

Cambridge IGCSE™

PHYSICS	0625/42
Paper 4 Extended Theory	October/November 2024
MARK SCHEME	
Maximum Mark: 80	

Published

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Question	Answer	Marks
1(a)(i)	$7.3 \times 10^7 \text{ N}$	B1
1(a)(ii)	(weight is) the gravitational force on a mass / an object (with mass) OR (weight is) the effect of a gravitational field on a mass	B1
1(b)(i)	(from O to A) increasing <u>acceleration</u>	B1
	(from A to B) <u>constant</u> / <u>uniform acceleration</u>	B1
1(b)(ii)	tangent drawn at time = 400 s	M1
	$\Delta y / \Delta x$ from candidate's tangent seen AND $17 \text{ m / s}^2 \leq \text{acceleration} \leq 23 \text{ m / s}^2$	A1
1(c)	resistive force / air resistance / drag increases as velocity increases	B1
	until gravitational force is balanced by air resistance (at terminal velocity) OR until resultant / net force is zero (at terminal velocity)	B1

Question	Answer	Marks
2(a)	(momentum is) mass $\times$ velocity	B1
2(b)(i)	1.9 N s OR 1.9 kg m / s	A2
2(b)(ii)	impulse = $F\Delta t = \Delta\{mv\}$ OR (impulse = $F\Delta t$) $\Delta\{mv\}$ OR (impulse =) 0.046×41	C1
	3800 N	A2
	$F = \Delta p / \Delta t$ OR $(F =) \Delta p / (\Delta t)$ OR $(F =) \Delta(mv) / (\Delta t)$ OR $(F =) \text{impulse} / (\Delta t)$ OR $1.9 / 0.0005$ OR $3.8 \times 10^4 \text{ N}$	C1

Question	Answer	Marks
3(a)	any two from: • fossil fuels / named fossil fuel • biofuels / named biofuel / biomass • wave(s) • wind (turbines) • Hydroelectric • solar panels / solar cells	B2
3(b)(i)	$E_k = \frac{1}{2} mv^2$	B1
	$(m \Rightarrow) 11000 \times 2 \div [6.3]^2$ OR $(m \Rightarrow) 11000 \times 2 \div [39.69]$ OR 554 (kg) SEEN	B1
3(b)(ii)	55 (%)	A2
	efficiency = useful energy out(put) / (total) energy in(put) $\times 100$ % OR $(6000 \div 11000) \times 100$	C1
3(c)	(tides) follow a regular / predictable pattern OR (tides) are reliable ORA for wind	B1

Question	Answer	Marks
4(a)	boiling happens at a specific temperature OR evaporation happens at a range of temperatures OR evaporation happens at any temperature (below the boiling point)	B1
	evaporation happens at the surface of the water OR boiling happens throughout the water	B1
4(b)	any four from: 1 (as the water is heated) the number of gas particles increases 2 (particles) gain internal / kinetic energy 3 (there are) more frequent collisions between particles and surface / wall / lid of the cooker 4 (each) collision (of particles) is harder / exerts more force (on cooker surface) OR greater change of momentum when particles collide (on cooker surface) 5 pressure $\propto$ (total) force (of collisions) OR pressure = force / area	B4

Question	Answer	Marks
5(a)	(tarmac / it) absorbs infrared radiation (emitted from the Sun)	A2
	(tarmac / it) absorbs radiation / infrared (emitted from the Sun)	C1
5(b)	conduction	B1
5(c)	convection	B1
5(d)	any two from: 1 black / tarmac is a better absorber (of radiation) than air 2 tarmac is a poor emitter (at low / this temperature) 3 thin layer of tarmac / very large volume / column of air above road	B2

Question	Answer	Marks
6(a)(i)	diffraction	B1
6(a)(ii)	450 Hz	A2
	$v = f \lambda$ OR ($f =$) v / λ OR 340 / 0.75	C1
6(a)(iii)	large diffraction when gap size / doorway is similar to wavelength	B1
	high frequency / 3500 Hz has (much) shorter wavelength AND there is less diffraction (with shorter wavelengths)	B1
6(b)	ray drawn from the violin to point X AND from point X to the teacher	B1
	mirror drawn at point X and labelled AND angle of incidence = angle of reflection	B1
	correct arrow on incident ray OR correct arrow on reflected ray	B1

