

Exercicis energia i treball - Donner

1)

a) $m = 15 \text{ kg} \rightarrow P = m \cdot g = 15 \cdot 9,8 = 147 \text{ N}$

$W = F_x \cdot \Delta x \cdot \cos \alpha = 147 \cdot 0 \cdot \cos 0^\circ = \underline{0 \text{ J}}$

b) $W = F_x \cdot \Delta x \cdot \cos \alpha = \underline{0 \text{ J}} \quad v = K$

c) $W = F_x \cdot \Delta x \cdot \cos \alpha = 147 \cdot 1 \cdot \underbrace{\cos 180^\circ}_{(-1)} = \underline{-147 \text{ J}}$

2)

a) $W = 20 \cdot 10 \cdot \cos 0^\circ = \underline{200 \text{ J}}$

b) $W = 20 \cdot 10 \cdot \cos 180^\circ = \underline{-200 \text{ J}}$

c) $W = 20 \cdot 10 \cdot \cos 90^\circ = \underline{0 \text{ J}}$

3)

a) $m = 100 \text{ kg}$
 $F_f = 250 \text{ N}$
 $F = 300 \text{ N}$

$F - F_r = m \cdot a$

$300 - 250 = 100 a$

$a = \frac{50}{100} = \underline{0,5 \text{ m/s}^2}$

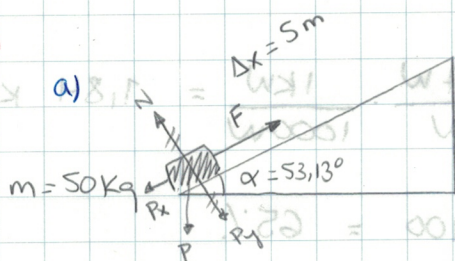
b) $t = 10 \text{ s}$

$\Delta x = v_0 \Delta t + \frac{1}{2} a \Delta t^2$

$\Delta x = 0,25 \cdot (10)^2 = 25 \text{ m}$

$W = F_x \cdot \Delta x \cdot \cos \alpha = \frac{300 - 250}{100} \cdot 25 \cdot \cos 0^\circ = \underline{1250 \text{ J}}$

4)



a) $F - P_x = m \cdot a = 0 \rightarrow v = K$

$F = P_x = m \cdot g \cdot \sin \alpha$

$F = 50 \cdot 9,8 \cdot \sin 53,13^\circ = \underline{392 \text{ N}}$

b) $W = F_x \cdot \Delta x \cdot \cos \alpha = 392 \cdot 5 \cdot \cos 0^\circ = \underline{1960 \text{ J}}$

c) $F - (P_x + F_r) = m \cdot a = 0 \rightarrow v = K$

$F_r = \mu m g \cos \alpha$

$F = 392 + 0,1 \cdot 50 \cdot 9,8 \cdot \cos 53,13^\circ$

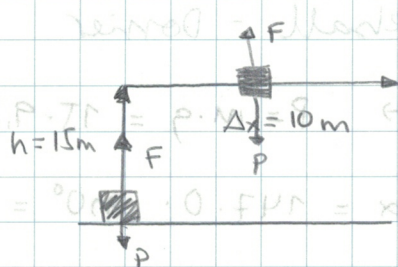
$F = 392 + 29,4 = \underline{421,4 \text{ N}}$

5

$$m = 100 \text{ kg}$$

$$h = 15 \text{ m}$$

$$\Delta x = 10 \text{ m}$$



a)

$$F = P = m \cdot g = 100 \cdot 9,8 = 980 \text{ N}$$

$$W = F_x \cdot \Delta x \cdot \cos \alpha = 980 \cdot 15 \cdot \cos 0^\circ = \underline{14700 \text{ J}}$$

b)

$$W = F_x \cdot \Delta x \cdot \cos \alpha = 980 \cdot 10 \cdot \cos 90^\circ = \underline{0 \text{ J}}$$

$$W_{\text{TOT}} = 14700 + 0 = \underline{14700 \text{ J}}$$

b)

$$P = \frac{\Delta W}{\Delta t} = \frac{14700 \text{ J}}{60 \text{ s}} = \underline{245 \text{ W}}$$

