UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2008 question paper

0654 CO-ORDINATED SCIENCES

0654/02 Paper 2 (Core Theory), maximum raw mark 100

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UNIVERSITY of CAMBRIDGE
International Examinations

1 **(a)** cornea, lens;
(ignore pupil, humours) [1]

(b) **(i)** focuses/adjusts light/image;
onto the retina;
lens changes shape;
ref to refraction/bending light; [max 2]

(ii) contains receptor/light sensitive cells;
converts light energy to impulse in nerve (fibre);
impulse sent to brain; [max 2]

(c) **(i)** abnormal choroid/blindness; [1]

(ii) gametes **A** and **a**;
offspring **AA** and **Aa**;
all normal/none have disease;
(allow ecf) [3]

[Total: 9]

2 **(a)** density = mass/volume;
= 40 / 35 = 1.14 g / cm^3; [2]

(b) momentum = mass x velocity;
= 0.04 x 40
= 1.6 kg m/s; [2]

(c) **(i)** 60 N; [1]

(ii) work = force x distance;
= 60 x 0.5
= 30 J; (allow ecf) [2]

[Total: 7]

3 (a) **A**/igneous; [1]

(b) (i) sedimentary; [1]

(ii) (biological)
roots;
abrade rock surface;
animals;
abrade rock surface;

(physical)
description of freeze/thaw;
reference to ice expansion;
description of thermal variation;
expansion/contraction cause surface damage;
particles carried by wind;
abrade rock surface;

(chemical)
(acidic) rain;
reacts with rock/dissolves rock; [max 2]

(iii) correct underlined from **(ii)** [1]

(c) (i) colloid; [1]

(ii) (incorrect)
should be called a sol;
emulsion is liquid in liquid / sol is name for solid in liquid; [2]

(iii) water contains (dissolved) sulphate (ions); [1]

[Total: 9]

4 (a) (i) **A** = palisade (layer);
B = (lower) epidermis; [2]

(ii) it has a cell wall;
it has chloroplasts/chlorophyll;
it has a vacuole/cell sap;
it can photosynthesise; [max 2]

(iii) arrow drawn entering stoma; [1]

(b) carries water (to the leaf);
carries minerals;
support; [max 2]

[Total: 7]

5 **(a)** **(i)** **S** on a horizontal portion; [1]

(ii) goes faster/accelerates/accelerating; [1]

(b) **(i)** number of waves (produced) per second; [1]

(ii) dolphin; [1]

(iii) dolphin; [1]

(c) distance = speed x time;
= 1500 x 0.2 = 300m;
distance = 150m ; [3]

(d) straight lines with arrows;
bending at surface;
entering eye; [3]

[Total: 11]

6 **(a)** **(i)** e.g. lithium
is less dense;
has higher melting point;
is less malleable;
is less reactive; [max 2]

(ii) electron configuration 2,8 shown; [1]

(iii) ions form by losing one electron/ions have one more proton than electron; [1]

(b) **(i)** magnesium sulphate;
both soluble and ionic/electrolyte is a solution containing ions; [2]

(ii) use different metals/materials for one or both of the electrodes;
use different electrolyte; [max 1]

[Total: 7]

7 **(a)** **(i)** May; [1]

(ii) idea that it was lower (except in July) in 2003;
idea that it peaked at different times; [2]

(b) **(i)** plants use nitrate to make proteins;
plants grow, larger/better/faster;
higher yield/bigger crop; [max 2]

(ii) add (nitrogen-containing) fertiliser; [1]

(c) (i) maize ⟶ cattle ⟶ people; [1]

(ii) energy (flow); [1]

(d) decomposers/named decomposer;
rot the roots/break them down/decomposes;
respiration (by composers) releases carbon dioxide; [max 2]

[Total: 10]

8 (a) (i) normal bodywork attracted;
filled hole not attracted; [2]

(ii) plastic filler is not magnetic [1]

(iii) no – aluminium is not magnetic; [1]

(iv) aluminium doesn't corrode/corrodes less than steel/less dense; [1]

(b) In a SOLID , the particles are closer together than in a GAS .

