Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE **0653/31**

Paper 3 Core Theory **May/June 2018**

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 International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

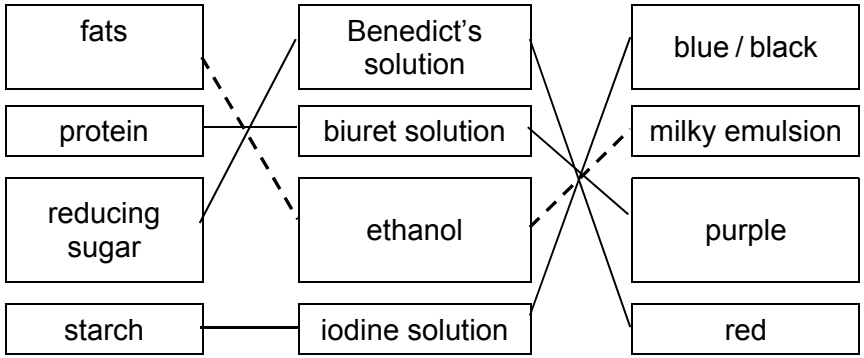
Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1(a)	boxes connected as shown  ;;; 1 mark for each 2 correct lines	**3**
1(b)(i)	**P**,**Q** and **R** in the correct order ;	**1**
1(b)(ii)	green areas contain chlorophyll ; reference to photosynthesis ;	**2**
1(c)	*(carbon doxide)* through <u>stomata</u> ; by diffusion ; *(water)* through <u>root hair</u> cells; from the soil / ground / by diffusion ;	**4**
1(d)(i)	false – no mark respiration takes place all the time / owtte ;	**1**
1(d)(ii)	*any one of* protein synthesis ; cell division ; growth ;	**max1**

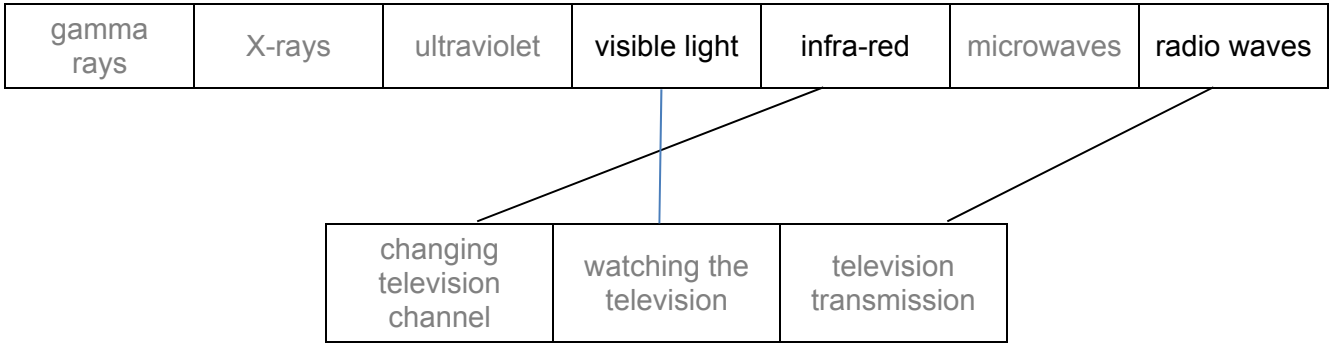
Question	Answer	Marks
2(a)(i)	calcium Ca zinc / Zn iron / Fe copper / Cu ;; 1 mark for calcium first and copper last 2 marks for all four correct	**2**
2(a)(ii)	increases / goes up / gets (closer) to 7 ;	**1**
2(b)(i)	hydrogen ;	**1**
2(b)(ii)	filter / filtering / filtration ;	**1**
2(b)(iii)	crystallisation / evaporation / heat ;	**1**
2(c)(i)	(atomic no.) 12 **and** (mass no.) 25 ;	**1**
2(c)(ii)	13 ;	**1**
2(d)(i)	(electrical) conductor ;	**1**
2(d)(ii)	higher strength ;	**1**

Question	Answer	Marks
3(a)(i)	two opposing vertical force arrows ; both arrows acting on the load ;	**2**
3(a)(ii)	moving at constant speed ;	**1**
3(a)(iii)	newton / N ;	**1**
3(b)(i)	3 (m / s)	**1**
3(b)(ii)	increasing speed, constant speed, decreasing speed *in this order only*	**1**

