



Cambridge IGCSE™

PHYSICS**0625/42**

Paper 4 Extended Theory

May/June 2022

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 May/June 2022 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **12** printed pages.

Question	Answer	Marks
1(a)(i)	($E =$) 2 200 000 (J) OR 2.2×10^6 (J)	A3
	($E =$) Pt in any form	C1
	($E =$) 600×3600	C1
1(a)(ii)	chemical	B1
1(b)	($t =$) 8600 s OR 140 min OR 2.4 h OR 2 h 24 min OR ($t =$) 8800 s OR 147 min OR 2 h 27 min	A2
	($t =$) 2.2×10^6 / 250 OR (600×60) / 250 OR 1×600 / 250	C1
1(c)	any two from: • less noise OR no noise • less OR no air / gaseous pollution (from the bicycle) OR does not produce acid rain • (the bicycle) uses no / less fossil fuel • does not contribute to greenhouse effect OR does not release CO₂	B2

Question	Answer	Marks
2(a)	($F = 2.0 \times 4.0 =$) 8.0 N	A2
	($F =$) ma in any form	C1

Question	Answer	Marks
2(b)	$(F = 30 - 12 =) 18 \text{ N}$	A3
	resultant force on 3 kg mass ($3 \times 4 =$) 12 (N)	
	(weight of 3 kg mass = 3×10) = 30 (N)	
2(c)(i)	$(\Delta v =) 4.0 \times 0.80 (= 3.2 \text{ m/s})$	A2
	$(\Delta)v = at$ in any form	C1
2(c)(ii)	$(t = 0.020 / 3.2 =) 0.0063 \text{ s}$ OR $6.3 \times 10^{-3} \text{ s}$	A2
	$(t =) d/v$ in any form	C1

Question	Answer	Marks
3(a)	scale at least 2 cm : 1 m/s stated	B1
	2.5 m/s AND 4.0 m/s vectors correctly drawn by eye AND correct resultant	M1
	magnitude of resultant velocity = 2.3 – 2.8 m/s inclusive	A1
	direction $35^\circ - 40^\circ$ inclusive (downstream)	A1
3(b)	$(E = \frac{1}{2} \times 65 \times 2.5^2 =) 200 \text{ J}$	A2
	$(E =) \frac{1}{2} mv^2$ in any form	C1

Question	Answer	Marks
4(a)	statement: bore of constant (cross sectional) area	B1
	explanation: idea of same movement / change in length of liquid / thread AND for same increase in volume / expansion (of liquid)	
	statement: (liquid has) constant thermal expansion	B1
	explanation: liquid moves same distance for each °C temperature rise	B1
4(b)	heat capacity / it is small	B1
	only uses / needs a small amount of (thermal) energy (to raise its temperature)	B1
4(c)	36 J	A3
	($E =$) $C\Delta T$ in any form	C1
	($E =$) $0.11 \times (345 - 20)$ OR ($\Delta T =$) 325 (°C)	C1

Question	Answer	Marks
5(a)(i)	ultrasound OR sound (frequency) above audible range	B1
	frequency > 20 kHz OR 20 000 Hz	B1
5(a)(ii)	8.7×10^{-4} m	A3
	($\lambda =$) v/f OR $v = f\lambda$ in any form	C1
	($\lambda =$) $1.3 \times 10^3 / 1.5 \times 10^6$ OR 8.7×10^n	C1
5(b)	basic description of use e.g. X-rays for detecting broken bones	B1
	additional detail e.g. X-rays pass through soft tissue AND not through bone	B1

Question	Answer	Marks
6(a)	1.9–2.1 cm	B1
6(b)	(circle round) enlarged	B1
	(circle round) inverted	B1
	(circle round) real	B1
6(c)	not an intersection of rays OR cannot be formed on a screen OR cannot be projected on a screen OR light rays do not pass through image OR light rays do not meet OR light rays do not converge	B1

Question	Answer	Marks
7(a)	(pole A:) N AND (pole B:) S	B1
7(b)	vertical	B1
	up	B1
7(c)	vertical	B1
	down	B1

Question	Answer	Marks
8(a)	$(t = 1/60 =) 0.017 \text{ s}$ OR $1.7 \times 10^{-2} \text{ s}$	B1
8(b)(i)	diode	B1
8(b)(ii)	$(I =) 1.4 \text{ A}$	A3
	$(I =) Q/t$ in any form	C1
	$(I =) 1.5 \times 10^{17} \times 1.6 \times 10^{-19} / 0.017$ OR $0.024 / 0.017$	C1

Question	Answer	Marks
8(c)	one arrow clockwise AND one arrow anticlockwise	B1
	arrow anticlockwise (around circuit) <u>labelled I</u>	B1
8(d)	$(P = 0.35 \times 12 =) 4.2 \text{ W}$	A2
	$(P =) IV$ in any form	C1

Question	Answer	Marks
9(a)(i)	0 (A)	B1
9(a)(ii)	$(I = 12/2 =) 6.0 \text{ A}$	A2
	$(I =) V/R$ in any form	C1
9(a)(iii)	$(I = 12/5 =) 2.4 \text{ A}$	A2
	$(R_s = R_1 + R_2 = 2 + 3 =) 5 (\Omega)$	C1
9(b)	$(R_p = 6/5 =) 1.2 \Omega$	A3
	$1/R_p = 1/R_1 + 1/R_2$ OR $(R_p =) R_1 R_2 / (R_1 + R_2)$	C1
	$1/R_p = 1/2 + 1/3$ OR $(R_p =) 2 \times 3 / (2 + 3)$	C1

Question	Answer	Marks										
10(a)	<table><tr><td>output of X</td><td>output of Y</td></tr><tr><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td></tr></table>	output of X	output of Y	1	0	1	0	0	1	0	0	
	output of X	output of Y										
	1	0										
	1	0										
	0	1										
0	0											
	all column X correct 1, 1, 0, 0	B1										
	first 2 rows of column Y correct 0, 0	B1										
	last 2 rows of column Y correct 1, 0	B1										
10(b)	high humidity AND dark(ness)	B1										
10(c)	relay	M1										
	low voltage output (of NOR gate/gate Y) OR small current (in relay coil)	A1										
	large(r) current provided (by relay) OR large(r) voltage provided (by relay)	A1										

Question	Answer	Marks
11(a)(i)	top: travels to left	B1
	middle: deflected down AND still travels to right	B1
	bottom: straight on	B1

Question	Answer	Marks
11(a)(ii)	plus OR positive OR +	B1
11(b)	79 (electrons)	B1
	119 (neutrons)	B1
	79 (protons)	B1