CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0654 CO-ORDINATED SCIENCES

0654/23 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

1 (a) (i) haploid / gamete ;
zygote ;
dissimilar ; [3]

(ii) fertilisation ; [1]

(b) (i) anther ;
stigma ; [2]

(ii) **A** ;
D ; [2]

(c) (i)

tube	*conditions*		
C	water	oxygen	no light
D	no water	oxygen	no light
E	water	no oxygen	no light

(all three tubes correct for 2 marks, two tubes correct for 1 mark) ;; [2]

(ii) (lettuce) seeds need oxygen (for germination) ;
(lettuce) seeds need water (for germination) ;
(lettuce) seeds do not need light (for germination) ;
(max 2 marks if germination **not** mentioned) [3]

[Total: 13]

2 (a) (i) 78 (%) ; [1]

(ii) *in mixture*
idea of variable composition ;
nitrogen not bonded to oxygen ;
in compound
fixed composition ;
has a chemical formula ;
nitrogen bonded to oxygen ; [max 2]

(iii) carbon monoxide ; [1]

(b) (i) covalent ;
ionic / electrovalent ; [2]

(ii) in nitrogen two non-metal (atoms) are bonded ;
in magnesium nitride bonding is between metal and non-metal ; [2]

(iii) idea that ratio of magnesium atoms to nitrogen atoms is 3 : 2 ; [1]

(c) colour change (from red) to blue ;
ammonia given off ; [2]

[Total: 11]

3 (a) **A** – constant speed ;

B – (constant) acceleration / increasing speed ; [2]

(b) distance covered = speed × time ;
20 × 90 = 1800 m ; [2]

(c) (i) (resistance) = voltage / current ;
= 12/2 (= 6 Ω) ; [2]

(ii) R = R1 + R2 ;
= 12 (Ω) ; [2]

[Total: 8]

4 (a) (i) any number above 20 000 (Hz) ; [1]

(ii) longitudinal ; [1]

(b) (i) more drinking attempts from smooth than rough ;
use of figures / almost no attempts from rough ; [2]

(ii) reference to water having a smooth surface ;
sound waves scattered in many directions from a rough surface / not scattered from smooth surface ;
bats receive fewer echoes from a smooth surface / more echoes from rough surface ; [max 2]

(c) (i) (hearing) ultrasound ; [1]

(ii) **B** ;
A ; [2]

(iii) more likely to be killed by bats ;
before they can reproduce ; [2]

[Total: 11]

5 **(a)** chlorination ;
kills (harmful) microorganisms ;
filtration ;
removes solids ; [4]

(b) **(i)** red ;
dye giving only one spot matches red (in P) ; [2]

(ii) **S** ; [1]

(iii) idea that impurities may be hazardous to health ;
idea that impurities may compromise the colour ; [max 1]

[Total: 8]

6 **(a)** heat ;
kinetic ; (either order) [2]

(b) **(i)** water / liquid turns to water vapour / gas ;
(as) particles / molecules get further apart ;
heat is needed / used to cause evaporation ;
(more) energetic particles escape (from surface) ;
able to overcome attractive forces of other particles / break bonds between liquid particles ; [max 2]

(ii) average energy of remaining particles is less ;
energy taken from surroundings to do this ; [max 1]

(c) solid particles touching and regular ;
regular arrangement for solid but random arrangement for liquid ; [2]

(d) description of efficiency ;
e.g.
how little or how much energy is wasted in a device ;
the fraction of energy which is usefully transferred in a device ;
energy is wasted in inefficient machines ;
how good a device is at not wasting energy ; [max 1]

[Total: 8]

7 **(a)** **(i)** **A** – incisor / canine ;
B – molar / premolar ; [2]

(ii) crush / grind ;
increase surface area ;
idea of better access for enzymes ; [max 2]

(b)

part	ingestion	digestion	absorption
mouth	√	√	
stomach		√	
small intestine		√	√

1 mark per correct row ;;; [3]

(c) (i) amylase ; [1]

(ii) mouth / salivary glands / pancreas ; [1]

(d) taken up by liver <u>cells</u> ;
changed to glycogen ;
(glycogen) stored ; [max 2]

[Total: 11]

8 (a) (i) ductile ;
(electrical) conductor ; [2]

(ii) mixture of metals / two or more metals chemically bonded together ;
alloy is less malleable / harder / stronger / lower melting point ; [2]