Question	Answer	Marks
3(c)(i)	volume of cube = 0.50 × 0.50 × 0.50 = 0.125 (m^3) ;	**1**
3(c)(ii)	density = mass / volume **or** $d = m / V$ **or** $m = V \times d$ **or** mass = 0.125 × 7000 ; = 875 (kg) *or* 880 (kg) ;	**2**

Question	Answer	Marks
4(a)	**B** – no mark (expired air) contains carbon dioxide ; (inspired air) contains very little carbon dioxide ;	**2**
4(b)	in order in the table less ; stays the same ; increases ;	**3**
4(c)(i)	hormone ;	**1**
4(c)(ii)	increase of blood glucose concentration ; increase in pulse / heart rate ;	**2**
4(c)(iii)	destroyed by liver ;	**1**

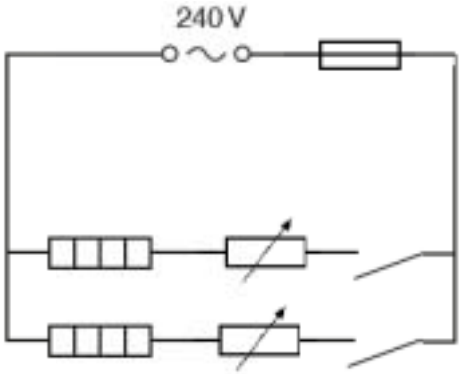
Question	Answer	Marks
5(a)(i)	fractional distillation ;	**1**
5(a)(ii)	physical ;	**1**
5(a)(iii)	*mixture* idea that the components are not joined / bonded (together) / idea that the components retain their original properties / components can be separated by physical processes ; *compound* different atoms / elements bonded / joined (together) / has different properties from the elements / elements cannot be separated by physical processes ;	**2**
5(b)(i)	shared (pair of) electrons) ;	**1**
5(b)(ii)	test white / anhydrous copper sulfate ; result (turns) blue ; **or** blue / anhydrous cobalt chloride (paper); result (turns) pink;	**2**
5(b)(iii)	exothermic ;	**1**

Question	Answer	Marks
6(a)	 three correct names of electromagnetic waves ; correct names in the correct positions ; two correct links ;	**3**
6(b)(i)	convection ;	**1**
6(b)(ii)	gases cool by thermal energy (heat) transfer to surroundings (by conduction though balloon) / hot gas cools down ; (causing) decrease of gas volume / contraction ;	**2**
6(b)(iii)	chemical ; gravitational (potential) (energy) / potential (energy) / kinetic (energy) ;	**2**
6(b)(iv)	(energy transfer) by radiation / infra-red	**1**

Question	Answer	Marks
7(a)(i)	green plants ; mice, snails, caterpillars ;	**2**
7(a)(ii)	green plants ⟶ mice ⟶ owl correct organisms in the correct order ; arrows correct, in correct direction ;	**2**

Question	Answer	Marks
7(b)	decrease – no mark the small birds will eat more snails ; **or** increase – no mark more food for snails when caterpillars disappear ;	**1**

Question	Answer	Marks
8(a)(i)	ionic ;	**1**
8(a)(ii)	$CuCl_2$;	**1**
8(a)(iii)	cathode ;	**1**
8(a)(iv)	chlorine ;	**1**
8(b)(i)	speeds up a reaction (without being used up) ;	**1**
8(b)(ii)	transition (metals) ;	**1**
8(c)(i)	(copper oxide) + carbon → copper + carbon dioxide carbon on left-hand side and copper on the right-hand side ; carbon dioxide / monoxide on the right-hand side ;	**2**
8(c)(ii)	oxygen is removed from the copper oxide / carbon reacts with oxygen / idea that oxidation and reduction occur at the same time / oxygen is transferred / loss and gain of oxygen ;	**1**

Question	Answer	Marks
9(a)(i)	fuse:  switch:  variable resistor:  three correct symbols for 2 marks ; one or two correct symbols for 1 mark ;	**2**
9(a)(ii)	 second hotplate connected in parallel ; each hotplate branch contains a variable resistor in series ; each hotplate branch has a switch in series ; fuse in main circuit ;	**4**
9(b)(i)	24 Ω ;	**1**
9(b)(ii)	R = V / I or 24 = 240 / I or I = V / R or I = 240 / 24 ; I = 10 A ;	**2**