

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0654 CO-ORDINATED SCIENCES

0654/23

Paper 2 (Core Theory), maximum raw mark 120

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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	23

- 1 (a) (i) fat ;
protein ;
calcium ; [max 2]
- (ii) iron ; [1]
- (iii) has more fat ; [1]
- (b) (i) (1.50)
15 ;
6 ; [2]
- (ii) no, because large amount is needed to meet vitamin C requirement ; [1]
- (iii) bleeding gums ;
poor skin/bruising ;
scurvy ; [max 2]
- (c) (i) prevents constipation/promotes peristalsis ; [1]
- (ii) (named) cereal grain/fruit/vegetable ; [1]
- [Total: 11]**

- 2 (a) (i) idea of greater precision/accuracy ; [1]
- (ii) neutralisation ; [1]
- (iii) salt ;
water ; [2]
- (b) (i) (first 35 cm³) decreased slowly/decreased from pH 13 to 12 ;
(next 10 cm³) decreased rapidly/more quickly/decreased from pH12 to 2 ; [2]
- (ii) 40 (cm³) ;
evidence of finding the volume at pH = 7 ; [2]
- (iii) take same amount/20.0 cm³ of alkali ;
add 40 cm³ of the acid (allow ecf from (ii)) ; [2]
- (iv) white solid/solid sodium chloride ; [1]
- [Total: 11]**

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	23

3 (a) (i)

(gamma)	X-rays	ultraviolet	(visible)	infra-red	(microwaves)	radio waves
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(all four correct 2 marks, any two correct 1 mark) ;; [2]

(ii) microwaves ; [1]

(b) (i) label line at base of fire / label line where both rays meet ; [1]

(ii) 55 (mm) \pm 1 mm ; [1]

(c) particles constantly in motion ;
collide with walls of container ;
force of collisions exerts a pressure ; [max 2]

(d) weight (of penguin) ;
(surface) area of foot / feet ; [2]

(e) diagram **B** (no mark) particles are touching and randomly arranged ;
(if **A** or **C** – 0 marks even with correct explanation) [1]

[Total: 10]

4 (a) (i) magnesium + carbon dioxide \rightarrow magnesium oxide + carbon ; [1]

(ii) oxidation is gain of oxygen and reduction is removal of oxygen ;
magnesium gains oxygen and is oxidised ;
carbon dioxide loses oxygen and is reduced ; [max 2]

(b) (i) anode clearly labelled ; [1]

(ii) chlorine ;
 Cl_2 ; [2]

(c) (i) carbon ;
carbon dioxide ; [2]

(ii) test the electrical conductivity of the product / lead will conduct electricity ; [1]

[Total: 9]

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	23

- 5 (a) (i) asexual ; [1]
- (ii) no gametes / fertilisation involved ;
genetically identical ; [max 1]
- (b) (i) photosynthesis ; [1]
- (ii) sexual reproduction ; [1]
- (c) (i) anther / stamen ; [1]
- (ii) sepal ; [1]
- (d) because the fruits develop from the flowers ; [1]

[Total: 7]

- 6 (a) (i) crosses (X) marked on graph at 13–14 s, 71 s, 105 s and 150 s ; [1]
- (ii) 13–14 (s) ; [1]
- (iii) 20 (s) ; [1]
- (iv) **C–D or G–H** ;
graph goes down ; [2]
- (b) (i) thermal energy produces increased particle vibration ;
particle vibration is passed on from particle to particle ;
metals are good thermal conductors ; [max 2]
- (ii) gas around filament heats up / gas expands ;
gas rises / gas less dense ; [2]
- (iii) *wavelength*: distance between two waves ;
but distance between two peaks / two troughs / two identical points on consecutive waves ;
frequency: number of waves produced per second / number of waves passing a fixed point per second ; [3]
- (c) (i) $(\text{current}) = \frac{\text{voltage}}{\text{resistance}} ;$
 $= \frac{12}{4} = 3 \text{ (A)} ;$ [2]
- (ii) 8 (Ω) ; [1]

[Total: 15]

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	23

7 (a) xylem ; [1]

(b) evaporation of water ;
 from surfaces of mesophyll cells ;
 followed by loss of water vapour ;
 by diffusion ;
 out through stomata ; [max 4]

(c) (i) (coloured) water does not move as far ; [1]

[Total: 6]

8 (a) petroleum ;
 fractional distillation ; [2]

(b) (i) carbon dioxide ;
 water ; [2]

(ii) reference to carbon monoxide/incomplete combustion ;
 which are toxic/which could poison people ; [2]

(c) (i) hydrocarbon will decolourise bromine ;
 if it is unsaturated ; [2]

(ii)

$$\begin{array}{c}
 \text{H} \quad \quad \text{H} \\
 \diagdown \quad \diagup \\
 \text{C} = \text{C} \\
 \diagup \quad \diagdown \\
 \text{H} \quad \quad \text{H}
 \end{array}
 ;$$

carbon – carbon double bond ;
 4 × H **and** all else correct ; [2]

[Total: 10]

9 (a) no resultant force because constant speed ; [1]

(b) three straight lines ;
 horizontal lines from boat and into eye ;
 internal reflection shown at both prisms ; [3]

(c) (i) lead / concrete / aluminium ; [1]

(ii) geiger counter / GM tube, etc. ; [1]

[Total: 6]

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	23

- 10 (a) (i)** deforestation ; [1]
- (ii) logging ;
building of roads / towns / factories ;
farming ;
fuel ; [max 2]
- (b)** control of hunting / nature reserve / conservation area ;
(captive) breeding programmes ;
alternatives to timber / control of deforestation / replanting ;
AVP ; [max 2]
- (c) (i)** grow / photosynthesise more (because not eaten by okapis) ; [1]
- (ii) have less food / must find alternative food sources ;
(*accept: more competition for food / migration*) [1]
- [Total: 7]**
- 11 (a) (i)** neon ; [1]
- (ii) proton / atomic number / number of electrons ; [1]
- (iii) 9 protons ;
10 neutrons ; [2]
- (b) (i)** sodium chloride ; [1]
- (ii) reference to loss of electron(s) / loss of outer shell ; [1]
- (iii) balance of charge / protons and electrons in the atom ;
excess of electrons in the ion / gains electrons ; [2]
- (c)** silver nitrate ;
white precipitate ; [2]
- [Total: 10]**
- 12 (a) (i)** 5000000 (N) ; [1]
- (ii) need positive resultant, for upward motion / acceleration ; [1]
- (iii) chemical, thermal (heat), kinetic ;
(*all three for 2 marks, any two for 1 mark*) [2]

Page 7	Mark Scheme	Syllabus	Paper
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(b) (i) sound waves cannot travel through space/vacuum or sound waves need a medium ; [1]

(ii) $\text{speed} = \frac{\text{distance}}{\text{time}}$;
 $= \frac{225\,000\,000}{750} = 300\,000 \text{ (km/s)}$; [2]

(c) (i) ionising radiation that humans are exposed to/radiation that is always there ; [1]

(ii) rocks ; [1]

[Total: 9]

13 (a) (i) increased rate of breathing ;
increased depth of breathing / volume of breaths ; [2]

(ii) less oxygen / O_2 ; (*reject: no oxygen*)
more carbon dioxide / CO_2 ;
more water vapour ;
warmer ; [max 2]

(b) (i) increased heart / pulse rate ;
increased blood glucose ;
AVP ; [max 2]

(ii) chemical / substance produced by a gland ;
carried in the blood ;
alters the activity of target organ(s) ;
destroyed by the liver ; [max 3]

[Total: 9]