Capítulo X

Actividad 10·1

1) a) $F = Peso = mg = (75kg)(9,8 m/s^2) = 735N$

$W_{min} = F\cos\theta \cdot d = (735N)\cos 0° \cdot 6,0m = 44$

b) $P = \frac{W}{t} = \frac{4410J}{45,0s} = 98W$ R/

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2) $W = EC_B - EC_A \Rightarrow EC_B = W + EC_A = 15J + 30J$

$EC_B = 45J$ R/

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3) $W = \cancel{EC_B^{0}} - EC_A = -200J$ R/

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4) $W = F\cos\theta \cdot d = 12000N \cos 0° \cdot 27m = 3,24 \times 10^5 J$ R/

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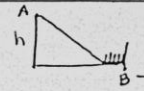
5)

$EM_A = EM_B$

$EP_A + \cancel{EC_A^{0}} = EP_B + \cancel{EC_B^{0}}$

$mgh_A = \frac{Kx^2}{2}$



$x = \sqrt{\frac{2mgh}{K}} = \sqrt{\frac{2(180kg)(9,8 m/s^2)(5,0m)}{3 \times 10^5 Pa}} = 0,24m$ R/

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6) $W_1 = 20N \cos 180° \cdot 5m = -100J$

$W_2 = 34N \cos 90° \cdot 5m = 0$

$W_3 = 52N \cos 40° \cdot 5m = 199,17J$

$W_4 = 42 \cos 0° \cdot 5m = 210J$

$W_{neto} = 309,17J$

7) $EM_A = EP_A + \cancel{EC_A}^{0}$

$EM_A = mgh_A = (2kg)(9,8 m/s^2)(12m) = 235,2 J$

$EM_A = EM_B$

$EM_A = EP_B + EC_B$

$EM_A - EP_B = \frac{1}{2} m v_B^2$

$v_B = \sqrt{\frac{2(EM_A - EP_B)}{m}}^{1}$

$v_B = \sqrt{\frac{2}{2kg}[235,2 - (2kg)(9,8 m/s^2)(7m)]}^{1}$

$v_B = 9,9 m/s$ R/

8) $EM = EC + EP$

$EM = \frac{mv^2}{2} + mgh = m\left(\frac{v^2}{2} + gh\right)$

$EM = 6200kg\left[\frac{(620m/s)^2}{2} + (9,8 m/s^2)(2000m)\right]$

$EM = 1,31 \times 10^7 J$ R/

9) $EM_A = EM_B$

$EP_A + EC_A = \cancel{EP_B}^{0} + EC_B$

$mgh_A + \frac{1}{2} m v_A^2 = \frac{1}{2} m v_B^2$

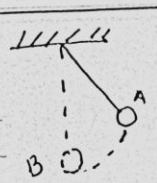
$m(gh_A + \frac{1}{2} v_A^2) = \frac{1}{2} m v_B^2$

$v_B = \sqrt{2(gh_A + \frac{v_A^2}{2})}^{1}$

$v_B = \sqrt{2[(9,8 m/s^2)(10m) + \frac{(2m/s)^2}{2}]}^{1}$

$v_B = 14,14 m/s$ R/

10)



$EM_A = EP_A + \cancel{EC_A}^{0}$

$EM_A = mgh_A$

$\frac{EM_A}{mg} = h_A$

$h_A = \frac{6,7\,J}{(1,8\,kg)(9,8\,m/s^2)} = 0,38\,m$ R/

11) 2 horas $\Rightarrow$ $h = 800\,m$

$EP = mgh = (75\,kg)(9,8\,m/s^2)(800\,m) = 5,88 \times 10^5\,J$ R/

12) ✓ $W = \Delta EC_f - \cancel{EC_i}^{0}$

$W = EC_f$

$F \cos\theta \cdot d = EC_f$

$EC_f = (3000\,N)\cos 0° \cdot 200\,m = 6,0 \times 10^5\,J$

✓ $EC = \frac{mv^2}{2} \Rightarrow v = \sqrt{\frac{2EC}{m}} = \sqrt{\frac{2 \cdot 6,0 \times 10^5\,J}{900\,kg}}$

