

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 series

0653 COMBINED SCIENCE

0653/33

Paper 3 (Extended 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.

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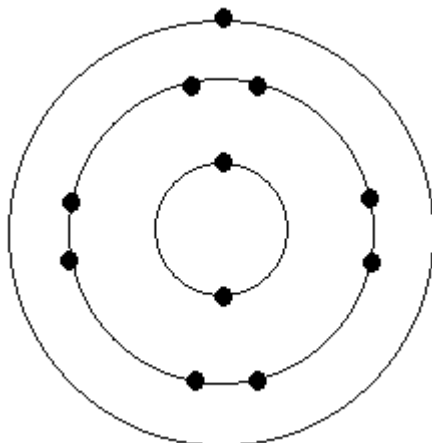
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1 (a) (i) iron has reacted with oxygen in the air / water takes the place of oxygen that has reacted with the iron ; [1]

(ii) iron has not reacted with helium / helium is unreactive ; [1]

(b) (i) same number of electrons ;
same number of electron shells ;
full electron shells / reference to complete outer shell ; [max 2]

(ii)



2,8,1 configuration ; [1]

(iii) sodium atom has lost an electron ; [1]

(iv) (no reaction)
sodium ions have electron configuration with full outer shell / sodium ions do not gain or lose electrons ; [1]

(c) name and use of noble gas ;
property related to use ; [2]

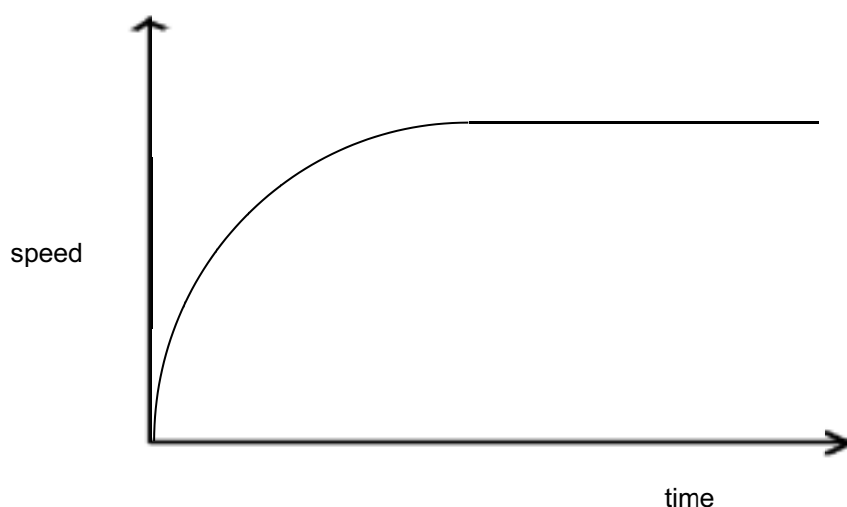
[Total: 9]

2 (a) (i) R, T ; [1]

(ii) T ;
T is the weight of canoe and man / description of downward force due to gravity / the Earth ; [2]

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(iii)



line drawn steepest at first ;
smooth curve levelling off to horizontal ;
horizontal section continuing ;

[3]

(b) (transfers to) thermal (heat)/movement of water / sound ;

[1]

(c) (kinetic energy =) $\frac{1}{2} mv^2$;
 $= \frac{1}{2} \times 250 \times 2 \times 2 = 500$ (J) ;

[2]

[Total: 9]

3 (a) (i) placenta correctly labelled ;
cervix correctly labelled ;

[2]

(ii) glucose ;
carbon dioxide ;

[2]

(iii) amniotic fluid ;
cushions / protects / supports the fetus ;

[2]

(b) (i) amylase ✓ and x ;
protease ✓ and x ;

[2]

(ii) digestion takes place in small intestine / enzymes are secreted here ;
large intestine mainly absorbs water / enzymes not secreted here /
food already digested ;

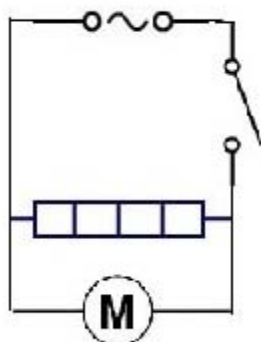
[2]

(c) destroys white blood cells ;
(destroys) T cells ;
reduces / weakens immunity ;

