

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

**0653 COMBINED SCIENCE**

**0653/32**

Paper 32 (Extended 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) (i) Q and R ; [1]
- (ii) ovary ; [1]
- (iii) they contain/protect, seeds/implied ;  
disperse seeds/specific mechanism ;  
so plant can spread to new areas/reduces competition with parent plant ; [max 2]
- (b) (i) insects/birds/bats/animals/reason: coloured (petals attract) ; [1]
- (ii) does not require (all) forest trees to be cut down ;  
so less likelihood of habitat loss (for animals) ;  
so less chance of soil erosion ;  
so less chance of reduction in rainfall ;  
so less reduction in species diversity ;  
does not use, fertilisers/pesticides ;  
fertilisers might mean some plants outgrow native ones ;  
pesticides might kill other species ; [max 3]
- [Total: 8]
- 2 (a) (i) potassium chloride ; [1]
- (ii) outer electron lost from K atom ;  
outer shell of chlorine atom fills/gains one electron ;  
K forms positive ion/ $K^+$ /Cl forms negative ion/ $Cl^-$  ;  
reference to ions having filled outer shells ;  
reference to KCl have greater stability / lower energy than uncombined atoms ;  
reference to ions attracting (to form KCl) ; [max 4]
- (b) (i) K ion is positive, cathode is negative/opposite charges attract ; [1]
- (ii) ions gain electron(s) ;  
(each ion gains) one electron/is discharged/becomes an atom ; [2]  
( $K^+ + e^- \rightarrow K$  = 2 marks)
- [Total: 8]

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- 3 (a) (i)** IR/UV/X Rays/gamma/microwave ;  
(1 mark for two correct answers from list) [1]
- (ii)** burns skin ;  
damages eyes/cataracts ;  
reference to cancer ;  
(ionisation leading to) mutation/DNA damage/cell damage ; [1]
- (iii)**  $3 \times 10^8$  m/s ;  
(any correct value with unit) [1]
- (b) (i)** no difference ; [1]
- (ii)** weight is 6 times greater on Earth (accept answers showing numbers) ;  
i.e. weight on Earth is 960N weight on moon is 160N  
(reject weight Earth is 96 kg and on moon 16 kg) [1]
- (c) (i)** line higher ;  
(allow curves arising from effects of air resistance) [1]
- (ii)** gravity/force/acceleration is greater ; [1]
- (d) (i)** (work =) force/weight  $\times$  distance ;  
 $= 6 \times 2 = 12$  J ; [2]
- (ii)** power = work (energy)/time ;  
 $= 12/2 = 6$ W (or J/s) ;  
(allow ecf from **(i)**) [2]

**[Total: 11]**

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- 4 (a) (i) (cardiac) muscle ; [1]
- (ii) coronary arteries ;  
ref to red blood cells ;  
ref to haemoglobin ;  
diffusion out of capillaries/blood vessels into tissue ;  
(reject *by diffusion* alone) [max 2]
- (iii) **C** and **D** ; [1]
- (b) (i) (evapo) transpiration/loss of water from leaves ;  
(transpiration) reduces pressure/reduces water potential ;  
water moves down pressure gradient/from high to low pressure /from high to low  
water potential ; [max 2]
- (ii) in phloem ;  
as sucrose ;  
in solution ; [max 2]
- [Total: 8]**
- 5 (a) (coal has) taken much longer to form / has required action of pressure / heat /  
bacterial action/formed underground/under rocks/within the Earth ;  
been made from dead plants ; [max 1]
- (b) (i) crude oil/petroleum ; [1]
- (ii) (at **M**)  
mixture is simpler/has larger proportion of smaller molecules ;  
is less viscous/more flammable/less dense ;  
has lower boiling range/point/is at a lower temperature ; [max 2]
- (iii) (at **N**)  
mixture contains smaller molecules / lower boiling point / lower viscosity /  
lower density ;  
mixture contains (much greater proportion of) unsaturated compounds ; [2]
- (iv) description of (addition) polymerisation / polymer reasonably shown by  
diagram ;  
reference to unsaturated molecules reacting or shown in diagram ;  
no (significant amounts of) unsaturated compounds at **M** ; [max 2]
- (c) (i) cobalt chloride paper ;  
blue to pink ;
- anhydrous/white copper sulfate ;  
(white to) blue ; [2]
- (ii) + 3O<sub>2</sub> (formula and balance) ;; [2]
- [Total: 12]**

