. 4.125 (g)  
**or**  
1.  $\frac{0.93}{31} = 0.03$ ;  
2.  $\text{PCl}_3 = 137.5$   
3.  $137.5 \times 0.03 = 4.125 \text{ (g)}$ ; 3  
(b)(i) less;  
right to left reaction is endothermic/takes in heat energy 2  
(ii) more;  
fewer molecules on right hand side 2  
(c) A calculation to include:  
1.  $\text{Cl} = 4.62 - 0.36 = 4.26 \text{ g}$ ;  
2.  $\frac{0.36}{12} = 0.03$       $\frac{4.26}{35.5} = 0.12$ ;  
3. 1:4;  
4.  $\text{CCl}_4$  **deduced**; 4  
[ $\text{CCl}_4$  formula **without** any working out shown scores no marks]  
**(Total 11 marks)**

- |     |        |  |   |
|-----|--------|--|---|
| 10. | (a)(i) | 35, 44   | 1 |
|     |        | 35, 46   | 1 |
|     | (ii)   | around 50% each  | 1 |
|     | (b)(i) | $2\text{Br}^- + \text{Cl}_2 \rightarrow \text{Br}_2 + 2\text{Cl}^-$        |   |
|     |        | all symbols correct  | 1 |
|     |        | equation balanced  | 1 |
|     | (ii)   | iodine is less reactive than bromine so it would not displace bromide ions | 1 |
|     | (c)(i) | sodium iodide/potassium iodide/any soluble metal iodide                    | 1 |
|     | (ii)   | (colourless) solution would go red-brown                                   | 1 |
|     | (iii)  | each bromine atom gains an electron  | 1 |
|     | (iv)   | 2  | 1 |
|     |        | $2\text{e}^-$  | 1 |

**(Total 11 marks)**

**TOTAL FOR PAPER: 90 MARKS**





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**IGCSE in Science (Double Award) (4437)**

**Mark Scheme for Specimen Paper**

**Paper 6H (Higher Tier)**

**MARK SCHEME FOR  
LONDON EXAMINATIONS IGCSE IN SCIENCE  
(DOUBLE AWARD) (4437)  
SPECIMEN PAPER 6H  
HIGHER TIER**

- |    |   |   |
|----|---|---|
| 1. | (a) (electromagnet) induction – not mutual, magnetic<br>(b) greater / larger / increases<br>reference to number of field lines cut<br>reference to weight of cutting<br><i>dependent on previous mark</i><br>(greater motion between field and cable scores 1 out of 2)   | 1<br>1<br>1<br>1<br><br><b>(Total 4 marks)</b>  |
| 2. | (a) moving gas particles<br>hitting container walls<br>(b) increases<br>increases<br>stays the same<br>stays the same<br>(c)(i) increases linearly / steady rate<br>(ii) correctly indicated – intercept with horizontal axis<br>(iii) zero / minimum   | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br><br><b>(Total 9 marks)</b>                 |
| 3. | (a)(i) 65%<br>(ii) door – draught excluder / curtains<br>floor – carpets / wooden floors<br>(damp proofing scores 1 out of 2)<br>(b)(i) 108<br>(ii) $224 \times 60$ (or $224 \times 1$ i.e. energy $\times$ time)<br>$\times 60$<br>$= 806\,400$ (J)  | 1<br>1<br>1<br><br>1<br>1<br>1<br>1<br><br><b>(Total 7 marks)</b>                       |
| 4. | (a) (gravitational) potential to kinetic<br>kinetic to electrical<br>(b) 1440 / 2000<br>$= 72\%$ or 0.72<br>(70 or 0.7% scores 1 out of 2)<br>(c) friction in the (generator / wheel) / heat due to friction<br>water missing the blades OR<br>resistance in the generator wires OR<br>converted / changed to heat energy (ignore sound)<br>heat lost surroundings (0)<br>air resistance (0)<br>water stays on wheels (0) | 1<br>1<br>1<br>1<br><br>1<br><br><br><br><br><br><br><br><br><br><b>(Total 5 marks)</b> |

