Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/43**

Paper 4 Extended Theory **May/June 2023**

MARK SCHEME

Maximum Mark: 80

Published

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[Turn over

Question	Answer	Marks
1(a)	1200 N **AND** $g = W / m$ **OR** (W =) mg **OR** (W =) 120 × 9.8	**B1**
1(b)	$F = ma$ **OR** (a =) F / m	**B1**
	(a =) 54 / 120	**B1**
1(c)	(v =) 3.6 m / s	**A2**
	a = (Δ)v / t **OR** (Δv =) at **OR** (Δv =) 0.45 × 8(.0)	**C1**
1(d)	(d =) 14 m	**A2**
	<u>average</u> speed = (total) distance travelled / (total) time taken **OR** 1.8 × 8 **OR** $\left(\frac{3.6}{2}\right) \times 8$	**C1**

Question	Answer	Marks
2(a)(i)	(pressure is) force per unit area	**B1**
2(a)(ii)	(variation with depth) increases (as depth increases)	**B1**
	(variation with density) increases (as density increases)	**B1**
2(b)	any **two** from: • geothermal • nuclear • tidal	**B2**
2(c)(i)	(statement) non-renewable / not renewable / no	**B1**
	(explanation) (nuclear) fuel is used up	**B1**
2(c)(ii)	(statement) renewable / yes	**B1**
	(explanation) waves will always continue **OR** produced by wind which will always continue **OR** nothing used up	**B1**

Question	Answer	Marks
3(a)(i)	(greatest) gas	**B1**
	(least) solid	**B1**
3(a)(ii)	any **three** from: • (solids) particles vibrate • (gases) particles move freely • (solids) particles in fixed / close positions • (gases) particles randomly arranged (in container) / wide separation • (gas) particles move quickly	**B3**
3(b)(i)	(specific heat capacity is the) energy required to raise 1 kg / unit mass by 1 °C / 1 K / 1 kelvin / unit temperature	**A2**
	energy required per unit mass / 1 kg **OR** energy required per unit temperature / 1 °C increase / 1 K increase / 1 kelvin increase	**C1**
3(b)(ii)	time	**B1**
	mass	**B1**
	initial temperature **AND** final temperature	**B1**

Question	Answer	Marks
4(a)(i)	two correct rays extended back (towards the intersection)	**M1**
	extended rays intersect	**A1**
	image drawn from intersection to principal axis **AND** base of image lies in correct range	**B1**
4(a)(ii)	circles around: • enlarged • virtual • upright	**B3**
4(b)(i)	long-sightedness / long sight / far-sighted	**B1**
4(b)(ii)	converging lens reduces focal length of eye **OR** converging lens brings focal point forward **OR** without lens, rays converge behind back of eye	**B1**
	(so that) rays converge / focus on back of eye / retina	**B1**

Question	Answer	Marks
5(a)(i)	infrared	**B1**
5(a)(ii)	glass is transparent to visible light and (some) IR	**B1**
	(visible light and some IR) can carry high rates of data / information	**B1**
5(b)(i)	(n =) 1.4	**A2**
	(n =) 1 / sin c **OR** (n =) 1 / sin c **OR** (n =) 1 / sin 45	**C1**
5(b)(ii)	diagram shows that total internal reflection is taking place inside optical fibre	**B1**
	one or more correct reflections with i > 45°	**B1**

Question	Answer	Marks
6(a)	(I =) 9.8 A	**A3**
	$P = I^2R$ **OR** $I^2 = \frac{P}{R}$ **OR** $I^2 = \frac{2500}{26}$	**C1**
	I^2 = 2500 / 26 **OR** (I =) √(P / R) **OR** $\sqrt{\frac{2500}{26}}$	**C1**
6(b)	(R =) 53 Ω	**A3**
	$R \propto l$ **OR** 1.8 / 1.2 **OR** 1.5 seen as multiplier	**C1**
	R ∝ 1 / A **OR** 7.9 (× 10^{-7}) / 5.8 (× 10^{-7}) **OR** 1.36(2) seen as multiplier	**C1**
6(c)	(cost =) $36	**A2**
	$E = Pt$ **AND** (cost =) E × 0.3(0) **OR** (cost =) 25 × 10^N × 2 × 24 × 0.3(0) **OR** 3.6 × 10^N dollars	**C1**

Question	Answer	Marks
7(a)	(I_p =) 0.14 A	**A3**
	$V_p I_p = V_s I_s$ **OR** (I_p =) $V_s I_s / V_p$ **OR** (I_p =) 12 × 2.5 / 220	**C1**
	(I_p =) 12 × 2.5 / 220	**C1**
7(b)	(turns ratio =) 18 (: 1)	**A2**
	$N_p / N_s = V_p / V_s$ **OR** (N_p / N_s =) V_p / V_s **OR** (turns ratio =) 220 / 12	**C1**

Question	Answer	Marks
8(a)(i)	(neutron) becomes proton and electron **OR** (neutron) becomes proton and β particle	**B1**
8(a)(ii)	charge on neutron = 0 **OR** total charge on products = 0	**B1**
	charge on proton = +1 **AND** charge on electron = –1	**B1**
8(b)	($^{212}_{86}Rn \rightarrow$) $^{208}_{84}Po + {}^{4}_{2}\alpha$	**A3**
	any **two** from: • proton numbers balance • nucleon numbers balance • ${}^{4}_{2}\alpha$ **OR** ${}^{4}_{2}He$ seen	**C2**

Question	Answer	Marks
9(a)	both positions correctly marked S_1 and J_1 on the diagram	**A3**
	Saturn moved $360 \times 5 / 30$ (= 60°) **OR** S_1 in correct position	**C1**
	Jupiter moved $360 \times 5 / 12$ (= 150°) **OR** J_1 in correct position	**C1**
9(b)(i)	S_2 at 240° **AND** J_2 at (600° – 360° =) 240°	**B1**
9(b)(ii)	(Saturn and Jupiter) are aligned / Jupiter exactly in front of Saturn / there is a conjunction owtte	**B1**
9(c)(i)	(Jupiter) gaseous **AND** large **AND** (Earth) rocky **AND** small	**B1**
9(c)(ii)	any **three** from: (density) • Jupiter has a low density because it is composed of gas / Earth has a high density because it is a solid (gravitational field strength) • Jupiter (has a large GFS so it) has a large mass / Earth (has a small GFS so it) has a small mass • Jupiter's mass is larger than the Earth's mass because the volume of Jupiter is larger even though the density of Jupiter is smaller	**B3**
9(d)	(mass =) 1.8×10^{27} kg	**A3**
	$\rho = m / V$ **OR** (m =) ρV **OR** (m =) $1300 \times 1.4 \times 10^{15} \times 10^{9}$	**C1**
	(m =) $1300 \times 1.4 \times 10^{15} \times 10^{9}$ (kg) **OR** $1.8(2) \times 10^{N}$	**C1**

Question	Answer	Marks
10(a)	$v = s / t$ **OR** $(s =) vt$	**B1**
	$(c =) 3 \times 10^8$ (m / s)	**B1**
	(1 year =) $365 \times 24 \times 3600$ (s) **OR** 3.2×10^7 (s) **OR** 32×10^6 **OR** 8760×3600	**B1**
	(s =) candidate's speed of light × candidate's time (m)	**B1**
10(b)(i)	change of wavelength (of galaxy's starlight) **OR** redshift	**B1**
10(b)(ii)	$H_0 = v / d$	**B1**
10(b)(iii)	brightness of a supernova	**B1**