

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2010 question paper
for the guidance of teachers**

0654 CO-ORDINATED SCIENCES

0654/32

Paper 3 (Extended Theory), maximum raw mark 100

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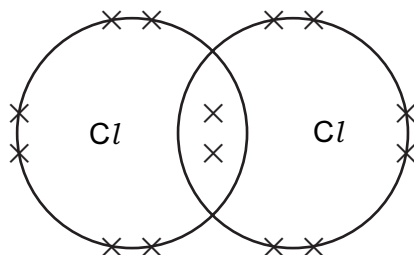
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- 1 (a) (i) pink / orange / brown / copper (layer) ;
- (ii) 2+ ;
two negative charges from chloride must balance the charge on the copper ion / owtte ; [2]
- (iii) (L)
it is a negative ion / has a negative charge / has more electrons than protons ;
reference to attraction between opposite charges ; [2]

(iv)



one shared pair ;
all other electrons correctly shown ; [2]

- (b) (i) carbon dioxide ; [1]
- (ii) $2\text{PbO} + \text{C} \rightarrow 2\text{Pb} + \text{CO}_2$;
(correct formula then look for balance) [2]
- (iii) (no reaction)
idea that carbon is less reactive than potassium ;
and so cannot remove / combine with the oxygen ; [2]
(allow 1 mark for saying potassium is too reactive)

[Total: 12]

2 (a)

ammeter	current / amps
A ₁	0.7
A ₂	0.3
A ₃	0.4
A ₄	0.3

::

[2]

- (b) (i) (yes – no mark)
straight line on graph so current is directly proportional to voltage ; [1]
- (ii) 2 amps ;
explanation e.g. $13 \times 0.15 \text{ A}$ or $2 \times 1 \text{ A}$; [2]

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- (c) (i) make magnetic field stronger ;
only magnetic while the current is on ;
so that magnetic field can be reversed ; [1]
- (ii) $V_s = V_p \times N_s / N_p = 200 \times 1000 / 10000 = 20 \text{ V}$; [1]

[Total: 8]

- 3 (a) water vapour lost from plant's leaves ;
transpiration ;
condensation ;
water vapour cooled ;
gas changed to liquid / water vapour changed to water (droplets) ;
ref. to particles and (kinetic) energy ; [max 4]

- (b) (i) loss of turgor (in leaf cells) / cells become flaccid ;
because water lost from the cells ; [2]

- (ii) (supported by) xylem / lignin ; (reject if reason is that xylem contains water) [1]

- (iii) approximately similar shaped cell, with all parts shown ;
outer cell wall slightly caved in ;
vacuole much smaller ;
cytoplasm pulled away from cell wall ; [max 3]

[Total: 10]

- 4 (a) (i) sound / ultrasound ; [1]

- (ii) infra-red ;

- (iii) gamma ; [1]

- (b) (i) number of, waves / oscillations, per, second / unit time ; [1]

- (ii) (no – no mark)
maximum human frequency about 20 000 Hz ; [1]

- (iii) $v = f \times \lambda$;
wavelength = $330 / 50\,000$;
= 0.0066 m ; [3]

[Total: 8]