5.	(a)	similarity – number of protons / proton number / atomic number	1
		difference – number of neutrons / atomic mass (number) nucleon number	1
	(b)(i)	number of neutrons and protons are the same	1
	(ii)	X marked at (7,8)	1
	(iii)	unstable	1
		<b>(Total 5 marks)</b>	
6.	(a)	0.39(s)	1
	(b)	use area below graph	1
		$\frac{1}{2} \times 3.8 \times 0.39$	1
		= 0.74(m)	1
	(c)(i)	use $a = (v - u)/t$	1
		correct substitution	1
		= 9.7	1
		m/s <sup>2</sup>	1
	(ii)	downwards	1
		negative gradient / backwards slope / slowing down / retardation / deceleration	1
	(d)	use $F = ma$	1
		$65 \times 9.7$ ecf	1
		= 630 N	1
	(e)	downward pull of Earth / gravitational pull / weight	1
		<b>(Total 14 marks)</b>	
7.	(a)	gpe (or pe)	1
	(b)	use of mgh	1
		$6.0 \times 1.5 \times 10$	1
		= 90 J	1
	(c)	kinetic	1
		<b>(Total 5 marks)</b>	
8.	(a)(i)	use $pV = \text{constant}$	1
		$100\,000 \times 18 = p \times 6$	1
		$p = 300\,000$ Pa	1
	(ii)	constant mass / no gas escapes	1
		constant temperature	1
	(b)	no change	1
		<b>(Total 6 marks)</b>	

9. (a) (nuclear) fission 1  
 (b) kinetic / heat / thermal 1  
 (c) neutrons released  
 cause further fissions  
 more neutrons released  
 rate of fission increases MAX THREE 3  
 (d) component: control rod OR moderator 1  
 function: control rod: stop the neutrons  
 moderator: slow down the neutrons 1  
**(Total 7 marks)**
10. (a)(i) moves to the left 1  
 (ii) the wire is carrying a current in a magnetic field 1  
 the direction of the current is perpendicular to direction  
 of the magnetic field 1  
 (b) to left and right alternately at the same frequency as the  
 a.c. 1  
**(Total 4 marks)**
11. (a)(i) voltage has both + and – values 1  
 (ii)  $\pm 2.6$  V 1  
 accept 0.023 s, 0.024 s or 0.025 s 1  
 (iii)  $f = 1/T = 1/0.023$  or  $1/0.024$  or  $1/0.025$  1  
 = 43.5 or 41.7 or 40 Hz 1  
 (b) conduct in one direction / create dc 1  
 prevent discharge of battery 1  
**(Total 7 marks)**
12. (a) slowed / stopped by air particles 1  
 so they reach gold foil 1  
 (b) prevent alpha going behind / through sides 2  
 absorbs stray alphas  
 direct alpha (particles) at (thin gold) foil ANY TWO  
 (c) kinetic to 1  
 light 1  
 (d)(i) some large angle deflections 1  
 some particles undeviated 1  
 (ii) nuclear model of atom 1  
**(Total 9 marks)**

- |     |        |  |   |
|-----|--------|--|---|
| 13. | (a)(i) | electron / negative particle             | 1 |
|     |        | ONE OF high speed / emitted from nucleus | 1 |
|     | (ii)   | 14                                       | 1 |
|     |        | 7  | 1 |
|     | (b)(i) | 5100–5600 years                          | 1 |
|     | (ii)   | $\frac{1}{4}$ / 25%                      | 1 |
|     | (iii)  | starts at 200 Bq                         | 1 |
|     |        | less steep than first curve              | 1 |

**(Total 8 marks)**

**TOTAL FOR PAPER: 90 MARKS**



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**IGCSE Science (Double Award) (4437)**

**Mark Schemes for Specimen Papers**

**Paper 7 (Common to both tiers)**

**MARK SCHEME FOR  
LONDON EXAMINATIONS IGCSE IN SCIENCE  
(DOUBLE AWARD) (4437)  
SPECIMEN PAPER 7 (COMMON TO BOTH TIERS)**

