

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0654 CO-ORDINATED SCIENCES

0654/21

Paper 2 (Core Theory), maximum raw mark 120

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 2015 series for most Cambridge IGCSE[®], Cambridge International A and AS Level components and some Cambridge O Level components.

© IGCSE is the registered trademark of Cambridge International Examinations.

Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	21

- 1 (a) (i) 5 ; [1]
- (ii) neutron ; [1]
- (iii) electron ; [1]
- (b) decreases ;
because elements change from metals to non-metals ; [2]
- (c) (i) covalent ; [1]
- (ii) it would be slower / it would not work ; [1]
- (d) (i) nitrogen ; [1]
- (ii) phosphorus **and** potassium ; [1]
- [Total: 9]**
- 2 (a) X = chloroplast ;
Y = nucleus ; [2]
- (b) carbon dioxide / CO₂ ;
water ; [2]
- (c) (oxygen) from photosynthesis ;
(CO₂) from respiration ; [2]
- (d) (i) transport (of water / minerals) / support ; [1]
- (ii) dead / no chloroplasts ; [1]
- [Total: 8]**
- 3 (a) point has small area and therefore high pressure therefore sinks in ;
disc / ski has large area therefore small pressure therefore doesn't sink in ; [2]
- (b) (i) sound waves are reflected ; [1]
- (ii) 166 (m) ; [1]
- (iii) (speed =) $\frac{\text{distance}}{\text{time}}$;
= $\frac{166}{0.5} = 332 \text{ (m/s)}$; (*allow ecf from (ii)*) [2]

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	21

- (c) (i) (B – no mark)
particles are touching and randomly arranged ; [1]
- (ii) (A – no mark)
particles are touching and regularly arranged ; [1]
- (d) liquid particles gain kinetic energy and move faster ;
fastest particles are able to overcome forces of attraction forces ;
fastest/most energetic/with most KE particles escape from liquid ; [max 2]
- [Total: 10]**
- 4 (a) not expressed in the presence of the dominant allele / not expressed when heterozygous ;
allele requires the identical allele to be seen ; [max1]
- (b) (i) NN, nn ; [1]
- (ii) Nn ; [1]
- (c) normal, normal ;
Nn, Nn ;
N, n, N, n ;
NN, Nn, Nn, nn (in Punnett square) ;
3:1 ; [max 4]
- (d) less able to find food / find a mate / escape predators ;
so, less likely to survive / reproduce ; [2]
- [Total: 9]**
- 5 (a) (i) W ;
contains nitrogen (with C, H and O) ; [2]
- (ii) Y and Z ;
contain **only** hydrogen and carbon ; [2]
- (b) (i) ethene molecules contain double bond and / or ethane all single bonds ; [1]
- (ii) (with ethane) no change / no reaction ;
(with ethene) bromine solution decolourised ; [2]
- (c) (i) (addition) polymerisation / self addition ; [1]
- (ii) poly(ethene) / polyethene / polythene ; [1]

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	21

- (d) (i) carbon dioxide ; [1]
- (ii) goes milky / goes milky then clears ; [1]
- [Total: 11]**
- 6 (a) rays of light pass through optical fibre ;
angles approximately correct and all reflections occurring on fibre wall ; [2]
- (b) chemical ;
kinetic ; [2]
- (c) less ionising so less damage caused to tissue / can pass through tissue / not absorbed by tissue ; [max 1]
- (d) X-rays;
viewing bones in the body ;
(allow any correct electromagnetic wave and use) [2]
- [Total: 7]**
- 7 (a) any part of the nervous system except brain / spinal cord ; [1]
- (b) (i) response to a stimulus / response to protect body;
immediate / automatic / without conscious thought ; [2]
- (ii) carry impulses / AW from receptors to CNS ;
carry impulses / AW from CNS to effectors / muscle ;
reference to sensory neurons / motor neurons ; [max 2]
- (c) (carried) in the blood ;
destroyed by the liver ; [2]
- [Total: 7]**
- 8 (a) (i) weaker / less attraction where filler is ; [1]
- (ii) no – aluminium is not magnetic ; [1]
- (iii) positive paint droplets attracted to negative panel because opposite charges attract ;
paint droplets repel each other and spread out because like charges repel ; [2]

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	21

- (b) (i) all symbols correct ;
two lamps connected in parallel with battery ;
switch in correct place ; [3]
- (ii) voltmeter drawn across battery ; [1]
- (iii) $I = \frac{V}{R}$;
 $= \frac{12}{2.5} = 4.8 \text{ (A)}$; [2]
- (iv) 1.25Ω ; [1]
- (v) charge / electrons ; [1]
- (c) conduction / convection ; [1]
- (d) to allow for expansion in hot weather ;
flexible material fills gap but can be squashed ; [2]

[Total: 15]

