

Cambridge IGCSE™

PHYSICS**0625/42**

Paper 4 Extended Theory

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MARK SCHEME

Maximum Mark: 80

Published

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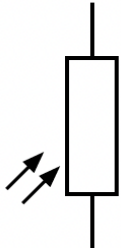
Question	Answer	Marks
1(a)	50 000 N / m OR $5.0 \times 10^4 \text{ N / m}$	A2
	($k \Rightarrow F \div x$ OR k is (determined from) the gradient (of the line in Fig. 1.1)	C1
1(b)	Any one from: - The graph is a straight line (through the origin) - The slope / gradient is constant - The graph / line does not curve	B1
1(c)	1300 N	B1
	any negative number OR indication that force is in opposite direction	B1
1(d)	(Force is a) vector quantity. Forces have (both magnitude / size and) direction	B1

Question	Answer	Marks
2(a)	(statement momentum is) zero / 0 AND (explanation) momentum is mass $\times$ velocity OR the velocity (of B) is zero	B1
2(b)	1.1 kg	A3
	Conservation of momentum OR momentum after (collision) = momentum before (collision) OR $\{0.75 \times 0.44\} = \{0.75 + m\} \times 0.18$	C1
	momentum before collision = 0.75×0.44 ($+ m \times 0 = 0.33$) OR momentum after collision = $(0.75 + m) \times 0.18$	C1
2(c)(i)	0.13 N	A2
	($F =$) $\Delta p \div (\Delta)t$ OR $(0.75 + 1.1) \times 0.18 \div 2.6$ OR ($F =$) $0.33 \div 2.6$ ($F =$) $\{0.75 + 2(b)\} \times 0.18 \div 2.6$	C1

Question	Answer	Marks
2(c)(ii)	(time taken) Increases AND use of $F(\Delta)t = \Delta\{mv\}$ OR $F \propto 1 / (\Delta)t$ OR same momentum change required	B1

Question	Answer	Marks
3(a)	infrared	B1
3(b)	shiny surface / it is a good reflector of radiation Any one from: • it is a good reflector • it reflects radiation	A2 C1
3(c)	Any one from: • prevents (electric) shock (if live wire touches the metal casing) owtte • if live wire touches the metal casing the current goes to earth	B1
3(d)(i)	2.6 A $R = V / I$ OR $(I =) V / R$ OR $(I =) 230 / 89$	A2 C1
3(d)(ii)	$P = IV$ $(I =) 5.2$ (A) OR $(P =) 2 \times$ power of one element OR	B1 B1
3(d)(iii)	68 000 J OR 68 kJ $E = Pt$ OR $(E =) Pt$ OR $(E =) 1200 \times 60$ efficiency = useful energy out / total energy (in) OR $95 \div 100 \times E$ (power output of heater =) $95\% \times 1200$	A3 C1 C1

Question	Answer	Marks
4(a)(i)	(acceleration is) rate of change in velocity OR (acceleration is) change in velocity per unit time OR (acceleration is) change in velocity per second	B1
4(a)(ii)	200 km = 200 000 m OR $\times 1000$ seen division by $\{60 \times 60\}$ seen OR division by 3600 seen	B1
4(a)(iii)	80 s OR 79 s $(t =) \Delta v / a$ OR $56 / 0.7(0)$	A2 C1
4(b)(i)	310 000 N OR 3.1×10^5 N $F = ma$ OR $440000 \times 0.7(0)$	A2 C1
4(b)(ii)	(statement:) reduces acceleration OR lower (maximum) velocity AND (explanation:) <u>resultant/net</u> force decreases	B1

Question	Answer	Marks
5(a)	y-axis labelled resistance AND x-axis labelled light intensity Straight line / smooth curve with negative gradient	B1 B1
5(b)(i)	 Correct symbol drawn to complete circuit.	B1

Question	Answer	Marks
5(b)(ii)	in the dark, V_{LDR} is a bigger proportion of e.m.f OR when R_{LDR} is high V_{LDR} is a bigger proportion of e.m.f. OR when V_{LDR} is high V_{LDR} is a bigger proportion of e.m.f.	A2
	In the dark, V_{LDR} is high OR when R_{LDR} high, V_{LDR} is high	C1
	Any one from: • emf shared (between fixed resistor and LDR) OR emf is constant • $V_{LDR} = V_{LAMP}$ OR p.d. is the same across components in parallel	B1

Question	Answer	Marks
6(a)(i)	Horizontal axis labelled P	B1
6(a)(ii)	X on horizontal axis 3.0 cm to the left of centre of L OR X on horizontal axis 3.0 cm to the right of centre of L	B1
6(a)(iii)	Any two from: • Straight line from a point on O, passing through centre of L (and beyond) • Horizontal line from same point on O to L, refracted through F (on RH side of L) • Straight line from same point on O through F (on LH side of L) to L, refracted parallel to principal axis	M1
	both rays extended until they intersect	A1

