Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE **0653/21**

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

MARK SCHEME

Maximum Mark: 80

Published

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1 **(a)** **(i)** light / radiation (energy) ;
kinetic (energy) ; [2]

(ii) (average) speed = distance / time OR 900 / 12 ;
75 (cm / s) ; [2]

(iii) any two from:
volume/s = cross-sectional area × speed / volume = length × cross-sectional area ;
75 × 10 ;
× 60 (s) seen ;
and
45 000 cm^3 ; [3]

(b) wind energy / hydro-power / AVA ;
use to turn a turbine (wind or water); [2]

2 **(a)** **(i)** electron ;
proton ; [2]

(ii) 23 ; [1]

(b) **(i)** electron loss ;
one (electron lost) ; [2]

(ii) oxidation [1]

(iii) exothermic [1]

(iv) Na_2O ; [1]

(c) **(i)** increases ; [1]

(ii) decreases ; [1]

3 **(a)** **(i)** oxygen ;
suitable temperature ; [2]

(ii) geotropism ; [1]

(b) seedlings get maximum amount of / more light ;
for photosynthesis ; [2]

(c) **(i)** xylem ; [1]

(ii) no leaves present ;
therefore no transpiration ; [2]

(iii) any two from:
more humid ;
lower temperature ;
darker ; [2]

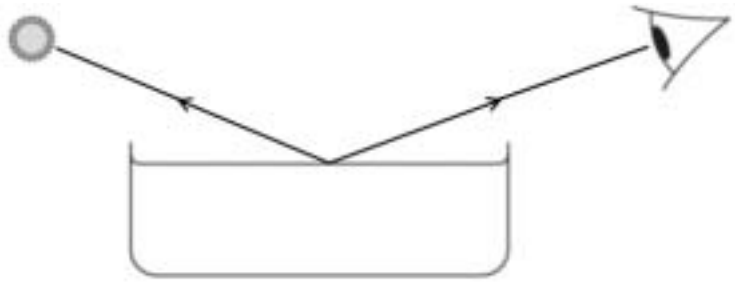
4 **(a)** **(i)** evaporation ; [1]

(ii) infra-red ; [1]

(iii) (thermal energy from Sun) causes water molecules to move faster / gain more kinetic energy ;
(more) molecules moving fast enough / have enough energy to escape (surface) ; [2]

(iv) 10+ more molecules drawn touching below water level ;
in random arrangement ; [2]

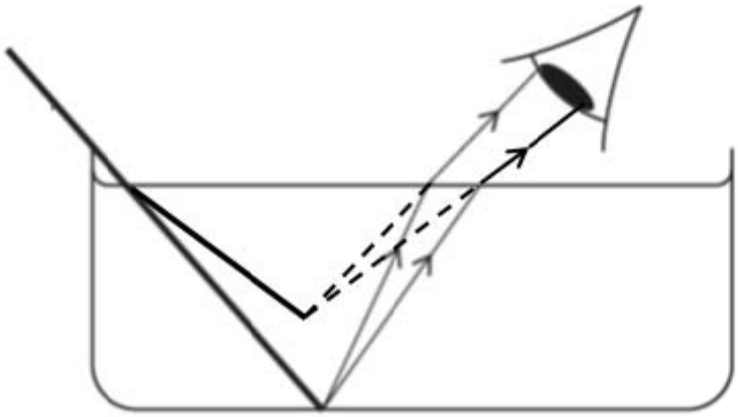
(b)



ray from Sun reflected at surface to eye ;
angles of incidence and reflection look equal (by eye) **and** (at least) one arrow ; [2]

(c) **(i)** Second diverging ray refracted to eye ; [1]

(ii) rays to eye projected back and converge and image drawn ; [1]

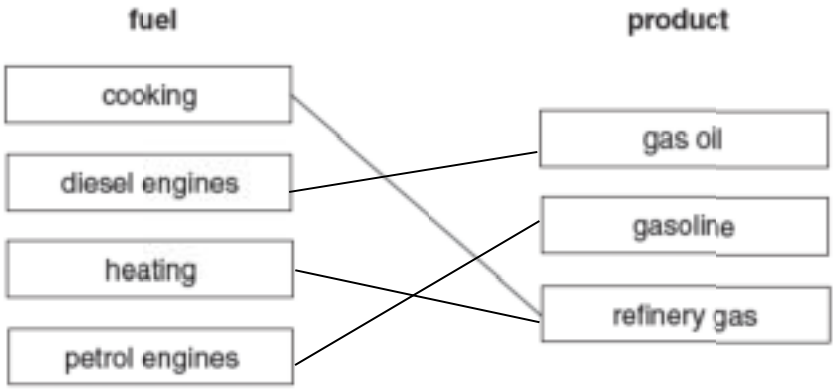


(d) microwaves ; [1]

5 **(a)** **(i)** fractional distillation ; [1]

(ii) **refinery gas / (bottled gas)**
gasoline / (petrol)
(kerosine)
gas oil / (oil)
(fuel oil)
(bitumen)
; ;
three correct is 2 marks, one or two correct is 1 mark [2]

(iii)



1 mark for each correct ;;; [3]

(b) (i) C=C double bond and all four C–H bonds correct ; [1]

(ii) carbon dioxide / CO_2 ; [1]

(iii) test: cobalt chloride (paper) ;
result: (blue to) pink ;
or
test: copper sulfate ;
result: (white / anhydrous to) blue ; [2]

6 (a) (i) vitamins / named vitamin ;
prevent diseases / named disease / role of named vitamin ; [2]

(ii) respiration; [1]

(iii) carbohydrates, fat and protein ;;
all correct is 2 marks, two correct is 1 mark [2]

(iv) fruit / vegetables / correctly named fruit or vegetable ; [1]

(b) digestive ;
methane ;
greenhouse ;
global warming ; [4]

7 (a) electrons ;
stays the same ; [2]

(b) (i) variable resistor ; [1]

(ii) increase / decrease the resistance ;
decreases / increases the speed ; [2]

(iii) correct circuit symbol connected across motor only ; [1]

8 (a) proton ;
metallic **and** non-metallic ;
high **and** high ; [3]

(b) (i) iron
calcium
magnesium ;;
3 correct is 2 marks, 2 correct is 1 mark [2]

(ii) magnesium oxide / magnesium carbonate /
magnesium hydrogen carbonate / magnesium hydroxide
/ magnesium sulfide **or** correct formula ; [1]

(c) chlorine / Cl_2 ; [1]

9 **(a)** ovary correctly labelled ;
oviduct correctly labelled ; [2]

(b) **(i)** attaches to the wall ;
of the uterus ; [2]

(ii) rich blood supply / good source of nutrients / suitable temperature ; [1]

(c) Any two from
sexual intercourse
sharing needles
blood transfusions
(from mother to baby) at birth
(from mother to baby) during breast feeding
avp ;; [2]