6

$$P = 8 \text{ CV}$$

$$t = 1,5 \text{ h}$$

$$8 \text{ CV} \cdot \frac{737 \text{ W}}{1 \text{ CV}} = 5896 \text{ W}$$

$$\Delta W = P \cdot \Delta t = 5896 \cdot 5400 = \underline{3,18 \cdot 10^7 \text{ J}}$$

$$\frac{3,18 \cdot 10^7 \text{ J}}{3,6 \cdot 10^6 \text{ J}} \cdot \frac{1 \text{ kWh}}{3,6 \cdot 10^6 \text{ J}} = \underline{8,84 \text{ kWh}}$$

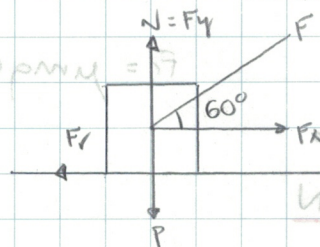
7

$$P = 2,5 \text{ CV} \cdot \frac{737 \text{ W}}{1 \text{ CV}} \cdot \frac{1 \text{ kW}}{1000 \text{ W}} = 1,84 \text{ kW}$$

$$P_{\text{utilizada}} = 1,2 \text{ kW}$$

$$\eta = \frac{P_u \cdot 100}{P_T} = \frac{1,2}{1,84} \cdot 100 = 65\%$$

8



$$a) W_F = 100 \cdot 10 \cdot \cos 60^\circ = \underline{500 \text{ J}}$$

$$W_{F_f} = 60 \cdot 10 \cdot \cos 180^\circ = \underline{-60 \text{ J}}$$

$$W_P = 10 \cdot 9,8 \cdot 10 \cdot \cos 90^\circ = \underline{0 \text{ J}}$$

$$b) \Delta t = 2s \quad P = \frac{\Delta W}{\Delta t} = \frac{440}{2} = \underline{220 \text{ W}}$$

$$W_{\text{tot}} = 500 - 60 + 0 = 440 \text{ J}$$

9

$$a) W = F_x \cdot \Delta x \cdot \cos \alpha = 100 \cdot 0 \cdot \cos 0^\circ = \underline{0 \text{ J}}$$

$$b) W = F_x \cdot \Delta x \cdot \cos \alpha = 200 \cdot 50 \cdot \cos 0^\circ = \underline{10.000 \text{ J}}$$

$$c) W = F_x \cdot \Delta x \cdot \cos \alpha = 500 \cdot 100 \cdot \cos 60^\circ = \underline{25000 \text{ J}}$$

$$d) W_a = 0 \text{ J} \rightarrow P_a = \underline{0 \text{ W}}$$

$$W_b = 10.000 \text{ J} \quad P_b = \frac{\Delta W}{\Delta t} = \frac{10.000}{10} = \underline{1000 \text{ W}}$$

$$W_c = 25.000 \text{ J} \quad P_c = \frac{\Delta W}{\Delta t} = \frac{25.000}{1,25} = \underline{1976,28 \text{ W}}$$

10

$$a) W = F_x \cdot \Delta x \cdot \cos \alpha = 250 \cdot 10 \cdot \cos 0^\circ = \underline{2500 \text{ J}}$$

