

# UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

## MARK SCHEME for the November 2005 question paper

### 0653/02 COMBINED SCIENCE

0653/02

Paper 2, maximum mark 80

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

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.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

The minimum marks in these components needed for various grades were previously published with these mark schemes, but are now instead included in the Report on the Examination for this session.

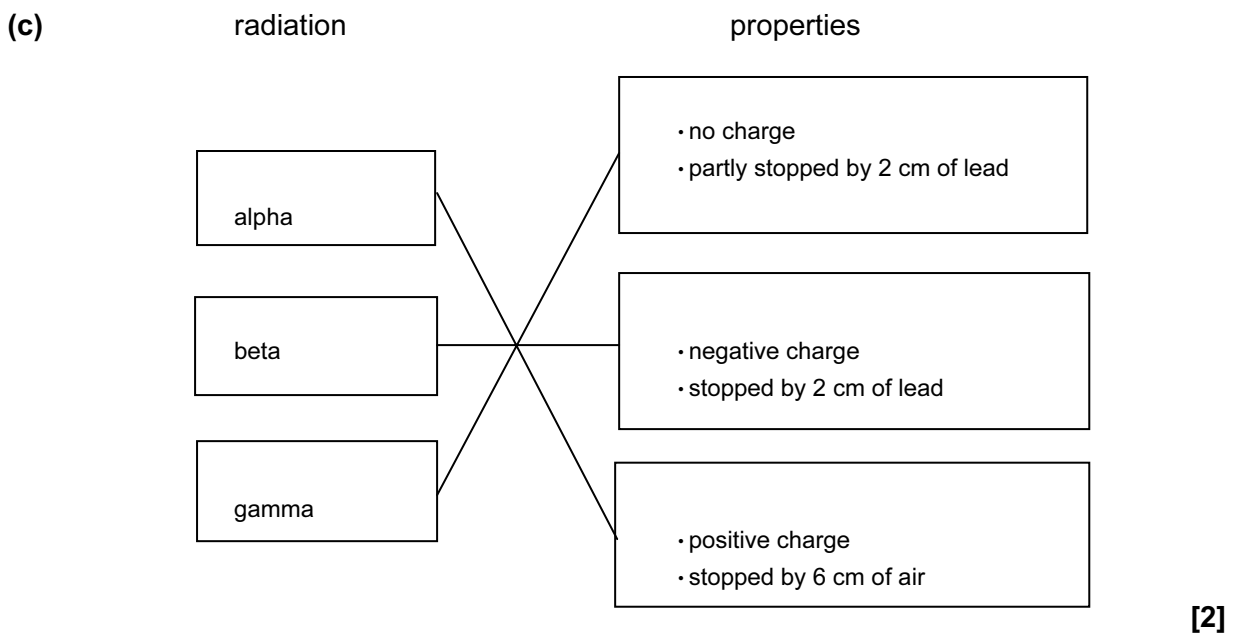
- CIE will not enter into discussion or correspondence in connection with these mark schemes.

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- 1 (a) (i) R  
P  
Q; [1]
- (ii) add excess copper carbonate/of the powder/solid remains on bottom of beaker/no more gas produced when solid added/reference to pH 7 /reference to temperature no longer rises; [1]
- (iii) H<sub>2</sub>SO<sub>4</sub> ; [1]
- (iv) copper;  
is a transition metal/transition metals have coloured compounds; [2]
- (b) electrolysis  
electrodes  
cathode  
electrolyte; ; ; ; [4]
- Total [9]**

- 2 (a) Geiger counter/Geiger Muller tube; [1]
- (b) (i) causes electrons to be lost from atoms; [1]
- (ii) cells can mutate;  
DNA damaged;  
atoms in cells ionised; max [1]



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- (d) (i) splitting;  
of nucleus; [2]
- (ii) heat energy turns water into steam;  
steam drives turbine;  
turbine drives generator; [3]
- Total [10]**

- 3 (a) respiration;  
nutrition;  
excretion;  
growth;  
sensitivity;  
reproduction;  
ability to move himself; max [2]
- (b) provide energy; [1]  
for making more cells/building muscles; [1]
- (c) (i) it increases it; [1]
- (ii) it adds red cells (to the person's blood);  
red cells contain haemoglobin; max [2]
- (iii) more haemoglobin means more oxygen can be carried;  
so cells get more oxygen;  
cells can respire faster;  
cells/muscles, get more energy;  
cyclist can, cycle faster/cycle (quickly) for longer; max [3]
- Total [10]**

- 4 (a) 30 35 30  
8 8 8 ; ; ; one mark for each column [3]
- (b) (i) zinc oxide; [1]
- (ii) oxidation/combustion; (allow redox) [1]
- (iii) oxygen has joined with the zinc/zinc oxide is combined mass of oxygen and zinc/other reasonable; [1]

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- (c) (i) application of a layer of zinc to the steel; [1]
- (ii) oxygen; [2]
- water; [2]
- Total [9]**
- 5 (a) (i) metre stick/metre ruler/ruler (marked in millimeters); [1]
- (ii) stopwatch; [1]
- (b) distance = speed x time = 60 x 1; [2]
- = 60 mm; [2]
- (c) (i) line is horizontal; [1]
- (ii) 250 s; [1]
- (iii) B to C/100 to 150 seconds (from start); [2]
- speed is increasing/line goes up; [2]
- Total [8]**
- 6 (a) (i) arrow through stomata and air space to X; [1]
- (ii) it has chloroplasts; [2]
- which absorb sunlight; [2]
- it is close to the (upper) surface of the leaf; [2]
- so gets more sunlight; [2]
- (iii) stops it dehydrating; [2]
- prevents water loss; [2]
- by transpiration; [2]
- (b) (i) arrow from plants to air labelled respiration; [2]
- arrow from decomposers to air labelled, respiration/decomposition; [2]
- (ii) less photosynthesis; [3]
- less carbon dioxide removed from air; [3]
- carbon dioxide in air increases; [3]
- increases greenhouse effect/description; [3]
- Total [10]**

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- 7 (a) fractional distillation; both words required [1]
- (b) (i) carbon dioxide;  
water (vapour);  
sulphur dioxide; [3]
- (ii) sulphur dioxide pollutes the atmosphere/forms acid rain;  
reference to harmful effects of the gas by inhalation/reference to  
harmful effects of acid rain; [2]
- (c) (i) substance which speeds up a reaction;  
but is unchanged by the reaction/owtte; [2]
- (ii) transition metals/elements; [1]
- Total [9]**
- 8 (a) correct symbols;  
in series; [3]
- (b) (i) not a complete circuit; [1]
- (ii)  $8 \Omega$ ; [1]
- (c) (i) coal/oil/gas/nuclear; [1]
- (ii) (nuclear) fusion; [1]
- (iii) needs a medium/material/air; [1]
- Total [8]**
- 9 (a) (i) A urethra; [1]
- (ii) B stores urine;  
C makes sperm; [2]
- (b) (i) asexual has one parent/sexual may have one or two;  
asexual all offspring are identical/sexual they are different;  
genetically identical/genetically different;  
sexual involves, gametes/fertilisation, or asexual does not; **max [2]**

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(ii) appropriate method named or described;

some detail of this method;

[2]

*for example*

by runners/new stems growing out;

grow roots into the ground;

**Total [7]**