**Symbols used in the Mark Scheme**

; indicates separate mark points

/ indicates alternatives

eq allow for correct equivalent

1. (a) beaker correct; 2  
flask correct;
- (b) A = 28 °C; 2  
B = 21 °C;
- (c) Flask A; 2  
respiration releases energy / releases heat;
- (Total 6 marks)**

2. (a)

Step		Why carried out
1	Place plant in dark for 24 hours	<b>Removes all starch present / destarches plant;</b>
2	<b>Place plant in bright sunshine for 12 hours;</b>	Photosynthesis can occur
3	Remove leaf from plant	<b>Allows starch test to be performed;</b>
4	<b>Immerse leaf in boiling water for 1 minute;</b>	Kill leaf
5	<b>Heat leaf in boiling ethanol;</b>	<b>Removes chlorophyll / green colour;</b>
6	<b>Add iodine solution;</b>	Shows presence of starch

7

- (b) don't heat directly / use water bath at 70 °C; 1  
**(Total 8 marks)**

3. (a) show on diagram / described  
one plant inside box with hole;  
lamp on same side as hole;  
reference to time using clock;  
named control variable test; 4 max
- (b) box with no hole / plant in 'normal' light; 1  
**(Total 5 marks)**



4. (a) counting squares and summing part squares;  
leaf area = 48–52 cm<sup>2</sup>; 2
- (b) length = 10 (if leaf stalk ignored)  
12 (if leaf stalk etc included); 1  
width = 7; 1  
estimate =  $7 \times 10 \times \frac{2}{3} = 6.67 \text{ cm}^2$  /  $7 \times 12 \times \frac{2}{3} = 56 \text{ cm}^2$ ; 1
- (c)(i) points  $\times 2$ ;;  
correct leaf areas; 3
- (ii) mode = 41 to 50; 1
- (d)(i)

Leaf area in cm <sup>2</sup>	Tally	Total number of leaves
11 to 20		4
<b>21 to 30</b>		<b>5</b>
<b>31 to 40</b>		<b>3</b>
<b>41 to 50</b>		<b>4</b>
<b>51 to 60</b>	\	<b>1</b>
<b>61 to 70</b>		<b>2</b>
<b>71 to 80</b>	\	<b>1</b>

all tallies correct = 3 marks (minus 1 for each error);;  
all leaf numbers match tallies = 2 marks (minus 1 for each error, but allow transfer error from incorrect tally count);;

5

- (ii) yes, more smaller leaves in full sunlight;  
ref to lower mode / mean / or range;  
or  
not possible to conclude;  
samples too small / not enough leaves measured;

2 max

**(Total 16 marks)**

5. (a) 33.3; 1
- (b)(i) temperature / light intensity; 1  
(ii) water bath / keep beaker set distance from lamp; 1
- (c)(i) as concentration of carbon dioxide increases so does rate of photosynthesis; 1  
(ii) carbon dioxide required for photosynthesis; 1  
(iii) the results confirm her prediction; 1
- (d) the first minute's reading for 2 g of hydrogencarbonate / eq is higher than others; 1
- (e)(i) use measuring cylinder / graduated tube to collect volume of gas evolved;  
allows quantitative estimate of rate of photosynthesis; 2
- (ii) e.g. continue to increase the amount of hydrogencarbonate / eq available; to see if it is a limiting factor / eq; 2

**(Total 11 marks)**

6. range of exercise levels;  
people same size / sex / age;  
several people used;  
(how breathing measured) breaths per minute;  
other variable(s) controlled e.g. temperature;

**(Total 4 max marks)**

**TOTAL FOR PAPER: 50 MARKS**

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**IGCSE in Science (Double Award) (4437)**

**Mark Scheme for Specimen Paper**

**Paper 8 (Common to both tiers)**

**MARK SCHEME FOR  
LONDON EXAMINATIONS IGCSE IN SCIENCE  
(DOUBLE AWARD) (4437)  
SPECIMEN PAPER 8 (COMMON TO BOTH TIERS)**

