CAMBRIDGE
International Education

Cambridge International AS & A Level

PHYSICS **9702/22**

Paper 2 AS Level Structured Questions **February/March 2026**

MARK SCHEME

Maximum Mark: 60

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the February/March 2026 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

Question	Answer	Marks
1(a)	rate of change of momentum	**B1**
1(b)	$kg\,m\,s^{-1}/s = kg\,m\,s^{-2}$	**B1**
1(c)	(Base units of) $F = kg\,m\,s^{-2}$ **and** (Base units of) $m = kg$ **and** (Base units of) $A = m^2$	**C1**
	(Base units of) RHS $= kg\,m\,s^{-2} \times m^2\,s^{-1} / (kg \times m^2)$ $= m\,s^{-3}$ (Base units of) LHS $= m\,s^{-1}$ **and** (base units of) RHS $= m\,s^{-3}$ so equation is not homogeneous	**A1**

Question	Answer	Marks
2(a)	sum / total momentum (of a system of bodies) is constant *or* sum / total momentum before = sum / total momentum after	**M1**
	for an isolated system / no (resultant) external force	**A1**
2(b)(i)	23×3.4 or $(23 + 160)v$ $23 \times 3.4 + (160 \times 0) = (23 + 160)v$	**C1**
	$v = 0.43\ m\,s^{-1}$	**A1**
2(b)(ii)	$E_{(K)} = ½\ mv^2$	**C1**
	$E_2/E_1 = ½\,(160+23) \times 0.43^2 / ½\,(23) \times 3.4^2$ $= 16.9 / 132.9$	**C1**
	$E_2/E_1 = 0.13$	**A1**

Question	Answer	Marks
2(b)(iii)	The <u>total</u> kinetic energy after the collision is less than the <u>total</u> kinetic energy before the collision, so inelastic	**B1**
	OR The relative speed of approach is more than the relative speed of separation, so inelastic	**(B1)**
	OR $E_2 < E_1$ so inelastic	**(B1)**
2(c)(i)	(upthrust =) $(160 + 23) \times 9.81 = 1800$ (N)	**A1**
2(c)(ii)	$\rho = F / gV$ $= 1800 / (9.81 \times 1.80 \times 10^5 \times 10^{-6})$	**C1**
	$= 1.02 \times 10^3$ kg m^{-3}	**A1**
	OR $\rho = m / V$ $= 183 / (1.80 \times 10^5 \times 10^{-6})$	**(C1)**
	$= 1.02 \times 10^3$ kg m^{-3}	**(A1)**

Question	Answer	Marks
3(a)(i)	$F = W / d$ $= 5.1 \times 10^3 / 23$	**C1**
	= 220 N	**A1**

Question	Answer	Marks
3(a)(ii)	$(\Delta)E_{(P)} = (16.1 \times 10^3 – 1.3\times 10^3 – 5.1 \times 10^3)$ $= 9.7 \times 10^3$	**C1**
	$(\Delta)E_{(P)} = mg(\Delta)h$	**C1**
	$\Delta h = (9.7 \times 10^3) / (280 \times 9.81)$ $= 3.5$ m	**A1**
3(b)	kinetic energy (at Z) is less (than at X) (due to work done by carriage against resistive forces), so the speed is less (at Z than at X)	**B1**

Question	Answer	Marks
4(a)(i)	product of force and <u>perpendicular</u> distance (between the line of action of the force and the point)	**B1**
4(a)(ii)	(the line of action of) the <u>weight</u> passes through P / the perpendicular distance of (the line of action of) the <u>weight</u> from P is zero (so the moment is zero)	**B1**
4(a)(iii)	$2T\sin\theta = W$	**C1**
	$\sin\theta = 19 / (2 \times 13)$ $\theta = 47°$	**A1**
4(a)(iv)	$E = \sigma / \varepsilon$ or $E = FL / Ax$ **and** $\varepsilon = x / L$ $\varepsilon = F / (AE)$	**C1**
	$= 13 / (\pi (0.8 \times 10^{-3} / 2)^2 \times 9.3 \times 10^{10})$	**C1**
	$= 2.8 \times 10^{-4}$	**A1**