[max 2]

[Total: 12]

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- 4 (a) complete circuit + switch ;
correct parallel connection ; [2]
- (b) water molecules move faster / has increased kinetic energy as they are heated by warm air / owtte ;
attraction forces between more water molecules are broken ;
more water molecules have enough energy to escape (from water / hair) / owtte ;
air flow removes escaped molecules so cannot return to hair / owtte ; [max 3]
- (c) air molecules further apart as temperature rises ;
(heated) air becomes less dense (than surrounding air), so rises ; [2]
- (d) (i) watt(s) ; [1]
(ii) $I = (P/V) = 1100/220 (= 5 \text{ A})$; [1]
- (e) (i) short circuit (accept other reasonable ideas which might lead to fuse melting) ;
e.g. too much current flowing in the circuit ; [1]
(ii) 10 A (no mark)
2 A and 5 A fuses would blow / 10 A is the smallest fuse which will not flow ;
15 A fuse gives less protection than 10 A ; [2]
- [Total: 12]**
- 5 (a) (i) geotropism ; [1]
(ii) makes sure roots grow downwards / does not matter which way up the seed is planted
(the roots will always grow downwards) ;
to anchor plant ;
absorbs mineral ions / water ; [max 2]
- (b) auxins / the hormones inhibit slow down growth ;
retarded cell elongation where shaded / at bottom of the root ;
cells at top grow / expand normally / reference to differential growth ; [max 2]

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- (c) (i) no oxygen therefore slows or stops respiration ; [1]
(ii) slows growth due to less/no energy being released ; [1]

[Total: 7]

- 6 (a) calcium chloride ;
water ; [2]

- (b) (i) carbon dioxide lost from apparatus ;
carbon dioxide gas has mass ; [max 1]

- (ii) rate decreases ;
quickly at first then more slowly/stops at mass 203 g/after 6 minutes ;
(because) acid concentration decreases ;
(because) surface area of calcium carbonate decreases ;
reference to reduced collision frequency ; [max 3]

- (c) (i) 203 g ; [1]

- (ii) particles have more (kinetic) energy/move faster at higher temperature ;
collide more frequently ;
increased chance of successful collision ; [max 2]

[Total: 9]

- 7 (a) (i) visible light ;
radio waves (and) ultra-violet (both required for mark) ; [2]

- (ii) reflection ; [1]

- (b) (i)
- | | | | | | | |
|-----------------|-----|--|--|--|------------|--|
| gamma radiation | X ; | | | | microwaves | |
|-----------------|-----|--|--|--|------------|--|
- [1]

- (ii) X-rays and light will reach the Earth at the same time ;
all electromagnetic radiation travels at same speed (in vacuo) ; [2]

[Total: 6]

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- 8 (a) as the light intensity decreases the rate of photosynthesis decreases / ora ;
not a linear / proportional relationship / numbers taken from graph to illustrate relationship ; [2]
- (b) faster rate with plant **P** (than plant **Q**) or vice versa because it gets more light ;
water / plants / debris prevent some light from reaching plant **Q** ; [2]
- (c) (i) causes surface plants / algae to grow faster ; [1]
- (ii) reduces light to plant **Q** ;
little or no photosynthesis ;
(leading to) reduced growth of plant / plant dies ; [max 2]
- [Total: 7]**
- 9 (a) (i) aluminium / oxygen is an element because it / an element, consists of one
type of atom ;
aluminium oxide is a compound because it / a compound contains different atoms /
elements bonded together ; [max 1]
- (ii) bauxite is a mixture because it has a variable composition / can be separated ;
aluminium oxide is a compound because it contains a fixed proportion of
elements / can only be separated by chemical methods ; [max 1]
- (b) Al_2O_3 ;
idea of balanced charges ; [2]
- (c) aluminium ions migrate / move to / go to are attracted to the negative electrode / cathode ;
electrons flow from cathode to each aluminium ion ;
3 electrons / aluminium ions are discharged ; [max 3]
- (d) carbon is less reactive than aluminium / below aluminium in the reactivity series / aluminium
is more reactive than carbon / above carbon in the reactivity series / copper is less reactive
than carbon ;
carbon will not react with / reduce / remove oxygen from aluminium oxide / carbon will not
displace aluminium ; [2]
- [Total: 9]**