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COMBINED SCIENCE **0653/23**

Paper 2 Core Theory **October/November 2016**

MARK SCHEME

Maximum Mark: 80

Published

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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 km / h = 180 × 1000 / 3600 = 50 m / s ; [1]

(ii) time = distance / speed ; (or equivalent) OR 100 / 50
= 2 (s) [2]

2 (a)

particle	*number*
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 / H_2 [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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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

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]

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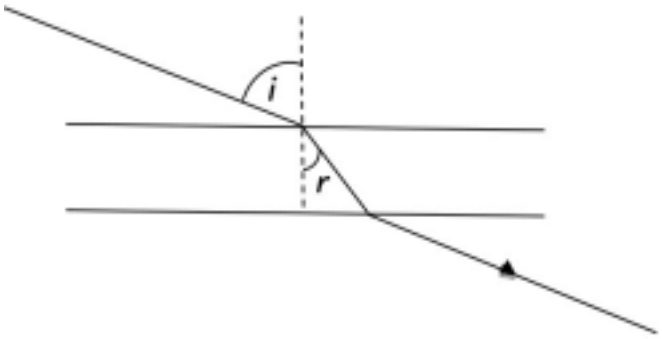
(f)



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*
copper(II)	NaOH / NH_3(aq) ;	(light) blue ppt / solid ***ALLOW*** dark_blue solution if NH_3 used ;
chloride	$AgNO_3$;	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]

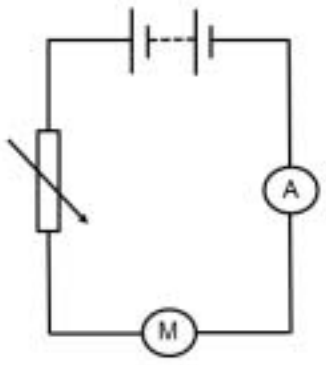
(c) (i) root **1 and**
it has root hairs cells (for absorption of water) ; [1]

(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]

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8 **(a)** process **B** filter(ing) / filtration ;
process **C** evaporation / crystallisation ; [2]

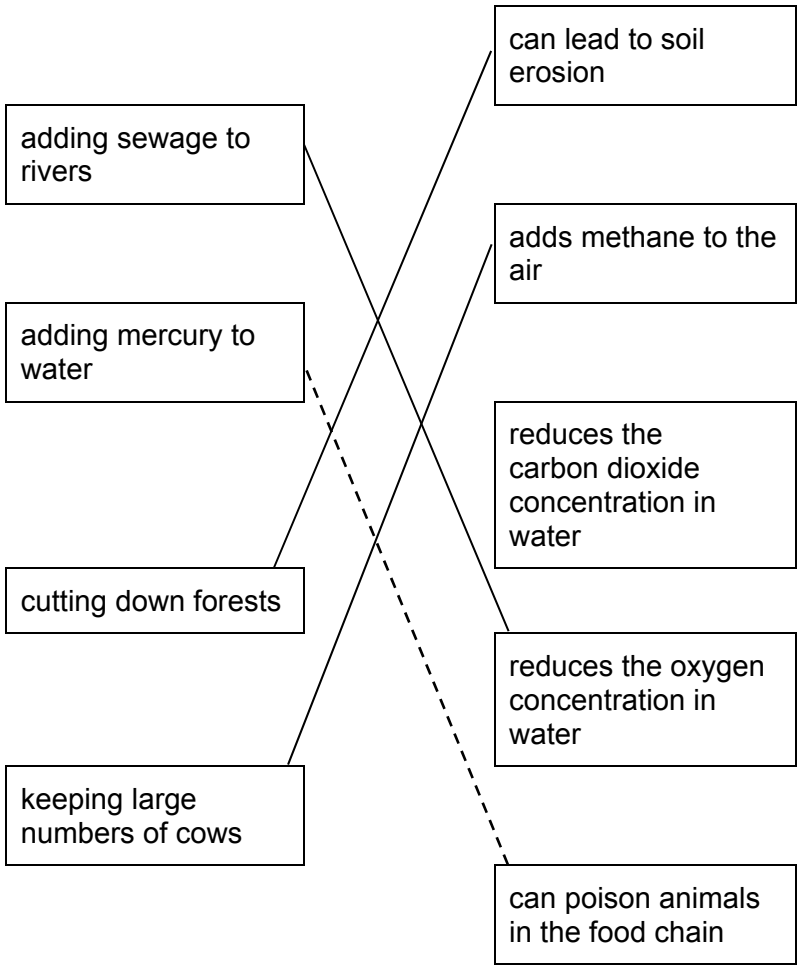
(b) increase concentration (of acid);
increase temperature ; [2]

(c) **(i)** sodium sulfate / Na_2SO_4 ;
carbon dioxide / CO_2 ; [2]

(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 ;
consequence, e.g. flooding / melting ice caps / changes in weather patterns ;
AVP [2]

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