



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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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**

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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Page 2	Mark Scheme	Syllabus	Paper
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1 (a) radio (waves) in RH box ; [1]

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

(ii) chemical (energy) ; [1]

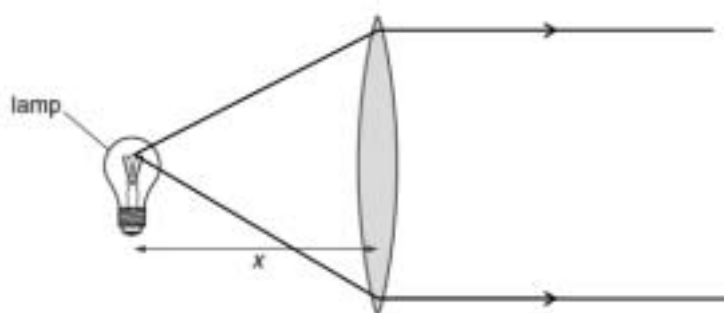
(c) (i) kinetic ;  
sound ; [2]

(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 to lens, then emerging from lens parallel (as shown, arrows not required) ; [1]

(ii) focal length ; [1]

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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]

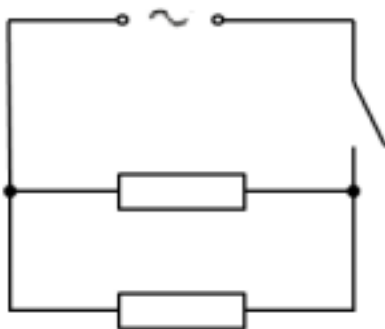
(ii) cell drawn right way up in palisade layer ; [1]

(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]

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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)

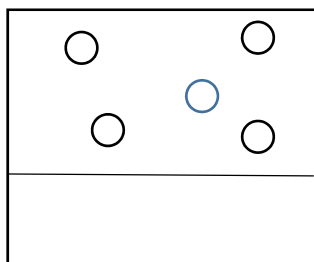


diagram shows example only – look for four similar-sized circles placed randomly apart from each other and from the given circle ;

[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]

Page 7	Mark Scheme	Syllabus	Paper
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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]