CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2013 series

0654 CO-ORDINATED SCIENCES

0654/23 Paper 2 (Core), 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 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

1 **(a)** **A** to cell membrane ;
B to nucleus ;
C to cell wall/large vacuole ; [3]

(b) water ;
mineral salts / named mineral ; [2]

(c) **(i)** transport ;
of sugars / substances made in the leaves ; [2]

(ii) roots have no sucrose / short of nutrients ;
no source of energy / cannot respire ; [2]

[Total: 9]

2 **(a)** **(i)** argon / Ar ; [1]

(ii) calcium / lithium and oxygen / sulfur / fluorine ;
metal with non-metal ; [2]

(b) **(i)** nucleus ; [1]

(ii) 15 ;
same as number of electrons / 3 shells = Period 3, 5 outer electrons means Group V so must be phosphorus which has proton number 15 ; [2]

(c) **(i)** magnesium sulphate ; [1]

(ii) filter mixture (**W**) ;
dry the solid ;
use balance to find mass / weigh it ; [3]

[Total: 10]

3 **(a)** **(i)** change resistance (of circuit) / change current through resistor ; [1]

(ii) X – ammeters need to be in series in a circuit ; [1]

(iii) R = V/I ;
= 8/0.6 = 13.3Ω ; [2]

(b) decreases
decreases
stays the same
3 correct = 2 marks, 2 correct = 1 mark ;; [2]

(c) length ;
diameter / cross sectional area ; [2]

[Total: 8]

4 **(a)** crush / chop ;
mix with, ethanol / alcohol ;
pour into water ;
milky appearance indicates presence of fat ; [max 3]

(b) for growth ;
for repair ;
other use of protein ; [max 2]

(c) increases surface area ;
idea of making it easier for enzymes to make contact ; [2]

(d) proteins not digested ;
to amino acids ;
proteins cannot be absorbed / amino acids cannot be absorbed ; [max 2]

(e) reduction of habitat ;

area too small to support populations / reduction in biodiversity / extinction / species become endangered / lack of opportunity to find new medicines ;

flooding / leaching of minerals ;
due to rain falling directly on soil / lack of protection of tree canopy / increased runoff ;

soil erosion ;
due to lack of tree roots ;

drought ;
due to lack of transpiration by trees to form rain leading to desertification ;

fewer trees to photosynthesise / less photosynthesis ;
to remove carbon dioxide ;

burning trees produce CO_2 ;

rotting trees produce CO_2 ;
by respiration of microbes ;

carbon dioxide traps long-wave radiation / infra-red / heat/thermal energy / is a greenhouse gas ;
reduces rate of loss of heat from the Earth's surface ; [max 4]

[Total: 13]

5 (a) (i) **Q** ;
orange layer is rust ;
formed when iron reacts with (dissolved) air and water ; [3]

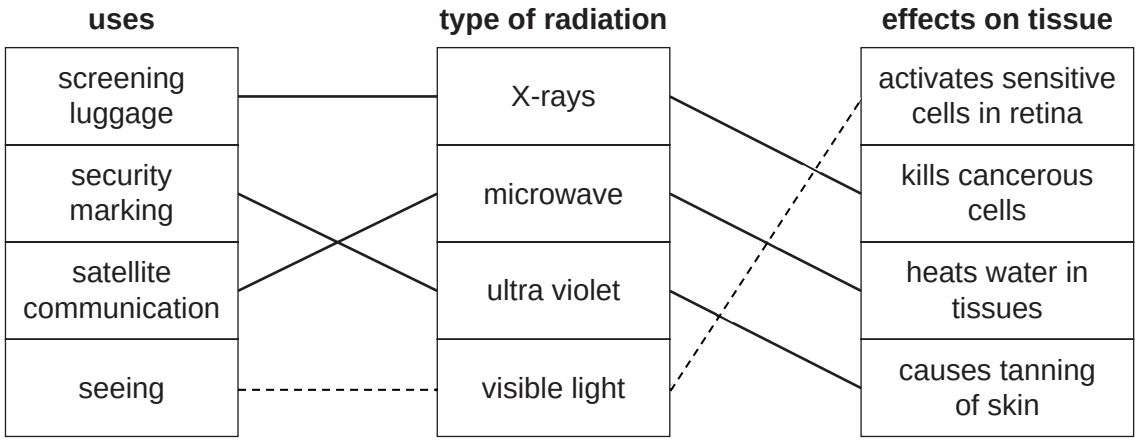
(ii) calcium / magnesium / zinc ;
hydrogen ; [2]

