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

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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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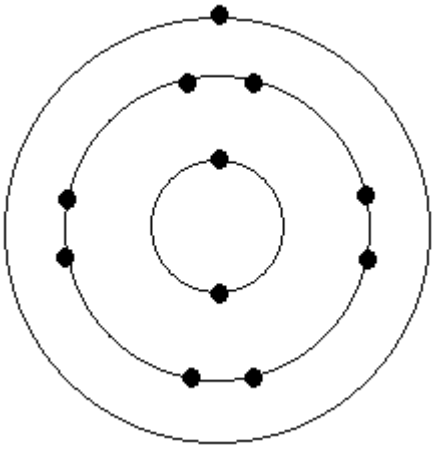
International Examinations

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]

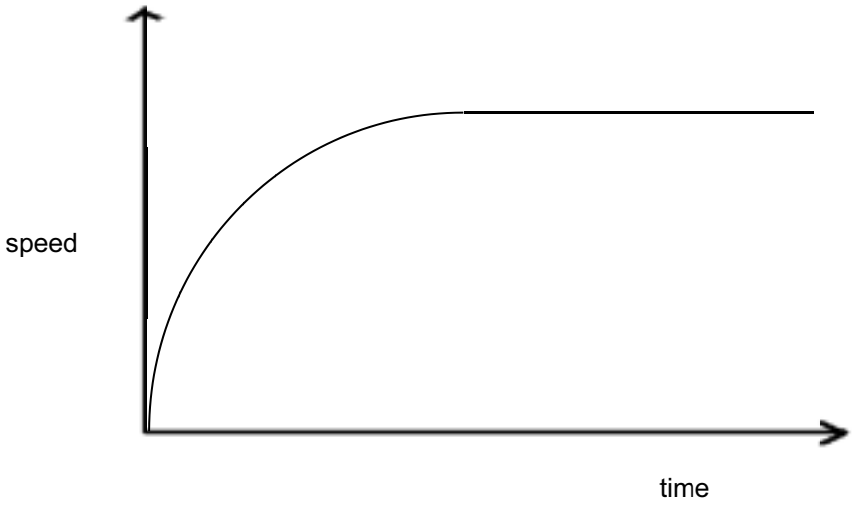
(c) name and use of noble gas ;
property related to use ; [2]

[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]

(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 =) ½ mv^2 ;
= ½ × 250 × 2 × 2 = 500 (J) ; [2]

[Total: 9]

3 **(a)** **(i)** placenta correctly labelled ;
cervix correctly labelled ; [2]

(ii) glucose ;
carbon dioxide ; [2]

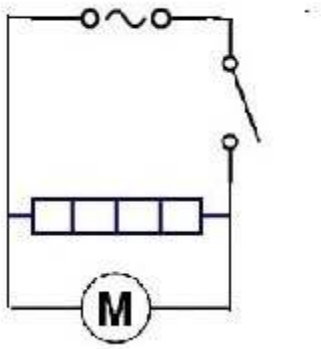
(iii) amniotic fluid ;
cushions / protects / supports the fetus ; [2]

(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 A) ; [1]

(e) **(i)** short circuit (accept other reasonable ideas which might lead to fuse melting) ; [1]
e.g. too much current flowing in the circuit ;

(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 <u>roots</u> 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 <u>cell elongation</u> 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 ; [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]

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 <u>ions</u> 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]