



Cambridge IGCSE™

PHYSICS

0625/42

Paper 4 Extended Theory

October/November 2021

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

This document consists of **16** printed pages.

Question	Answer	Marks
1(a)	(acceleration) increases	B1
1(b)	tangent drawn at 25 s	M1
	78 to 82 m / s ²	A1
1(c)	(distance =) area under graph (stated or correct area clearly shown on graph) OR (400 x 10) / 2 OR (b x h) ÷ 2	C1
	2000 m	A1

Question	Answer	Marks
2(a)	extension is (directly) proportional to load (if elastic limit is not exceeded)	B1
2(b)(i)	0 to 20.5 + / – 0.5 N	B1
2(b)(ii)	(k =) F / x OR (k =) 1 / gradient	C1
	140 N / m OR 0.14 N / mm	A1
2(b)(iii)	60 OR 61 OR 62 OR 63 (mm) seen	C1
	180 mm OR 0.18 m	A1
2(c)	$W = mg$ in any form OR (m =) W / g OR (m) = 4 / 8.7	C1
	0.46 kg	A1

Question	Answer	Marks
3(a)	momentum before collision = momentum after collision	B1
	(initial momentum (p) =) 800×2 OR 1600 (kg m / s)	
	(v =) $(1600 - 1300) / 800$ OR 300 / 800 OR 0.38 (m / s)	
3(b)(i)	(impulse =) change in momentum	C1
	1300 Ns	A1
3(b)(ii)	same value as (b)(i) OR 1300 (Ns)	B1

Question	Answer	Marks
4(a)	(statement) renewable	B1
	(explanation) (wind) is) replaced / replenished OR does not run out OR is not used up OR is an infinite energy resource	
4(b)	any two from: geothermal nuclear tidal	B2
4(c)	chemical	B1
	<u>gravitational</u> potential	B1

Question	Answer	Marks
5(a)	wires of 2 different metals	B1
	one junction <u>clearly</u> in each liquid	B1
	voltmeter / ammeter / galvanometer correctly connected	B1
5(b)	any two from • expansion of liquid • expansion of solid • expansion of gas • density (of liquid) • (electrical) resistance	B2
5(c)	any two from • large range • (measure) high temperatures • remote sensing • small size OR small mass • small thermal capacity • suitable for data logging • responds quickly OR measures rapidly varying temperatures OR temperature changing continuously	B2

Question	Answer	Marks
6(a)(i)	C in line with smallest gap between dots	B1
6(a)(ii)	R in line with largest gap between dots	B1
6(a)(iii)	arrow corresponds to wavelength	B1
6(b)	1500 m / s	B1
6(c)	$v = f\lambda$ in any form OR $(f =) v / \lambda$	C1
	$(f =) 1500 / 0.12$	C1
	$(f =) 13 \text{ kHz}$ OR 13 000 Hz	A1
6(d)	statement consistent with candidate's answer to 6c	M1
	ultrasound is above 20 000 Hz	A1

Question	Answer	Marks
7(a)(i)	$i = 60^\circ$ used or seen	C1
	$\sin i / \sin r = n$ in any form	C1
	ray refracted toward normal and toward AC	C1
	ray clearly refracted down in prism reaching AC with $r = 35^\circ$	A1
7(a)(ii)	10°	B1
7(b)	refracted away from normal	B1
7(c)(i)	(total internal) reflection at X NOT refraction at X or anywhere else	B1
	reaches end of fibre with <u>only one</u> additional reflection (off lower internal edge of fibre)	B1
7(c)(ii)	total internal reflection	B1

Question	Answer	Marks
8(a)(i)	clearly more –ve (than +ve) on left AND more +ve (than –ve) on right	B1
	same number of +ve and –ve	B1
8(a)(ii)	–ve charges (flow) from earth OR –ve charges flow to object	B1
	electrons flow to balance (excess) +ve charge on the object	B1
8(b)	$I = Q / t$ in any form OR $(Q =) It$	C1
	$(Q =) 0.65 \times 10^{-3} \times 2.2 \times 60$	C1
	$(Q =) 0.086 \text{ C}$	A1

Question	Answer	Marks
9(a)	7.5 V	B1
9(b)(i)	$1/R_p = 1/R_1 + 1/R_2$ OR $(R_p =) R_1 R_2 / (R_1 + R_2)$ in any form	C1
	$(R_p =) 1.2 (\Omega)$	C1
	3.2 Ω	A1
9(b)(ii)	$(V =) IR$ in any form	C1
	4.1 V	A1

Question	Answer	Marks
10(a)	OR (gate)	B1
10(b)	0	B1
	1	B1
10(c)	prevents electrocution OR metal case cannot become live OR metal case always at earth potential / voltage	B1
	(if) live wire touches metal case	B1
10(d)(i)	if current too high	B1
	fuse melts	B1
10(d)(ii)	13 A (circled)	B1
	fuse rating/value above but near (to) normal operating current/ 10 A	B1
	OR	
	fuse rating/value slightly higher (than) normal operating current /10A OWTTE	

Question	Answer	Marks
11(a)	(very small) nucleus AND (surrounded by) electrons (in orbit / shells)	B1
	neutrons and protons in nucleus	B1
	4 electrons (in atom) OR number of electrons = number of protons	B1
	4 neutrons (in nucleus)	B1
11(b)	$^{135}_{55}$ on left	B1
	Cs on left	B1
	$^{135}_{56}$ Ba on right	B1
	+ β on right OR – β on left	B1