



Cambridge IGCSE™

PHYSICS

0625/32

Paper 3 Theory (Core)

March 2021

MARK SCHEME

Maximum Mark: 80

<p>Published</p>

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 March 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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

PUBLISHED**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

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	<p><u>'List rule' guidance</u></p> <p>For questions that require <i>n</i> responses (e.g. State two reasons ...):</p> <ul style="list-style-type: none"> • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked <i>ignore</i> in the mark scheme should not count towards <i>n</i>. • Incorrect responses should not be awarded credit but will still count towards <i>n</i>. • 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 <i>n</i> 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)	(kinetic energy / it) increases	B1
	(because) speed / velocity (of box) increases OR faster	B1
1(b)	(gravitational potential energy) decreases	M1
	(because) height (of box) decreases	A1
1(c)(i)	any indication on graph / in text that horizontal section represents steady speed	C1
	10 (m / s)	A1
1(c)(ii)	(resultant vertical force =) zero OR 0 (N)	B1
1(d)	distance = area under graph OR $\frac{1}{2} \times b \times h$	C1
	(distance =) $\frac{1}{2} \times 6.0 \times 45$	C1
	135 (m)	A1
1(e)	deceleration (line) is steeper OR higher gradient than acceleration (line)	B1

Question	Answer	Marks
2(a)	(volume =) difference in candidate's readings	C1
	24 (cm ³)	A1
2(b)	(density =) mass $\div$ volume	C1
	(density =) $98.4 \div 41.0$	C1
	2.4(0) (g / cm ³)	A1

Question	Answer	Marks
2(c)	idea that mass is (a measure of) amount of matter in a body	B1
	idea that weight is a gravitational force	B1

Question	Answer	Marks
3(a)	(moment of force =) force $\times$ (perpendicular) distance of force from pivot	B1
	5.2×6.0	B1
	31.2	B1
3(b)	(sum of) clockwise moment(s) = (sum of) anticlockwise moment(s)	C1
	$P \times 2.0 + 8.1 \times 2.0 = 5.2 \times 6.0$ OR 31.2 OR answer from (a)	C1
	$P = (31.2 - 16.2) \div 2.0$ OR $15 \div 2.0$	C1
	7.5 (N)	A1

Question	Answer	Marks
4(a)	(part A) turbine	B1
	(part B) generator	B1
4(b)	any 2 valid examples of renewable energy from: sunlight wind wave hydroelectric biofuels/biomass tidal	B2
4(c)	any 2 from: does not produce carbon dioxide OR does not contribute to global warming no sulphur dioxide or nitrous oxides produced no mining needed for fuel	B2

Question	Answer	Marks
5(a)(i)	(weight =) $\text{mass} \times g$ OR 1.6×10 OR $\text{mass} = W \div g$	C1
	(weight =) 16 (N)	A1
5(a)(ii)	(pressure =) $\text{force} \div \text{area}$	C1
	(pressure =) $16 \div 18$	C1
	(pressure =) 0.89 (N / cm ²)	A1
5(b)	1 (volume of block) increases	B1
	2 (mass) remains constant	B1
	3 (density) decreases	B1

Question	Answer	Marks
6(a)(i)	angle of incidence correctly identified (with $\times$ between normal and incident ray)	B1
6(a)(ii)	refraction	B1
6(a)(iii)	normal (line)	B1
6(b)(i)	62°	B1
6(b)(ii)	reflection	C1
	total internal reflection	A1
6(c)	ray refracted away from normal	B1

Question	Answer	Marks
7(a)	1 (amplitude of wave = arrow) R	B1
	2 (wavelength of wave = arrow) S	B1
7(b)	(frequency =) number of (complete) waves per second	C1
	(frequency =) $12 \div 8$	C1
	1.5 (Hz)	A1
7(c)	vibration(s) OR oscillation(s)	B1
	in transverse waves is / are perpendicular / at right angles to the direction of energy transfer / wave travel	B1
	in longitudinal waves is / are in same direction OR parallel to the direction of energy transfer / wave travel	B1

Question	Answer	Marks
8(a)(i)	(plotting) compass OR iron filings	B1
	detail of method	B1
	use of (plotting) compass to give direction of field	B1
8(a)(ii)	steel	B1
8(b)(i)	reverse magnetic field owtte OR reverse current in wire	B1
8(b)(ii)	force is weaker	B1
	(because) magnetic field is weaker	B1

Question	Answer	Marks
9(a)	$V = IR$ or $(R =) V / I$	C1
	$5.6 \div 0.04$	C1
	140 (Ω)	A1
9(b)	(current in thermistor) increases	B1
	(because) resistance of thermistor decreases	B1
9(c)	fire / high temperature alarm / warning	B1

Question	Answer	Marks
10(a)	electrocution OR overheating / fire	B1
10(b)	large current (in fuse)	B1
	(causes) fuse / it to melt	B1
	isolating appliance from supply OR prevents current in appliance OR breaks circuit	B1
10(c)	$V_s / V_p = N_s / N_p$	C1
	$V_s / 120 = 200 / 2000$ OR $V_s = 120 \times 200 / 2000$ OR $V_s = 120 / 10$	C1
	12 (V)	A1
10(d)	(soft) iron	B1

Question	Answer				Marks
11(a)		carbon-12	carbon-14		3
	number of electrons	6	6	B1	
	number of protons	6	6	B1	
	number of neutrons	6	8	B1	
11(b)	any indication on graph of line from 8000				C1
	5600 (years)				A1