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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the November 2004 question paper

0653 COMBINED SCIENCE

0653/03 Paper 3 (Extended Theory), 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*.

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Grade thresholds taken for Syllabus 0653 (Combined Science) in the November 2004 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 3	80	58	35	21	14

The threshold (minimum mark) for B is set halfway between those for Grades A and C.
The threshold (minimum mark) for D is set halfway between those for Grades C and E.
The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.
Grade A* does not exist at the level of an individual component.

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November 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0653/03

COMBINED SCIENCE

Paper 3 (Extended Theory)

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1 **(a)** **(i)** smaller (than white cells)/no nucleus/suitable ref to shape;

(ii) clotting/description of clotting;

(b) **(i)** A lymphocyte;

B phagocyte;

antibodies; **[3]**

(ii) lymphocytes/antibodies, are specific (or words to that effect);

antibodies remain (in blood);

lymphocytes multiply so there are more of that type in future;

so bacteria are destroyed before they can, breed/cause illness; **max [2]**

(iii) break down proteins;

to amino acids;

destroys, cell membrane/enzymes/other, in the bacteria; **max [2]**

Total [9]

2 **(a)** glowing splint;

relights; **[2]**

(b) **(i)** filtration/filtering; **[1]**

(ii) water; **[1]**

(iii) 5.0 g;

catalysts are not consumed/words to that effect; **[2]**

(c) **(i)** produces the lowest volume of gas in a given time; **[1]**

(ii) experiment **B**;

experiment **B** has the highest rate/produces gas in shorter time;

the higher the surface area (of the MnO_2) the higher the rate; **max [2]**

Total [9]

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3 **(a) (i)(ii)** lamp lights.;

does not light.;

explanation with reference to transformer; **[3]**

(b) less energy loss/less heat loss/wires can be thinner; **[1]**

(c) **(i)** parallel; **[1]**

(ii) (stay on) still a complete circuit; **[1]**

(iii) $1/R = 1/R_1 + 1/R_2$;

R = 2 ohms; **[2]**

(d) **(i)** goes out – no complete circuit; **[1]**

(ii) 8 ohms; **[1]**

(e) light beam shown reflecting;

parallel to original; **[2]**

Total [12]

4 **(a)** **A**;

D; **[2]**

(b) insect attracted to flower by, colourful/large/scented, petals;

reference to nectar;

pollen brushes onto insect's body; *not 'male gamete'*

pollen deposited on, stigma/E; **max [3]**

(c) **(i)** hanging outside flower/longer filaments; **[1]**

(ii) wind carries pollen in all directions/insects carry pollen to other flowers;

so more pollen wasted with wind pollination;

producing more pollen increases chance of it landing on another flower; **max [2]**

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(d) it produces variation;

which can help to avoid all plants dying from same disease/enable adaptation to changed environment;

or

it produces, seeds/fruits;

which can survive (dormant) in difficult conditions/which can be dispersed; **[2]**

Total [10]

5 **(a)** **(i)** 4; **[1]**

(ii) 10; **[1]**

(b) **(i)** Cu; **[1]**

(ii) reference to need for electrical charge balance; **[1]**

(c) magnesium and zinc more reactive than copper/

silver less reactive than copper; **[1]**

(d) **(i)** (positive on the left)

electrode producing, chlorine/the gas, is positive/anode OR electrode not producing a gas is negative/cathode;

chloride ions going to positive because they are negative/non-metallic;

copper ions going to negative because they are positive/are metallic; **max [2]**

(ii) copper ions have fewer electrons than copper atoms;

two fewer; **[2]**

Total [9]

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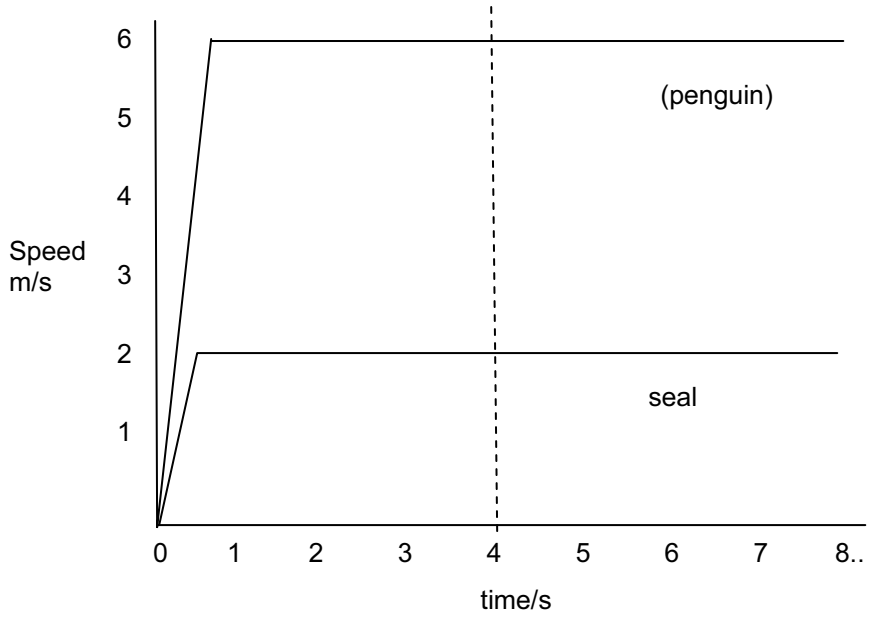
6 **(a)** **(i)** acceleration = change in speed ÷ time;

3.33 m/s^2; **[2]**

(b)



correct gradient; **[2]**

then straight line at 2 m/s;

(c) area under graph clearly being calculated;

21 for penguin and 7.4 for seal; (allow ecf from (b)

difference = 13.6 m; (allow ecf) **[3]**

Total [7]

7 **(a)** web shows all four organisms in correct relationship;

all arrows in correct direction; **[2]**

(b) photosynthesis;

light captured by chlorophyll;

carbon dioxide combined with water to make, glucose/carbohydrate;

energy contained in, glucose/carbohydrate; **max [3]**

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(c) energy lost;

between trophic levels;

as heat/in respiration; **max [2]**

(d) (rain forest has) high species diversity/many different animals/many different plants; (not 'many animals')

may contain plants that could be used as medicines;

trees use carbon dioxide/may help to reduce global warming;

trees produce oxygen; *not 'change carbon dioxide into oxygen'*

trees reduce soil erosion/reduce risk of flooding;

loss may reduce rainfall; **max [2]**

Total [9]

8 **(a)** chlorine

potassium

potassium chloride;; (three correct = 2 one correct =1) **[2]**

(b) **(i)** 2; **[1]**

(ii) equal numbers of protons and electrons; **[1]**

(c) **(i)** $H_2 + Cl_2 \rightarrow 2HCl$;; (formulae and balanced) **[2]**

(ii) numbers of electrons correct;

shared pair shown; **[2]**

Total [8]

9 **(a)** alpha and beta radiations consist of charged particles, gamma is not; **[1]**

(b) (increasing heat) <u>increases</u> the <u>pressure</u>; **[1]**

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(c) convection;

hot water rises/cold water falls;

because it is less dense; **max [2]**

(d) gravity is pulling the satellite towards the Earth;

satellite moving, horizontally/forward, is made to follow a curved path;

at correct speed satellite's path matches curvature of Earth; **[3]**

Total [7]