Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/43**

Paper 4 Extended Theory **May/June 2022**

MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **11** printed pages.

Question	Answer	Marks
1(a)(i)	9.7 s	**A2**
	(a =) $\Delta v \div t$ in any form OR 28 (–0)/2.9	C1
1(a)(ii)	4600 N	**A2**
	(F =) ma in any form OR 1600 × 2.9	C1
1(a)(iii)	630 000 J / 6.3×10^5 J	**A2**
	(KE =) ½ mv^2 in any form OR $\frac{1600 \times 28^2}{2}$	C1
1(b)	960 000 C / 9.6×10^5 C	**A3**
	(Q =) It in any form OR 32 × 8.3 × 60 × 60	C1
	(t s =) 8.3 × 60 × 60	C1
1(c)	any **one** explicit example of a variation from *ideal conditions* such as: (repeated) acceleration / deceleration / use of brakes / varying speed motion uphill / uneven road surface cold weather / headwind	**B1**

Question	Answer	Marks
2(a)	gravitational potential (energy)	**B1**
2(b)(i)	2.0×10^6 J / s	**A3**
	(P =) E/t in any form OR (480 × 10 × 410)/1	C1
	(ΔGPE =) mgh in any form OR 480 × 10 × 410	C1

Question	Answer	Marks
2(b)(ii)	81 (%) OR 82 (%)	**A3**
	$P = V I$ in any form OR 6000 × 270 OR 1 620 000	C1
	(efficiency =) (useful) power out / (total) power in (× 100%) in any form	C1
2(c)(i)	damage to habitats (for fish) / construction is expensive / droughts / flood risk if dam bursts	**B1**
2(c)(ii)	biofuel / wind / geothermal / tidal / solar / wave	**B1**

Question	Answer	Marks
3(a)(i)	suitable scale recorded (e.g. 2 cm : 25 N)	**B1**
	two vectors correctly drawn by eye **AND** correct resultant	**M1**
	130 N	**A1**
	(vertically) upwards	**A1**
3(a)(ii)	13 kg	**B1**
3(b)	acceleration	**B1**
	momentum	**B1**

Question	Answer	Marks
4(a)(i)	zig zag motion / random changes of direction	**B1**
	random length of path in each direction	**B1**

Question	Answer	Marks
4(a)(ii)	any **four** from: • air molecules bombard smoke particles • air molecules are small (compared to smoke particles) / have small(er) mass • air molecules are very fast moving • air molecules move in random directions • (collisions exert unbalanced) forces on smoke particles	**B4**
4(b)(i)	kinetic energy (and potential energy) of molecules increase (hence internal energy increases)	**B1**
4(b)(ii)	bigger change in momentum of molecules OR molecules hit (the walls) harder	**B1**
	(molecules hit) more often / more frequently	**B1**

Question	Answer	Marks
5(a)	energy required to raise the temperature of 1 kg / 1 g / unit mass of a substance by 1 °C / unit temperature	**A2**
	energy required to raise the temperature of a substance by 1 °C	C1
5(b)(i)	0.50 kg	**A2**
	$\rho = m/V$ in any form	C1
5(b)(ii)	190 000J / 1.9×10^5 J / 190 kJ	**A5**
	(E=) $mc\Delta T$ in any form	C1
	(E=) mL in any form	C1
	Use of c = 4200 (J / kg °C) AND ΔT = 5	C1
	Use of c = 2100 AND ΔT = 18	C1

Question	Answer	Marks
6(a)(i)	wavefronts semicircles or part semicircles centred on gap	**B1**
	wavelength of waves to right of barrier same as wavelength of incident wave	**B1**
6(a)(ii)	1 wavelength shorter	**B1**
	correct refraction	**B1**
	2 direction of travel perpendicular to wavefronts	**B1**
6(b)	any **two** from: • particles (in transverse waves) vibrate perpendicular to the direction of travel (of the wave) OR particles in longitudinal waves vibrate parallel to the direction of travel of the wave • longitudinal waves have compressions and rarefactions • transverse waves have troughs and crests	**B2**
6(c)(i)	1000 m / s ⩽ value ⩽ 2000 m / s	**B1**
6(c)(ii)	molecules closer together / water has greater density	**B1**

Question	Answer	Marks
7(a)	ray from left hand corner of the mirror to the eye	**B1**
	angle of incidence = angle of reflection	**B1**
7(b)	any **two** from: virtual upright same size as object laterally inverted	**B2**
7(c)(i)	ultraviolet / X-rays / gamma rays	**B1**
7(c)(ii)	infrared / microwaves / radio (waves)	**B1**

Question	Answer	Marks
8(a)(i)	light-dependent resistor / LDR	**B1**
8(a)(ii)	voltmeter connected in parallel with component Y	**B1**
8(a)(iii)	1 0.016 A	**A2**
	(I =) V/R in any form **or** 12/400 **or** 12/350 **or** 12/750 OR ($R_{total} = R_1 + R_2$ =) 750 (Ω)	C1
	2 6.4 V	**A1**
8(a)(iv)	(in a dark room the p.d. across component Y) decreases	**B1**
8(b)	one named practical application of LDR e.g. switch on street lights (at night) / turn on security light (at night)	**B1**

Question	Answer	Marks
9(a)(i)	any **four** from: • needle oscillates (as magnet moves up and down) • coil cuts magnetic field / magnetic field changes (as magnet moves) • changing (magnetic) field induces voltage/current • induced voltage/current opposes the motion/change causing it • force, magnetic field and induced current are mutually perpendicular	**B4**
9(a)(ii)	larger (maximum) deflection	**B1**
9(b)	2300	**A2**
	(N_P =) $V_P N_S / V_S$ in any form OR (N_P =) $\frac{25000 \times 36000}{400000}$	C1

Question	Answer	Marks
10(a)	background radiation (present in values in Table 10.1)	**B1**
	(background radiation) is removed (before plotting) OR (background radiation) not present in the graph values	**B1**
10(b)	$70 \leqslant$ half-life $\leqslant 76$ (s)	**A2**
	evidence of at least one pair of values for count rate halving taken from graph	C1
10(c)	${}^{234}_{91}\text{Pa} \rightarrow {}^{234}_{92}\text{U} + {}^{0}_{-1}\beta$	
	${}_{92}\text{U}$ on RHS	**B1**
	${}^{234}\text{U}$	**B1**
	$+ {}^{0}_{-1}\beta$ on RHS	**B1**