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**COMBINED SCIENCE**

**0653/22**

Paper 2 Core Theory

**May/June 2016**

MARK SCHEME

Maximum Mark: 80

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**Published**

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)

function	name of organ(s)
ingestion	<b>mouth ;</b>
absorption of digested food	<b>small intestine ;</b>
secrete digestive enzymes	<b>salivary glands ; small intestine ; pancreas ;</b> max 2

[4]

(b) plasma ;

[1]

(c) diffusion ;  
from high concentration to low concentration ;

[2]

(d) (i) pH 2.7 allow 0.1 pH tolerance ;

[1]

(ii) activity would disappear ;  
graph shows no activity above pH 4.5 ;

[2]

2 (a) (i) electrolysis ;

[1]

(ii) name: bromine ;  
colour: brown / orange-brown ;

[2]

(b) copper chloride → copper + chlorine ;

[1]

(c) (i) increase ;

[1]

(ii) electron ; proton ; neutron ;

[3]

(iii) no. protons + no. neutrons / number of particles in the nucleus ;

[1]

3 (a) weight / gravitational (force) ; *accept gravity*

[1]

(b) (i) *Either it does not affect the speed (no mark)*  
*weight / force / gravity acts downwards ;*  
*or it decreases the speed of the cart (no mark)*  
*due to friction / frictional forces ;*

[1]

(ii) (average) speed = distance / time (or rearranged) ;  
time = (distance / speed) = 20 / 8 = 2.5 (s)

[2]

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- (iii) horizontal straight line for constant speed /  
slightly sloping line for decreasing speed ;  
smooth sloping line (straight or curved) down to speed = 0 ; [2]
- (c) (from) potential (energy)/gravitational potential (energy) ;  
(to) thermal /heat (energy) ; [2]
- 4 (a) cell membrane ;  
ions ;  
xylem ;  
transpiration ; [4]
- (b) idea of:  
root hair cells are very delicate / fine / are easily damaged (by soil) / owtte ; [1]
- (c) (i) carbon dioxide + water ;  
(→) sugar / glucose + oxygen ; [2]
- (ii) light ;  
supply of carbon dioxide ;  
chlorophyll / chloroplasts ;  
(suitable temperature) ; [max 2]
- 5 (a) (i) fractional distillation ; [1]
- (ii) (compound / molecule) containing hydrogen and carbon ;  
only ; [2]
- (b) (i) methane ; [1]
- (ii) oxygen ; [1]
- (c) (i) C<sub>2</sub>H<sub>5</sub> correct ;  
–O–H correct ; [2]
- (ii) carbon dioxide ;  
water / steam / water vapour ; [2]
- 6 (a) thermal expansion (of sea water) ; owtte [1]
- (b) (i) evaporation ; [1]
- (ii) no effect ;  
decrease / cool ; [2]

(c) (i) radiation ; [1]

(ii)

gamma rays	X-rays		(visible) light	<b>infrared</b>		radio waves
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1. infrared ; – **must** be circled
  2. (visible) light ; – **must not** be circled
- infrared in correct space ;  
light in correct space ;

[4]

7 (a) (i)

organism	producer	consumer	herbivore	carnivore
buzzard		✓		✓
grass	✓			
snail		✓	✓	
thrush		✓		✓

one mark for each correct line ;;;

[3]

(ii) grass → snail → thrush → buzzard  
organisms in correct order ;  
arrows in correct direction ;

[2]

(b) (i) keeping cattle / growing rice / leaving rubbish in dumps / avp ;

[1]

(ii) it is a greenhouse gas / traps heat / infra-red radiation ;  
it contributes to global warming ;

[2]

8 (a) (i) (most reactive) calcium  
zinc  
iron  
copper ;

[1]

(ii) bubbles of gas / fizzing / effervescence / dissolving ;

[1]

(b) (test) aqueous sodium hydroxide / aqueous ammonia ;  
(iron(II) ions) (gelatinous) green precipitate / green solid ;  
(iron(III) ions) brown precipitate / brown solid ;

[3]

(c) (i) exothermic ;

[1]

(ii) 1+ / +1 / Na<sup>+</sup> / Na<sup>1+</sup> ;

[1]

(iii) (sodium atom) loses one / an electron ;

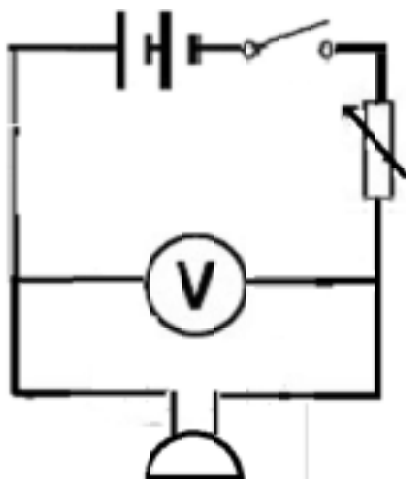
[1]

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9 (a) (i) resistor ; *accept* variable resistance / rheostat [1]

(ii) changes / varies current ;  
 changes / p.d. across the buzzer ; *owtte*  
 changes the resistance in the main circuit ; [max 2]

(iii)



ammeter symbol;  
 ammeter in series with buzzer (any correct point in circuit, *reject* if in the  
 voltmeter branch) ;  
 all else correct (ignore tiny gaps in wiring) ; [3]

(b) use of correct reading off graph at  $6\text{ V} > 0.015\text{ A}$  ;  
 resistance at  $6\text{ V} = 6 / 0.015 = 400\ (\Omega)$  ; [2]

(c) frequency unchanged / remains the same ;  
 amplitude increases ; [2]