

MARK SCHEME for the May/June 2008 question paper

0654 CO-ORDINATED SCIENCES

0654/02

Paper 2 (Core Theory), maximum raw mark 100

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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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- 1 (a) cornea, lens;
(ignore pupil, humours)
- (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;
= $40 / 35 = 1.14 \text{ g / cm}^3$; [2]
- (b) momentum = mass x velocity;
= 0.04×40
= 1.6 kg m/s ; [2]
- (c) (i) 60 N; [1]
- (ii) work = force x distance;
= 60×0.5
= 30 J; (allow ecf) [2]
- [Total: 7]

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- 3 (a) A/igneous;
- (b) (i) sedimentary;
- (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]

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- 5 (a) (i) S on a horizontal portion;
- (ii) goes faster/accelerates/accelerating;
- (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]

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- (c) (i) maize → cattle → people;
(ii) energy (flow);
- (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]

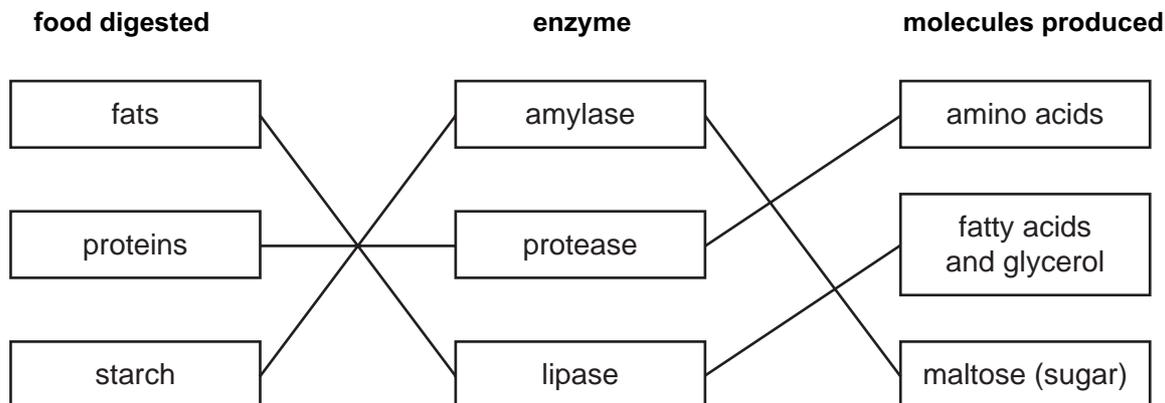
- 9 (a) made from once living material/millions of years to form; [1]
- (b) carbon dioxide produced;
reference to (excessive) global warming/enhanced greenhouse effect;
reference to negative consequences of climate change; [max 2]

- (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]

[2]

(c) drugs/medicines;
dyes;
(accept named compounds)

[2]

[Total: 9]

12 (a) (i) ammeter;

[1]

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(ii) $M_2 = 1A;$

(iii) $(R = R_1 + R_2)$
 $= 3\Omega;$

(iv) power = voltage x current = $3 \times 3 = 9 \text{ W};$ [1]

(b) charge = current x time;
 $= 4 \times 60 = 240 \text{ C};$ [2]

[Total: 6]