

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0654 CO-ORDINATED SCIENCES

0654/21

Paper 2 (Core Theory), maximum raw mark 120

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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2015	0654	21

- 1 (a) fibre traps layer of air; [max2]
 air is a good insulator;
 prevents convection:
- (b) friction; [2]
 transfer of electrons/charged particles;
- (c) (i) cause (skin) cancer [1]
 (ii) radiation and correct use; (both required for mark) [1]
- [Total: 6]
- 2 (a) (i) exothermic; [1]
 (ii) temperature has stopped increasing/no more thermal energy is being released; [1]
 (iii) 3 (minutes); [1]
 (iv) time would be decreased; [2]
 because reaction speed higher/ greater concentration of acid particles /greater collision frequency;
- (v) the higher the temperature the higher the rate; [1]
- (b) hydrogen; [2]
 pops when ignited;
- (c) no temperature change; [2]
 because there is no reaction/because copper is unreactive/less reactive;
- [Total: 10]

Page 3	Mark Scheme	Syllabus	Paper
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- 3 (a) (i) A = larynx; [5]
 B = trachea;
 C = bronchus;
 D = bronchiole;
 E = alveolus/alveoli;
- (ii) alveoli/ capillaries/ part E; [1]
- (b) (i) arrows on Q and R both pointing to right; [1]
- (ii) less CO₂; [2]
 more oxygen;
- (iii) A – no change; [2]
 B – goes cloudy/milky;
- (iv) more CO₂ in expired air; [1]

[Total: 12]

- 4 (a) (i) cannot be simplified / only one type of atom / only one chemical symbol / can be found in Periodic Table; [1]
- (ii) compound has a fixed chemical formula/mixture has no fixed chemical formula; [max2]
 compound has properties different to the elements/
 a mixture has properties similar to those of the two elements or
 compound has unique properties/mixture has properties of components;
 making compound is a chemical change/involves temp/energy change/no energy change when mixture is made;
- (b) (i) 21; [1]
- (ii) the idea that it must not contain harmful substances / does not make people ill / so that it works as expected; [1]
- (c) (i) nucleon number includes neutrons and protons; [1]
- (ii) both (argon) atoms have 18 / same number of protons; [2]
 Ar – 36 has 18 neutrons (per atom) and Ar – 40 has 22 neutrons (per atom)/ different number of neutrons / they have different numbers of neutrons (per atom);
- (iii) caesium would react with oxygen / components in air; [max 2]
 argon is very unreactive / is an inert gas / caesium does not react with argon;
 reference to filled electron shells;

[Total: 10]

Page 4	Mark Scheme	Syllabus	Paper
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- 5 (a) lines drawn from [3]
electric drill to kinetic energy;
radio to sound energy;
torch to light energy;
- (b) ray refracted at both surfaces; [2]
evidence of dispersion;
- (c) (angle of) reflection; [2]
 60° ;
- (d) (i) all symbols correct; [2]
all in series;
- (ii) correct symbol; [2]
in parallel with lamp;
- (iii) $V = I \times R$; [2]
 $= 0.9 \times 5 = 4.5 \text{ (V)}$;

[Total: 13]

Page 5	Mark Scheme	Syllabus	Paper
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- 6 (a) (nitrate) for protein synthesis / amino acids to form proteins; [2]
(magnesium) for chlorophyll;
- (b) (i) first 20 days: the same; [1]
next 100 days: do not grow as high in field **B** / grows higher/quicker in field **A**; [max 2]
approx straight line instead of curve;
final (mean) difference of 35cm;
- (ii) 290; [1]
- (iii) extra nitrate/magnesium/mineral ions increases growth; [1]
- (c) water; [4]
from soil;

carbon dioxide;
from air;

[Total: 11]

Page 6	Mark Scheme	Syllabus	Paper
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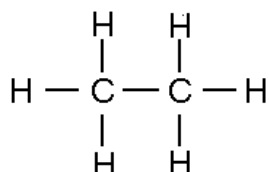
7 (a) (i) air; [1]

(ii) (A) [2]

C contains carbon dioxide;
which would react with limewater;

(iii) carbon monoxide (CO); [1]

(iv) ethane; [3]



C – C bond;
6H all correctly bonded;

(b) (i) ethene; [2]
(+) water;

(ii) solvent/fuel/alcoholic drinks; [1]

[Total: 10]

Page 7	Mark Scheme	Syllabus	Paper
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- 8 (a) (i) oxygen;
temperature; [2]
- (ii) seeds in dish **A** germinate and seeds in dish **B** do not;
because water needed/no water in dish **B**; [2]
- (b) (i) ovary/ovule; [1]
- (ii) so animals do not eat/chew them; [max2]
because they contain the embryo/offspring / which could kill/damage embryo;
unchewed seeds can pass through the intestines intact/not digested;
- [Total: 7]
- 9 (a) (i) conduction
convection; [1]
- (ii) iron magnetises quickly/steel magnetises slowly/
iron loses magnetism quickly/steel loses magnetism slowly; [1]
- (iii) volume = mass/density;
convert 0.80 kg to 800 g;
 $800/7.9 = 101.3 \text{ (cm}^3\text{)}$; [3]
- (b) (B) no mark [1]
because particles are close together/ most particles touching and randomly arranged;
- (c) force; [2]
area;
- [Total: 8]

Page 8	Mark Scheme	Syllabus	Paper
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- 10 (a) (i)** (pupil) reflex; [1]
(ii) (change in) light; [1]
- (b) (i)** motor/effector (neurone); [1]
(ii) relay/connector (neurone); [1]
- (c)** damage to retina; [1]

[Total: 5]

- 11 (a) (i)** **P** copper; [4]
Q chlorine;
R hydrogen;
S oxygen;
- (b) (i)** fork and copper electrode connected to power supply; [3]
fork connected to negative and copper to positive;
fork and copper both dipping into electrolyte;
- (ii)** fork now has the extra mass of the copper plating; [1]

- (c)** [2]

property	
compounds usually have colours other than white	✓
good conductors of electricity	
good conductors of heat	
often used as catalysts	✓
malleable	
very reactive	

the only 2 correct = 2 marks only 1 correct = 1 mark
minus 1 for any incorrect;

[Total: 10]

Page 9	Mark Scheme	Syllabus	Paper
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- 12 (a) coal; [max2]
 petroleum;
 natural gas;
 peat;
- (b) cannot be replaced once used; [1]
- (c) (named) alternative energy sources; [max2]
 insulation;
 low-energy appliances/equipment;
 more public transport/less use of cars;
 less use of/recycling of, plastics;
 AVP;
- [Total: 5]
- 13 (a) (i) **B and D and A and C;** (either order) [2]
B and D;
- (ii) equal; [2]
 opposite;
- (b) (i) time = distance / speed; [2]
 =240/1500 = 0.16(s);
- (ii) 20 Hz (allow 10) to 20000 Hz (allow 25000); [1]
- (iii) ultrasound waves have a frequency above 20000Hz; [1]
- (c) (i) K; [1]
 (ii) N; [1]
- (d) (i) wave motion makes turbine move; [2]
 turbine turns generator;
- (ii) solar/geothermal/wind/hydroelectricity/tidal/ biomass/biofuels; any two for one mark [1]
- [Total: 13]