$$b) F = m \cdot a$$

$$250 = 500a$$

$$a = \frac{250}{500} = 0,5 \text{ m/s}^2$$

$$v^2 = v_0^2 + 2a\Delta x$$

$$v^2 = 2 \cdot 0,5 \cdot 10$$

$$v^2 = 10$$

$$v = \sqrt{10} = \underline{3,16 \text{ m/s}}$$

11

$$m = 1200 \text{ kg}$$

$$v_0 = 20 \text{ m/s}$$

$$v = 8 \text{ m/s}$$

$$W = \Delta E_c = \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2$$

$$W = \frac{1}{2} \cdot 1200 \cdot 8^2 - \frac{1}{2} \cdot 1200 \cdot 20^2$$

$$W = 38.400 - 240.000 = \underline{-201.600 \text{ J}}$$

12

$$m = 250 \text{ kg}$$

$$\Delta x = 0,3 \text{ m}$$

$$v_0 = 300 \text{ m/s}$$

$$v = 90 \text{ m/s}$$

$$W = \Delta E_c = \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2$$

$$W = 0,125 \cdot 90^2 - 0,125 \cdot 300^2$$

$$W = 1012,5 - 112500 = \underline{-10237,5 \text{ J}}$$

$$W = F_x \cdot \Delta x \cdot \cos \alpha$$

$$-10237,5 = F \cdot 0,3 \cdot \cos 180^\circ$$

$$F = \frac{-10237,5}{-0,3} = \underline{34125 \text{ N}}$$

13) a) $F - F_r = m \cdot a$
 $100 - F_r = 10 \cdot 5$
 $F_r = \frac{100 - 50}{1} = 50 \text{ N}$

b) $v = v_0 + a \Delta t$
 $v = 10 + 5 \cdot 20$
 $v = 10 + 100 = 110 \text{ m/s}$

c) $v^2 = v_0^2 + 2a\Delta x$
 $110^2 = 10^2 + 2 \cdot 5 \cdot \Delta x$
 $12100 = 100 + 10\Delta x$
 $\Delta x = \frac{12000}{10} = 1200 \text{ m}$

d) $W = F_x \cdot \Delta x \cdot \cos \alpha$
 $W = 50 \cdot 1200 \cdot \cos 0^\circ$
 $W = 60.000 \text{ J}$

e) $\Delta E_c = \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2 = \frac{1}{2} \cdot 10 \cdot (110)^2 - \frac{1}{2} \cdot 10 \cdot (10)^2$
 $\Delta E_c = 60.500 - 500 = 60.000 \text{ J}$

14) a) $W = \Delta E_c = \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2 = 50 \cdot (20)^2 - 50 \cdot (15)^2 = 8750 \text{ J}$

b) $W = F_x \cdot \Delta x \cdot \cos \alpha$
 $8750 = 500 \cdot \Delta x \cdot \cos 0^\circ$
 $\Delta x = \frac{8750}{500} = 17,5 \text{ m}$

15) a) $E_{c0} = \frac{1}{2}mv_0^2 = 500 \cdot (22,2)^2 = 246914 \text{ J}$

$\frac{80 \text{ km}}{\text{h}} \cdot \frac{1000 \text{ m}}{1 \text{ km}} \cdot \frac{1 \text{ h}}{3600 \text{ s}} = 22,2 \text{ m/s}$

b) $W = F_x \cdot \Delta x \cdot \cos \alpha = 2000 \cdot 50 \cdot \cos 180^\circ = -100.000 \text{ J}$

c) Com que l'energia cinètica és superior al treball fet pels frens, el cotxe s'aturarà després del semàfor.

16) $E_p = m \cdot g \cdot h = 80 \cdot 9,8 \cdot 500 = 235200 \text{ J}$

17) $\Delta E_p = mgh - mgh_0 = 75 \cdot 9,8 \cdot (1-500) - 0 = -367.500 \text{ J}$

18) a) $h = 3,5 \cdot 5 = 17,5 \text{ m}$ $E_p = mgh = 60 \cdot 9,8 \cdot 17,5$
 $E_p = \underline{10290 \text{ J}}$

b) $h = 3,5 \cdot 8 = 28 \text{ m}$ $E_p = mgh = 60 \cdot 9,8 \cdot 28 = \underline{16464 \text{ J}}$

c) $\Delta E_p = 60 \cdot 9,8 \cdot 35 - 0 = \underline{20580 \text{ J}}$

$\uparrow$
 $h = 3,5 \cdot 10 = 35 \text{ m}$
 $2n \rightarrow 12^e$

d) $\Delta E_p = 0 - 60 \cdot 9,8 \cdot 21 = \underline{-12348 \text{ J}}$

$\uparrow$
 $h = 3,5 \cdot 6 = 21 \text{ m}$
 $6^e \rightarrow 0$

19)



$E_{mo} = E_{mf}$

$\frac{1}{2} m v_0^2 = mgh$

$\frac{1}{2} \cdot 1 \cdot 15^2 = 1 \cdot 9,8 \cdot h$

$h = \frac{0,5 \cdot 15^2}{9,8}$

$\underline{h = 11,47 \text{ m}}$

20)