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- 6 (a) volume =  $8 \text{ cm}^3$  ;  
density = mass/volume ;  
 $21.6/8 = 2.7 \text{ g/cm}^3$  ; [3]
- (b) (i) liquid most particles touching and irregular arrangement ;  
gas – spaces between particles and irregular arrangement ; [2]
- (ii) reference to forces of attraction ;  
a comparative statement showing forces greater in liquids ; [2]
- (c) particles slightly further apart/vibrate more and so require more space ; [1]
- (d) problem e.g. bridges/rail tracks/rulers expand ;  
amplification – can be consequence e.g. causes damage/become inaccurate ;  
**or**  
solution e.g. gaps/rubber filled gaps are included ; [max 2]

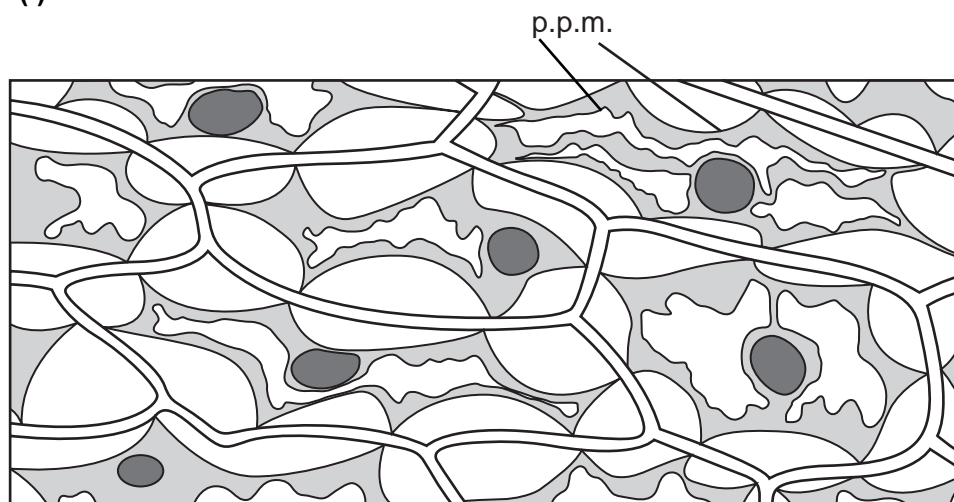
**[Total: 10]**

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7 (a) (i) tissue ; [1]

(ii) they have cell walls ;  
they have, vacuoles / cell sap ; [2]

(b) (i)



[1]

(ii) water has gone out of cells ;  
because concentration of solution outside cell is greater than inside  
or because 'concentration' of water is greater inside cells than outside  
or because water potential is greater inside cells than outside ;  
e.g. water moves from low concentration to high concentration / but water  
moves from high to low – must specify water concentration (so) volume of,  
cytoplasm / vacuole, has decreased or cell contents have shrunk ;  
cell membrane has pulled away from cell wall ;  
ref to plasmolysis ; [max 3]

(c) amylase ;  
in, saliva / pancreatic juice ;  
breaks down starch to sugar ;  
in, mouth / duodenum / small intestine ; [max 3]

**[Total: 10]**

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8 (a) (i) (in B) it took less time to (collect the same amount/volume of gas) ; [1]

(ii) B (highest)

A

D

C (lowest) ; [1]

(iii) (may do this generally or in terms of increased or decreased conc.)  
 (when concentration changes) different number of ions present / per unit  
 volume/near the magnesium ;  
 ions are in (constant random) motion/collide with magnesium ;  
 different numbers of ions mean different collision frequency/OWTTE ;  
 rate of reaction affected by collision frequency ; [max 3]

(reference to numbers of particles = 1 mark  
 reference to motion and or collisions = 1 mark  
 linking collision to rate = 1 mark)

(b)  $24 + (35.5 \times 2)$  ;  
 $= 95$  ; [2]  
 (e.c.f. from use of proton numbers, so 20 scores 1 mark)

[Total: 7]

9 (a) straight lines with correct arrows ;  
 angles approx correct ; [2]

(b) (i) (resistance =)  $PD/\text{current}$  ; also  $V \div I/\text{voltage} \div I$   
 $= 3.0/0.3 = 10 \Omega$  ; [2]

(ii) (no)  
 not a straight line / not (directly) proportional / current and voltage not  
 proportional ;  
 resistance increases with voltage/not a constant ; [2]

[Total: 6]