

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**NOVEMBER 2002**

**INTERNATIONAL GCSE**

<b>MARK SCHEME</b>
<b>MAXIMUM MARK : 80</b>
<b>SYLLABUS/COMPONENT : 0653/3</b> <b>COMBINED SCIENCE</b> <b>(EXTENDED)</b>

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1(a)

feature	arteries	veins	capillaries
valves present	x	√	x
walls are one cell thick	x	x	√

one mark per correct column ; ; ; 3

(b)(i) more room for haemoglobin ;  
 haemoglobin, combines with / carries, oxygen ;  
 so more oxygen can be, carried / transported ; max 2

(ii) increases surface area (to volume ratio) ;  
 speeds uptake / release / diffusion, of oxygen ; 2

(c) anaerobic respiration ;  
 lactic acid produced ; 2

2(a) the breakdown of the nucleus of an atom ;  
 the time taken for half the mass (of a nuclide) to decay / eq ; 2

(b) 4 half lives ;  
 7.64 years ; 2

(c) deflected in opposite directions ;  
 alpha towards negative / beta towards positive ;  
 beta deflected more than alpha ; max 2

(d) electrons are lost from the atoms (of the material) ; 1

Page 2	Mark Scheme	Syllabus
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- 3(a)(i) volume / concentration, of acid solution ;  
whether stirred or not ;  
surface area / mass, of magnesium ; max 1
- (ii) same amount of, magnesium /reactants, used ; 1
- (b)(i) the higher the temperature the higher the rate ; 1
- (ii) higher temperature means faster particles ;  
so more collisions (per unit time) ;  
between acid particles and magnesium ; 2 max
- (c)(i) hydrogen + magnesium sulphate ; 1
- (ii) H ;  
+ ; 2
- 4(a) only washes slowly into the lake ;  
because it is not very soluble ;  
does not break down quickly / is persistent ; 2 max
- (b) peregrines are carnivores / eat other birds or animals ;  
peregrines are at the end of a food chain ;  
DDT does not break down in animals' bodies ;  
concentrates up food chain ; 3 max
- (c)(i) using a, predator / parasite / disease-causing organism ;  
to control a pest ; 2
- (ii) named pest ;  
named control organism ; 2

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- 5 (a) normal approx  $90^\circ$  and labelled ;  
both angles correctly labelled ;
- (b) it is less than  $40^\circ$  ; 1
- (c) (up to critical angle), some light is reflected and some refracted ;  
at critical angle refraction occurs along the surface ;  
more than the critical angle there is, no refraction / total internal reflection ;  
critical angle is (approx)  $43^\circ$  between 42 and 48 ; max 3
- (d)(i) distance between lens and point where rays are brought to a focus ;  
parallel rays ; 2
- (ii) real can be projected onto a screen / vice versa ; 1
- 6(a)(i) ions ;  
sodium and chloride ; 2
- (ii) sodium ions are positive ;  
attracted to, negative electrode / cathode ;  
ions gain electrons from the cathode ;  
each ion gains one electron ; 3 max
- (iii) sodium too reactive to form from aqueous solution ;  
sodium more reactive than hydrogen ;  
so hydrogen forms (in preference to sodium) ; 2 max
- (b)(i) they lose electrons ; 1
- (ii) green to purple ;  
solution become alkaline / sodium hydroxide is an alkali /  $\text{OH}^-$   
ions form ; 2

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- 7(a) a group of cells ;  
that are similar / that perform a particular function ; 2
- (b) line to, cell/ vacuolar membrane ; 1
- (c) water ;  
has gone out of the cells ;  
by osmosis ;  
from dilute solution to more concentrated solution ; 4
- (d) water enters both animal and plant cells ;  
plant cell wall stops it from bursting / animal cell has no cell wall ; 2
- 8 (a) 70 m/s ; 1
- (b) working ;  
10 m/s<sup>-2</sup> ; 2
- (c) area under curve / other correct working ;  
245 m ; 2
- (d) between 7 and 8 seconds ;  
from area under graph / by calculating distance after 8 s /  
other correct working ; 2
- (e)(i) potential energy =  $mgh / 0.05 \times 10 \times 300$  ;  
= 150 J ;  
(allow ecf for one mark if out by a factor of 10) 2
- (ii) converted to, sound / heat ; 1

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- 9(a) Cl 37 has more neutrons ;  
two more ; 2
- (ii) 17 ;  
18 ; 2
- (b)(i) covalent ; 1
- (ii)  $\text{Cl}_2 + \text{H}_2 \rightarrow 2\text{HCl}$   
  
all formulae correct ;  
balancing ; 2
- (iii) outer shell of H has 1 electron and outer shell of Cl has 7 ;  
correct diagram showing shared pair ; 2