$v = 36,5\,m/s$ R/

13) ✓ $EM_A = EM_B$

$EP_A + \cancel{EC_A}^{0} = \cancel{EP_B}^{0} + EC_B$

$mgh_A = \frac{mv^2}{2} \Rightarrow v_B = \sqrt{2gh_A}$

$v_B = \sqrt{2(9,8\,m/s^2)(4,8\,m)} = 9,70\,m/s$ R/

✓ $EM_A = EM_C$

$EP_A + \cancel{EC_A}^{0} = EM_C$

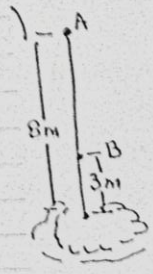
$mgh_A = EM_C$

$(0,35\,kg)(9,8\,m/s^2)(4,8\,m) = EM_C$

$EM_C = 16,5\,J$

(799)

4)



$EM_A = EM_B$

$EP_A + \cancel{EC_A^{\,0}} = EP_B + EC_B$

$mgh_A = mgh_B + \frac{1}{2}mv_B^2$

$v_B = \sqrt{2(gh_A - gh_B)}$

$v_B = \sqrt{2g(h_A - h_B)}$

$v_B = \sqrt{2(9{,}8\,m/s^2)(8m - 3m)}$

$v_B = 9{,}9\,m/s$ R/

15) $\therefore W = EC_B - \cancel{EC_A^{\,0}}$

$W = EC_B = 6500\,J$

$EC_B = \frac{1}{2}mv_B^2 \Rightarrow v_B = \sqrt{\frac{2EC_B}{m}}$

$v_B = \sqrt{\frac{2(6500\,J)}{2500\,kg}} = 2{,}28\,m/s$ R/

$W = F\cos\theta \cdot d \Rightarrow F = \frac{W}{\cos\theta \cdot d}$

$F = \frac{6500\,J}{\cos 0^\circ \cdot 80m} = 81{,}3\,N$ R/

Repaso de conceptos (página 239)

I Parte.

1) a) Potencial, Cinética

b) $EP_B = 0$, $EC = EP_C$; toda la energía potencial en C se transformó en energía cinética en B, en ausencia de fuerzas disipativas

2) El trabajo es el mismo, porque solo depende de las condiciones iniciales y finales.

3) La energía cinética se cuatriplica.

4) El trabajo mecánico es el mismo, porque es independiente de la trayectoria.

5) El trabajo es el mismo. La potencia es mayor en la primera hora.

6) El primer caso hay trabajo mecánico sobre la silla. En el segundo caso el trabajo es cero.

7) Sería 9 Ec.

8) Se requeriría 4W.

9) El furgón tiene más masa, así que el auto debe llevar mayor rapidez para obtener la misma EC.

10) $EP = \frac{U}{4}$

11) 750J.

II Parte.

1) a $W = EC_f - EC_i$

$W = \frac{m}{2}(V_f^2 - V_i^2) = \frac{0,016kg}{2}\left[(48,0\,m/s)^2 - (600\,m/s)^2\right]$

$W = -1037J$

2) b $W = F\cos\theta \cdot d = 40N \cdot \cos 0^\circ \cdot 15m = 600J$

3) b I Falsa II Verdadera

4) b $P = \frac{4,8 \times 10^4 J}{60s} = 800W$

5) c $EP_A + \cancel{EC_A}^{0} = EC_B + EP_B$

$EC_B = EP_A - EP_B = mgh_A - mgh_B$

$EC_B = mg(h_A - h_B) = (2kg)(9,8\,m/s^2)(10m - 1,0m)$

$EC_B = 176,4J$

6) d $W = EC_f - \cancel{EC_i}^{0} = \frac{mv^2}{2} = \frac{(1500kg)(20m/s)^2}{2}$

$W = 300\,000\,J$

7) b $W = EC_B - EC_A = 6,5J - 2J = 4,5J$

8) b I. Verdadera II. Verdadera.

9) d $EC = EP_k = \frac{kx^2}{2} = \frac{(4N/m)(0,05m)^2}{2} = 0,0125$

10) d $W = F\cos\theta \cdot d = 30N \cos 0° \cdot 3m = 90J$

11) d El trabajo no depende del tronco.

12) d $EP_A = EC_B = \frac{mv^2}{2}$ $v = \sqrt{\frac{2EP_g}{m}}$

$v = \sqrt{\frac{2(10J)}{0,10kg.}} = 14,14m/s.$

13) b. 14) b 15) a

16) d $EP_A = EC_B \Rightarrow mgh_A = \frac{mv^2}{2} \Rightarrow h_A = \frac{v^2}{2g}$.

