

NOVEMBER 2002

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK : 80

SYLLABUS/COMPONENT : 0653/3

**COMBINED SCIENCE
(EXTENDED)**



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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

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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° and labelled ;
both angles correctly labelled ; 2
- (b) it is less than 40° ; 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° 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 / 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⁻² ; 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 x 10 x 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