Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/31**

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

MARK SCHEME

Maximum Mark: 120

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:

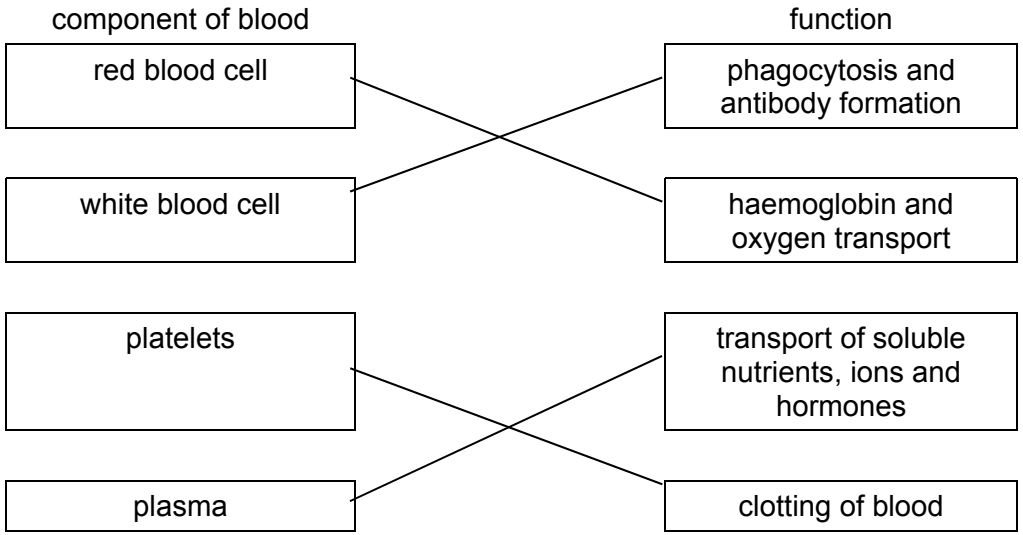
Marks must be awarded **positively**:

- 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)(i)	septum ;	**1**
1(a)(ii)	**V** labelled to one of the ventricles ;	**1**
1(b)	pulmonary artery ;	**1**
1(c)	(heart), pumps / contracts ; (blood pushed) through the aorta (to the rest of the body) ;	**2**
1(d)	 1 / 2 / 3 correct lines ; 4 correct lines ;	**2**

Question	Answer	Marks
2(a)(i)	Any **two** from: (good) conductor of electrical energy / electricity ; (good) conductor of thermal energy / heat ; malleable ; ductile ; lustrous / shiny ;	**max 2**
2(a)(ii)	two **and** three ; electrons ; atom ;	**3**
2(b)(i)	label line to negative electrode ;	**1**
2(b)(ii)	oxygen ;	**1**
2(c)(i)	idea of removal of oxygen ;	**1**
2(c)(ii)	ammonia ; changes colour to blue ;	**2**

Question	Answer	Marks
3(a)(i)	10.25 (s) ;	**1**
3(a)(ii)	speed = distance / time or 100 / 9.58 ; =10.44 (m / s) ;	**2**
3(a)(iii)	chemical ; kinetic ;	**2**
3(b)	more energy transferred in same time / same energy used in less time ;	**1**
3(c)	more energetic particles escape / average energy of remaining molecules drops ; temperature of water decreases ; thermal energy transferred from body to water ;	**max 2**

Question	Answer	Marks
4(a)	sensory ; neurone ;	**2**
4(b)	involves CNS ; sensory → relay → motor ; reference to effector (muscle) response ;	**3**
4(c)	coughing ticked ; sneezing ticked ; sweating ticked ;	**3**
4(d)	increase in pulse rate ; increase in blood glucose concentration ; AVP ;	**max 2**

Question	Answer	Marks
5(a)(i)	salt ;	**1**
5(a)(ii)	neutralisation ;	**1**
5(b)(i)	**1** **13** **7** ;	**1**
5(b)(ii)	potassium chloride ;	**1**
5(b)(iii)	measure temperature (of reacting mixture) which increases ;	**1**
5(c)(i)	nitrogen and oxygen ;	**1**
5(c)(ii)	compound contains two or more types of atom chemically bonded ; a mixture contains two or more substances that are not chemically bonded ;	**2**
5(c)(iii)	carbon monoxide ; nitrogen dioxide ;	**2**
5(c)(iv)	oxygen and water vapour ;	**1**

