Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

PHYSICAL SCIENCE **0652/42**

Paper 4 Extended Theory **October/November 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 October/November 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level 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)	2.5 (N) ;	**1**
1(a)(ii)	1.4 (cm) ;	**1**
1(b)	(extension =) 1.4 × 0.10 ÷ 0.25 **OR** 0.56 ; (length = 12.0 + 0.56 =) 12.56 (cm) ;	**2**
1(c)	limit marked within correct range ;	**1**

Question	Answer	Marks
2(a)(i)	alloy ;	**1**
2(a)(ii)	different sized atoms ; prevent (atom) layers sliding over each other ; regular arrangement (of atoms) distorted / lattice distorted ;	**3**
2(b)	*use* wires / pipes / jewellery / saucepans ; *any **one** explanation to <u>match the use given</u>:* • wires: conducts electricity / ductile • pipes: malleable / ductile / non-reactive • jewellery: malleable / shiny / ductile / non-reactive • saucepans: malleable or conducts heat ;	**2**
2(c)	Cu **AND** Fe **AND** S used ; correct formula e.g. $CuFeS_2$;	**2**

Question	Answer	Marks
3(a)	gravitational potential ;	**1**
3(b)(i)	(work done =) force × distance (moved) **OR** 96 000 × 3.2 ; 307 200 ; J ;	**3**
3(b)(ii)	(power =) work done ÷ time **OR** 307 000 ÷ 25 ; 12 000 (W) ;	**2**
3(b)(iii)	motor not 100 % efficient / some energy lost or wasted (as heat) / work done against friction or lifting the crane ;	**1**

Question	Answer	Marks
4(a)(i)	reaction of Cs (with acid or water) is explosive or too violent ;	**1**
4(a)(ii)	*within the range pH* 8 to14 ;	**1**
4(b)	W = magnesium ; X = copper ; Y = zinc ; Z = sodium ;	**2**
4(c)(i)	oxide layer ; prevents acid from getting in contact with surface ;	**2**
4(c)(ii)	$2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$;	**2**

Question	Answer	Marks
5(a)	radiation ;	**1**
5(b)	(black is) a good absorber (of radiant energy) ;	**1**
5(c)(i)	conduction ;	**1**
5(c)(ii)	(energy) passed from to particle to adjacent particle ; vibration of particles / movement of (free) electrons ;	**2**

Question	Answer	Marks
6(a)(i)	photography ;	**1**
6(a)(ii)	silver <u>ions</u> / Ag^+ ;	**1**
6(b)	Na atom has 1 outer electron ; Br atom has 7 outer electrons ; Na atom loses 1 electron to Br ORA ; both ions have full outer shell / have noble gas configuration ; Na forms Na+ ion AND Br forms Br– ion ;	**5**
6(c)	no reaction AND iodine less reactive then bromine ;	**1**
6(d)	solid ; range between –6 °C and 183 °C ;	**2**

Question	Answer	Marks
7(a)(i)	convex wavefronts spreading out from gap ; wavefronts are arcs of circle centred on the centre of the gap ; wavelength consistent and equal to wavelength of the incident wavefronts ;	**3**
7(a)(ii)	diffraction ;	**1**
7(b)(i)	arrow drawn showing distance from equilibrium point and maximum displacement ;	**1**
7(b)(ii)	12(.0 cm) ;	**1**
7(b)(iii)	$c = f\lambda$ **OR** 64.0 = $f \times$ 12.0 **OR** (f =) $c \div \lambda$ **OR** 64 ÷ 12 ; 5.3 (Hz) ;	**2**

Question	Answer	Marks
8(a)(i)	$P = VI$ **OR** 1500 = 230 $\times$ I **OR** (I =) P ÷ V **OR** 1500 ÷ 230 ; 6.5 (A) ;	**2**
8(a)(ii)	(Q =) It **OR** 6.5 $\times$ 5 $\times$ 60; 1950 (C);	**2**
8(b)(i)	p.d. across each is less (OWTTE) / higher total resistance in circuit ; thus current less ;	**2**
8(b)(ii)	current greater ; fuse ‘blows’;	***2***

Question	Answer	Marks
9	soluble ; precipitate ; filtration ; cold ;	**4**

Question	Answer	Marks
10(a)	*Mr of C_4H_{10} and Mr* H_2O M*r* of C_4H_{10} = 58 AND M*r* H_2O = 18 ; *ratio* 58 kg C_4H_{10} gives 5 × 18 = 90 kg H_2O OR 1 : 5 (or 2 : 10) ratio $2C_4H_{10}$: $10H_2O$; *mass of* H_2O 3.5 kg of C_4H_{10} gives (90 / 58) × 3.5 = 5.43 kg of H_2O ;	**3**
10(b)(i)	'family' of similar compounds / compounds with same functional group ; 'family' has similar properties / same general formula / each member of group differs by CH_2 ;	**2**
10(b)(ii)	C_2H_4 ;	**1**
10(b)(iii)	*any **one** from:* • (catalyst) speeds up a reaction ; • provides an alternative pathway with lower activation energy ;	**1**

Question	Answer	Marks
11(a)	*from N to S:* no reading on the voltmeter ; *upwards*: reading on the voltmeter ; *downwards*: reading on the voltmeter in the opposite direction ; *from N to S or upwards or downwards:* voltmeter gives a kick / voltmeter returns to zero ;	**4**
11(b)(i)	slip rings ;	**1**
11(b)(ii)	larger amplitude ; shorter wavelength ;	**2**

Question	Answer	Marks
12(a)	125 (cm^3) ;	**1**
12(b)	*any **two** from:* • only product is water ; • CO_2 not emitted ; • SO_2 not emitted ; • does not cause acid rain ;	**2**