Question	Answer	Marks														
6(a)(iv)	<table><tr><td>diminished</td><td></td></tr><tr><td>enlarged</td><td>✓</td></tr><tr><td>inverted</td><td>✓</td></tr><tr><td>real</td><td>✓</td></tr><tr><td>same size</td><td></td></tr><tr><td>upright</td><td></td></tr><tr><td>virtual</td><td></td></tr></table>	diminished		enlarged	✓	inverted	✓	real	✓	same size		upright		virtual		B3
	diminished															
	enlarged	✓														
	inverted	✓														
	real	✓														
	same size															
	upright															
virtual																
6(b)	(image is now) virtual	B1														
	(image is now) upright	B1														

Question	Answer	Marks
7(a)(i)	diffraction	B1
7(a)(ii)	$4.8 \times 10^{-7} \text{ m}$ OR 480 nm	A2
	One wavelength marked on Fig. 6.1 OR 1.2 seen	C1
7(a)(iii)	at least two curved wavefronts	B1
	three <u>semi-circular</u> wavefronts centred on (centre of) gap	B1
	wavelength is unchanged	B1

Question	Answer	Marks
7(b)(i)	$v = f\lambda$	M1
	$(\lambda =) 330 / 380$ OR $(\lambda =) 0.87 \text{ (m)}$	A1
7(b)(ii)	7.6 s	A2
	$v = s / t$ OR $(t =) s / v$ OR $(t =) 2500 / 330$	C1

Question	Answer	Marks
8(a)	(direction of force) down(wards)	B1
	magnetic field direction, current direction and force are mutually perpendicular	B1
	magnetic field is from N to S / left to right AND current flows from positive to negative / anticlockwise / into paper	B1
8(b)	(direction of force) reverses / changes by 180°	B1

Question	Answer	Marks
8(c)	(J carbon brushes) Any one from: • connect cell / circuit to coil / wire / split ring(s) / commutator • maintains (continuous) connection • prevent wires from tangling (as motor rotates) (K coil) Any one from: • rotates / turns • conducts / has a current in it (L axle) Any one from: • allows the coil to rotate / turn • allows motor to turn / spin (M split ring commutator) Any one from: • keeps motor turning in the same direction • reverses the connections to the coil (every half-turn) • prevents wires from tangling (as the motor rotates)	B1

Question	Answer	Marks
9(a)(i)	(isotopes are) forms of an element with the same number of protons but a different number of neutrons (in the nucleus) OR (isotopes are) the same element with a different number of neutrons	B1

Question	Answer			Marks
9(a)(ii)	particle	number in each atom of strontium	location	B1
	electron	38	outside nucleus	
	neutron			
	proton	38	Inside nucleus	
9(b)(i)	particle	number in each atom of strontium	location	B1
		38	outside nucleus	
	neutron	52	Inside nucleus	
		38	Inside nucleus	
9(b)(i)	(there is a) different count rate with different thicknesses of metal OR number of β -particles detected varies with thickness			A2
	(beta (β) particles) can penetrate thin / 0.75mm metal OR (beta (β) particles) are stopped by thick metal			C1
9(b)(ii)	(approximate) percentage of source remaining (after 15 years) stated AND in range 63–70% (approximate) percentage of sample lost (after 15 years) stated AND in range 30–37%			B1
	Any one from: - count rate / activity (too) low (to detect differences in thickness) owtte - detector needs high activity (to detect differences in thickness) owtte - count rate / activity too close to background owtte - less difference in activity for different thicknesses owtte			B1

Question	Answer	Marks
10(a)	(number of days =) 91	B1
	(statement F to G) is $\frac{1}{4}$ of (a complete) orbit OR a whole year is 365 days	B1
10(b)(i)	F	B1
10(b)(ii)	H	B1
10(c)	1.5×10^{11} m	A3
	$v = 2\pi r/T$ OR $(r =) vT/(2\pi)$ OR $(r =) 3.0 \times 10^4 \times 365 \times 24 \times 60 \times 60 / 2\pi$	C1
	$(T =) 365 \times 24 \times 60 \times 60$ OR $(T =) 31\,536\,000$ OR $(r =) 3.0 \times 10^4 \times T / (2\pi)$ OR correct rearrangement of and substitution into formula using candidate's value of T	C1
10(d)	Any one from: • minor planets • asteroids OR meteoroids • moons (that orbit planets) • comets • natural satellites	B1