$h_A = \frac{(20m/s)^2}{2 \cdot 9,8m/s^2} = 20,4m$

17) a I. Verdadera II. Verdadera III. Verdadera.

18) a 19) c $EP = mgh = (30N)(0,5m)$

$EP = 15J$

20) b $P = \frac{W}{t} = \frac{F\cos\theta\, d}{t} = \frac{(200N)(\cos 0°)(8m)}{10s} = 160W$

21) b $EC = \frac{mv^2}{2} = \frac{2000kg\ (25m/s)^2}{2} = 625000\ J$

22) c $W = F\cos\theta \cdot d = 500N \cos 30° \cdot 5m = 2165J$

23) d $EC_A = EP_B = \frac{mv_A^2}{2} = \frac{(0,5kg)(30m/s)^2}{2}$

$EP_B = 225\ J$

25) a $\cancel{EC_A}^{0} + EP_A = EC_B + \cancel{EP_B}^{0}$

$mgh_A = \frac{mv_B^2}{2}$

$v = \sqrt{2gh} = \sqrt{2 \cdot 9,8m/s^2 \cdot 1,5m}$

$v = 5,4m/s$

24) b. $W = EC_f - EC_i = 15J - 5J = 10J$

26) d 27) c 28) b.

29) b $W_1 = 0$

$W_2 = F\cos\theta \cdot d =$

$W_2 = (50kg)(9,8m/s^2) \cdot \cos 0° \cdot (7m)$

$W_T = 3430\ J$

30) b $EP_A = EC_B$

$mgh_A = EC_B$

$EC_B = (1,50kg)(9,8m/s^2)(20m)$

$EC_B = 294J$

III Parte

1) $W = EC_f - EC_i = \frac{mv_f^2}{2} - \frac{mv_i^2}{2} = \frac{m}{2}(v_f^2 - v_i^2)$

$W = \frac{10\,000 kg}{2}\left[(300 m/s)^2 - (200 m/s)^2\right] = 2{,}50 \times 10^8 J$

---

2) a) $W = -\Delta EP = -(EP_f - EP_i)$

$W = -100N \cdot 1{,}3m = -180 J$

El negativo indica que la roca obtuvo energía del entorno.

b) $P = \frac{W}{t} = \frac{180 J}{25} = 90 w$

c) $EP = 80 J$ *

) a) $W_1 = (22 N)\cos 0° (3m) = 66 J$

$W_2 = (32N)\cos 0° (2m) = 64 J$

$W_T = 130 J$ * corregir pág 305

b) $EC = W_{neto}$ (suponiendo que parte del reposo)

$EC = 130 J$ *

c) $EC = \frac{1}{2}mv^2$ $\quad v = \sqrt{\frac{2EC}{m}} = \sqrt{\frac{2(130J)}{0{,}51kg}}$

$m = \frac{P}{g} = 0{,}51 kg$ $\quad v = 22{,}58 m/s$ *

(104)

4)

h(m)	EC(J)	EP(J)	EM(J)
70	0	1715	1715
60	245	1470	1715
50	490	1225	1715
40	735	980	1715
30	980	735	1715
20	1225	490	1715
10	1470	245	1715
0	1715	0	1715

5)

a) $EC_i = \frac{1}{2} m v_i^2 = \frac{1}{2} (1,5\ kg)(300\ m/s)^2$

$EC_i = 6,75 \times 10^4\ J$

b) $EP_f = EC_i = 6,75 \times 10^4\ J$

6)

$W = EC_B - EC_A$

$EC_A = \frac{1}{2} \cdot (2500\ kg)(20\ m/s)^2 = 5 \times 10^5\ J$

$EC_B = W + EC_A = (2,81 \times 10^5\ J) + (5 \times 10^5\ J)$

$EC_B = 7,81 \times 10^5\ J$

$v = \sqrt{\frac{2EC_B}{m}} = \sqrt{\frac{2(7,81 \times 10^5\ J)}{2500\ kg}} = 25\ m/s$ R/

$EM_B = EM_C$

$EP_B^{\,0} + EC_B = EP_C + EC_C^{\,0}$

$EC_B = mgh_C$

$h_C = \frac{EC_B}{mg} = \frac{7,81 \times 10^5\ J}{(2500\ kg)(9,8\ m/s^2)} = 31,88\ m$ R/

7)

$W = EC_B - EC_A$

$EC_B = W + EC_A = 40\ J + 30\ J = 70\ J$

8)

