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

0654 CO-ORDINATED SCIENCES

0654/23 Paper 2 (Core Theory), maximum raw mark 100

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UNIVERSITY of CAMBRIDGE
International Examinations

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

(ii) oxygen ; [1]

(iii) glucose molecules join / link together ;
to form long chains ; [2]

(b) (C_6H_{14}) largest / heaviest ; [1]

(c) **(i)** nitrogen ;
water (vapour) ; [2]

(ii) (mix gas with) limewater ;
goes cloudy ; [2]

(iii) carbon monoxide ;
nitrogen dioxide ; [2]

[Total: 12]

2 **(a)** power = energy / time ;
= 8000 / 600 = 13.3 ;
W ; [3]

(b) **(i)** KE = ½ mv^2 ;
= 0.5 × 2 × 40 × 40 = 1600 (J) ; [2]

(ii) 1600 J (or same answer as **(i)**) ;
energy is conserved ; [2]

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

[Total: 10]

3 **(a)** **(i)** triceps ;
biceps ; [2]

(ii) **B**: contracts ;
A: transmits force from **B** to bone ;
C: relaxes ; [3]

(b) **(i)** increases ;
steady / linear, (increase) ;
from 0.6 to 1.1 (g / cm^3) / by 0.5 (g / cm^3) ; [max 2]

(ii) these foods contain calcium ;
needed for bones ; [2]

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

(c) **(i)** (bone is) harder / stronger / less elastic / less smooth ; [1]

(ii) (on the surface of the bones) at the joint ;
reduces friction / allows bones to move smoothly over each other ; [2]

[Total: 13]

4 **(a)** work done = force × distance ;
= 700 × 55 = 38500 (J) ; [2]

(b) **(i)** 50 s ; [1]

(ii) constant speed ;
of 36 m / s ; [2]

(c) relationship between pressure, force and area ;
pointed end has small area and large pressure ;
disc has large area and small pressure ; [max 2]

(d) less friction ; [1]

[Total: 8]

5 **(a)** **(i)** hair ; [1]

(ii) large ears / large eyes / long neck (so eyes high above ground) / long legs ; [1]

(b) **(i)** diffusion ;
from alveoli ; [2]

(ii) more oxygen can be absorbed (from the air) / taken in by lungs / compensates for less oxygen ;
more oxygen supplied to cells ;
for respiration ; [max 2]

(c) **(i)** ref. to limiting factors ;
not enough grass to eat ;
many eaten by, foxes / pumas ; [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: 10]

6 **(a)** **(i)** Group **1**, Period **2** ; [1]

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

(iii) lithium atoms have two shells / only have two electrons in first shell ;
lithium atoms have three electrons ; [2]

(b) **(i)** hydrochloric (acid) ; [1]

(ii) carbon dioxide ; [1]

(iii) chlorine ; [1]

(c) **(i)** substance which changes the way the body works ; [1]

(ii) avoid unexpected / uncontrolled effects (of impurities) ;
avoid harming the user ;
ensure correct dosage / owtte ; [max 1]

[Total: 10]

7 **(a)** straight lines ;
approx angles of incidence and reflection (correct by eye) ; [2]

(b) correct diagram ; [1]

(c) **(i)** red, blue, green ; [1]

(ii) frequency **or** wavelength ; [max 1]

[Total: 5]

8 **(a)** **(i)** petals / nectary ; [1]

(ii) anther / stamen ; [1]

(iii) ovule ; [1]

(b) (pollination is) the transfer of pollen from anther to stigma ;
(fertilisation is) the fusion of male and female gametes ;
pollination takes place before fertilisation ; [max 2]

(c) **(i)** 17 ; [1]

(ii) nucleus ; [1]

(iii) DNA ; [1]

(d) **(i)** sugars produced by photosynthesis in leaves ;
transported to flowers in phloem ;
as sucrose ;
mineral ions in xylem ; [max 2]

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

[Total: 11]

9 (a) (i) temperature ;
acid concentration ;
use the same acid ;
surface area of the metal ; [max 3]
volume of acid ;

(ii) ignites / pops ;
hydrogen is given off ; [2]

(iii) both **A** and **C** did not react / cannot decide between **A** and **C** / two of the metals did not react ; [1]

(b) (i) electrolyte in beaker ;
electrodes in electrolyte ;
voltmeter connecting electrodes ; [3]

(ii) voltage changes ;
because voltage depends on the metals used for electrodes ; [2]

[Total: 11]

10 (a) (i) uranium ; [1]

(ii) nuclei ;
energy ;
turbine, generator ; (both needed for mark) [3]

(b) (i) lead or concrete ; [1]

(ii) causes ionisation inside cells ; [2]
damages cells / kills cells / mutation / damages DNA ;
cancer ;
radiation sickness ;
radiation burns / burns skin ; [max 2]

(c) (i) Geiger counter / GM tube etc. ; [1]

(ii) 3 half-lives ;
300 (years) ; [2]

[Total: 10]