**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

International General Certificate of Secondary Education

# MARK SCHEME for the May/June 2010 question paper

# for the guidance of teachers

## 0653 COMBINED SCIENCE

0653/31          Paper 31 (Extended Theory), maximum raw mark 80

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.
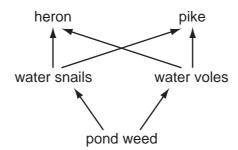
Mark schemes must be read in conjunction with the question papers and the report on the examination.

* CIE will not enter into discussions or correspondence in connection with these mark schemes.

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**1 (a)** community ;
ecosystem ;

**(b)** all five organisms included ;
arrows between them going the right away ;
all links present and correct (allow one missing arrow, or heron / pike feeding on
only one species / penalise any incorrect link) ;



[3]

**(c) (i)** no food (for primary consumers) ;
no oxygen ;                                                                                    [2]

**(ii)** terracing / undulations / keep plant cover / other ;                                 [1]

**[Total: 8]**

**2 (a) (i)** parallel ;                                                                        [1]

**(ii)** $1/R = 1/R_1 + 1/R_2$ (whole equation needed unless $R_1R_2 \div R_1+R_2$) ;
$1/R = \frac{1}{4} + \frac{1}{4} = \frac{1}{2}$ ;
$R = 2$ ohms ;                                                                                  [3]

**(b)** larger, turning force / moment ;
because distance is larger/moment = F × d ;                                                     [2]

**(c)** work done = force × distance ;
= 250 × 10 = 2500 J ;                                                                           [2]
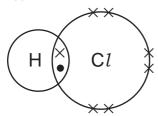
**[Total: 8]**

**3 (a)** sodium is too / very reactive / very little strength ;

**(b) (i)** $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$ ;

**(ii)** two from iron oxide / carbon dioxide / oxygen / iron ions ;
one relevant reference to removal of oxygen / gain of electrons ;                     [2]
(e.g. iron (ions) because it gains (three) electrons)

**(c) (i)** they gain electrons / are reduced / are discharged / become atoms /
neutralised ;
correct description of each ion gaining **three** electrons each ;                     [2]

**(ii)** aluminium more reactive than iron ;
aluminium more reactive than C or CO ;
aluminium more strongly bonded to oxygen ;                     [max 2]

**(iii)** +3 ;
working showing the need to balance charges ;
also allow discussion of how aluminium atoms gain noble gas configuration ;     [max 2]

[Total: 10]

**4 (a) (i) Y** ;                     [1]

**(ii) X** – bromine
**Y** – iodine / astatine
**Z** – fluorine / chlorine ;                     [1]

**(b) (i)** 10 ;                     [1]

**(ii)** 2 × 19/38 ;                     [1]
(ignore any units)

**(c) (i)**



shared pair (showing dot and cross) ;
filled chlorine shell ;                     [2]
(if chemical symbols used they must be correct)

**(ii)** $H^+ / Cl^-$ ;                     [1]

**(d)** **(i)** chlorine with potassium bromide ;

**(ii)** chlorine is more reactive than bromine (reject bromide) / chlorine displaces bromine / oxidises bro<u>mide</u> ions ;
(allow correct equation)

**[Total: 9]**

**5** **(a)** May,
June ;                                                                                                            [1]

**(b)** **(i)** linking of infra-red with heat ;
idea that (more) heat produced inside the glasshouse ;
heat trapped inside / stays in the glasshouse ;                                     [max 2]

**(ii)** warm air less dense than cold ;
warm air near the ground (outside) rises ;
warm air cannot rise / get out of the glasshouses ;                               [max 2]

**(c)** **(i)** too hot (in **A**) ;
for bees (to pollinate flowers / to be active) ;
for plant's, metabolic reactions / enzymes ;
more water lost ;                                                                              [max 2]

**(ii)** carbon dioxide (concentration) ;
wind ;
water supply / humidity ;
pests / animals ;
weeds ;
soil / availability of minerals ;
(sun)light ;
(reject sunshine and refs to bees)                                                     [max 2]

**(d)** **(i)** attractive to animals ;
eat fruit / carry fruit away ;
and egest seeds in a different place ;                                                  [max 2]

**(ii)** less competition ;
for, light / space / water / minerals ;
colonise new areas ;                                                                          [max 2]

**[Total: 13]**

**6** **(a)** (distance =) speed × time ;
=1500 × 0.5 = 750 m ;

**(b)** **(i)** **A** shown on any part where there is acceleration / deceleration ; [1]

  **(ii)** constant speed / uniform motion / moves at 1.5 m per s ; [1]

  **(iii)** working shown (area under graph) ;
  30 m ; [2]

**(c)** **(i)** straight line drawn at correct angle (angle of incidence = angle of refraction) ; [1]

  **(ii)** angle of incidence and angle of refraction ; [1]

  **[Total: 8]**

**7** **(a)** group of tissues (performing a particular function) ; [1]
  (accept e.g. a muscle made of many tissues and other specific examples)

**(b)** **(i)** sweat secreted (onto surface of skin) / sweat produced ;
  water evaporates ;
  using heat (from the skin) ; [max 2]

  **(ii)** capillaries / arterioles, get wider / vasodilation ;
  more blood flowing near surface ;
  more heat lost <u>from blood</u> (to air) ; [max 2]

**(c)** **(i)** glucose ; [1]

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

  **(iii)** cells cannot respire ;
  no energy ;
  avp e.g. symptoms of relevant disease e.g. diabetes / damage from fainting,
  etc. ; [max 2]

  **[Total: 9]**

**8** **(a)** **(i)** (Earth's atmosphere) is 78–80% $N_2$ 22-20% $O_2$/$N_2$ and/or $O_2$ too/very low/ $CO_2$ too high ;

   **(ii)** water vapour/any noble gas ;

**(b)** **(i)** 78 – 80 $cm^3$ ;
oxygen removed by reaction (with copper)/copper oxide formed ;
which has virtually no volume ;
so remaining gas is nitrogen (and other gases) ;
so remaining gas volume is 78-80% of 100 $cm^3$ ;   [max 3]

   **(ii)** greater surface area ;
increases rate of reaction ;
reference to increase of collision frequency between oxygen and copper ;   [3]

[Total: 8]

**9** **(a)** **(i)** emission of small particles and energy from an (unstable) nucleus ;
(reject breakdown of nucleus)   [1]

   **(ii)** can remove electrons from atoms/can form ions ;   [1]

**(b)** **(i)** alpha is electrically charged and gamma has no charge ;   [1]

   **(ii)** they have opposite charges / alpha is positively charged and beta is negatively charged ;   [1]

   **(iii)** alpha radiation is more ionising (than gamma) ;
alpha more likely to be absorbed/cannot escape ;
will cause more damage internally ;   [max 2]

**(c)** background (radiation) ;   [1]

[Total: 7]