Plano inclinado

$EM_A = EM_B$

$EP_A + \cancel{EC_A}^{0} = EP_B + EC_B$

$mgh_A = mgh_B + EC_B$

$mgh_A - mgh_B = EC_B$

$E_B = mg(h_A - h_B)$

$EC_B = (45kg)(9,8m/s^2)(10m-4m)$

$EC_B = 2646J$

Rampa con igual planteo

$EC_B = mg(h_A - h_B)$

$EC_B = (45kg)(9,8m/s^2)(12,4)m$

$EC_B = 3528J$

---

9)

$EM_A = EM_B$

$EP_A + \cancel{EC_A}^{0} = EP_B + EC_B$

$EP_A - EP_B = EC_B$

$mgh_A - mgh_B = \frac{1}{2}mv_B^2$

$v_B = \sqrt{2g(h_A - h_B)}$

$v_B = \sqrt{2(9,8m/s^2)(0,30m)}$

$v_B = 2,42 m/s$ R/

---

10)

✓ $EM_i = EP_i + EC_i$

$EM_i = mgh_i + \frac{mv_i^2}{2}$

$EM_i = (8kg)(9,8m/s^2)(100m) + \frac{1}{2}(8kg)(15m/s)^2$

$EM_i = 8740J$ R/

✓ $EM_2 = EC_2 + EP_2$

$EM_2 - EP_2 = EC_2$

$EC_2 = 8740J - (8kg)(9,8m/s^2)(70m)$

$EC_2 = 3252J$ R/

11) $W = -(EP_f - EP_i) = EP_i - EP_f$

$W = mgh_i - mgh_f = mg(h_i - h_f)$

$W = 700N(-7,0m) = -4900J$ R/

12) a)

$EP = mgh = 80N \cdot 115m = 9200J$ } $EM = 9200J$

$EC =$

b) $EP = mgh = 80N \cdot 35m = 2800J$

$EC = EM - EP = 9200J - 2800J = 6400J$

$EM = 9200J$

c) $EP = 0$ $EM = 9200J$

$EC = 9200J$

13)

Auto A	Auto B
$P = \frac{100J}{5s}$	$P = F \cdot v$
$P = 20w$	$P = (5N)(5m/s)$
	$P = 25w$

El auto B R/

14) $EP_A + EC_A = EP_B + EC_B$

$EP_A = mgh_B + EC_B$

$EP_A - EC_B = mgh_B$

$h_B = \frac{EP_A - EC_B}{mg} = \frac{764J - 80J}{60kg \cdot 9,8m/s^2}$

$h_B = 1,16m$ R/

15) a) $d = 3{,}5\,m$ $\quad W = (20\,N)\cos 0^\circ (3{,}5\,m) = 70\,J$ R/

b) $W = EC_f - EC_i = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2$

$W = \frac{m}{2}(v_f^2 - v_i^2) = \frac{(3\,kg)}{2}\left[(50\,m/s)^2 - (20\,m/s)^2\right]$

$W = 3150\,J$ R/

16) $W_F = (20\,N)\cos 0^\circ (10\,m) = 200\,J$

$W_f = (5\,N)\cos 180^\circ (10\,m) = -50\,J$

$W_{neto} = 150\,J$ R/

17) $EP = mg\,\Delta h = mg(h_2 - h_1)$

$EP = (20\,kg)(9{,}8\,m/s^2)(30\,m)$

$EP = 5880\,J$ R/

18) $W = EC_f - EC_i$

$W = \frac{m}{2}(v_f^2 - v_i^2) = \frac{2\,kg}{2}\left[(10\,m/s)^2 - 0\right]$

$W = 100\,J$ R/

19) $m = 0{,}70\,kg$

a) $h = y_i^{\,0} t + \frac{1}{2} g t^2 = \frac{1}{2}(9{,}8\,m/s^2)(5\,s)^2$

$h = 122{,}5\,m$ R/

b) $EM = EP_i = mgh = (0{,}70\,kg)(9{,}8\,m/s^2)(122{,}5\,m)$

$EM_i = EM_f = 840{,}35\,J$ R/

c) $EM_f = \cancel{EP_f^{\,0}} + EC_f$ (suelo)