- |    |   |                         |
|----|---|-------------------------|
| 1. | (a)(i) <b>A</b> – Conical flask   | 1                       |
|    | (ii) <b>B</b> – Pipette   | 1                       |
|    | (iii) <b>C</b> – Measuring cylinder   | 1                       |
|    | (iv) <b>D</b> – (Filter) funnel   | 1                       |
|    | (b)(i) Measuring cylinder   | 1                       |
|    | (ii) Pipette  | 1                       |
|    | (iii) (Filter) funnel   | 1                       |
|    |   | <b>(Total 7 marks)</b>  |
| 2. | (a) Lines joined to correct boxes. Deduct one mark for an error<br>(hydrogen – “pops”, acid turns UI red, carbon dioxide turns lime water cloudy)   | 2                       |
|    | (b)(i) to clean the wire  | 1                       |
|    | (ii) sodium   | 1                       |
|    | (iii) sodium sulphate   | 1                       |
|    |   | <b>(Total 5 marks)</b>  |
| 3. | (a)(i) Hydrogen   | 1                       |
|    | (ii) 75 cm <sup>3</sup> (+/- 1 cm <sup>3</sup> )  | 1                       |
|    | (b)(i) graph 1  | 1                       |
|    | (ii) Any two from:<br>Use same mass / length of magnesium ribbon<br>Use same acid<br>Use same volume of acid<br>Use same concentration of acid<br>Use same temperature for all three tests. | 2                       |
|    | (c)(i) Columns for time and volume shown in two tables  | 1                       |
|    | Correct units shown for both time and volume  | 1                       |
|    | (ii) 1 mark for each graph (points plotted correctly, smooth curves)  | 2                       |
|    | (iii) Both go to same max volume / Both are curves  | 1                       |
|    | (iv) Same mass and volume of reagents used / Reaction starts quick and then slows down as reagents are used up  | 1                       |
|    | (v) Curve is steeper but horizontal at 60 cm <sup>3</sup>   | 1                       |
|    | (vi) Anomalous result is circled  | 1                       |
|    | (vii) Checked by repeating them   | 1                       |
|    |   | <b>(Total 14 marks)</b> |

4. (a)(i) Correct diagram = 2 marks  
Deduct 1 for any piece wrongly placed (min = 0) 2
- (ii) 3-2-4-1 1
- (iii) Take water temperature at the start of each test 1
- (iv) Any two from:  
Wear safety spectacles  
Take care not to break thermometer  
Care with flammable liquid  
Care with hot water 2
- (v) Any two from:  
Use same volume of water each time  
Use same start temperature  
Make sure beaker is same distance above crucible each time  
Use same mass of alcohol each time  
Stir equally each time  
Use same position in lab (i.e. to avoid draughts) 2
- (vi) Lack of heat shielding 1
- (b)(i) More carbon atoms in the molecule = more heat released (1)  
Energy released is not directly proportional to number of  
carbon atoms (1) 2
- (ii) Reasonable placing for pentanol (graph continues rising,  
but less steep) 1
- (Total 12 marks)**

5. (a)(i) C 1
- (ii) Use a pipette filler / don't blow out / eye level when  
reading 1
- (b) 34.4 1
- (c)(i) 19.8, 19.6 2
- (ii) 19.7 (cm<sup>3</sup>) 1
- (Total 6 marks)**

6. Apparatus used:  
Conical flask / or other suitable container 1  
Pipette / Measuring cylinder 1  
Burette 1
- Method – Any three points from the following:  
Use pipette / cylinder to place a known volume of acid  
(e.g. 0.1 M HCl) in flask / or similar  
Fill burette with first indigestion liquid  
Add suitable indicator (e.g. universal / screened methyl orange)  
Titrate into acid until end point / neutralization  
Record volume of acid used  
Rinse out flask / similar container, and repeat with liquid 2  
Strongest indigestion liquid is the one which needed least  
volume of liquid to neutralise the acid 3
- (Total 6 marks)**

**TOTAL FOR PAPER: 50 MARKS**



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**IGCSE in Science (Double Award) (4437)**

