

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

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## **MARK SCHEME for the October/November 2014 series**

### **0653 COMBINED SCIENCE**

**0653/33**

Paper 3 (Extended Theory), maximum raw mark 80

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

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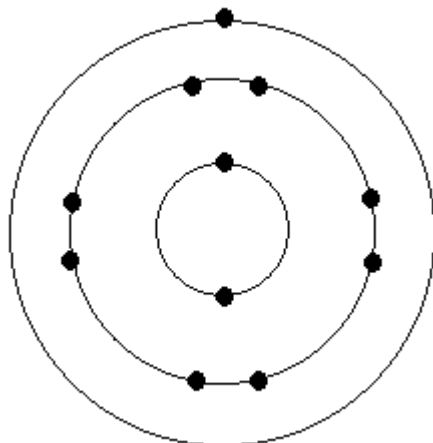
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- 1 (a) (i) iron has reacted with oxygen in the air / water takes the place of oxygen that has reacted with the iron ;
- (ii) iron has not reacted with helium / helium is unreactive ;
- (b) (i) same number of electrons ;  
same number of electron shells ;  
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]

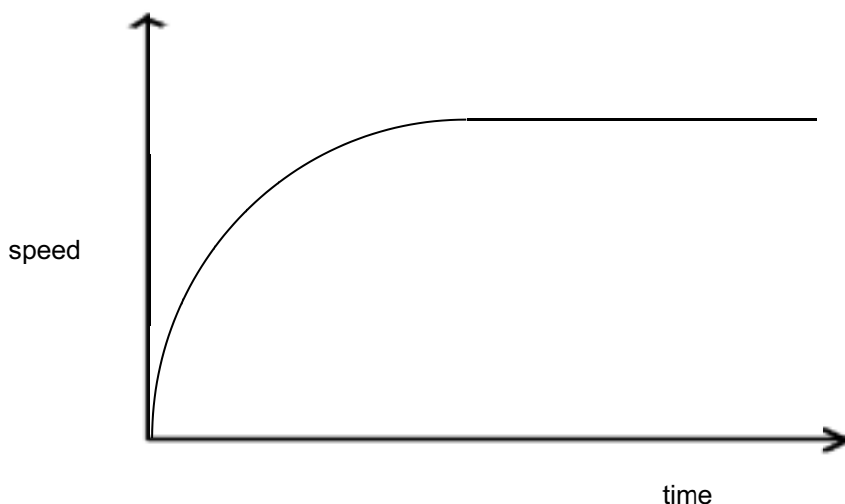
(c) name and use of noble gas ;  
property related to use ; [2]

[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]

(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]

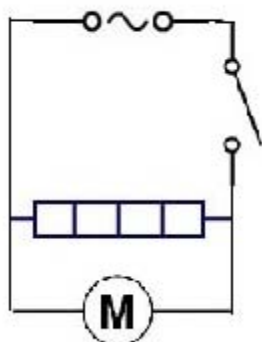
(ii) digestion takes place in small intestine / enzymes are secreted here ;  
large intestine mainly absorbs water / enzymes not secreted here /  
food already digested ;

[2]

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

[max 2]

[Total: 12]



- 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]

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

[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	
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[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 / or a ;  
not a linear / proportional relationship / numbers taken from graph to illustrate relationship ;
- (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]