$EC_f = \frac{mv^2}{2} \Rightarrow v = \sqrt{\frac{2\,EC_f}{m}}$

$v = \sqrt{\frac{2(840{,}35\,J)}{0{,}70\,kg}} = 49\,m/s$ R/

d) 168 W

d) $W = -(EP_f - EP_i) = EP_i - \cancel{EP_f}^{0}$

$W = mgh_i = 840,35\ J$

$P = \frac{W}{T} = \frac{840,35\ J}{5s} = 168,07\ W$

---

20) $W = EC_f - EC_i = \frac{mV_f^2}{2} - \frac{mv_i^2}{2} = \frac{m}{2}(V_f^2 - V_i^2)$

$W = \frac{4kg}{2}\left[(5m/s)^2 - (20m/s)^2\right] = -750\ J$ R/

---

21) $W = -(EP_f - EP_i) = \cancel{EP_i}^{0} - EP_f$

$W = -mgh = -(60kg)(9,8\ m/s^2)(3,5\ m) = 2058\ J$

$P = \frac{W}{T} = \frac{2058\ J}{15s} = 137,2\ W$

---

22) $EM_i = EM_f$

$EP_i + \cancel{EC_i}^{0} = EM_f$

$mgh_i = EM_f$

$h_i = \frac{EM_f}{mg} = \frac{25\ J}{(0,8kg)(9,8\ m/s^2)}$

$h_i = 3,19\ m$ R/

---

23) $W = F\cos\theta \cdot d$

$W = 2800N \cos 0^\circ \cdot 3m = 8400\ J$ R/

(Trabajo mínimo)

24) $EM_i = EM_f$

$EP_i + \cancel{EC_i}^{0} = EP_f + \cancel{EC_f}^{0}$ (una vez que se comprimió el resorte)

$mgh = \frac{kx^2}{2}$

$x = \sqrt{\frac{2mgh}{k}} = \sqrt{\frac{2(6\,kg)(9{,}8\,m/s^2)(5\,m)}{15\,000\,N/m}}$

$x = 0{,}20\,m$ R/

25) $m = 0{,}05\,kg$

a) $EM_i = EC_i + \cancel{EP_i}^{0}$

$EM_i = \frac{1}{2}mv_i^2 = \frac{1}{2}(0{,}05\,kg)(25\,m/s)^2$

$EM_i = 15{,}62\,J$ R/

26) $EM_A = EM_B$

$EP_A + \cancel{EC_A}^{0} = EP_B + EC_B$

$EC_B = EP_A - EP_B = 200\,J - 80\,J$

$EC_B = 120\,J$ R/

Trabajo extraclase (p. 247)

I Parte

a) (No) El ángulo = 90°

b) (Sí)

c) (No) Es escalar

d) (Sí)

e) (No) w y P son directamente proporcionales

f) (No) La energía cinética aumenta.

II Parte

1) El trabajo producido por las fuerzas conservativas no depende de la trayectoria. El trabajo producido por las fuerzas disipativas sí depende de la trayectoria.

2) La energía potencial va disminuyendo y la energía cinética va aumentando.

3) Trabajo máximo: $\theta = 0°$
Trabajo nulo: $\theta = 90°$

4) La energía mecánica de un sistema se mantiene constante, siempre y cuando se desprecien las fuerzas disipativas.

5) El trabajo neto realizado por un objeto es equivalente al cambio de la energía interna del objeto o del sistema.

6) La potencia depende del tiempo, y el trabajo no.

III Parte

1) $EP = mgh = (20kg)(9,8m/s^2)(20m) = 3920J$ R/

$EC = \frac{mv^2}{2} = \frac{(20kg)(8m/s)^2}{2} = 640J$ R/

$EM = 3920J + 640J = 4560J$ R/

2)

$W_1 = (4N)\cos 0°\,(23m) = 92J$

$W_2 = (2N)\cos 180°\,(23m) = -46J$

$W_3 = (6N)\cos 20°\,(23m) = 129,7J$

$W_{neto} = 175,7J$ R/

3) $F_{neta} = 580N - 490N = 90N$

$W = (90N)\cos 0^\circ (5m) = 450J$ R/

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4) ✓ $EM_B = EM_A$

$EM_B = EP_A + \cancel{EC_A}^{0} \Rightarrow EM_B = mgh_A$

$EM_B = (2,2kg)(9,8m/s^2)(15m) = 323,4J$ R/

✓ $EM_A = EM_C \Rightarrow EM_A = \cancel{EP_C}^{0} + EC_C = \frac{mv_C^2}{2}$

$v = \sqrt{\frac{2\,EM_A}{m}} = \sqrt{\frac{2(323,4J)}{2,2kg}} = 17,15m/s$ R/

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5) $EP_K = EC \Rightarrow \frac{Kx^2}{2} = \frac{mv^2}{2} \Rightarrow v = x$

