



COMBINED SCIENCE

0653/23

Paper 2 Core Theory

October/November 2016

MARK SCHEME

Maximum Mark: 80

Published

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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2016	0653	23

- 1 (a) (i) newton ; [1]
(ii) because a force moves through a distance ; *owtte* [1]

- (b) (i) chemical ;
potential / stored (elastic) ;
kinetic ; [3]
(ii) because some energy is still in longbow as e.g. vibration / is lost as
sound / thermal energy / AVR ; [1]

- (c) (i) $180 \text{ km/h} = 180 \times 1000 / 3600 = 50 \text{ m/s}$; [1]
(ii) time = distance / speed ; (or equivalent) OR $100 / 50$
= 2 (s) [2]

2 (a)

<i>particle</i>	<i>number</i>
proton	12
neutron	12

- ;;
2 or 3 correct boxes (1)
4 correct boxes (2) [2]

- (b) oxygen LHS ;
magnesium LHS **and** magnesium oxide RHS ; [2]

- (c) A **and** hydrogen / H₂ [1]

- (d) (i) sodium chloride ;
sodium is a metal **and** chlorine is a non-metal ; [2]

- (ii) water ;
hydrogen **and** oxygen are non-metals ;
or
hydrogen ;
hydrogen is a non-metal ; [2]

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	Cambridge IGCSE – October/November 2016	0653	23

- 3 (a) (i) E vena cava / B pulmonary vein ;** [1]
- (ii) valve ;**
prevents backflow of blood ; [2]
- (iii) oxygen content increases ;**
carbon dioxide content decreases ; [2]
- (b) (i) glucose + oxygen → carbon dioxide + water ;** [1]
- (ii) any two from:**
protein synthesis ;
cell division ;
growth ;
passage of nerve impulses ;
maintenance of a constant body temperature ; [2]
- (c) any suitable activity, e.g. walking and**
activity is more energetic/active/uses more oxygen than sitting but less
energetic/active/uses less oxygen than running ; [1]

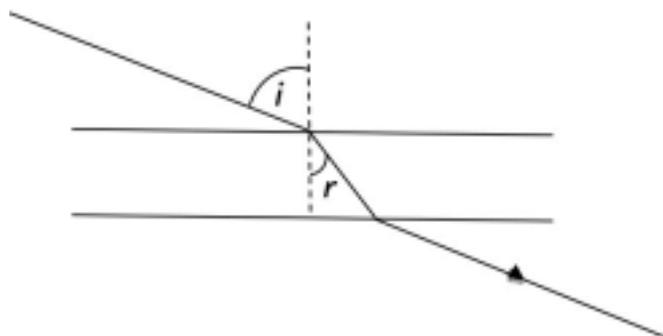
- 4 (a) infra-red ;**

gamma radiation		ultra-violet		infra-red		radio waves
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in correct box ; [2]

- (b) radiation ;**
convection ; [2]
- (c) any reasonable description of good insulation around tank ;** [1]
- (d) any reasonable description of thermal expansion ;** [1]
- (e) any reasonable problem caused by water freezing/ice forming ;** [1]

(f)



ray from air to glass bent towards normal ;
 both angles marked correctly ;
 exit ray into vacuum roughly parallel to incident ray ;

[3]

5 (a)

ion	reagent	result
<i>copper(II)</i>	NaOH/NH ₃ (aq) ;	(light) blue ppt / solid ALLOW dark_blue solution if NH ₃ used ;
<i>chloride</i>	AgNO ₃ ;	white ppt / solid ;

[4]

(b) (i) cathode ; anode ;
 electrolyte ;
 3 correct (2)
 1 or 2 correct (1)

[2]

(ii) copper ;
 brown / pink ;

[2]

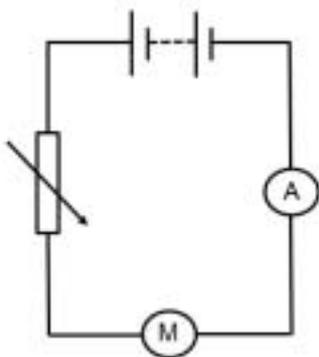
(iii) (chlorine) (pale) green ;
 (litmus) white / bleached ;

[2]

