UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2008 question paper

0653 COMBINED SCIENCE

0653/03 Paper 3 (Extended Theory), maximum raw mark 80

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UNIVERSITY of CAMBRIDGE
International Examinations

1 **(a)** chlorophyll
chloroplast
(cell) wall
cell membrane
two correct for one mark; [2]

(b) **(i)** at least two more rectangles drawn, in a line and connected; [1]

(ii) (damages) phloem (vessels)/sieve tubes; *no mark if xylem is also referred to*
through which sugar is transported;
root cells cannot make their own, sugar/carbohydrate/glucose/sucrose; [max 2]

(c) **(i)** asexual/vegetative; [1]

(ii) can reproduce without a partner;
so reproduction possible even if few other plants around;

offspring are genetically identical to parent/clones;
so if parent is adapted to environment they will be as well;

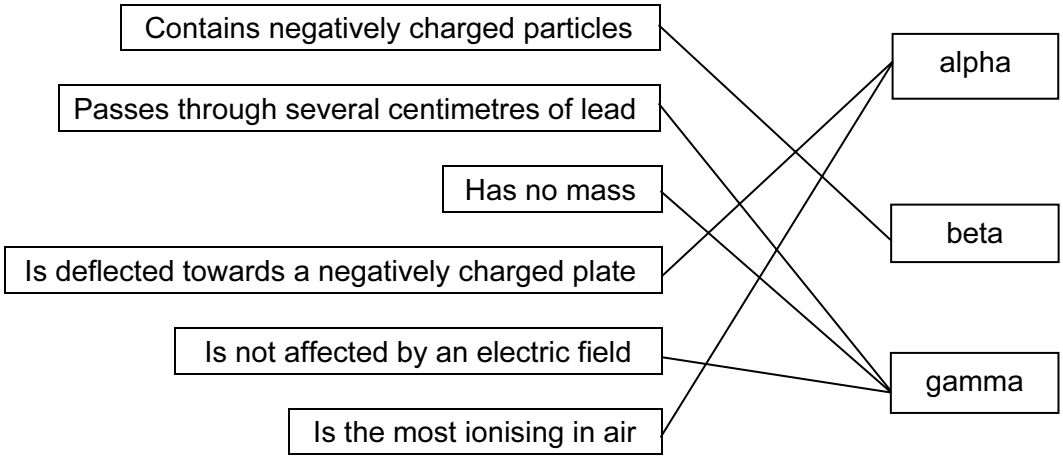
young plants already have roots;
so have a better chance of survival than a germinating seedling; [max 3]

(d) transpiration/water loss from leaves/evaporation;
water vapour diffuses out of leaves;
water drawn up through xylem vessels;

also allow other functions, e.g.
form pitchers; to trap insects for nitrogen source;
produce tendrils; for climbing;
store food; as starch/other named;
store water; in dry environment;
excretion; loss of named waste product;
respiration; release energy from glucose; *not 'produce' energy* [max 2]

[Total: 11]

2 (a)



any two correct for one mark;; [3]

(b) a form of an element with same number of protons/atomic number;
different number of neutrons/different mass number; [2]

(c) ionising/destroys cells; [1]

(d) (i) 10 minutes; [1]

(ii) five half lives/working;
50 minutes; *allow ecf* [2]

(e) (i) radiation from sources in the environment; [1]

(ii) 1160 (cpm); [1]

[Total: 11]

3 (a) (i) gasoline or petrol/diesel/fuel oil/propane/butane/naphtha; [1]

(ii) different boiling points/intermolecular attractive forces; [1]

(b) O_2;
$20(O_2)$; [2]

(c) a covalent bond;
shared electrons;
two shared pairs of electrons/double bond; [2]

[Total: 6]

4 **(a)** it decreased;
more steeply at first/other description of shape of curve; [2]

(b) burning less fossil fuels;
using better quality fuels/removed S from fuel before burning;
'scrubbers' to clean emissions; [max 2]

(c) they are harmful to human health;
cause breathing problems/named illness;

cause acid rain;

damages buildings;
by reacting with/damaging, limestone;

harms/kills, plants/trees;

acidifies lakes/rivers;
so fish/shellfish cannot live there/harms aquatic organisms; [max 3]

[Total: 7]

5 **(a)** **A** – **B** constant acceleration;
B – **C** constant speed; [2]

(b) total distance covered = area under graph;
(0.5 x 5 x 4) + (40 x 4) + (0.5 x 5 x 4);
= 180m; [3]

[Total: 5]

6 **(a)** **(i)** copper oxide + hydrogen → copper + water; [1]

(ii) appropriate colour change/electrical conductivity; [1]

(b) **(i)** oxide ion has 2 more electrons (than protons)/has gained 2 electrons;
oxygen atom has same number of electrons as protons; [2]