**Mark Scheme for Specimen Paper**

**Paper 9 (Common to both tiers)**

**MARK SCHEME FOR  
LONDON EXAMINATIONS IGCSE IN SCIENCE  
(DOUBLE AWARD) (4437)  
SPECIMEN PAPER 9 (COMMON TO BOTH TIERS)**

1.	(a)(i)	30 cm	1F	O
	(ii)	48 cm	1F	O
	(iii)	18 cm	1C	A
	(iv)	safety concerning pin e.g. cover when not in use	2C	DD
		large mass falling		
		goggles in case spring breaks		
		spring secured at the top		ANY TWO
	(b)(i)	show $w$ on diagram	1F	O
	(ii)	$h = 2.1$ cm	1F	O
	(iii)	amplitude $\times 2$ (twice the amplitude)	1C	A
			<b>(Total 8 marks)</b>	
2.	(a)(i)	straight line	1F	D
		line through A and B	1F	D
		AB continued to meet XY	1F	D
		C correctly labelled	1F	D
	(ii)	straight line drawn from C to D	1F	D
	(iii)	$ACY = 37 \pm 1^\circ$	1C	O
		$DCX = 49 \pm 1^\circ$	1C	O
	(b)(i)	axes labelled	1C	A
		plotting	2C	AA
	(ii)	smooth curve	1A	D
	(iii)	Point plotted and labelled P	1C	A
	(iv)	No because	1F	E
		point is not / near curve	1F	E
		(OR No because point is not near curve)		
			<b>(Total 14 marks)</b>	



3. (a) attach string to object  
 water in measuring cylinder sufficient to cover object  
 record volume 1  
 lower object into cylinder using thread  
 record final volume 2  
 volume of object A = volume 2 – volume 1  
 object on balance  
 mass from scale ANY FOUR 4C 4D
- (b)(i) formula 1C A  
 correct 3.3 / 3.26 / 3.261 1C A  
 to 2 or 3 s.f. 1C A
- (ii) mass to 2 s.f. volume to 2 s.f. 1A E  
 density to 2 or 3 s.f. 1C E
- (c)(i) A and C same densities B and D same densities 1C A  
 A and C same materials B and D same materials 1C A
- (ii) student wrong – different from each other 1C E
- (d) density =  $8.6 \div 2.1$  1C A  
 = 4.1 1C A  
 similar value to A (4) 1A E

**(Total 15 marks)**

4. (a) place mass / weight in pan  
 current in coil / turn on current  
 vary current (using variable resistance)  
 note or add masses until balance is restored and note current  
 value when balance is restored  
 change mass  
 repeat for more masses      MAX 4 MARKS      4A    4P
- (b)(i) table – mass / current values inserted      1C    O  
 with units      A and g (or kg)      1C    O

mass in g	current in A
2	0.3
4	0.7
6	1.1
8	1.5
10	1.9

- (ii) Axes labelled (with units)      1C    A  
 Sketch straight line graph – current against mass      1C    P
- (c) place unknown mass / weight on pan      1F    P  
 note current      1A    P  
 read mass off from graph      1A    P

- (d) State move coil upwards 1A E  
 Explain more attraction 1A E  
 State move pan towards centre or pivot towards pan  
 Explain smaller clockwise moment  
 State use (soft) iron core (in coil)  
 Explain increase magnetic field (of electromagnet)  
 State use stronger magnet  
 Explain stronger force  
 State use heavier magnet  
 Explain need larger mass on pan to balance

ANY PAIR FOR 2 MARKS

**(Total 13 marks)**

**TOTAL FOR PAPER: 50 MARKS**

Allocation of marks targeted at grades A, C and F on Paper 3

Question	F	C	A	Total
1	4	4		8
2	7	6	1	14
3		13	2	15
4	1	4	8	13
Total	12	27	11	50

Allocation of marks for experimental and investigational skills on Paper 3

Question	P	D	O	A	E	Total
1		2	4	2		8
2		6	2	4	2	14
3		4	0	7	4	15
4	8	0	2	1	2	13
Total	8	12	8	14	8	50





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