Question	Answer	Marks
7(a)	(e.m.f. is the electrical) work done (by a source in) moving a unit charge around a (complete) circuit	A2
	(electrical) work done moving a charge	C1
7(b)	230 V	B1
7(c)	9.2 A	A2
	$R = V / I$ OR ($I =$) V / R OR 230 / 25	C1
7(d)	(ammeter reading $\Rightarrow$) {1.6 + candidate's answer to 7(c)} A	B1
	Sum of currents into a junction = sum of currents out of junction OR total current is sum of the current in the branches	B1

Question	Answer	Marks
8(a)	ultrasound	B1
8(b)	0.029 s	A3
	(distance travelled $\Rightarrow$) 22×2 OR 44 SEEN	C1
	$v = s / t$ OR ($t =$) s / v OR 44 / 1500	C1
8(c)	reflected wave is weaker / has smaller amplitude	M1
	fish is small(er) OR only small part of wave reflects off fish OR most of sound goes to seabed	A1

Question	Answer	Marks
9(a)	any two from: 1 (magnitude is) constantly changing owtte 2 (magnetic field is) stronger closer to the coil of wire ORA 3 (the magnetic field is) perpendicular to the a.c. current (producing it) 4 (the magnetic field) changes direction owtte	B2
9(b)(i)	any one from: • secondary coil is in changing / varying magnetic field • secondary coil is in the magnetic field of primary coil voltage is <u>induced</u> (in the secondary coil)	B1
9(b)(ii)	any one from: • There is no iron core (to strengthen field) • transformer usually has an iron core to connect the two coils • some energy transferred to thermal energy (in phone / surroundings)	B1
9(c)(i)	6000 s	A2
	$E = VIt$ OR $(t =) E / IV$ OR $4.5 \times 10^4 / [12 \times 0.63]$	C1
9(c)(ii)	$(Q =) 38 \text{ C}$	A2
	$I = Q / t$ OR $(Q =) It$ OR 0.63×60	C1

Question	Answer	Marks
10(a)	(nucleus of carbon-14 contains) more neutrons OR (nucleus of) carbon-12 has fewer neutrons	B1
	<i>any one from:</i> • (atom / nucleus of carbon-14) is heavier • (atom / nucleus of carbon-14 is) not stable • (nucleus of carbon-14 contains) <u>two</u> more neutrons	B1
10(b)(i)	Every 5700 years the (remaining) carbon-14 decreases by half OR amount of C-14 halved every half life	A2
	amount of carbon-14 halves in 5700 years OR amount of carbon-14 decreases at a decreasing rate (with time)	C1
10(b)(ii)	11 000 (years ago)	A3
	2 × half-life have elapsed	C1
	25% of C-14 at time of death is still present in tree OR 75% of C-14 has decayed.	C1
10(c)	medical tracers OR medical imaging OR medical diagnosis	B1
	<i>any one from:</i> • keep dose low • doesn't stay in body too long • less damage (to body) OR less harmful (to humans)	B1

Question	Answer	Marks
11(a)(i)	Earth / Mars / Jupiter / Saturn / Uranus / Neptune	B1
11(a)(ii)	Mercury	B1
11(b)	$3.6 \times 10^4 \text{ (m/s)}$	A3
	$(T =) 220 \times 24 \times 60 \times 60 \text{ OR } (T =) 1.9 \times 10^7 \text{ (s)}$	C1
	$(v =) \frac{2\pi r}{T} \text{ OR } (v =) \frac{2\pi \times 1.1 \times 10^{11}}{220 \times 24 \times 60 \times 60}$	C1
11(c)	The further away from the Sun the slower the orbital speed / ORA	B1
11(d)	1 any one from: • comet has an elliptical orbit • speed of comet is faster when it closer to the Sun • speed of comet is slower when it is further away from the Sun	B1
	2 any one from: • (conservation of energy requires that) transfers between kinetic and gravitational stores (as comet changes speed) • total energy remains constant • energy cannot be created or destroyed	B1
	3 as radius of orbit decreases, gravitational energy decreases and kinetic energy increases ORA	B1