(iii) copper sulfide + oxygen ⟶ copper + sulfur dioxide ; [1]

(b) (i) copper chloride <u>solution</u> ; [1]

(ii) *positive electrode*
<u>chlorine</u> ;
bubbles / gas given off ;
negative electrode
copper ;
reference to copper coloured / brown / pink layer / solid ; [4]

[Total: 10]

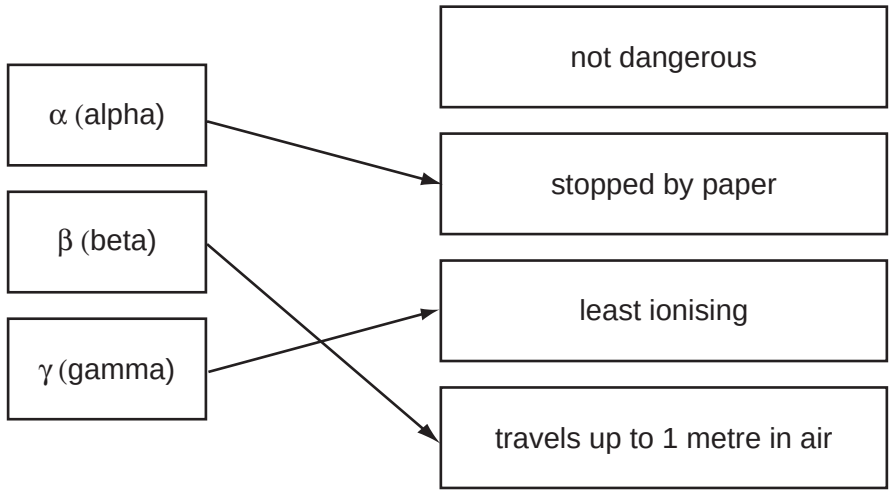
9 **(a)** turns atoms into ions / charged particles ;
removal of electrons ; [2]

(b) X-rays can destroy / damages cells / DNA or cause cancer / mutations ;
screen stops X-rays passing through / protect against / prevent exposure to X-rays ; [2]

(c) **(i)** water / liquid turns to water vapour / gas ;
(as) particles / molecules get further apart ;
heat is needed / used to cause evaporation ;
(more) energetic particles escape (from surface) ;
able to overcome attractive forces of other particles / break bonds between liquid particles ; [max 2]

(ii) average energy of remaining particles is less ;
energy taken from surroundings to do this ; [max 1]

(c)



(1 mark for each correct line) ;;; [3]

(d) nuclear ;
nuclei ;
energy ; [3]

(e) coal / oil / gas is burned ;
heat energy released turns water to steam ;
reference to turning a turbine and generator ; [3]

[Total: 13]

10 **(a)** **(i)** label **A** to root ; [1]

(ii) label **L** to leaf ; [1]

(iii) xylem ; [1]

(b) (i) roots hold soil ;
leaves reduce impact of rain on the ground ;
act as windbreak ; [max 2]

(ii) trees take carbon dioxide from the air ;
for photosynthesis ;
help to prevent carbon dioxide concentration increasing ;
help to prevent increased greenhouse effect ; [max 2]

[Total: 7]

11 (a) 6 ;
8 ;
6 ; [3]

(b) (i) *petroleum*
has higher viscosity ;
darker colour ;
lower flammability ;
higher density ; [max 2]

(ii) (physical)
only changes of state involved / no new compounds produced ; [1]

(iii) (saturated)
only single bonds / fits general formula C_2H_{2n+2} ; [1]

(iv) no effect / bromine stays orange / goes cloudier but stays orange ;
then max 1 from:
molecule is saturated ;
saturated molecules don't react / bromine reacts with unsaturated ; [max 2]

(c) gasoline burns to produce carbon dioxide which is linked to greenhouse effect / climate change ;
gasoline burns to produce pollutants such as carbon monoxide / other named pollutants (which have adverse effects on health) ;
hydrogen waste product is (non-polluting) water ; [max 2]
(max 1 without third point)

[Total: 11]

12 (a) correct symbols for ammeter, fuse and variable resistor ; [3]

(b) (i) 3 ; [1]

(ii) correct symbol in parallel with bulb ; [1]

(c) (i) angle of incidence and angle of reflection ; [1]

(ii) 45° ; [1]

(d) beam is bent correctly at both interfaces ;
dispersion shown ;
colours in correct order – red bent least, violet bent most ; [max 2]

[Total: 9]