

Cambridge International Examinations Cambridge International General Certificate of Secondary Education

## PHYSICS

0625/31 October/November 2016

Paper 3 Core Theory 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.

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NOTES ABOUT MARK SCHEME SYMBOLS AND OTHER MATTERS				
M marks	are method marks upon which further marks depend. For an the point to which it refers <b>must</b> be seen in a candidate's ans fails to score a particular M mark, then none of the depender scored.	swer. If a ca	ndidate	
B marks	are independent marks, which do not depend on other marks scored, the point to which it refers must be seen specifically answers.			
A marks	In general A marks are awarded for final answers to numeric If a final numerical answer, eligible for A marks, is correct, we an acceptable number of significant figures, all the marks for normally awarded. It is very occasionally possible to arrive a an entirely wrong approach. In these rare circumstances, do marks, but award C marks on their merits. However, correct with no working shown gain all the marks available.	ith the correct that question t a correct and not award th	ct unit and in are nswer by ne A	
C marks	are compensatory marks in general applicable to numerical of be scored even if the point to which they refer are not written candidate, <b>provided subsequent working gives evidence</b> <b>known it.</b> For example, if an equation carries a C mark and a write down the actual equation but does correct substitution shows that they knew the equation, then the C mark is score awarded if a candidate makes two points which contradict ea are wrong but irrelevant are ignored.	down by the that they m the candidat or working w d. A C mark	e <b>ust have</b> e does not /hich is not	
Brackets ( )	around words or units in the mark scheme are intended to in clarify the mark scheme, but the marks do not depend on see in brackets e.g. 10 (J) means that the mark is scored for 10, given.	eing the wor	ds or units	
Underlining	indicates that this must be seen in the answer offered, or sor	mething very	similar.	
OR/or	indicates alternative answers, any one of which is satisfactor marks.	y for scoring	the	
e.e.o.o.	means "each error or omission".			
o.w.t.t.e.	means "or words to that effect".			
Ignore	indicates that something which is not correct or irrelevant is t does not cause a right plus wrong penalty.	o be disrega	arded and	
Spelling	Be generous about spelling and use of English. If an answer mean what we want, give credit. However, beware of and do e.g. spelling which suggests confusion between reflection/re thermistor/transistor/transformer.	not allow ar	nbiguities:	
Not/NOT	indicates that an incorrect answer is not to be disregarded, b otherwise correct alternative offered by the candidate i.e. rigl applies.			

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e.c.f.	meaning "error carried forward" and is mainly applicable to ne but may occasionally be applied in non-numerical questions. candidate has made an earlier mistake and has carried an in to subsequent stages of working, marks indicated by e.c.f. m provided the subsequent working is correct, bearing in mind t	This indicat correct valu ay be award	es that if a e forward led,
Significant figures	Answers are normally acceptable to any number of significan exceptions to this general rule will be specified in the mark so	•	2. Any
Units	Deduct one mark for each incorrect or missing unit from an a otherwise gain all the marks available for that answer: maxim		
Arithmetic errors	Deduct only one mark if the <b>only</b> error in arriving at a final an arithmetic one. Regard a power-of-ten error as an arithmetic		arly an
Fractions	Only accept these where specified in the mark scheme.		

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Question	Expected answer	Mark
1(a)	0 and 5	B1
1(b)	distance = area under (speed-time)graph <b>or</b> distance = speed × time 8 × 15 120 (m)	C1 C1 A1
1(c)(i)	middle box ticked B	B1
1(c)(ii)	cyclist is moving with zero acceleration	B1
	(so) forward force must be same as backward force	B1
	Total:	7

Page 5	Mark Scheme	Syllabus	Paper
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Question	Expected answer	Mark
2(a)	3.5 4.3	B1 B1
2(b)	any 2 from: ruler with mm scale ruler vertical o.w.t.t.e. ruler next OR behind to elastic use of fiducial marker o.w.t.t.e. have eye level (with reading)	B2
2(c)(i)	top line labelled B – bottom line labelled A AND statement linked to readings for A OR idea that B will stretch more than A	B1
2(c)(ii)	straight line (by eye) steeper than line for B, through origin	B1
	Total:	6

Page 6	Mark Scheme	Syllabus	Paper
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Question	Expected answer	Mark
3(a)	arrow drawn vertically upwards (by eye)	B1
	arrow positioned beyond RH support	B1
3(b)	moment = force $\times$ (perp.) distance from pivot or 200 $\times$ 2.0	C1
	400 (Nm)	A1
3(c)	sum of Clockwise moments = sum of Anticlockwise moments	C1
	OR 400 = W × 0.50 OR 400/0.50 800 (N)	A1
	Total:	6

