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COMBINED SCIENCE

0653/22

Paper 2 Core Theory

October/November 2016

MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **7** printed pages.

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

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

(ii) chemical (energy) ; [1]

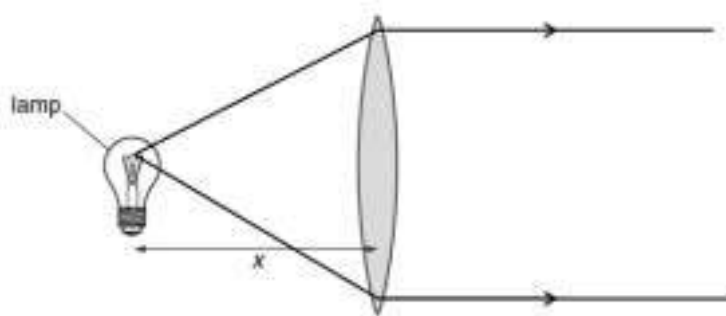
(c) (i) kinetic ;
sound ; [2]

(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 → 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]

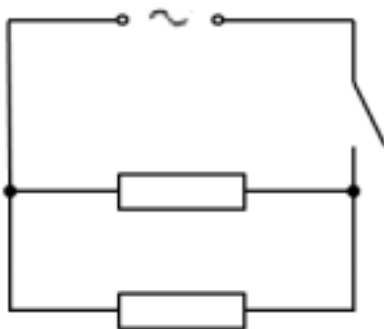
(c) sugar / glucose + oxygen ; [1]

(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 (cm)

[1]

(c)

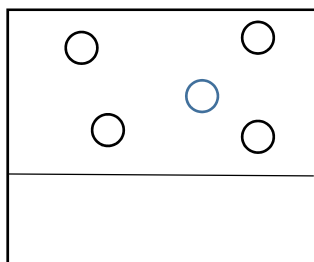


diagram shows example only – look for four similar-sized circles placed randomly apart from each other and from the given circle ;

[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 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]