UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2012 question paper

for the guidance of teachers

0653 COMBINED SCIENCE

0653/22 Paper 2 (Core Theory), maximum raw mark 80

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UNIVERSITY of CAMBRIDGE
International Examinations

1 **(a)** **(i)** argentite and galena (or formulae) ; [1]

(ii) scheelite (or formula) ; [1]

(b) each particle correctly labelled ;; [2]

(c) **(i)** heat given off / exothermic / temperature increases ;
effervescence / fizzing / gas given off ;
sodium (reacts and) dissolves ; [max 2]

(ii) faster / more violent / greater temperature rise / reference to (lilac) flame ; [1]

(iii) → potassium hydroxide + hydrogen ;; [2]

[Total: 9]

2 **(a)** suitable units ;
suitable labelled axes ;
all points plotted correctly ;
3 correct lines drawn ; [4]

(b) **(i)** water / sweat turns to gas / (water) vapour ;
heat is needed / used to cause evaporation ;
heat is obtained / taken / comes from (athlete's) body / so heat in (athlete's) body is reduced ;
accept answers based on particle theory. [max 2]

(ii) (higher) temperature ;
(lower) humidity ;
(greater) wind speed ;
(greater) surface area ; [max 2]

[Total: 8]

3 **(a)** (chemical reactions that) break down nutrient (molecules) / glucose ;
to release energy ; [2]

(b)

gas	percentage in inspired air	percentage in expired air
oxygen ;	21	17
carbon dioxide ;	0.04	4
nitrogen ;	78	78

[3]

(c) diffusion in the lungs ;
in red blood cells ;
combined with / attached to, haemoglobin ; [max 2]

(d) **(i)** increases pulse rate / makes heart beat faster ; [1]

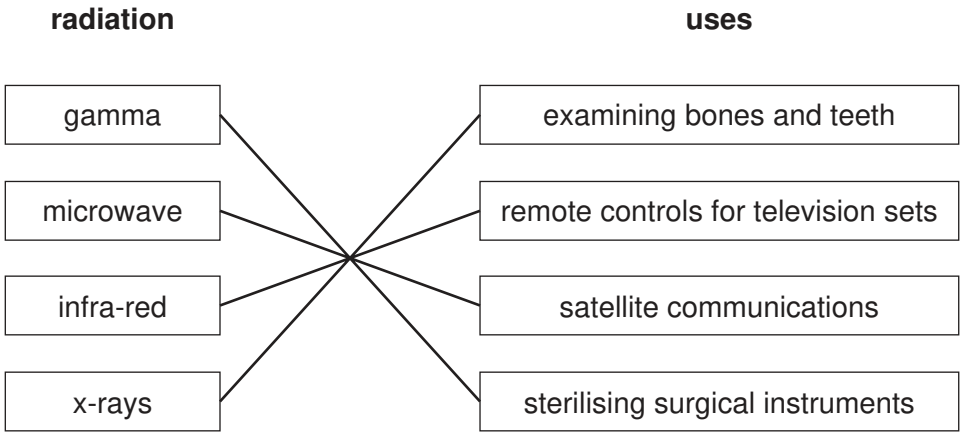
(ii) anything related to fear or excitement ; [1]

(iii) liver ; [1]

[Total: 10]

4 **(a)** transverse / longitudinal / difference frequency / wavelength / different speed ; [1]

(b)



all correct 3 marks / three or two correct 2 marks / one correct 1 mark ;;; [3]

(c) **(i)** (speed =) distance / time ;
= 500 / 1.5 = 333 (m / s) ; [2]

(ii) between 10 and 20 (Hz) to between 20 000 and 25 000 (Hz) ; [1]

(iii) (density =) mass / volume ;
= 10 000 / 1.1 = 9091 (kg / m^3) ; [2]

[Total: 9]

5 **(a)** use of chlorine / ozone / ultrafiltration / boiling ;
removes / kills harmful microorganisms ;
OR
filtration ;
removes insolubles ; [max 2]

(b) in water (molecules) hydrogen (atoms) are bonded to oxygen (atoms) ;
in the mixture only like atoms are bonded ;
OR
in water the H:O ratio is 2:1 ;
in the mixture no fixed ratio ;
OR
(chemical) properties of compound are different from those of the elements it contains ;
mixture retains properties of elements it contains ; [max 2]

(c) **(i)** heat / boil / leave ;
water evaporates / leaving crystals ; [2]

(ii) (no)
hexane is a liquid (at room temperature) ;
so also passes through filter ; [2]

(d) **(i)** it gains electrons ; [1]

(ii) magnesium oxide reacted with the water ;
and formed, an alkaline solution / product / magnesium hydroxide ; [2]

[Total: 11]

6 **(a)** **(i)** change shape ;
change speed / start object moving / stop object moving / acceleration etc ;
change direction (of motion) of object ; [max 2]

(ii) newton ; [1]

(b) **B** (no mark) ;
car is decelerating, (force) **B** as is greater than (force) **F** ; [1]

(c) chemical ;
burned ;
kinetic ;
heat ;
sound ; [5]

(d) reaction between the fuel / gasoline and oxygen / air / complete combustion ;
carbon reacts with oxygen to give carbon dioxide ;
hydrogen reacts with oxygen to give water ;
carbon dioxide and water are (combustion) products / products of burning ; [max 2]

[Total: 11]

7 **(a)** trees shade sand ;
reduces the temperature ;
reference to figures from the graph / quantitative comparison ; [max 2]

(b) open sand is hotter and so produced more females ;
forest cooler and so produced more males ; [2]

(c) deforestation will result in hotter / more open sand ;
so more female turtles produced ;
which might make breeding difficult / might reduce number of young born ; [max 2]

(d) increased carbon dioxide / effects of increased carbon dioxide ;
less oxygen (in the atmosphere) ;
(more soil) erosion / landslides ;
(more) flooding ; [max 2]

[Total: 8]

8 **(a)** **(i)** (expt. **2**)
potassium hydroxide is an alkali ; [1]

(ii) (expt **1**)
temperature decreased ; [1]

(iii) no reaction occurred / no energy was transferred ;
copper is less reactive than magnesium (so no reaction) ; [max 1]

(b) (expt **5**)
the rate of reaction was greater ;
so energy was transferred more quickly / temperature increases more quickly ;
because powder has greater surface area ; [max 2]

[Total: 5]

9 **(a)** catalyst ;
biological / that works in living organisms ;
protein ; [max 2]

(b) greatest activity at pH 6.5 ;
no activity at below pH 4 / above pH 9 ; [2]

(c) **(i)** curve of similar shape with peak at pH 4 or below ; [1]

(ii) sodium hydrogencarbonate neutralises / reacts with the acid / sodium hydrogencarbonate is a base ;
so pH rises (above optimum for enzyme) / becomes too alkaline / pH too high ; [2]

(d) so they can be absorbed ;
into cells / into the blood / to be carried round the body ; [2]

[Total: 9]