



Cambridge IGCSE™

PHYSICS

0625/42

Paper 4 Extended Theory

March 2020

MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **15** printed pages.

Question	Answer	Marks
1(a)	$(a=\Delta v / \Delta t$ in any form OR $(a=\Delta v / \Delta t$ OR $(a)=120 / 8$	C1
	$(a) = 15 \text{ m / s}^2$	A1
1(b)(i)	straight line from (0,0) to (8,120)	B1
1(b)(ii)	$(h = A =) \frac{1}{2} \times 120 \times 8$	C1
	$(h=) 480 \text{ m}$	A1
1(b)(iii)	rising <u>curve</u> from 8 s to 20 s	B1
	decreasing gradient from 8 s to 20 s	B1
	horizontal from 20 s to 25 s AND below 200 m / s, AND above 120 m / s	B1

Question	Answer	Marks
2(a)	(impulse =) <u>change of</u> momentum	C1
	(impulse =) $71(10 - 4)$	C1
	(impulse =) 430 N s	A1
2(b)(i)	(impulse =) force $\times$ time	B1
2(b)(ii)	(av F =) impulse / time (= $430 / 1.2$)	C1
	(av F =) 360 N	A1
2(c)	$F = ma$ in any form OR $(F =) ma$ OR 71×6.4	C1
	$(F=) 450 \text{ N}$	A1

Question	Answer	Marks
3(a)(i)	KE = $\frac{1}{2}mv^2$ in any form OR $v^2 = 2 \times \text{KE} / m$ OR $240 = \frac{1}{2} \times 7.5 v^2$	C1
	$v^2 = 2 \times 240 / 7.5$ OR $(v =) \sqrt{2 \times 240 / 7.5}$ OR $(v =) \sqrt{2 \text{KE} / m}$	C1
	= 8.0 m / s	A1
	240 W	B1
3(b)(i)	P = VI in any form OR 11×2	C1
	22 W	A1
3(b)(ii)	(efficiency =) P_o / P_i OR (efficiency =) P_o / P_i OR (efficiency =) $(11 \times 2 / 240) \times 100$	C1
	{efficiency = $(11 \times 2 / 240) \times 100 =$ } 9.2 (%)	A1
3(c)	$\rho = m / V$ in any form OR $(V =) m / \rho$ OR $(V =) 7.5 / 1.3$	C1
	$(V = 7.5 / 1.3 =) 5.8 \text{ m}^3$	A1

Question	Answer	Marks
4(a)	(thermal) energy to change state o.w.t.t.e.	M1
	to melt (solid) per kg / unit mass NOT per °C	A1
4(b)(i)	$E = mc(\Delta)T$ in any form OR ($c =$) $E / m(\Delta)T$ OR ($c =$) $35\,000 / (0.35 \times 24.5)$	C1
	($c =$) $4\,100\text{ J} / (\text{kg } ^\circ\text{C})$	A1
4(b)(ii)	use of 35 000	B1
	$E = mL$ in any form OR ($m =$) E / L OR $35000 / 3.3 \times 10^5$	C1
	($m =$) 0.11 kg	A1

Question	Answer	Marks
5(a)	conduction	B1
	conduction	B1
	radiation	B1
5(b)	electrons <u>move</u>	B1
	lattice / molecular / particle <u>vibration</u> or w.t.t.e. OR free / delocalised electrons	B1
5(c)	shiny white	M1
	best reflector	A1

Question	Answer	Marks
6(a)(i)	3 straight crests, to the right of A parallel to incident crests AND same λ by eye	B1
	curving round correct way below A	B1
6(a)(ii)	diffraction	B1
6(b)(i)	correct arrow perpendicular to wave fronts	B1
6(b)(ii)	refraction	B1
6(b)(iii)	wavelength – decreases	B1
	frequency – stays same	B1
	speed of wave – decreases	B1

Question	Answer	Marks
7(a)(i)	one correct ray	B1
	second correct ray	B1
	rays intersect above axis to left of A AND object drawn from axis to intersection	B1
7(a)(ii)	AC	B1
	CB	B1
7(b)(i)	ray in prism refracted down less than green ray	B1
7(b)(ii)	ray in rectangular block refracted down less than green ray	B1
7(b)(iii)	ray leaving rectangular block parallel to incident ray	B1

Question	Answer	Marks
8(a)	$\{R_s = R_1 + R_2 + R_3 \text{ in any form OR } (R_s) = R_1 + R_2 + R_3 \text{ OR } (R_s) = 3 + 2 + 6 (\Omega) \text{ OR } (R_s) = 11 (\Omega)\}$ AND $\{V = IR \text{ in any form OR } (I =) V / R \text{ OR } (I =) 12 / 11 (A)\}$	C1
	(I =) 1.1 A	A1
8(b)	uses resistance of wire proportional to length OR (resistance $XQ =$) 6Ω 0.6 / 2.0 (Ω) OR 1.8 (Ω)	B1
	$1 / R_p = 1 / R_1 + 1 / R_2 \text{ OR } (R_p =) R_1 R_2 / (R_1 + R_2)$	C1
	$1 / R_p = 1 / 1.5 + 1 / (6 \times 0.6 / 2)$ OR $(R_p =) 1.5 \times (6 \times 0.6 / 2) / (1.5 + 6 \times 0.6 / 2)$ OR $(R_p =) 1.5 \times 1.8 / \{1.5 + 1.8\} = 0.82 (\Omega)$	C1
	(R = $3 + 2 + 0.82 =$) 5.8 Ω	A1

Question	Answer	Marks
9(a)	NAND	B1
9(b)	NOT	B1
9(c)	AB 1st row 11 AND 4th row 00	B1
	AB 2nd and 3rd row 01 AND 10 in any order	B1
	E 1st two rows 0 1	B1
	E last two rows 1 1	B1

Question	Answer	Marks
10(a)	magnetic field (produced)	B1
	(magnetic field / magnetic flux / magnetic effect / magnetism) (it) alternates / changes direction / reverses	B1
10(b)	e.m.f. / p.d. / voltage	B1
10(c)	(temperature) increased	B1
	current in <u>base of pan</u> o.w.t.t.e.	B1
	thermal energy (produced in base of pan)	B1

Question	Answer	Marks
11(a)	neutrons 1 2	B1
	electrons 2 2	B1
	mass 3 4 OR 2 more 3 more	B1
11(b)	β	B1
	β – (would be) stopped by 5 mm / thick Al	B1
	α – (would be) stopped by 0.1 mm Al / Al foil AND γ – (would) not (be) stopped by 5 mm / thick Al	B1