$E_{mo} = E_{mf}$

$\frac{1}{2} m v_0^2 + mgh_0 = \frac{1}{2} m v^2 + mgh$

$\frac{1}{2} \cdot 18^2 + 9,8 \cdot 8 = \frac{1}{2} v^2 + 9,8 \cdot 2$

$162 + 78,4 = \frac{1}{2} v^2 + 19,6$

$240,4 - 19,6 = \frac{1}{2} v^2$

$2 \cdot 220,8 = v^2$

$\rightarrow$ eliminem la massa perquè està a tots els termes

$v^2 = 441,6$ $v = \sqrt{441,6} = \underline{21,02 \text{ m/s}}$

(21)

a)

$$E_{\text{mo}} = E_{\text{mf}}$$

$$\frac{1}{2} m v_0^2 + m g h_0 = m g h$$

$$\frac{1}{2} 50^2 + 9,8 \cdot 20 = 9,8 \cdot h$$

$$1250 + 196 = 9,8 h$$

$$h = \frac{1446}{9,8} = \underline{147,55 \text{ m}}$$

b)

$$E_{\text{mo}} = E_{\text{mf}}$$

$$\frac{1}{2} m v_0^2 + m g h_0 = \frac{1}{2} m v^2$$

$$\frac{1}{2} m v_0^2 + m g h_0 = \frac{1}{2} m v^2$$

$$1250 + 196 = \frac{1}{2} v^2$$

$$2 \cdot (1446) = v^2$$

$$v^2 = 2892$$

$$v = \sqrt{2892} = \underline{53,77 \text{ m/s}}$$

c)

$$E_{\text{mo}} = E_{\text{mf}}$$

$$\frac{1}{2} m v_0^2 + m g h_0 = \frac{1}{2} m v^2 + m g h$$

$$1250 + 196 = \frac{1}{2} (20)^2 + 9,8 h$$

$$1446 - 200 = 9,8 h$$

$$h = \frac{1246}{9,8} = \underline{127,14 \text{ m}}$$

$$E_L = \frac{1}{2} m v^2 = \frac{1}{2} \cdot \underline{0,005} \cdot 20^2 = \underline{1 \text{ J}}$$

$$E_P = \frac{1}{2} m g h = \underline{0,005} \cdot 9,8 \cdot 127,14 = \underline{6,23 \text{ J}}$$

(22)

$$E_{\text{mo}} = E_{\text{mf}} = E_{\text{pot}} = E_{\text{kin}} = 93$$

$$\frac{1}{2}mv_0^2 = mgh + \frac{1}{2}mv^2$$

$$\frac{1}{2} \cdot 2 \cdot (20)^2 = E_p + \frac{1}{2} \cdot 2 \cdot (10)^2$$

$$400 = E_p + 100$$

$$E_p = 400 - 100 = \underline{300 \text{ J}}$$

(23)

a) $36 \text{ km/h} \rightarrow 10 \text{ m/s}$

$$E_{\text{mo}} = E_{\text{mf}}$$

$$mgh_0 + \frac{1}{2}mv^2 = mgh$$

$$9,8 \cdot h_0 + \frac{1}{2}(10)^2 = 9,8 \cdot 200$$

$$9,8 \cdot h_0 + 50 = 1960$$

$$h_0 = \frac{1960 - 50}{9,8} = \underline{194,9 \text{ m}}$$

b)

$$E_{\text{mo}} = E_{\text{mf}}$$

$$mgh_0 + \frac{1}{2}mv_0^2 = \frac{1}{2}mv^2$$

$$9,8 \cdot (194,9) + \frac{1}{2}(10)^2 = \frac{1}{2}v^2$$

$$1910 + 50 = \frac{1}{2}v^2$$

$$v = \sqrt{2 \cdot (1960)} = \sqrt{3920} = \underline{62,6 \text{ m/s}}$$

c)

