

MARK SCHEME for the May/June 2014 series

0653 COMBINED SCIENCE

0653/22

Paper 2 (Core Theory), maximum raw mark 80

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, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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- 1 (a) (i) 5(m) ; [1]
- (ii) (speed =) distance / time ;
= 5/0.2 = 25 m/s ; [2]
- (iii) 25 m/s = 25 × 3600 = 90 000 m / hour ;
90 000 m / hour = 90 km / hour (which breaks speed limit of 80 km / h) ; [2]
- (b) (i) arrow pointing backwards, from van, labelled 'friction (from brakes)' ;
arrow pointing backwards, from van, labelled 'air resistance' (owtte) ;
allow friction between tyre and the road [2]
- (ii) converted to heat ; [1]
- [Total: 8]**
- 2 (a) oxygen ;
water ; [2]
- (b) aids buoyancy / helps it to float ; [1]
- (c) allows gaseous exchange ;
lower surface would be under water ; [2]
- (d) root hairs increase surface area / enable more water to be absorbed / collected ;
not needed as roots immersed in / surrounded by water ; [2]
- (e) bacteria (from sewage) ;
used oxygen in pond ;
lack of oxygen suffocated fish / fish died through lack of oxygen ;
sewage is toxic ; [max 3]
- [Total: 10]**
- 3 (a) (i) salt ; A water [1]
- (ii) hydrochloric acid ; [1]
- (b) Cu₂O ; A Cu₄O₂ ; [1]
- (c) (i) oxygen / air ;
water ; [2]

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- (ii) paint/oil/plating/ any other correct method ; A alloy
to exclude oxygen/ air/ water/ explanation matching method ; [2]

[Total: 7]

- 4 (a) carbon dioxide and water ; (both needed, in any order) [1]

- (b) X cytoplasm ;
Y cell membrane ; [2]

- (c) breaks down ;
large/insoluble molecules ;
into small/soluble molecules ;
which can be absorbed ; [max 3]

- (d) running ;
89 ;
Allow ecf from mpt 1 [2]

- (e) as the exercise became more vigorous/faster/harder ;
The pulse (rate) increases ; [2]

[Total: 10]

- 5 (a) (i) metal malleable, non-metal not malleable/ brittle ;
metal electrical conductor, non-metal insulator ;
metal heat conductor, non-metal insulator ;
metal ductile, non-metal not ductile ;
metal lustrous/shiny, non-metal not lustrous/dull ;
metal sonorous, non-metal not sonorous ;
metal high density, non-metal low density ; [max 1]

- (ii) elements become less metallic from Group 1 to 0/left to right/across the
period ; [1]

- (b) (i) sodium hydroxide ;
hydrogen ; [2]
(any order)

- (ii) trend down the group is to lower melting point/other valid response ;
trend down the group is to more vigorous reaction ; [2]

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- (c) sodium atom loses (one) electron ;
 chlorine atom gains (one) electron ;
 allow 2 marks for:
 (one) electron is transferred from the sodium atom to the chlorine atom [2]

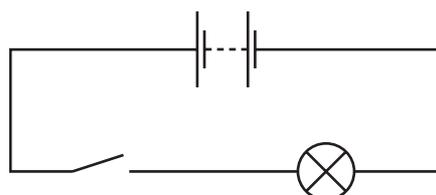
[Total: 8]

- 6 (a) colour ;
 platform ;
 anther ;
 pollen ;
 stigma ; [5]

- (b) rough/sculptured surface/aw ;
 will stick to insect's body/stigma ; [max 1]

[Total: 6]

7 (a)



complete circuit, switch symbol, lamp symbol (all required) ; [1]

- (b) (i) 12 (ohms) ; [1]
 (ii) (current is) increased ; [1]
 (iii) lamps are brighter/if one lamp goes out, the other is still lit/owtte ; [1]

- (c) damaged insulation/unsafe insulation ;
 electric shock/overheating/fire/other reasonable danger ; [2]

- (d) overloaded socket/current too high/overheating/gets too hot ;
 fuse melts and breaks circuit ; [2]

[Total: 8]

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- 8 (a) (i) pH increases ;
contents become less acidic ; [2]
- (ii) carbon dioxide ;
limewater ;
cloudy / milky ; [3]
allow ecf from name of gas
- (b) practical arrangement for collecting gas ;
calibrated apparatus used ; [2]
- (c) (i) steeper initial gradient with same final volume ; [1]
- (ii) greater surface area ;
greater rate of reaction / starts working more quickly ; [2]
- (iii) concentration of acid / pH of acid ;
greater concentration / lower pH causes greater rate of reaction ;
OR
same size of tablet(s) ;
greater surface area causes greater rate of reaction ; [max 2]

[Total 12]

- 9 (a) (i) conduction ; [1]
- (ii) increased insulation / expanded polystyrene is a good insulator / poor conductor of heat ;
stops (heat loss by) convection of air in the gap ; [2]
- (b) 05.00 ; A 06.00 [1]
- (c) (i) convection ; [1]

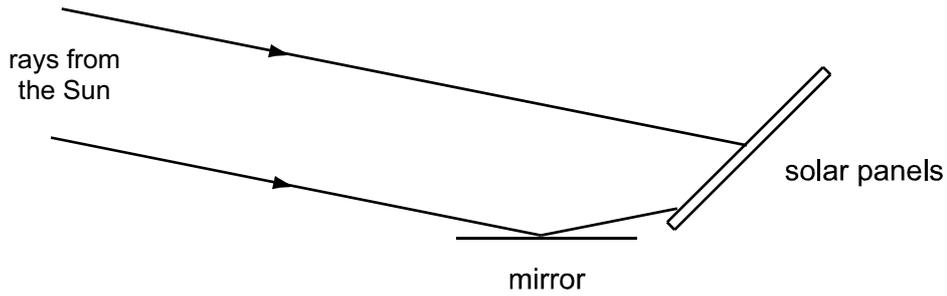
(ii)

	X-rays		visible light	infra-red	microwaves	
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- infra-red ;
correct place in spectrum ; [2]

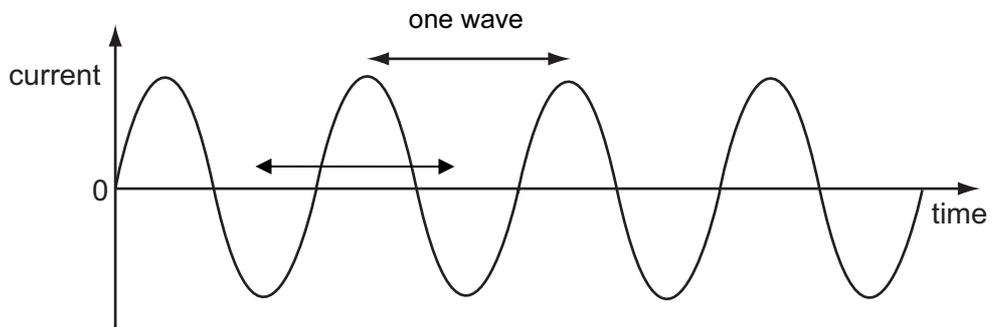
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(d)



direct ray + ray reflected from mirror to solar panel ;
 angle of incidence = angle of reflection as judged reasonable by eye ; [2]

(e) (i) one wave correctly marked and labelled (– example below) ; [1]



(ii) 50 vibrations / oscillations (allow wavelengths) per second ; [1]

[Total: 11]