

Cambridge IGCSE™

PHYSICS**0625/42**

Paper 4 Extended Theory

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MARK SCHEME

Maximum Mark: 80

Published

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Question	Answer	Marks
1(a)(i)	scalar has magnitude (size) <u>only</u> OR vector has (magnitude and) direction	B1
1(a)(ii)	mass, energy and temperature all correct and no additional quantities 2 marks 2 correct and no additional quantities 1 mark	B2
1(b)(i)	decrease in kinetic energy = increase in gravitational (potential) energy OR $\frac{1}{2} mv^2 = mg(\Delta)h$	B1
	$v^2 = 2gh$ OR $v^2 = 2 \times 9.8 \times 5.0$ OR $v^2 = 98$	B1
	$v = \sqrt{98}$ OR 9.899	B1
1(b)(ii)	0.57 kg m / s (upwards) OR 0.57 Ns (upwards)	A2
	(momentum =) mv OR $5.8 \times 10^{-2} \times 9.9$	C1

Question	Answer	Marks
2(a)(i)	7400 N	A3
	$a = \Delta v / \Delta t$ OR $a = \{22 - 13\} / 4.5$ OR 2.0 (m/s ²) SEEN	C1
	($F =$) ma OR 3700×2.0	C1
2(a)(ii)	air resistance OR drag	B1
	<u>friction</u> (between tyres and road)	B1
2(b)(i)	arrow from car pointing towards the centre of the circle	B1
2(b)(ii)	any two from: • car has higher speed • less friction (between car and track) OR not enough friction • larger mass	B2

Question	Answer	Marks
3(a)	more electricity generated OR makes solar panels more efficient	B1
	black is a good absorber OR black is a poor reflector	B1
3(b)	22 kW OR 22 000 W	A3
	(total power input =) {useful power output ($\times 100\%$)} / (%) efficiency OR (total power input =) $\{3.5 \times 100\} / 16$ OR (total power input =) $3.5 / 0.16$	C1
	(total power input =) $3.5 / 0.16$ OR (total power input =) $\{3.5 \times 100\} / 16$	C1
3(c)	alternating current reverses direction OR direct current is only in one direction	B1
3(d)	electricity can be used when there is no Sun OR when it is dark or cloudy OR at night	B1
3(e)	29 000 C	A3
	$(Q =) I t$ OR $(Q =) 4.0 \times 2.0 \times 60 \times 60$	C1
	correct conversion from h to s SEEN	C1

Question	Answer	Marks
4(a)(i)	170 (cm ³)	A3
	$pV = \text{constant}$ OR $1.0 \times 10^5 \times 240 = 1.4 \times 10^5 \times V_2$	C1
	$(V_2 =) \{1.0 \times 10^5 \times 240\} / 1.4 \times 10^5$ OR 1.7×10^N	C1
4(a)(ii)	270 N	A2
	$(F =) pA$ OR $(F =) 1.4 \times 10^5 \times 1.9 \times 10^{-3}$	C1
4(a)(iii)	$(W =) Fd$ in words or symbols	M1
	7.9 J	A1
4(b)	distance between gas particles is much larger (than distance between liquid particles) OR particles in liquid are touching AND particles in gas are far apart	B1

Question	Answer	Marks
5(a)(i)	particles with more (kinetic) energy escape OR fast(er) particles escape	B1
	(particles) escape from the surface	B1
5(a)(ii)	windy OR (air) temperature higher / Sun shining	M1
	particles that escape from surface blown away (and unable to return) OR more energy given to the particles (to escape)	A1
5(b)	braking distance increases AND friction (between tyres and road) decreases	B1

Question	Answer	Marks
6(a)(i)	wavefronts joined at the boundary	B1
	angle with the surface in region B smaller than angle with surface in region A AND slanting in correct direction	B1
	refracted wavefronts all parallel slanting in the correct direction AND wavelength less than incident waves	B1
6(a)(ii)	refraction	B1
6(b)(i)	speed of light in first region is less than speed of light in second region	B1
	angle of incidence must be greater than the critical angle	B1
6(b)(ii)	any two from: • high rates of data (transmission) • carry large amounts of data / information • secure • little data / signal loss • glass is transparent to visible light and (some) infrared	B2

Question	Answer	Marks
7(a)	correct symbols for a.c supply and lamps	B1
	components all connected in parallel	B1
7(b)(i)	0.29 A	A2
	$(I =) V / R$ OR $(I =) 230 / 800$	C1
7(b)(ii)	0.33 (kWh)	A3
	$(E =) VIt$ OR $(E =) \{230 \times 0.29 \times 5(.0)\} / 1000$	C1
	conversion from W to kW seen i.e. division by 1000	C1
7(b)(iii)	480 Ω	A2
	$1 / R = 1 / R_1 + 1 / R_2$ OR $1 / R = 1 / 800 + 1 / 1200$ OR $(R =) R_1 R_2 / \{R_1 + R_2\}$ OR $(R =) \{800 \times 1200\} / \{800 + 1200\}$	C1

Question	Answer	Marks
8(a)	region in which a (magnetic) pole experiences a force	B1
8(b)(i)	friction between trolley and track OR the (induced) current produces a magnetic field which opposes the (magnetic) field that causes the (induced) current	B1
8(b)(ii)	any three from: • direction will (still) be left OR there is no change of direction • <u>induced</u> current / emf / voltage does not change direction • smaller deflection • smaller (rate of) change of magnetic field • smaller current / emf / voltage <u>induced</u> (in coil)	B3

Question	Answer	Marks
9(a)(i)	curve bending upwards while in magnetic field and labelled α	B1
9(a)(ii)	curve bending downwards while in magnetic field and labelled β	B1
	smaller radius of curvature for β than for α	B1
9(a)(iii)	line passing straight through the magnetic field and labelled γ	B1
9(b)(i)	time taken for half the nuclei of a sample to decay	B1
9(b)(ii)	R	B1
	half-life not too short OR half-life is suitable so that source does not need to be replaced often	B1
	so count rate changes with thickness	B1
	γ - rays would not be stopped at all AND α -particles would be absorbed by any thickness of aluminium	B1

Question	Answer	Marks
10(a)	rocky	B1
	gaseous	B1
	gravitational force	B1
	accretion disc	B1
10(b)	3.9×10^8 (m)	A3
	(speed of light =) 3.0×10^8	C1
	(s =) vt OR (s =) $3.0 \times 10^8 \times 1.3$	C1
10(c)	4.8×10^5 m/s OR 4.8×10^2 km/s	A3
	(1 light-year =) 9.5×10^{15} (m) OR 9.5×10^{12} (km) OR 4.8×10^N	C1
	(v =) $H_0 d$ OR (v =) $2.2 \times 10^{-18} \times 2.3 \times 10^7 \times 9.5 \times 10^{15}$	C1