$$E_{\text{mo}} = E_{\text{mf}}$$

$$\frac{1}{2}mv_0^2 + mgh_0 = \frac{1}{2}mv^2 + mgh$$

$$50 + 1910 = \frac{1}{2}v^2 + 9,8 \cdot 10$$

$$1960 = \frac{1}{2}v^2 + 98$$

$$v = \sqrt{2 \cdot (1960 - 98)} = \sqrt{3724} = \underline{61,02 \text{ m/s}}$$

d) $E_p = mgh = 0,02 \cdot (9,8) \cdot (194,9) = \underline{38,2 \text{ J}}$

e) $E_{m0} = E_m$

$$\frac{1}{2}mv_0^2 + mgh_0 = \frac{1}{2}mv^2$$

$$\frac{1}{2} \cdot 0,02 \cdot (10)^2 + 38,2 = E_c$$

$$0,01 \cdot 100 + 38,2 = E_c$$

$$E_c = \underline{39,2 \text{ J}}$$

24

a) $E_p = mgh = (0,1) \cdot 9,8 \cdot 15,02$

$$40 = m \cdot 9,8 \cdot 15,02 + m \cdot 8, \quad \frac{40}{147} = \underline{0,27 \text{ kg}}$$

b)

$$E_p = m \cdot g \cdot h = 0,27 \cdot 9,8 \cdot (-20) = \underline{-53,3 \text{ J}}$$

c)

$$\Delta E_p = -E_p - E_{p0} = -53,3 - 40 = \underline{-93,3 \text{ J}}$$

25

a) $E_p = 10.000 \cdot (9,8) \cdot (19000) = 8,82 \cdot 10^8 \text{ J}$

$$E_m = E_p + E_c \quad 10^9 = 8,82 \cdot 10^8 + E_c$$

$$E_c = 10^9 - 8,82 \cdot 10^8 = \underline{1,18 \cdot 10^8 \text{ J}}$$

b)

$$E_c = \frac{1}{2}mv^2$$

$$1,18 \cdot 10^8 = \frac{1}{2} \cdot 10000 \cdot v^2$$

$$2,36 \cdot 10^8 = 10.000 v^2 \quad v = \sqrt{\frac{2,36 \cdot 10^8}{10.000}} = \underline{153,62 \text{ m/s}}$$

26

$$E_m = E_p + E_c = mgh + \frac{1}{2}mv^2$$

$$E_m = 1000 \cdot 9,8 \cdot 5 + 5000 \cdot 15^2 = \underline{161.500 \text{ J}}$$

(27)

$$E_{\text{mo}} = E_{\text{mf}} \quad m \cdot g = 8 \cdot 0,2 = 1,6 \quad (2)$$

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$$mgh = \frac{1}{2}mv^2 \quad 0,2 \cdot 8 \cdot 0,2 = \frac{1}{2} \cdot m \cdot v^2 = 0,2 \cdot m \cdot v^2 = 0,2 \cdot 8 \cdot v^2 = 1,6 \cdot v^2$$

$$9,8 \cdot 5 = \frac{1}{2}v^2 \quad v^2 = 9,8 \cdot 5 \cdot 2 = 98 \quad (26)$$

$$v = \sqrt{98} = \underline{9,9 \text{ m/s}}$$

$$v_0 = 5 \text{ m/s}$$

$$E_{\text{mo}} = E_{\text{mf}}$$

$$mgh_0 + \frac{1}{2}mv_0^2 = \frac{1}{2}mv^2$$

$$9,8 \cdot 5 + \frac{1}{2}(5)^2 = \frac{1}{2}v^2$$

$$v^2 = 61,5 \cdot 2$$

$$49 + 12,5 = \frac{1}{2}v^2$$

$$v = \sqrt{123} = \underline{11,09 \text{ m/s}}$$

(28)

a)

$$E_{\text{mo}} = E_{\text{mf}}$$

$$mgh_0 = \frac{1}{2}mv^2$$

$$9,8 \cdot 2000 = \frac{1}{2}v^2$$

$$39200 = v^2 \quad v = \sqrt{39200} = \underline{197,98 \text{ m/s}}$$

(29)

b)

$$126 \text{ km/h} \rightarrow 35 \text{ m/s}$$

$$E_{\text{mo}} = E_{\text{mf}}$$

$$mgh_0 = mgh + \frac{1}{2}mv^2$$

$$9,8 \cdot 2000 = 9,8 \cdot h + \frac{1}{2}(35)^2$$

$$19600 = 9,8h + 612,5$$

$$18987,5 = 9,8h$$

$$h = \frac{18987,5}{9,8} = \underline{1937,5 \text{ m}}$$

29)