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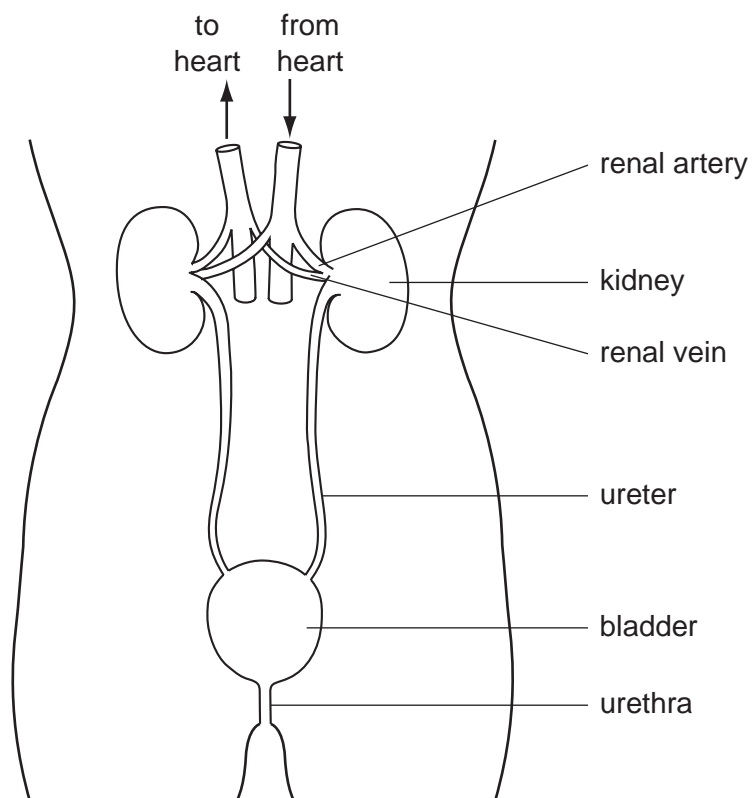
- 5 (a) (filtration)
microorganisms will pass through the filter / owtte ;
(allow idea that chlorination and distillation kill microorganisms whereas filtration does not)
- (b) light rays are scattered ;
by reflection from dispersed material ;
transparency requires most rays to be undeviated / owtte ; [max 2]
(first two points could come from diagram of scattered rays)
- (c) (i) 0.05 ; [1]
- (ii) relevant working e.g. $0.05 \times 12.5 / 1000$;
 $= 0.000625$; [2]
- (iii) evidence of the use of molar ratio. e.g. 2 mols of alkali neutralise one mole of acid / acid to alkali = 1:2 / $0.000625 \div 2$;
 $= 0.00031(25)$; [2]
- [Total: 8]
- 6 (a) A written anywhere between 0 and 13 seconds ; [1]
- (b) area under graph / other working ;
 $\frac{1}{2} \times 12.8 \times 8 = 51.2$ m ; [2]
- (c) maximum speed = 16 m / s
 $KE = \frac{1}{2} mv^2$;
 $= 0.5 \times 800 \times 16 \times 16 = 102400$ J ; [3]
- (d) momentum is directly proportional to v / momentum = mv ;
KE is directly proportional to v^2 / explained using numbers ; [2]
- [Total: 8]
- 7 (a) hair / fur ;
mammary glands ;
different types of teeth ;
pinnae / ear flaps ; [max 2]
- (b) arterioles ;
delivering blood to skin surface ;
dilate / get wider ;
so more blood flows close to skin surface ;
loses heat (by radiation to air) ; [max 3]

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- (c) (i) sensed by pancreas ;
pancreas secretes insulin ;
insulin affects liver ;
causes liver to take glucose from blood ;
(liver) converts glucose to glycogen ;

[max 3]

(ii)



- one renal artery and vein drawn and labelled ;
two renal arteries and veins drawn ;
(at least one) ureter drawn and labelled ;
urethra drawn and labelled ;

[4]

[Total: 12]

- 8 (a) working ;
5 hours ; (allow leeway if carefully shown on graph) [2]
- (b) (i) causes, atoms / molecules, to lose electrons / to become ions ; [1]
- (ii) alpha is less penetrating and is stopped by, the air / clothes / skin ;
alpha is more ionising and so causes more damage when close to cells ; [2]

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- (c) (i) fusion is joining and fission is splitting (of atoms / nuclei) ;
of nuclei ;
- (ii) radiation leaks / ref. Chernobyl ;
cancer / mutations in, local people / animals ;
or disposal of waste ;
needs to be stored safely for a long period ;

[max 2]

[Total: 9]

9 (a)

Table 9.1

element name	protons	neutrons
(oxygen)	8	8
phosphorus	(15)	(16)

;; (1 mark per row)

[2]

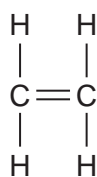
- (b) (i) silicon / Si ;
periodic pattern refers to (repeating) patterns (of properties) across periods /
every eight elements / owtte ;
silicon is eight elements further on (in Periodic Table) from element No. 6 /
carbon ;

[max 2]

- (ii) carbon has a giant structure and nitrogen is simple molecular ;
much energy needed to, melt / break down, giants / converse for molecular ;
because strong bonds must be broken / converse for molecular ;
because many bonds must be broken / converse for molecular ;

[max 3]

(c) (i)



;; (2C and 4H bonded and double bond shown)

[2]

- (ii) (catalytic / thermal) cracking ;
fractions are boiled / vaporised / heated ;
passed over (hot) catalyst / subjected to very high temperature and pressure ;
- (iii) double bonds become single ;
single bonds form between molecules to form a long chain ;
(marks can be obtained by clear diagrams)

[3]

[2]

[Total: 14]

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- 10 (a) (i) 23 ;
- (ii) 46 ;
- (iii) nucleus ; [1]
- (b) (i) oviduct / fallopian tube ; [1]
- (ii) uterus / womb ; [1]
- (c) produces / contains, amniotic fluid ;
protects / supports, embryo ; [2]
- (d) individual with the mutation is more likely to survive ;
individual with the mutation is more likely to reproduce ;
passing mutation on to its offspring ;
repeated over many generations ;
most / all, of population have the mutation ;
and the characteristic that the mutated gene produces ; [max 4]

[Total: 11]