PAUTES DE CORRECCIÓ — FÍSICA
SÈRIE 4 — CURS 2005-06

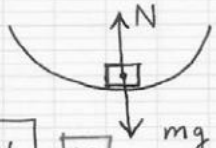
P1. a) $W = Mg(H-h)$ [0,7] $\rightarrow$ $W = 300 \cdot 10 \cdot (15-5) = \boxed{3 \cdot 10^4 \text{ J}}$ [0,3]

b) $W_{nc} = \Delta E = \Delta(U + E_c)$ [0,7]

$W_{nc} = -30.000 + \frac{1}{2} 300 (10^2 - 0^2) = -15.000 \text{ J}$

$Q = \boxed{-1,5 \cdot 10^4 \text{ J}}$ [0,3]

c) $N - Mg = M \frac{v^2}{R}$ [0,7]



$N = M\left(g + \frac{v^2}{R}\right) \rightarrow N = \boxed{8 \cdot 10^3 \text{ N}}$ [0,3]

Q1. a) $\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2$ [0,2] $\rightarrow \alpha = \frac{2\theta}{t^2} = \boxed{\frac{\pi}{40} \text{ rad/s}^2}$ [0,1]

$\omega = \omega_0 + \alpha t$ [0,1] $\rightarrow \omega = \frac{\pi}{40} \cdot 15 \text{ rad/s}$

$a_n = \omega^2 r$ [0,1] $\rightarrow a_n = \left(\frac{\pi}{40} \cdot 15\right)^2 \cdot 0,15 = \boxed{0,21 \text{ m/s}^2}$ [0,1]

b) $a_t = \alpha \cdot r$ [0,3] $\rightarrow a_t = \frac{\pi}{40} \cdot 0,15 = \boxed{1,2 \cdot 10^{-2} \text{ m/s}^2}$ [0,1]

Q2. $g_L/5 = G \frac{M_L}{(R_L + h)^2}$ [0,2]

$g_L = G \frac{M_L}{R_L^2}$ [0,2]

$\Big\}$ $5 = \left(\frac{R_L + h}{R_L}\right)^2 \rightarrow h = R_L(\sqrt{5} - 1)$ [0,4]

$h = \boxed{2,15 \cdot 10^6 \text{ m}}$ [0,2]

OPCIÓ A

P2. a) $A = 0,01 \text{ m}$ [0,2]

$k = 2\pi/\lambda = 2\pi\nu/v \rightarrow k = 2\pi \cdot \frac{4}{3} \text{ rad/m}$ [0,2]

$\omega = 2\pi\nu \rightarrow \omega = 2\pi \cdot 440 \text{ rad/s}$ [0,2]

$\rightarrow \boxed{\psi = 0,01 \cdot \cos 2\pi\left(\frac{4}{3}x - 440t\right)}$ [0,4]

La solució en sin també és vàlida

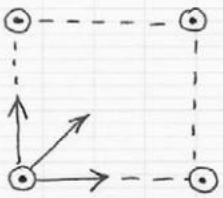
b) $\phi = k \cdot \Delta x$ [0,6] $\rightarrow \phi = 5\pi \text{ rad}$ [0,2]

Defasatge real: π rad. [0,2]

SÈRIE 4 (CONT.) — CURS 2005-06

c) $v_{max} = +A\omega$ [0,6] $\rightarrow$ $v_{max} =$ [27,65 m/s] [0,4]

Q3.



Totes les forces són d'atracció. [0,4]
La resultant té la direcció de la diagonal del quadrat i sentit cap al centre. [0,6]

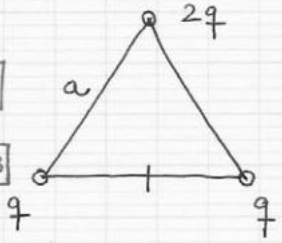
Q4. $E = h\nu$ [0,2]; $\lambda = c/\nu$ [0,2] } $E = \frac{hc}{\lambda}$ [0,1] $\rightarrow$ $E =$ [$3,3 \cdot 10^{-19}$ J] [0,1]

$p = \frac{h}{\lambda}$ [0,3] $\rightarrow$ $p =$ [$1,1 \cdot 10^{-27}$ kg·m/s] [0,2]

OPCIÓ B

P2. a) $V = k\left(\frac{q}{a/2} + \frac{q}{a/2} + \frac{2q}{\sqrt{a^2 - \frac{a^2}{4}}}\right)$ [0,7]

$V = k\frac{q}{a}\left(2+2+\frac{4}{\sqrt{3}}\right) =$ [$3,28 \cdot 10^6$ V] [0,3]



b) $\vec{E} = k\frac{q}{\left(\frac{a}{2}\right)^2}(1,0) + k\frac{q}{\left(\frac{a}{2}\right)^2}(-1,0) + k\frac{2q}{a^2 - \frac{a^2}{4}}(0,-1)$ [0,3]

[0,3]

$\rightarrow$ $\vec{E} =$ [$8 \cdot 10^5\ (0,-1)$ N/C] [0,4]

c) $W = 2q \cdot (V_f - V_i)$ [0,3]
$V_i = k\left(\frac{q}{a} + \frac{q}{a}\right)$ [0,2]
$V_f = k\left(\frac{q}{a/2} + \frac{q}{a/2}\right)$ [0,2]
} $W = 2q \cdot k\frac{2q}{a} =$ [2,1 J] [0,3]

Q3. 1.a , 2.b

Q4. 1.c , 2.a

Correcta: [0,5]
En blanc: [0]
Incorrecta: [−0,25]
} El total de Q3 + Q4 entre 0 i 2 punts (no puntuacions negatives)