



Cambridge IGCSE™

PHYSICS

0625/43

Paper 4 Extended Theory

May/June 2020

MARK SCHEME

Maximum Mark: 80

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

This document consists of **10** printed pages.

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.

Science-Specific Marking Principles

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|---|--|
| 1 | Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly. |
| 2 | The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored. |
| 3 | Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection). |
| 4 | The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted. |

5 'List rule' guidance

For questions that require ***n*** responses (e.g. State **two** reasons ...):

- The response should be read as continuous prose, even when numbered answer spaces are provided
- Any response marked *ignore* in the mark scheme should not count towards ***n***
- Incorrect responses should not be awarded credit but will still count towards ***n***
- Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response
- Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form, (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (*a*) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Question	Answer	Marks
1(a)	rate of change of velocity OR change in speed per unit time / s	B1
1(b)(i)	deceleration	C1
	constant deceleration	A1
1(b)(ii)	acceleration	C1
	increasing acceleration	A1
1(b)(iii)	decreasing speed / velocity OR deceleration	B1
1(b)(iv)	constant speed	B1

Question	Answer	Marks
2(a)	$V (= 0.3 \times 0.3 \times 0.4) = 0.036 \text{ (m}^3\text{)}$	C1
	$\rho = m / V$ in any form OR $(m =) \rho V$ OR 1020×0.036	C1
	$(m =) 37 \text{ kg}$	A1
2(b)(i)	$P = \rho gh$ in any form	C1
	$(h =) 400 \times 10^3 / (1020 \times 10)$	C1
	$(h =) 39 \text{ m}$	A1
2(b)(ii)	$P = F / A$ OR $(F =) PA$ OR $500 \times 10^3 \times 0.62$	C1
	$(F =) 310\,000 \text{ N}$ OR 310 kN	A1

Question	Answer	Marks
3(a)	line of action of the centre of mass falls outside the base of the bus OR anticlockwise moment is greater than clockwise moment	B1
3(b)	bus more likely to fall over / topple / less stable	M1
	(line of action of) centre of mass may fall outside (the base of) the bus	A1
3(c)(i)	total mass of passengers = 73×65 (kg) OR 4700 kg	C1
	(total mass of bus, driver and 73 passengers) = 21 000 kg	A1
3(c)(ii)	(F =) ma in any form	C1
	(F =) 15 000 N	A1

Question	Answer	Marks
4(a)	molecules escape from the surface of the liquid	B1
	more energetic / faster moving molecules escape	B1
	slower / less energetic molecules are left behind	B1
	temperature of liquid decreases because average K.E. of remaining molecules is lower	B1
4(b)	any two from: air temperature increases more wind cloud stops covering the Sun	B2

Question	Answer	Marks
5(a)(i)	$E = Pt$ in any form	C1
	$(E =) 6000 \text{ J}$	A1
5(a)(ii)	$E = mc\Delta T$ in any form	C1
	$c = \frac{6000}{550(33 - 20)}$	C1
	$(c =) 0.84 \text{ J / (g } ^\circ\text{C)}$ OR $840 \text{ J / (kg } ^\circ\text{C)}$	A1
5(a)(iii)	EITHER some of energy supplied by the heater heats the heater / goes to lagging / goes to surroundings	M1
	specific heat capacity is lower than value in (ii)	A1
	OR some energy may be absorbed from surroundings if they are at a higher temperature	M1
	specific heat capacity is higher than value in (ii)	A1
5(b)	(specific) heat capacity of water is much higher than (specific) heat capacity of sand	B1
	same rate of energy supplied to sand and sea	B1
5(c)	cold junction labelled or shown in ice or something similar OR diagram with two junctions with voltmeter labelled	B1
	two different metals labelled	B1
	galvanometer or voltmeter joining ends of wires	B1

Question	Answer	Marks
6(a)	three wavefronts parallel to each other	B1
	two wavelengths same as reflected by eye	B1
	three wavefronts at same angle to barrier as original	B1
6(b)	second, third, fifth and sixth boxes ticked	B3
6(c)	1500 m / s	B1

Question	Answer	Marks
7(a)	$\sin i / \sin r = n$ in any form	C1
	$r = 18^\circ$	A1
7(b)	light travelling from optically dense medium to optically less dense medium	B1
	all light reflected OR no light refracted	B1
	angle of incidence is greater than the critical angle	B1
7(c)	ray reflected at face AB with $i = r$ by eye	B1
	ray refracted at face BC and bent away from the normal	B1

Question	Answer	Marks
8(a)(i)	region in which an electric charge experiences a force	B1
8(a)(ii)	direction of force on a positive charge	B1

Question	Answer	Marks
8(b)	any four from: • ball moves towards positive plate • ball touches positive plate • made of conducting material so becomes positively charged • repelled from positive plate • touches negative plate and loses charge • negatively charged ball attracted back to positive plate and process repeats	B4
8(c)	$I = Q / t$ in any form	C1
	$t = Q / I$	C1
	$(t = 15 / 0.29 =) 52 \text{ s}$	A1

Question	Answer	Marks
9(a)(i)	anti-clockwise (seen from brushes)	M1
	I correctly described	A1
	F down on left / up on right	A1
9(a)(ii)	arrow labelled correct direction on coil	B1
9(a)(iii)	electrons –ve OR repelled from –ve connection of supply	B1
9(b)(i)	rotates in opposite direction	B1
9(b)(ii)	turns faster OR greater moment / turning effect	B1
9(b)(iii)	turns faster OR greater moment / turning effect	B1

Question	Answer	Marks
10(a)	0_X	B1
	$^{-1}_X$	B1
	β OR beta (particle)	B1
10(b)(i)	background radiation	B1
	rocks / ground / buildings / food / space / weapons testing / nuclear accidents or waste / sun / air / radon / argon	B1
10(b)(ii)	subtracts 10 from 80	B1
	evidence of recognising two half-lives OR compares 70 and 10	B1
	(final reading =) $70/4 + 10 = 27$ OR ($70/10 = 7$) age > 2 half-lives OR age nearly 3 half-lives	B1
	age > 11 400	B1