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**COMBINED SCIENCE**

**0653/22**

Paper 2 Core Theory

**October/November 2016**

MARK SCHEME

Maximum Mark: 80

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**Published**

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1 (a) radio (waves) in RH box ; [1]

(b) (i) cell / battery ; [1]

(ii) chemical (energy) ; [1]

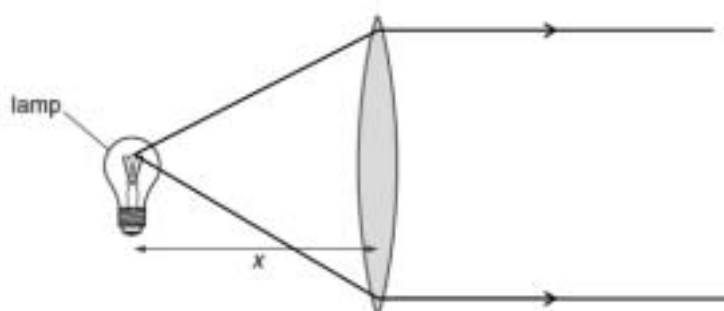
(c) (i) kinetic ;  
sound ; [2]

(ii) (higher pitch) A **and** (larger amplitude) A ; [1]

(d) (i) any one from:  
damp conditions / water ;  
damaged insulation (in unit) ;  
current too high / could overheat / cause a fire ; [1]

(ii) fuse ; [1]

(e) (i)



at least two diverging rays from a point on lamp, then emerging from lens parallel (as shown, arrows not required) ; [1]

(ii) focal length ; [1]

2 (a)  $C_2H_5OH/C_2H_6O$  any order/ $CH_3CH_2OH$  ; [1]

(b) (ethanol) + oxygen  $\rightarrow$  carbon dioxide + water  
LHS ; RHS ; [2]

(c)

	test	result
carbon dioxide	limewater ;	(turns) cloudy ;
oxygen	glowing splint ;	relights ;

[4]

(d) increases ; [1]

(e) fractional distillation ; [1]

3 (a) **A** cell wall ;  
**B** chloroplast ;  
**C** vacuole ; [3]

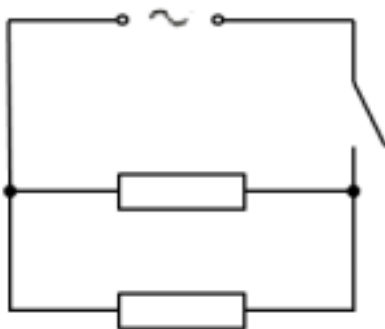
(b) (i) cuticle correctly labelled on diagram ; [1]

(ii) cell drawn right way up in palisade layer ; [1]

(c) sugar /glucose + oxygen ; [1]

(d) carbon dioxide - any two from:  
by diffusion ;  
through the stomata/intercellular spaces ;  
from the air ;  
  
water - any two from:  
through the xylem ;  
from the roots/by the transpiration stream ;  
from the soil ; [4]

4 (a)



resistor **and** switch symbols ;  
 resistors in parallel ;  
 supply, switch, in series ;

[3]

(b) (i) conduction ;

[1]

(ii) density = mass / volume or  $d = m / V$  or  $V = m / d$  or  $128 / 8$  ;  
 =  $16 \text{ (cm}^3\text{)}$  ;

[2]

(iii) (thickness = volume / area =  $16 / 160$ ) =  $0.10 \text{ (cm)}$

[1]

(c)

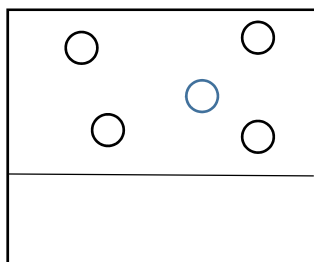


diagram shows example only – look for four similar-sized circles placed randomly apart from each other and from the given circle ;

[1]

(d) metals expand on heating ;  
 brass expands more than steel ;  
 so bends and breaks contact ;

[max 2]

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- 5 (a) anode ;  
cathode ;  
electrolyte ; [3]
- (b) chlorine ;  
copper ; [2]
- (c) (i) copper hydroxide / copper carbonate (/copper sulphide) ; [1]  
(ii) increase temperature / increase concentration / catalyst / decrease particle size ; [1]
- (d) any two from:  
(copper) forms coloured compounds ;  
(copper) has higher melting point / boiling point ;  
copper / copper compounds act as catalyst(s) ; AVP [2]
- (e) (bronze is) harder / stronger ; [1]
- 6 (a) arrow drawn going from plasma into alveolus ; [1]
- (b) (i)  $0.6 \text{ dm}^3$  [1]  
(ii)  $(0.6 \times 3) = 1.8 \text{ dm}^3$  [1]
- (c) became faster ;  
became deeper ; [2]
- (d) any two from:  
muscle contraction ;  
protein synthesis ;  
cell division ;  
growth ;  
passage of nerve impulses ;  
maintenance of body temperature ; [2]

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- 7 (a) (i) newton ; [1]
- (ii) weight / gravitational force ; [1]
- (b) (i) points plotted at (45, 15) and (60, 20) +/- half a small square ;  
graph line extended to at least to (60, 20) ; [2]
- (ii) answer in range 24 (cm) to 30 (cm) ; [1]
- (c) 100 (N) ;  
when cords are fully stretched, no further movement / change in length / forces  
balanced / *owtte* ; [2]
- 8 (a) no new substance made / no chemical reaction occurs ; [1]
- (b) compound / molecule ;  
**any one from:**  
containing hydrogen and carbon ;  
only; [2]
- (c) (refinery gas) heating / cooking ; AVP  
(gasoline) car fuel / petrol ; AVP  
(gas oil) lorry fuel / bus fuel / diesel ; AVP [3]
- (d) C–C bond shown (1)  
fully correct structure (2) ;; [2]

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- 9 (a)** (a network of) interconnected food chains ;  
showing energy flow (through part of an ecosystem) ; [2]
- (b)** Sun ;  
producers ;  
consumers ;  
water flea ;  
turtle ; [5]
- (c) (i)** (algae) increase  
less being eaten ; [1]
- (ii)** (large fish) decrease  
less food ; [1]