(ii) two;
because copper ion has +2 charge to balance the –2 oxide charge;
and so to discharge the Cu^{2+} ion two electrons are required; [max. 2]

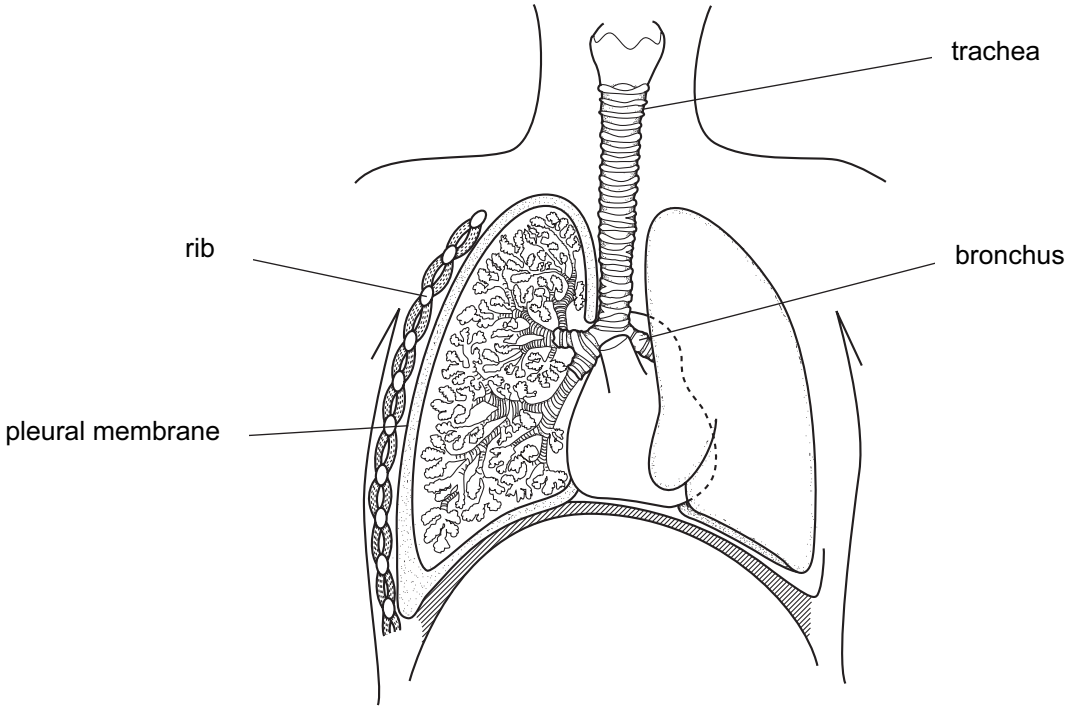
(c) **(i)** copper sulphate/copper(II) sulphate ; *not formula* [1]

(ii) zinc is more reactive than copper; [1]

(iii) zinc (atoms) oxidised;
because electrons are removed/transfer to copper ions; [2]

[Total: 10]

7 **(a)** one mark per two correct labels; [2]



(b) less (surface) area;
for diffusion; [2]

(c) contain haemoglobin;
which combines with oxygen; *ignore 'transports oxygen' as this is in the question.*

no nucleus;
more room for haemoglobin;

(bi)concave;
increases surface area which increases rate of oxygen, uptake/release;

small;
get close to tissues/squeeze through smallest capillaries; [max 3]

(d) respiration;
to release energy; *not to 'produce' energy* [2]

[Total: 9]

8 (a) (i) work done = force x distance;
= 1000 x 2000 = 2000 000 J; [2]

(ii) power = work / time;
= 2000 000 / 100 = 20 000 W; allow J/s
allow ecf [2]

(b) (i) electromagnetic/transverse; [1]

(ii) reflection; [1]

(c) correct formula; $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$;
1/R = ¼ + ¼;
R = 2 ohms; [3]

(d) extension = 12 cm/appropriate working;
(4 x mass =) 200 g; [2]

[Total: 11]

9 (a) **F C G**;
D; [2]

(b) (i) oxygen/gas/material <u>is given off</u>/<u>leaves the flask</u>; [1]

(ii) increasing the mass of MnO_2 increases the rate; [1]

(iii) acts as a catalyst;
catalyst speeds up reaction (without being consumed);

evidence from table:
mass of MnO_2 does not decrease (so is not consumed);
detail which reasonably accounts for effect on rate of increasing amount of catalyst;
ref. decreasing activation energy; [max 3]

(iv) higher temp means particles move faster; *not vibrate*
so collision frequency increases;
so collision energy increases/hit each other harder;
any correct discussion of activation energy; [max 2]

(c) 34; [1]

[Total: 10]