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- 6 (a) (i) **F** stigma / carpel ;
G sepal ; [2]
- (ii) any anther correctly labelled ;
contains the male gamete / pollen [2]
- (iii) any one from:
large / brightly-coloured petals ;
scented ;
presence of nectar ; [1]
- (b) (i) any two from:
increased rate of transpiration (at 27 °C) ;
(due to) increased rate of evaporation / more water loss from plant ;
molecules have more kinetic energy ; [2]
- (ii) any value less than 1.1 cm because the rate of evaporation / transpiration is
lower in humid conditions ; [1]
- (c) (i) root **1 and**
it has root hairs cells (for absorption of water) ; [1]
- (ii) line drawn across the root through the cortex to the stele ;
line finishes in the xylem ; [2]
- 7 (a) (i) 50 (cm) ; [1]
- (ii) correct arrow ; [1]

(b)

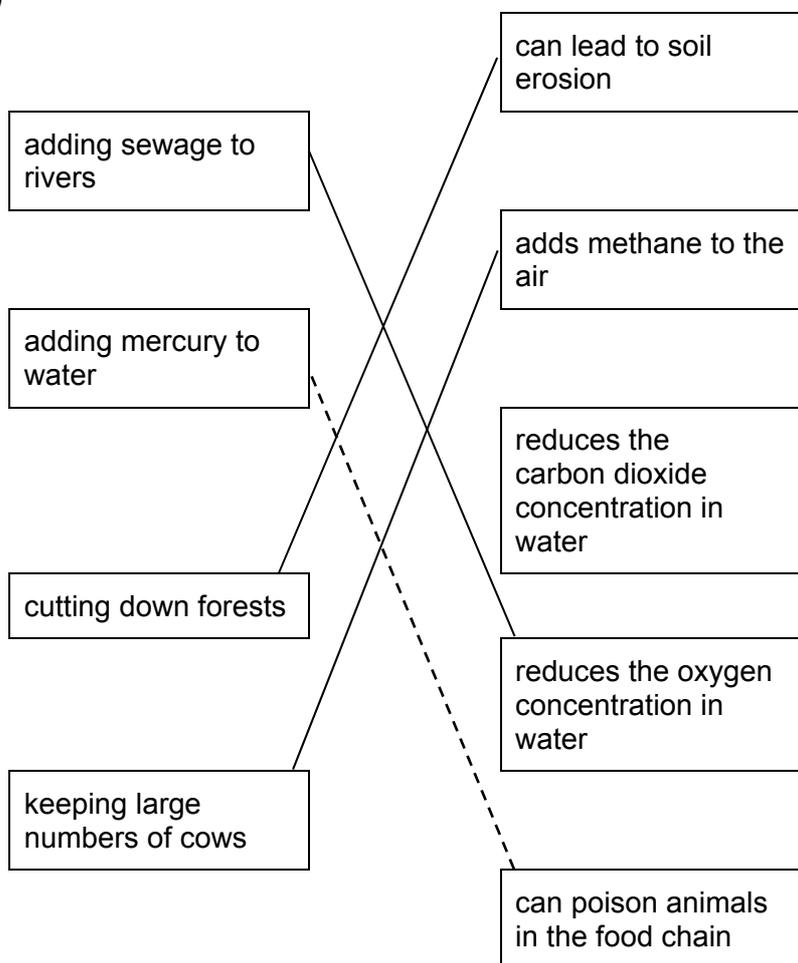


variable resistor symbol ;
ammeter symbol ;
all connected in series to form a complete circuit ; [3]

- (c) (i) resistance ; [1]
- (ii) $(3/2 =) 1.5$;
ohm(s) / Ω ; [2]

- 8 (a) process **B** filter(ing)/filtration ; [2]
 process **C** evaporation/ crystallisation ;
- (b) increase concentration (of acid); [2]
 increase temperature ;
- (c) (i) sodium sulfate/Na₂SO₄ ; [2]
 carbon dioxide/CO₂ ;
- (ii) (pH number) increases/ goes to 7 ; [1]
- (iii) three/3 ; [1]

9 (a)



[3]

- (b) (i) burning fossil fuels / deforestation ; [1]
- (ii) causes the temperature of the atmosphere to rise / global warming / carbon dioxide is a greenhouse gas ; [2]
 consequence, e.g. flooding / melting ice caps / changes in weather patterns ;
 AVP