$v = \sqrt{\frac{Kx^2}{m}} = \sqrt{\frac{(10N/m)(0,1m)^2}{1,0kg}} = 0,32m/s$ R/

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6) $W = EC_f - EC_i = \frac{mv_f^2}{2} - \frac{mv_i^2}{2} = \frac{m}{2}(v_f^2 - v_i^2)$

$W = \frac{1800kg}{2}\left((8,5m/s)^2 - (2m/s)^2\right) = 61425J$ R/

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7) ✓ $W_F = (30N)\cos 0^\circ \cdot (50m) = 1500J$

$W_F + W_f = EC_B - EC_A$

$W_f = EC_B - EC_A - W_F$

$W_f = \frac{mv_B^2}{2} - \frac{mv_A^2}{2} - W_F$

$W_f = \frac{(5kg)(10m/s)^2}{2} - \frac{(5kg)(7m/s)^2}{2} - 1500J$

$W_f = -1372,5J$ R/

✓ $W_f = f\cos 180^\circ \cdot d \Rightarrow f = \frac{W_f}{\cos 180^\circ \cdot 50m}$

$f = \frac{-1372,5}{(-1)(50m)} = 27,45N$ R/

8) $EM_A = EM_B$

$EP_A + EC_A = EP_B + EC_B$

$mgh_A + \frac{mv_A^2}{2} = mgh_B + EC_B$

$EC_B = \frac{mv_A^2}{2} + mgh_A - mgh_B$

$EC_B = \frac{(2kg)(1,8m/s)^2}{2} + (2kg)(9,8m/s^2)(22m) + (2kg)(9,8m/s^2)(14m)$

$EC_B = 160,04J$ R/

$EM_A = EM_C$

$EC_A + EP_A = EC_C + \cancel{EP_C}^{0}$

$\frac{\cancel{m}v_A^2}{2} + \cancel{m}gh_A = \frac{\cancel{m}v^2}{2}$

$v = \sqrt{2\left(\frac{v_A^2}{2} + gh_A\right)}$

$v_c = \sqrt{2\left(\frac{(1,8m/s)^2}{2} + (9,8m/s^2)(22m)\right)} = 20,84m/s$ R/

9) $EM_A = EM_B$

$EP_A + \cancel{EC_A}^{0} = EP_B + EC_B$

$mgh_A = mgh_B + \frac{mv_B^2}{2} \Rightarrow v = \sqrt{2(gh_A - gh_B)}$

$v = \sqrt{2(9,8m/s^2)(1,3m - 0,7m)} = 3,43m/s$ R/

10) $EM_i = EM_f$

$EP_i + \cancel{EC_i}^{0} = EP_{fk} + \cancel{EC_f}^{0} + \dots$

$mgh_i = \frac{Kx^2}{2}$

$K = \frac{2mgh_i}{x^2} = \frac{2(2,4kg)(9,8m/s^2)(5m)}{(0,25m)^2}$

$K = 3763,2\ J$

$EM_i = EM_f$ (a 15cm) · Reposo = 25cm
A 15cm h = 10cm

$EP_i + \cancel{EC_i^{0}} = EP_f + EC_f + EP_k$

$mgh_i = mgh_f + \frac{mv^2}{2} + \frac{kx^2}{2}$

$\frac{mv^2}{2} = mgh_i - mgh_f - \frac{kx^2}{2}$

$v = \sqrt{\frac{2}{m}\left(mgh_i - mgh_f - \frac{kx^2}{2}\right)}$

$v = \sqrt{\frac{2}{2,4kg}\left[(2,4kg)(9,8m/s^2)(5m) - (2,4kg)(9,8m/s^2)(0,10m) - \frac{3763,25 \cdot (0,15m)^2}{2}\right.}$

$v = 7,79\ m/s$ R/

Capítulo XI

Actividad 11.1

1) a) 296 K b) 27 °C c) 260 °C d) −112 °F
   e) 322 K f) 420 °R

2) −40 °C
   °F = 1.8 °C + 32 = 1.8(−40 °C) + 32 = −40 °F

3) 136 °F = 58 °C = 331 K
   −127 °F = −88 °C = 185 K

4) $T_A = 4,44$ °C $T_B = 10$ °C $T_C = 7$ °C $T_D = 32$ °C
   $T_A < T_C < T_B < T_D$