`UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2011 question paper

for the guidance of teachers

0653 COMBINED SCIENCE

0653/32 Paper 3 (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.

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UNIVERSITY of CAMBRIDGE
International Examinations

1 (a) (i) population ; [1]

(ii) community ; [1]

(iii) consumer ; [1]

(b) (i) more oxygen can be absorbed from the air / in the lungs ;
more oxygen is carried / supplied to cells / muscles ;
for respiration / to release energy ; [max 2]

(ii) ref. to temperature regulation / homeostasis ;
insulation / reduces heat loss from the body ;
prevents body temperature dropping too low ; [max 2]

(c) (i) agriculture ;
mining ;
building (roads, houses) ;
tourism / ski resorts / ovp ; [max 2]

(ii) ref. to species diversity ;
idea of their importance in food chain / provide food for pumas / so pumas won't become extinct ;
other, e.g. tourism / moral arguments ; [max 2]

[Total: 11]

2 (a) (i) mirror in correct position and at correct angle ; [1]

(ii) straight lines from torch to mirror to observer with approx correct angle of incidence and reflection ; [1]

(b) (i) lamp / bulb **and** cell **and** switch ; [1]

(ii) correct symbols linked together in series ; [1]

(c) wider base ;
centre of mass lower ; [2]

[Total: 6]

3 **(a)** lithium is (very) reactive / easily combines / reacts with other elements / substances ;
oil prevents oxidation / reaction with air / oxygen / water / oil forms a protective barrier ; [2]

(b) **(i)** mix acid and carbonate (in beaker) ;
ensure carbonate in excess ;
details of how to ensure carbonate in excess ;
filter mixture ; [max 3]

(ii) lithium carbonate + hydrochloric acid → lithium chloride + carbon dioxide + water ; [1]

(c) **(i)** <u>ions</u> must be able to move / liquid must be able to conduct electricity ;
ions not free in solid ;
extra detail e.g. so that positive ions can move to cathode ; [max 2]

(ii) each ion gains one electron / electron configuration changes from 2 to 2.1 ; [1]

[Total: 9]

4 **(a)** beta / gamma are too penetrating ;
beta / gamma can pass through smoke ;
current would never flow (between electrodes) / beta / gamma not ionising (enough) ;
beta / gamma would be a hazard to people ; [2]

(b) **(i)** working ;
450 – 480 years ; [2]

(ii) has a very long half-life ; [1]

[Total: 5]

5 **(a)** *reference to*:
timescale / time to renew ;
action of heat / pressure ;
action of microorganisms ; [max 2]

(b) 6 × 12 (72) + 14 × 1 ; [1]

(c) **(i)** **X** drawn on bond in methane ; [1]

(ii) exothermic means heat / energy / released ;
more energy released when bonds form than is absorbed when bonds break ; [2]

(d) **(i)** incomplete combustion of the fuel ; [1]

(ii) nitrogen is in the air (intake) ;
(most) nitrogen does not react / nitrogen is unreactive ; [2]

[Total: 9]

6 **(a)**

cell	*tissue*	*organ*
sperm		eye stomach heart

;;

(1 mark for any two correct) [2]

(b) ref. to enzymes ;
work more slowly at lower temperatures ;
denatured at higher temperatures ; [max 2]

(c) **(i)** steady / linear / proportional, increase ;
from 0.6 to 1.1 (g / cm^2) / by 0.5 (g / cm^2) ; [max 2]

(ii) these foods contain calcium / calcium needed for bones ;
older children need more calcium / ref. to increasing mineral content of bones ; [2]

(iii) any citrus fruit / blackcurrants / other valid examples ; [1]

[Total: 9]

7 (a) (i) gravity / weight ; [1]

(ii) air resistance increases ;
upward force greater than downward force ;
produces deceleration / upwards acceleration ; [3]

(b) (i) around 88 s ; [1]

(ii) on any horizontal section ; [1]

(iii) distance = area under graph (or numbers) ;
= 10 × 20 = 200 m ; [2]

[Total: 8]

8 (a) (i) temperature / surface area of metal ;
temperature / surface area affects the rate ;
explanation of effect in terms of particles ;
idea of isolating the effect of changing one variable ; [max 3]

(ii) hydroxide / OH^- ;
solution is alkaline / water + metal produces alkali ; [2]

(iii) place metal into the copper nitrate solution ;
if copper forms / is displaced then metal **A** is more reactive than copper ;
if there is no reaction, copper is the more reactive ; [max 2]

(b) $2H_2 + O_2 \rightarrow 2H_2O$;;
(formulae and balanced – allow 1 mark for $H_2 + O \rightarrow H_2O$) [2]

[Total: 9]

9 (a) (i) petals / nectary / nectar / corolla ; [1]

(ii) anther / stamen ; [1]

(b)

feature	*insect-pollinated flower*	*wind-pollinated flower*
shape of stigma	rounded / flat / smooth	feathery ;
position of stigma	inside flower / inside petals	dangling / outside flower / outside petals ;

(one mark for each two correct) [2]

(c) (i) (sugars produced by) photosynthesis in leaves ;
transported (to flowers) in phloem ;
as sucrose ; [max 2]

(ii) for respiration / for energy / to make nectar / named energy-requiring process ; [1]

[Total: 7]

10 (a) (i) lines go up in the middle and down round the side and arrows in correct direction ; [1]

(ii) coldest: **A**, hottest: **C** ;
hot air rises, cold air sinks ;
hot air rises because its less dense than cold air (vice versa) ; [3]

(b) air / gas / expanded polystyrene is a poor conductor of heat / good insulator ;
concrete block is a poor conductor of heat / good insulator ;
trapped gas / air cannot carry heat around by convection ;
aluminium reflects heat back into house ; [max 3]

[Total: 7]