

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

**0653 COMBINED SCIENCE**

**0653/22**

Paper 22 (Core 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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- 1 (a) excretion ;  
sensitivity ; [2]
- (b) (i) tissue ; [1]
- (ii) assume answer refers to onion cells  
they have cell walls ;  
they have, vacuoles / cell sap ; [2]
- (c) (i) nutrients must get through wall of alimentary canal ;  
ref. to absorption ;  
must be broken into small molecules to allow this to happen ; [max 2]
- (ii) (teeth) break down large pieces of food to small ones / increase surface area ;  
(enzymes) break down large molecules of food to small ones ; [2]

**[Total: 9]**

- 2 (a) (i) period ; [1]
- (ii) Ge ; [1]
- (b) aluminium ;  
chlorine ;  
helium ; [3]
- (c) (i) flames / energy / heat / light given off ;  
white product / new substance formed ;  
chlorine colour disappears ; [max 2]
- (ii) potassium + chlorine → potassium chloride ; [1]
- (iii) sulfur and iron cannot be simplified / iron sulfide can be simplified ;  
sulfur and iron properties retained in mixture / iron sulfide has different  
properties (from iron and sulfur) ;  
proportions of iron and sulfur are fixed in iron sulfide / can be any proportions  
in mixture ;  
sulfur not joined to iron / only atoms of same type are bonded with each other ;  
colour ; [max 2]

**[Total: 10]**

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- 3 (a) (i)** IR / UV / X-rays / gamma / radio / microwave ;; [2]  
(one mark for any correct from list)
- (ii)** damages eyes / cataracts / sunburn / cancer / brain damage ; [1]
- (b) (i)** no difference ; [1]
- (ii)** weight is 6 times greater on Earth (accept answers showing numbers) ; [1]
- (c)** particle ;  
vibration ; [2]
- (d)** work = force × distance ;  
= 6 × 2 = 12 J ; [2]

**[Total: 9]**

- 4 (a) (i)** age of seeds ; [1]
- (ii)** water ;  
air / oxygen ;  
warm temperature ;  
*any additional factors negate correct ones* [3]
- (b) (i)** (young plants / seedlings) will be able to photosynthesis / allows them to  
grow in a space / less competition with other trees ; [1]
- (ii) D ;** [1]
- (c) (i)** (different species of trees provide) many different habitats ;  
many different food sources ; [2]
- (ii)** increased soil erosion ;  
because roots no longer hold soil in place ;  
because no leaf cover to stop rain hitting soil directly ;  
  
increased carbon dioxide in atmosphere ;  
because less photosynthesis ;  
if trees are burnt carbon dioxide released into the air ;  
  
decreased rainfall ;  
because less transpiration ;  
so less water vapour returned to the atmosphere ;  
  
*(these are the answers I would expect them to be able to give, but accept  
others such as loss of soil fertility, silting of rivers and flooding)  
(candidate could get all 3 marks from one idea, or from 2 or 3 ideas)* [max 3]

**[Total: 11]**

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- 5** (a) (i) coal / methane ;  
then one from:  
very long time period to form ;  
has required action of pressure / heat / bacterial action ;  
formed underground / under rocks / within the Earth ; [max 2]
- (ii)  $C_2H_2$  ;  
hydrocarbons contain hydrogen and carbon only / are made from hydrogen  
and carbon ; [2]
- (b) fractional distillation ;  
heated ;  
boiling points ; [3]
- (c) (i) limewater ;  
turns cloudy / milky ; [2]
- (ii) ethanol reacts with / joins with oxygen ; [1]
- [Total: 10]**
- 6** (a) (i) ruler / metre rule ; [1]
- (ii)  $8\text{ cm}^3$  ; [1]
- (iii) density = mass / volume ;  
 $21.6 / 8 = 2.7\text{ g / cm}^3$  ; [2]
- (b) liquid most particles touching and irregular arrangement ;  
gas – spaces between particles and irregular arrangement ; [2]
- (c) (i) particles slightly further apart – definitely not bigger! ; [1]
- (ii) problem; e.g. bridges expand in hot weather ;  
amplification; e.g. causes damage – leave gaps ; [2]
- [Total: 9]**

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7 (a) → magnesium chloride ; + hydrogen ; [2]

(b) (i) (in experiment 2) it took a shorter time to collect the same volume / amount of gas / OWTTE ; [1]

(ii) increase the temperature (of the acid) ;  
increase the concentration of the acid ;  
increase the surface area of the magnesium ; [max 2]

(iii) reaction too fast / sodium too reactive ;  
reference to hazard / explosion / health and safety ; [2]

**[Total: 7]**

8 (a) (i) resistance = PD/current ;  
=  $3 / 0.3 = 10$  ;  
 $\Omega$  / ohms ; [3]

(ii) ammeter and voltmeter correctly positioned ; [1]

(b) chemical ;  
electrical ;  
light ;  
heat ; [4]

**[Total: 8]**

9 (a) (i) contracts ;  
ref to pumping ;  
squeezes blood out of heart ; [max 2]

(ii) coronary arteries ; [1]

(iii) **C** and **D** ; [1]

(b) (i) loss of water from leaves ;  
as water vapour ; [2]

(ii) xylem ; [1]

**[Total: 7]**