

**MARK SCHEME for the May/June 2010 question paper
for the guidance of teachers**

0654 CO-ORDINATED SCIENCES

0654/21

Paper 21 (Core Theory), maximum raw mark 100

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1 (a) brain labelled ;

(b) stimuli ;
receptors ;
nerves ;
effectors ;

[4]

(c)

| | sexual reproduction | asexual reproduction |
|--|---------------------|----------------------|
| This involves gametes. | ✓ | |
| There is only one parent. | | ✓ |
| The offspring are genetically identical. | | ✓ |

∴ [3]

[Total: 8]

2 (a) (i) **B** – metamorphic ;
C – igneous ;

[2]

(ii) reference to the heating (of rock **A**) (by rock **C**) ;

[1]

(b) (i) carbon dioxide gas produced ;
shows the soil contains a carbonate ;
limestone is (mainly) composed of (calcium) carbonate ;

[max 2]

(ii) ammonia ;

[1]

(iii) ammonium ;

[1]

[Total: 7]

3 (a) (power =) work/time ;

$$= 12000/60 = 200 \text{ (W)} ;$$

[2]

(b) (speed =) distance/time ;
 $= 600/2 = 300 \text{ (m/s)} ;$

[2]

(c) (i) all symbols correct ;
four cells displayed ;
all symbols connected in series ;

[3]

(ii) 6 (V) ;

[1]

| | | |
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(d) (density =) mass/volume ;
= 5 / 10 = 0.5 (kg/dm³) ;

(e) two straight lines coming to a focus on the twigs/grass ; [1]

[Total: 11]

4 (a) (i) proteins ; [1]

(ii) monomer(s) ; [1]

(iii) glucose ; [1]

(b) (i) paper ;
building materials ;
furniture ;
fuel ;
other correct ; [max 2]

(ii) loss of habitat ;
threat to biodiversity ;
threat to (new) chemical resources ;
other reasonable ; [max 1]

(c) nylon, softens/melts, then hardens (on cooling) ;
cycle repeats on further heating ;
melamine resin does not soften/it chars ; [3]

[Total: 9]

5 (a) (i) C and D ; [1]

(ii) A and D ; [1]

(b) (bicuspid/tricuspid/atrioventricular) valve is (pushed) shut ;
idea that pressure of blood causes this ; [2]

(c) (i) haemoglobin ; [1]

(ii) iron ; [1]

(iii) for respiration/to combine with glucose ;
to release energy/to provide energy ; [2]

(d) white blood cells fight disease ;
bacteria/viruses/pathogens ; [2]

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(e) (i) insulin secreted ;
causes liver to absorb glucose from the blood ;
liver changes glucose to glycogen ;

(ii) liver ;

Total: 13

6 (a) (i) X and Z/Y and Z (no mark)
X/Y is acid/has pH less than 7 and Z is alkali/has pH greater than 7 ; [1]

(ii) pH meter immersed in one liquid as the other is added/pH meter immersed
in mixture after each addition ; [2]
reference to pH 7 ;

(iii) tell what pH it is / ability to tell how acidic a solution is rather than simply
acidic ; [1]

(b) (i) magnesium chloride ; [2]
calcium sulfate ;

(ii) boiling/ion exchange/sodium carbonate/bath salts/washing soda ; [1]

(c) element contains only one type of atom ;
compound contains different atoms (bonded) ; [max 2]
reference to diagram e.g. H₂ and O₂ diagrams show only one size of circle ;

[Total: 9]

7 (a) foam/air, is a poor conductor/gap prevents conduction ;
foam, stops convection of air/traps air ;
radiation reflected by shiny surfaces/foil/metal ; [max 2]

(b) water can conduct electricity/danger of electrocution/electric shock ; [1]

(c) (i) 60 W ; [1]

(ii) increase it/double it ; [1]

(iii) input – electrical ;
output – light and heat ; [3]

(iv) named part of spectrum ;
use ; [2]

| | | |
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- (d) (i) current (flows in circuit) / electricity passes through ;
produces (electro)magnet ;
this attracts iron bolt ;
- (ii) (no – no mark)
aluminium is not magnetic / not attracted to electromagnet ; [1]
- (iii) (yes – no mark)
still an electromagnet so still attract bolt ; [1]
- (iv) more coils / bigger voltage / bigger core ; [1]

[Total: 16]

- 8 (a) Geiger counter / Geiger Müller tube ; [1]
- (b) (i) can remove electrons from atoms / can form ions ; [1]
- (ii) alpha radiation is more ionising than gamma ;

more likely to be absorbed by body / cells ;
will cause more damage internally ; [max 2]
- (c) nuclei split ; [1]
- (d) protective clothing described / radiation badges to monitor exposure / lead shielding to stop radiation ; [1]

[Total: 6]

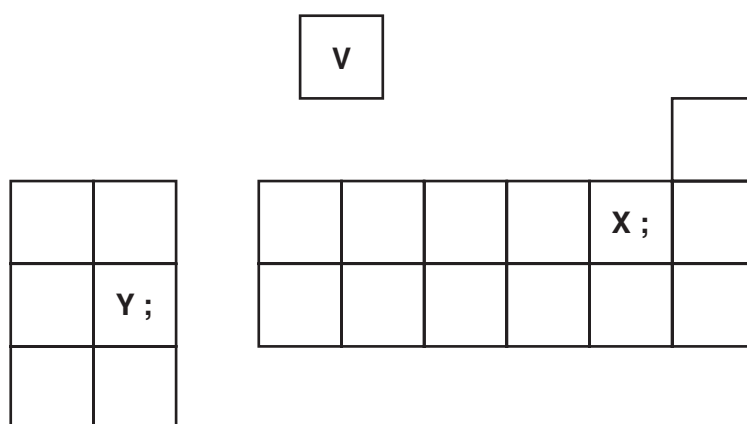
- 9 (a) (i) root / root hair ; [1]
- (ii) nitrogen gas is, unreactive / inert ; [1]
- (iii) to make protein / amino acids ; [1]
- (iv) shortage of something in the soil ;
more proteins can be made (so more growth) ;
detail, e.g. more cells / more cytoplasm ;
correct ref. to function of P or K ; [max2]
- (v) manure contains plant and animal waste e.g. proteins / urea ;
which needs to be, broken down decomposed ;
to produce, ammonia / nitrates / something that can be used by plants ;
NPK has ions that can be absorbed immediately ; [max 2]

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- (b) (i) osmosis ;
- (ii) carbon dioxide ;
oxygen ;
- (iii) palisade/mesophyll ; [1]
- (iv) through stomata ;
by diffusion ;
transpiration ;
evaporation ; [max 2]

[Total: 13]

10 (a)



;; [2]

- (b) (i) (iron has) greater density / lower reactivity / forms coloured compounds / can act as a catalyst ; [1]
- (ii) heated with carbon / carbon monoxide / other reducer which works e.g. hydrogen / (named) more reactive metal ;
reducing agent combines with / reacts with oxygen ; [2]
- (c) (i) carbon dioxide / CO_2 ;
water (vapour) / H_2O ; [2]
- (ii) produces hotter flame / reaches a higher temperature ;
reasonable reference to air behaving as 'dilute' oxygen ;
reference to higher temperatures needed to melt metals ; [max 1]

[Total: 8]