Question	Answer	Marks
4(b)(i)	$s = ut + ½\ at^2$ $1.6 = ½ \times 9.81 \times t^2$	**C1**
	$t = ((2 \times 1.6) / 9.81)^{0.5}$ $= 0.57$ s	**A1**
	OR $v = (2 \times 9.81 \times 1.6)^{0.5} = 5.6$ $t = (v - u) / a$ $= (5.6 - 0) / 9.81$	**(C1)**
	$= 0.57$ s	**(A1)**
	OR $t = 2s / v$ $= 2 \times 1.6 / 5.6$	**(C1)**
	$= 0.57$ s	**(A1)**
4(b)(ii)	a curved line from the origin	**B1**
	a line from the origin with a continuously decreasing positive gradient	**B1**

Question	Answer	Marks
5(a)(i)	time for one oscillation / vibration / cycle (of a particle / point on wave) or time between adjacent wavefronts (passing the same point) or shortest time between two wavefronts (passing the same point)	**B1**
5(a)(ii)	(The magnitude of the) maximum displacement (of a particle / point on the wave)	**B1**
5(b)(i)	a cross vertically in line with a peak or trough on the string	**B1**
5(b)(ii)	(λ =) 0.96 × 2 / 3 = 0.64	**M1**
	$v = f\lambda$	**C1**
	= 25 × 0.96 × 2 / 3 = 16 (m s^{-1})	**A1**
5(b)(iii)	λ = 16 / 30 or λ = 0.53 or $\lambda = L / 1.8$ or $\lambda = 0.55L$	**B1**
	$\lambda \neq 2L / n$ or $\lambda \neq 1.92 / n$ and (so) stationary wave not formed	**B1**
	OR $f \neq vn / 2L$ or $f \neq 16n / 2L$ or $f \neq 8.3n$ and (so) stationary wave not formed	**B2**
5(c)(i)	$n = d\sin\theta / \lambda$	**C1**
	= ((1 / 6.7 × 10^5) × sin(37)) / 4.5 × 10^{-7}	**C1**
	= 2	**A1**
5(c)(ii)	decreases	**B1**

Question	Answer	Marks
6(a)	a flow of charge carriers	**B1**
6(b)	a straight line from 0 A, 1.50 V with a negative gradient	**M1**
	straight line passes through 1.60 A, 0.30 V	**A1**
6(c)(i)	$\rho = RA / L$ $= 0.82 \times 2.0 \times 10^{-7} / 6.8$	**C1**
	$= 2.4 \times 10^{-8}\ \Omega$m	**A1**
6(c)(ii)	terminal pd $= 1.50 - (1.8 \times 0.75)$ $= 0.15$	**C1**
	current in fixed resistor $= 1.8 - (0.15 / 0.82)$ $= 1.6$	**C1**
	$R = 0.15 / 1.6$ $= 0.093\ \Omega$	**A1**
	OR terminal pd $= 1.50 - (1.8 \times 0.75)$ $= 0.15$	**(C1)**
	total external resistance $= 0.15 / 1.8$ $= 0.083$ $1 / 0.083 = 1 / 0.82 + 1 / R$	**(C1)**
	$R = 0.093\ \Omega$	**(A1)**

Question	Answer	Marks
6(c)(iii)	$P = IV$ or $P = V^2/R$ or $P = I^2R$ $= 1.8 \times (1.50 - 0.15)$ or $(1.50 - 0.15)^2 / 0.75$ or $1.8^2 \times 0.75$	**C1**
	$= 2.4$ W	**A1**

Question	Answer	Marks
7(a)	a <u>nucleus</u> containing <u>protons</u> and <u>neutrons</u>	**B1**
	(a nucleus) surrounded by (orbital) electrons	**B1**
7(b)(i)	alpha (decay)	**B1**
7(b)(ii)	beta-minus (decay)	**B1**
7(c)	ratio = n × elementary charge / mass (mass =) (n ×) $1.60 \times 10^{-19} / 1.76 \times 10^{11} = 9.09 \times 10^{-31}$	**B1**
	OR (mass =) (n ×) $1.60 \times 10^{-19} / (1.76 \times 10^{11} \times 1.66 \times 10^{-27}) = 0.000548$	**(B1)**
	OR (charge =) $1.76 \times 10^{11} \times 9.11 \times 10^{-31} = 1.60 \times 10^{-19}$	**(B1)**
	OR (ratio =) $1.60 \times 10^{-19} / 9.11 \times 10^{-31} = 1.76 \times 10^{11}$	**(B1)**
	(so X is a) positron	**B1**