



COMBINED SCIENCE

0653/32

Paper 3 Extended Theory

October/November 2016

MARK SCHEME

Maximum Mark: 80

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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2016 series for most Cambridge IGCSE[®], Cambridge International A and AS Level components and some Cambridge O Level components.

Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2016	0653	32

1 (a) (i) X-rays (no mark)
reference to highest frequency / $v = f\lambda$ / as f increases, λ decreases ; [1]

(ii)

	X-rays	ultra-violet		infra-red		radio waves
--	--------	--------------	--	-----------	--	--------------------

radio (waves) in correct box ; [1]

(b) (i) 3×10^8 m/s because all e/m waves travel at same speed ; [1]

(ii) $v = f\lambda$;
 $\lambda = 3 \times 10^8 / 200 \times 10^6 = 1.5$ (m) ; [2]

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

(ii) (higher pitch) A **and** (larger amplitude) A ; [1]

(d) closer together in compression / further apart in rarefaction ; [1]

2 (a) atomic / proton (number) ; [1]

(b) (i) F ;
H ;
B, E, F (any order) ; [3]

(ii) high density ;
high melting point ;
coloured compounds ;
(act as) catalysts ;
(also allow any general metal property) [max 2]

(c) $3+ / Al^{3+}$;
 $2- / O^{2-}$; [2]

(d) Mg_3N_2 ; [1]

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2016	0653	32

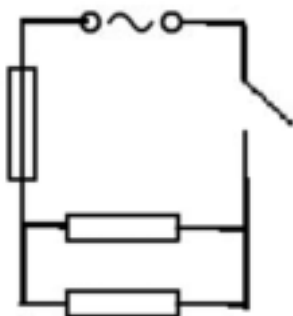
3 (a) from the top, label lines going to
the nucleus ;
the cell membrane ;
the cytoplasm ; [3]

(b) (i) contains chloroplasts ;
which contain chlorophyll ;
which trap sunlight/absorb light energy ;
and turn light energy into chemical energy ; [max 2]

(ii) $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
formulae ;
balancing ; [2]

4 (a) (i) length ; [1]

(ii)



a.c. supply, fuse, resistor, switch symbols ;;
(any 2 correct, 1 mark; all 4 correct 2 marks)
resistors in parallel ;
supply, switch, fuse all in series, fuse controlling both parallel branches ; [4]

(b) distance between molecules in gas greater than in liquid ;
reference to increase in (steam) pressure/pressure forces steam out ; [2]

(c) metals expand on heating ;
brass expands more than steel ;
so bends and breaks contact ; [max 2]

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2016	0653	32

- 5 (a) stopwatch / timer ; [1]
- (b) (i) CO₂/gas produced/lost from the reaction ;
CaCO₃ used up/no CaCO₃ left ; [2]
- (ii) steeper initial line starting at same point ;
levels off at same mass ; [2]
- (iii) increases ;
more effective/successful collisions between particles /
particles collide more often/more chance of collisions ;
[max1] if no reference to both particles and collisions. [2]
- (c) (1st) filtration ;
(2nd) evaporation/heating/crystallisation ; [2]
- (d) (1st) chlorine and calcium identified ;
(2nd) at correct electrodes ; [2]
- 6 (a) (i) arrow drawn going from plasma into alveolus ; [1]
- (ii) thin wall ;
good blood supply/many capillaries ;
large surface area (of alveolus) ;
moist surface ; [max 2]
- (b) (i) 0.6 dm³ ; [1]
- (ii) (0.6 × 3 =) 1.8 (dm³) ; [1]
- (c) (i) became faster ;
became deeper/owtte ; [2]
- (ii) to get more oxygen (to the cells) ;
for respiration ;
to release energy/for muscle contraction ;
to remove carbon dioxide more quickly ; [max 3]

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2016	0653	32

- 7 (a) weight of ball (+ cords) ;
effect of Earth's gravitational field (*accept* gravity) on mass of ball etc ;
(*allow* both marks if second point is made without first) [2]
- (b) (i) (total) upward force increases in proportion to / with extension / in accordance with Hooke's Law ; [1]
- (ii) 100 (N) ;
when cords are fully stretched, no further movement / change in length / forces balanced ; [2]
- (c) (i) $(KE =) \frac{1}{2} mv^2 / \frac{1}{2} \times 0.055 \times (20)^2 ;$
 $= 11 \text{ (J)} ;$ [2]
- (ii) PE gained = KE lost = $mgh / h = 11 \div (0.055 \times 10) ;$
 $= 20 \text{ (m)} ;$ [2]
- 8 (a) wood ; [1]
- (b) (i) reference to difference in molecular size ;
reference to difference in intermolecular forces (of attraction) ; [2]
- (ii) $C_8H_{18} ;$ [1]
- (iii) cracking ; [1]
- (iv) test bromine / bromine water ;
propene result decolourises
and
octane result no change ; [2]

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2016	0653	32

- 9 (a)** Sun ;
environment ;
water flea ;
turtle ; [4]
- (b)** two food chains correctly written (at least as far as the small fish) showing small fish in different trophic levels ;
ref. to small fish at level 3 or 4 in the chosen food chains ; [3]
- (c)** eutrophication ;
reference to
increased algal/surface plant growth ;
restricted light ;
failure of photosynthesis (in underwater plants) ;
death/decomposition of underwater plants ;
removal of oxygen from water (by respiring decomposers) ;
death/suffocation of underwater animals ; [max 2]