

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

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Page 2	Mark Scheme	Syllabus	Paper
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- 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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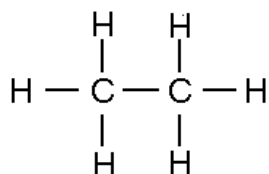
7 (a) (i) air; [1]

(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]**