

GCE Physics, Specification A, PHYA4, Fields and Further Mechanics

Section A

This component is an objective test for which the following list indicates the correct answers used in marking the candidates' responses.

Keys to Objective Test Questions												
1	2	3	4	5	6	7	8	9	10	11	12	13
C	B	D	A	D	B	B	A	A	D	B	D	A
14	15	16	17	18	19	20	21	22	23	24	25	
C	B	C	C	D	B	D	D	C	B	A	A	

Section B

Question 1		
(a)	(grav) potential energy → kinetic energy → (grav) potential energy → kinetic energy → gravitational potential energy ✓ energy lost to surroundings in overcoming air resistance ✓	2
(b) (i)	period $T = \left(\frac{42}{15}\right) = 2.8 \text{ s}$ ✓ use of $T = 2\pi \sqrt{\frac{l}{g}}$ gives length $l = \left(= \frac{T^2 g}{4\pi^2} \right) = \frac{2.8^2 \times 9.81}{4\pi^2}$ ✓ giving distance from pt of support to c of m, $l = 1.9 \text{ (m)}$ or 1.95 (m) ✓ answer must be to 2 or 3 sf only ✓	4
(b) (ii)	$E_k = mg\Delta h$ stated or used ✓ gives E_k of girl at lowest point = $18 \times 9.81 \times 0.25 = 44 \text{ (J)}$ ✓	2
(b) (iii)	$\frac{1}{2} m v^2 = 44.1$ gives max speed of girl $v = \sqrt{\frac{2 \times 44.1}{18}} = 2.2 \text{ (m s}^{-1}\text{)}$ ✓ [alternatively: $A^2 = (3.9 - 0.25) \times 0.25$ gives $A = 0.955 \text{ (m)}$ and $v_{\text{max}} = 2\pi f A = (2\pi/2.8) \times 0.955 = 2.1 \text{ (m s}^{-1}\text{)}$ ✓]	1
(c)	graph drawn on Figure 2 which: shows $E_k = 0$ at $t = 0, T/2$ and T ✓ has 2 maxima of similar size (some attenuation allowed) at $T/4$ and $3T/4$ ✓ is of the correct general shape ✓	3
	Total	12