Page 7	Mark Scheme	Syllabus	Paper
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Question	Expected answer	Mark
4(a)(i)	(gravitational) potential (energy)	B1
4(a)(ii)	increases the temperature	B1
4(a)(iii)	The total energy (of a system) remains constant <b>OR</b> energy cannot be created or destroyed o.w.t.t.e.	B1
	100 J = 80 J + 20 J <b>OR</b> <u>all</u> of the input energy is stored as PE or in the surroundings (as thermal energy)	B1
4(b)	any 2 benefits from: reliable supply of electricity large amount of (electrical) energy produced/power output plentiful supply of fuel one of cheapest methods of generating electricity	B2
	any 2 problems from: non-renewable (energy source) <b>OR</b> use up earth's resources greenhouse gases/carbon dioxide produced/increases global warming contributes to <u>atmospheric</u> pollution/acid rain	B2
	Total:	8

Page 8	Mark Scheme	Syllabus	Paper
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Question	Expected answer	Mark
5(a)(i)	refraction	B1
5(a)(ii)	ray travels un-deviated through curved surface ray reflected with i = r by eye	B1 B1
5(b)(i)	ray drawn from headlight to hit middle shop and reflected towards X	B1
5(b)(ii)	angle of reflection = angle of incidence	B1
5(b)(iii)	normal drawn at point of incidence on window angles of incidence and reflection correctly labelled	B1 B1
	Total:	7

Page 9	Mark Scheme		Paper
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Question	Expected answer	Mark
6(a)	molecules are closer in water <b>OR</b> molecules are further apart in water vapour randomly arranged moving randomly	В3
6(b)	more energetic particles <b>OR</b> particles near the surface are moving in correct direction	B1
	overcome force of attraction (in surface)	B1
	(process) Evaporation	B1
6(c)	P = F/A 5.6/140 0.040 (N/cm <sup>2</sup> )	C1 C1 A1
	Total:	9

Page 10	Mark Scheme		Paper
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Question	Expected answer	Mark
7(a)	ultraviolet	B1
7(b)	microwaves	B1
7(c)	middle box ticked	B1
7(d)	ANY ONE from (sound waves are) longitudinal OR compression waves cannot travel through a vacuum move at much slower speed	B1
	Total:	4

Question	Expected answer	Mark
8(a)	A in circle in series with wire	B1
	V in circle in parallel with wire	B1
8(b)	V = I R <b>OR</b> (R =) V/I 6.0/0.2 30 (Ω)	C1 C1 A1
8(c)	current is smaller (in 2nd wire)	B1
	(as) resistance is greater (in 2nd wire)	B1
	Total:	7

Page 11	Mark Scheme		Paper
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Question	Expected answer	Mark
9(a)	(laminated) iron	B1
9(b)(i)	$(V_p/V_s) = (N_p/N_s)$ in any form 240/V <sub>s</sub> = 36000/900 or V <sub>s</sub> = 240/40 6.0 (V)	C1 C1 A1
9(b)(ii)	step-down (transformer because) there are fewer turns on secondary (compared to primary coil) OR the output voltage is smaller than the input voltage	B1
9(c)	Any 2 from: less energy or power wasted or less heating or more efficient accept lower current can use thinner (transmission) wires or cables fewer power stations needed (so) lower cost for cable and supporting pylons transmit (electricity over) longer distances (without drop in power)	B2
	Total:	7

Page 12	Mark Scheme		Paper
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Question	Expected answer	Mark
10(a)(i)	attractive force ringed	B1
10(b)(i)	(end A ) N/north(seeking) AND (end B ) S/south(seeking)	B1
10(b)(ii)	at least two field lines drawn above AB at least two field lines below AB	B1 B1
10(b)(iii)	at least one arrow towards B ecf from bi	B1
10(c)	(it/electromagnet) can be switched off/on strength of electromagnet can be changed (by varying current in coil)	B1 B1
	Total:	7

Question	Expected answer	Mark
11(a)(i)	(arrange) magnets with opposite poles facing connect (ends of) wire across/to millivoltmeter move wire between poles	В3
11(a)(ii)	deflection on meter (as wire moves between poles)	B1
11(a)(iii)	any <b>two</b> from: wrap wire into (more) coils move wire/magnet faster use stronger magnets move (poles of) magnets closer together	B2
	Total:	6

Page 13	Mark Scheme		Paper
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Question	Expected answer		Mark	
12(a)	(type of particle)	(number of particles)		
	PROTON	55		B2
	NEUTRON	82		B2
12(b)	(nucleus has) same number protons			B1
	different number of neutrons			B1
			Total:	6