(iii) *(depends on answer to **(ii)** must be lower in activity series than **(ii)** and one which reacts)*
ideally zinc or iron ; [1]

(b) copper electrode and key connected to power supply by wires ;
correct polarity copper positive key negative ;
electrode and key dipping into the solution ; [3]

[Total: 9]

6 (a)



three correct linkages uses to type = two marks ;;
one correct linkages uses to type = one mark ;
three correct linkages type to effect = two marks ;;
one correct linkages type to effect = one mark ; [4]

(b) sine wave ;
amplitude correctly labelled ;
wavelength correctly labelled ; [3]

[Total: 7]

7 (a)

genotype	*colour*
AA	**normal** ;
Aa	*normal*
aa ;	*albino*

[2]

(b) phenotype ; [1]

(c) (i) (parents' genotypes) **Aa** and **Aa** ;
gametes **A** and **a** from both parents ;
offspring genotypes **AA**, **Aa**, **Aa** and **aa** ; [3]

(ii) 3 : 1 ; [1]

(d) breed it with an albino snake ;
if any albino offspring it is heterozygous / if no albino offspring it is homozygous ; [2]

[Total: 9]

8 (a) (i) carbon dioxide ; [1]

(ii) pass gas into limewater;
goes cloudy ; [2]

(iii) salt ; [1]

(iv) 9 ;
3 ; [2]

(b) (i) identifies higher pH with lower acid concentration ;
lowering acid concentration decreases the rate ; [2]

(ii) temperature ;
surface area of calcium carbonate ;
degree of agitation of the mixture ;
[max 2]

[Total: 10]

9 (a) (i) 80m ; [1]

(ii) (speed = distance/time = 50/10 =) 5 m / s ; [1]

(iii) not moving ; [1]

(iv) unbalanced because speed is changing ; [1]

(b) geothermal / hydroelectricity / waves / wind / biomass ; [1]

(c) (i) kinetic energy ; [1]

(ii) (gravitational) potential energy ; [1]

(d) density = mass / volume;
= 45/36 = 1.25 g / cm^3; [2]

(e) (i) particles far apart ;
irregular arrangement ; [2]

(ii) particles move faster therefore **more** collisions (with tyre wall) ; [1]

(iii) heat transferred from body to sweat / heat absorbed by sweat from athlete's body / heat energy in body reduced by sweating ;
kinetic energy of water molecules increase / water molecules move faster ;
faster moving / more energetic (water) molecules escape / leave the surface / water molecules turn to gas / vapour ;
break bonds / break forces of attraction between molecules ;
(KE) / energy of (remaining) water molecules (in sweat) decreases ; [max 3]

[Total; 15]

10 (a) **A** trachea ;
B lung ; [2]

(b) (i) movement of molecules ;
from region of high concentration to low concentration ;
down a concentration gradient ; [max 2]

(ii) plasma ; [1]

(iii) more energy used / more muscle contraction ;
reference to respiration / oxidation of glucose ;
so more carbon dioxide produced by cells ;
so more carbon dioxide diffuses into the blood ; [max 2]

(iv) increases ;
idea of greater diffusion gradient (from blood to alveolus) ; [2]

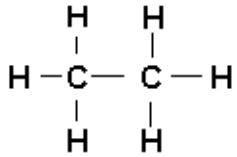
[Total: 9]

11 (a) coal / peat ; [1]

(b) (i) fractional distillation / fractionation ; [1]

(ii) (vehicle) fuel ;
burns easily / releases much energy when burnt ; [2]

(c) (i)



2 C joined by single bond ;
6 H all single bonded to carbon ; [2]

(ii) ethane + oxygen → carbon dioxide + water ;; [2]
(LHS for 1 mark and RHS for 1 mark)

(d) (i) cracking ; [1]

(ii) air contains oxygen ;
reactant would burn instead of crack / owtte ; [2]

[Total: 11]

12 **(a)** waves are reflected along fibre ;
total internal ; [2]

(b) **(i)** correct colours ;
correct positions ; [2]

(ii) raindrops ; [1]

(c) **(i)** same horizontal level as nose ;
same distance behind mirror that nose is from mirror ; [2]

(ii) same size as object ;
upright ;
virtual ; [3]

[Total: 10]