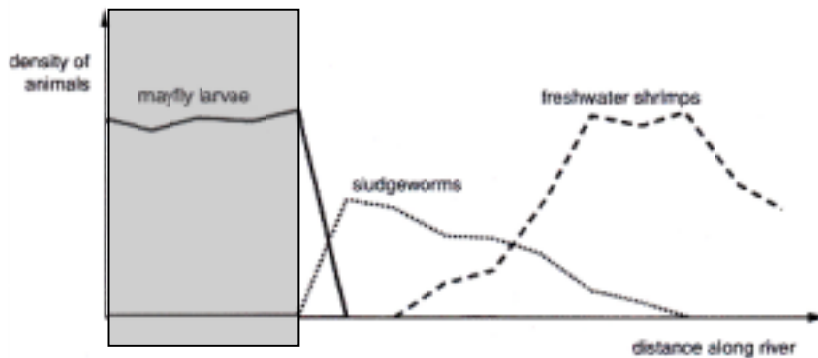
- 9 (a) (i) electrolysis ; [1]
- (ii) orange / brown vapour ; [1]
- (iii) ions no longer mobile ; [1]
- (b) reference to electron loss ; [1]
- (c) (i) hydrogen ; [1]
- (ii) lighted splint ;
'pops' ; [2]
- (iii) solution becomes alkaline / sodium hydroxide is made ; [1]
- (d) (i) alloys are stronger / less easily broken ; [1]
- (ii) reduces the mass / weight of the aircraft ; [1]

[Total: 10]

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	21

10 (a) mayfly larvae / caddis flies / freshwater shrimps / water lice / bloodworms ; [max 1]

(b) (i) arrow anywhere in the shaded area ;



[1]

(ii) (sewage)
microorganisms ;
respiration deoxygenates water ;
which prevents respiration ;

(chemical waste)
toxic ;
heavy metal bioaccumulation ;

[max 3]

(c) (i) increased temperature of the Earth ;
on average / at the Earth's surface ; [2]

(ii) burning of (carbon containing) fuels / named example ; [1]

(iii) reduced use of fossil fuels ;
public transport ;
alternative energy sources ;
planting trees / controlling deforestation ;
education / taxation / public awareness measures ; [max 2]

[Total: 10]

11 (a) force / weight ;
(vertical) distance ; [2]

(b) (density =) $\frac{\text{mass}}{\text{volume}}$;
 $= \frac{4000}{3.9} = 1026 \text{ (kg/m}^3\text{)} ;$ [2]

Page 7	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	21

- (c) (i) (10 Hz – no mark)
lowest frequency detected is 20 Hz ; [1]
- (ii) number of waves produced / passing a point per second ; [1]
- (iii) sound wave – arrow in same direction as wave movement ;
water wave – arrow perpendicular to wave movement ; [2]

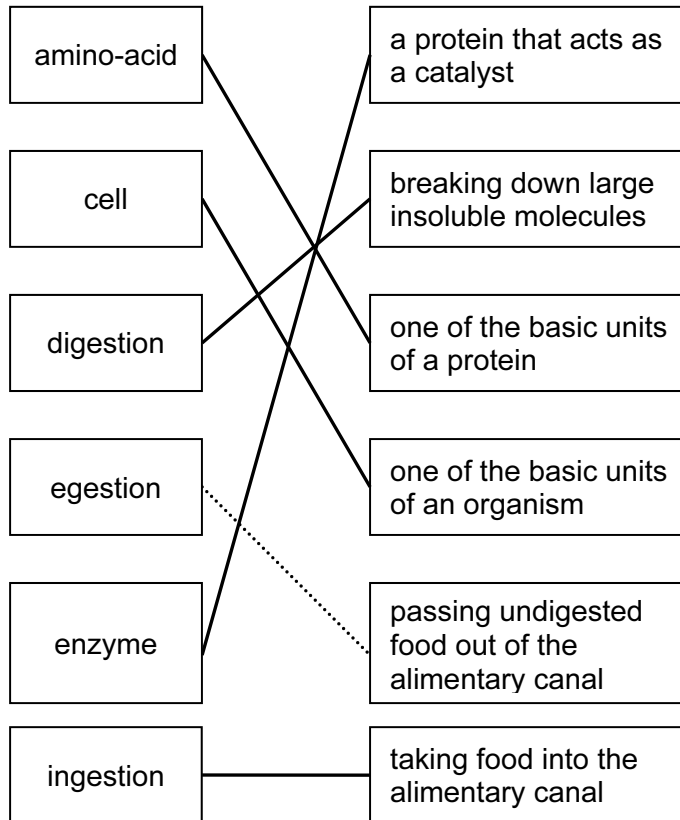
[Total: 8]

- 12 (a) hydrogen ;
hydrochloric acid ;
carbon dioxide + water ; [3]
- (b) (i) endothermic ; [1]
- (ii) reference to use of a suitable indicator / pH meter ;
correct neutral colour / pH 7 ; [2]
- (c) decrease acid concentration ;
decrease (acid) temperature ;
decrease surface area / use larger pieces of calcium carbonate ; [3]
- (d) reference to decreasing acidity / neutralising acidic lake water ; [1]

[Total: 10]

Page 8	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0654	21

13 (a)



5 or 4 correct = 4 marks, 3 correct = 3 marks, 2 correct = 2 marks, 1 correct = 1 mark

[max 4]

(b) (i) anus ; [1]

(ii) fibre/roughage/cellulose ; [1]

[Total: 6]