Question	Answer	Marks
6(a)(i)	**C** ;	**1**
6(a)(ii)	**B** greater than **D** ; opposite directions ;	**2**
6(a)(iii)	change shape of object ;	**1**
6(a)(iv)	newton / N ;	**1**
6(b)(i)	louder ;	**1**
6(b)(ii)	lower pitch ;	**1**
6(c)	laterally inverted ; virtual ; upright ;	**max 2**
6(d)	(use a magnet because) aluminium is not magnetic / steel is magnetic / steel is attracted to magnet / aluminium is not attracted to magnet ;	**1**
6(e)	gravitational potential energy to kinetic energy ;	**1**

Question	Answer	Marks
7(a)	chromosomes ; DNA ; protein ;	**3**
7(b)(i)	**EE** ; **Ee** ;	**2**
7(b)(ii)	homozygous ; recessive ;	**2**
7(c)	dominant allele / **E** is always expressed ; (expressed in) **EE** and **Ee** / not in **ee** ; AVP ;	**max 2**

Question	Answer	Marks
8(a)	calcium carbonate ;	**1**
8(b)(i)	45 (cm^3) ;	**1**
8(b)(ii)	use greater amount of limestone ;	**1**
8(b)(iii)	use greater concentration of acid ; increase (acid) temperature ; increase surface area of limestone ;	**max 2**
8(c)(i)	lime / calcium oxide ; carbon dioxide ;	**2**
8(c)(ii)	neutralisation ; of acid (in the soil) / reduce acidity ;	**Max 2**

Question	Answer	Marks
9(a)(i)	conduction ;	**1**
9(a)(ii)	indication that air descends from ceiling ; indication that air returns to starting point (to complete convection cycle) ;	**2**
9(a)(iii)	convection ;	**1**
9(b)(i)	sound needs a medium / sound needs air / there is no air / there is a vacuum ;	**1**
9(b)(ii)	any electromagnetic wave / any named electromagnetic wave / water waves ;	**1**
9(c)(i)	atoms of the same element with / the same numbers of protons but different numbers of neutrons ;	**1**
9(c)(ii)	helium nucleus / 2 protons and 2 neutrons / He ion ; positively charged ;	**2**

Question	Answer	Marks
10(a)(i)	(pH) 7 ;	**1**
10(a)(ii)	any value between (pH) 0–6 ;	**1**
10(b)(i)	stomach / pancreas / small intestine ;	**1**
10(b)(ii)	amino acids ;	**1**
10(c)(i)	breakdown large (food) molecules to small (food) molecules ; from insoluble to soluble ; reference to catalyst ;	**max 2**
10(c)(ii)	(action of) teeth / mechanical digestion ; breaking food into smaller pieces / increases the surface area ;	**2**

Question	Answer	Marks
11(a)(i)	44 ;	**1**
11(a)(ii)	17 ;	**1**
11(a)(iii)	7 / VII ;	**1**
11(b)(i)	orange / yellow ;	**1**
11(b)(ii)	reference to <u>bromine</u> (being displaced) ; because chlorine more reactive than bromine ;	**2**
11(c)(i)	compound of hydrogen and carbon ; only ;	**2**
11(c)(ii)	saturated / does not contain double bonds ;	**1**
11(d)	many ethene molecules join together (into a chain) ;	**1**

Question	Answer	Marks
12(a)(i)	opposite charges attract ;	1
12(a)(ii)	same charges repel ;	1
12(b)(i)	move faster ;	1
12(b)(ii)	collide with tyre wall ;	1
12(c)(i)	radiation ;	1
12(c)(ii)	infra-red ; box to the right of visible light ;	2
12(d)(i)	correct symbols for lamp and cells ; correct circuit ;	2
12(d)(ii)	R = V / I or 3.0 / 0.4 ; 7.5 (Ω) ; resistance = 3.75 ;	3

Question	Answer	Marks
13(a)(i)	phototropism ;	1
13(a)(ii)	plant gets <u>more</u> light ; light is needed for photosynthesis ;	2
13(b)	water absorbed by root <u>hair</u> (cells) ; by diffusion ; from high water concentration to low water concentration ;	max 2
13(c)	magnesium ;	1