The forces of attraction between particles are stronger in a SOLID than in a GAS .

When a SOLID is heated it will eventually turn into a liquid.

In a SOLID , the particles can only vibrate and not move.

Heat energy will travel through a SOLID by conduction.

Heat energy will **not** travel through a SOLID by convection.

Any two correct 1 mark [4]

[Total: 9]

9 (a) made from once living material/millions of years to form; [1]

(b) carbon dioxide produced;
reference to (excessive) global warming/enhanced greenhouse effect;
reference to negative consequences of climate change; [max 2]

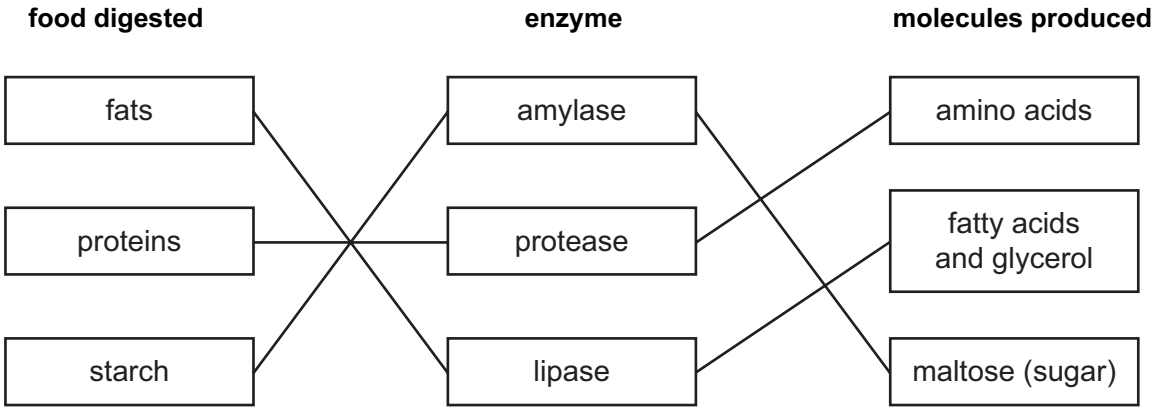
(c) (i) limewater;
goes cloudy; [2]

(ii) higher % of methane/more methane;
methane burns/other gases do not burn/contribute to heat output; [2]

[Total: 7]

10 (a) speeds up reaction;
without being used up; [2]

(b)



1 mark for each correct enzyme; [3]

(c) (i) passes through alimentary canal/named part of alimentary canal;
egested;
as faeces;
through anus; [max 2]

(ii) prevents constipation/helps egestion/stimulates peristalsis/lower risk of bowel cancer; [1]

(iii) fruit/named fruit/vegetables/named vegetable/breakfast cereal/grain/seeds/brown bread/ brown rice; [1]

[Total: 9]

11 (a) (i) C H O; (all three required) [1]

(ii) covalent; [1]

(b) (i) changing (the element) nitrogen in the air into nitrogen compounds/named nitrogen compound;
extra detail, e.g. one way it occurs/reference to inert nitrogen being converted into useful compounds/nitrifying bacteria/Haber process/lightning; [2]

(ii) ammonia; [1]

(iii) sum of protons + neutrons = 14;
reference to the nucleus; [2]

(c) drugs/medicines;
dyes; [2]
(accept named compounds)

[Total: 9]

12 (a) (i) ammeter; [1]

(ii) M_2 = 1A; [1]

(iii) (R = R1 + R2)
= 3Ω; [1]

(iv) power = voltage x current = 3 x 3 = 9 W; [1]

(b) charge = current x time;
= 4 x 60 = 240 C; [2]

[Total: 6]