



Cambridge IGCSE™

PHYSICS

0625/42

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 **9** printed pages.

Question	Answer	Marks
1(a)(i)	$s = vt$ in any form OR $(s =) vt$ OR relates distance to area (under graph)	C1
	any one of: $5 \times 20/60$ OR $40 \times 20/60$ OR $6 \times 22/60$	C1
	$(s = 1.667 + 13.333 + 2.2 =) 17 \text{ km}$	A1
1(a)(ii)	average speed = candidate's (i) / time	C1
	(average speed = $17 \times 60/74 =) 14 \text{ km/h}$	A1
	gradient	B1
1(b)	(gradient =) change of speed / time	B1
	0	B1
	(constant) gradient = 0 OR speed constant	B1

Question	Answer	Marks
2(a)	impulse OR $\Delta p = m(v - u)$ in any form	C1
	(impulse =) 750 000 (84 – 42)	C1
	(impulse =) $3.2 \times 10^7 \text{ N s}$ or m kg/s	A1
2(b)	$Ft = \text{impulse}$ OR Δp in any form OR $(F =) (\text{impulse OR } \Delta p) / t$	C1
	$(F = 3.2 \times 10^7 / 80 =) 3.9 \times 10^5 \text{ N}$	A1
2(c)	reduces drag / air resistance (experienced by the train) / more streamlined	B1
2(d)	less drag / air resistance (at slower speeds)	B1
2(e)	(maximum) friction (force) between rails and train reduced / train may slide	B1

Question	Answer	Marks
3(a)	$E = mc\Delta T$ in any form OR $(E =) mc\Delta T$	C1
	efficiency = (energy) output / (energy) input in any form	C1
	$15 \times 4200 \times \Delta T = 5000 \times 3600 \times 0.2$	C1
	$(\Delta T = 5000 \times 3600 \times 0.2 / 15 \times 4200 =) 57^\circ\text{C}$	A1
3(b)	e.g. renewable OR no <u>air</u> pollution OR low running costs OR no named polluting gas OR no greenhouse effect	M1
	explanation that follows from advantage stated	A1
	e.g. expensive to install OR not available at night OR visual pollution OR needs a suitable (roof) space	M1
	explanation that follows from disadvantage stated	A1

Question	Answer	Marks
4(a)	(place) in <u>melting</u> ice	B1
	when bead has stopped moving OR owtte mark as lower fixed point / 0°C	B1
	(place) in <u>steam</u> (above boiling water)	B1
	when bead has stopped moving OR owtte mark as upper fixed point / 100°C	B1
4(b)	bead would not be liquid owtte	B1
4(c)(i)	thinner bore / tube OR smaller bulb OR use liquid which expands more (per unit change in temperature)	B1
4(c)(ii)	longer tube OR larger (volume) glass bulb OR use liquid which expands less (per unit change in temperature)	B1
4(d)	expands uniformly (with temperature) OR same distance between all degree intervals	B1

Question	Answer	Marks
5(a)	three wavefronts parallel to each other AND same angles of reflection and incidence both by eye	B1
	two wavelengths same as original wavelength by eye	B1
	three reflected waves meet incident waves at barrier	B1
5(b)	$v = f\lambda$ in any form OR $(f =) v/\lambda$	C1
	OR $(f =) 1.2 / 0.36$	C1
	$(f =) 3.3 \text{ Hz}$	A1
5(c)	sound OR ultrasound	B1
	compressions	B1

Question	Answer	Marks
6(a)	incident ray travels straight on at first face of prism 1	B1
	ray reflected through 90° at sloping face of prism 1 continues vertically downwards to sloping face of prism 2	B1
	ray reflected through 90° at sloping face and leaves box horizontally	B1
6(b)	$n = 1 / \sin C$ in any form OR $(n =) 1 / \sin C$	B1
	$\{(n =) 1 / \sin 45 \text{ OR } (n =) 1 / 0.707\} \text{ AND } (n =) 1.41$	B1

Question	Answer	Marks
7(a)(i)	primary coil wound round iron AND (labelled primary or coil OR connected to labelled supply / 12 V)	B1
	secondary coil wound round iron AND (labelled secondary OR connected to labelled output / 2 V)	B1
	significantly more coils around primary	B1

Question	Answer	Marks
7(a)(ii)	two from three - links magnetic fields of coils / primary and secondary - stronger magnetic field in <u>secondary</u> - better induction owttte	B2
7(a)(iii)	$V_1 I_1 = V_2 I_2$ in any form OR $(I_1 =) V_2 I_2 / V_1$ OR $(I_1 =) 2 \times 0.10 / 12$	C1
	$(I_1 =) 0.017 \text{ A}$	A1
7(b)	metal case earthed	B1
	in case wire falls off / insulation fails / live(wire) touches case	B1

Question	Answer	Marks
8(a)	two circuit symbols correct	B1
	three circuit symbols correct	B1
	symbol for cell, battery or power supply AND two other circuit symbols in series	B1
	LED correct way round	B1
8(b)	$R = V / I$ in any form OR $(R =) V / I$	C1
	$(R = 3.1 / 0.030 =) 100 \Omega$	A1
8(c)(i)	uses $10.5 = 2.1 + V$ across heater	C1
	$(R = 8.4 / 1.5 =) 5.6 \Omega$	A1
8(c)(ii)	$P = VI$ in any form OR $(P =) VI$	C1
	$(P = 8.4 \times 1.5 =) 12.6 \text{ W}$	A1

Question	Answer	Marks
9(a)	output 1, 1, 1, 0	B1
9(b)(i)	AND	B1
9(b)(ii)	first two lines of E 0,1	B1
	last two lines of E 1,1	B1
9(c)	Q = It in any form OR (Q =) It	C1
	(Q = 3×60) = 180 (C)	C1
	(n = $3 \times 60 / 1.6 \times 10^{-19}$) = 1.1×10^{21}	C1

Question	Answer	Marks
10(a)	(beam) narrow OR straight OR in one direction owfte	B1
	radiation in other directions absorbed	B1
10(b)(i)	out of page / towards viewer	B1
	equiv. to current in direction of beam	B1
10(b)(ii)	opposite to (i)	B1
	equiv. to current in opposite direction to beam OR LH rule mentioned or described	B1
10(b)(iii)	none	B1
	(γ) uncharged OR not equivalent to current	B1