a) $m_T = 20 \cdot 3 = 60 \text{ m}$

$$E_p = m \cdot g \cdot h = 280 \cdot 9,8 \cdot 60 = \underline{164640 \text{ J}}$$

b) c)

$$E_{mo} = E_{mf}$$

$$mgh_o = \frac{1}{2}mv^2$$

$$v^2 = 1176$$

$$\underline{164640} = 140 v^2$$

$$= \underline{E_c}$$

$$v = \sqrt{1176} = \underline{34,29 \text{ m/s}}$$

30)

a) $h_T = 5 \cdot 4 = 20 \text{ m}$

$$E_{mo} = E_{mf}$$

$$mgh_o = \frac{1}{2}mv^2$$

$$9,8 \cdot 20 = \frac{1}{2}v^2$$

$$392 = v^2 \quad v^* = \sqrt{392} = \underline{19,8 \text{ m/s}}$$

b)

$$18 \text{ km/h} \rightarrow 5 \text{ m/s}$$

$$E_{mo} = E_{mf}$$

$$mgh_o = mgh + \frac{1}{2}mv^2$$

$$9,8 \cdot 20 = 9,8 \cdot h + \frac{1}{2}(5)^2$$

$$196 = 9,8h + 12,5$$

$$h = \frac{183,5}{9,8} = \underline{18,72 \text{ m}}$$

31)

a)

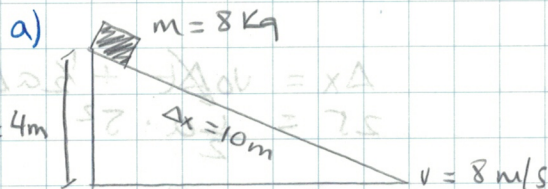
$$W_{Ff} = \Delta E_m = E_{mf} - E_{mo}$$

$$W_{Ff} = 0 - \frac{1}{2}mv_o^2 = -\frac{1}{2} \cdot 1 \cdot (5)^2 = \underline{-12,5 \text{ J}}$$

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b)

31)



$$E_{co} = 0 \text{ J}$$

$$E_{po} = m \cdot g \cdot h = 8 \cdot 9,8 \cdot 4 = \underline{313,6 \text{ J}}$$

$$E_c = \frac{1}{2} m v^2 = \frac{1}{2} \cdot 8 \cdot 8^2 = \underline{256 \text{ J}}$$

$$E_p = 0 \text{ J}$$

b)

$$W_{F_f} = \Delta E_m = E_{mf} - E_{mo}$$

$$W_{F_f} = 256 - 313,6 = -57,6 \text{ J}$$

$$W_{F_f} = F_f \cdot \Delta x \cdot \cos \alpha$$

$$-57,6 = F_f \cdot 10 \cdot \cos 180^\circ \rightarrow \cos 180^\circ$$

$$F_f = \frac{-57,6}{-10} = \underline{5,76 \text{ N}}$$

la fuerza sabemos que es negativa

32)

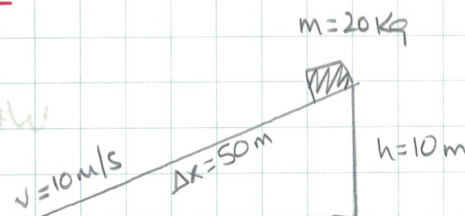
a)

$$E_{co} = 0 \text{ J}$$

$$E_{po} = 20 \cdot 9,8 \cdot 10 = \underline{1960 \text{ J}}$$

$$E_p = 0 \text{ J}$$

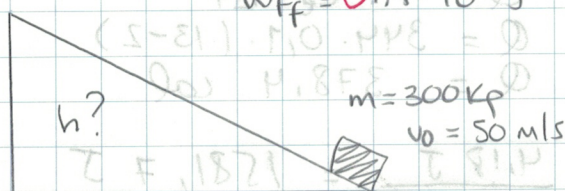
$$E_c = \frac{1}{2} m v^2 = \frac{1}{2} \cdot 20 \cdot 10^2 = \underline{1000 \text{ J}}$$



b)

$$W_{F_f} = \Delta E_m = E_{mf} - E_{mo} = 1000 - 1960 = \underline{-960 \text{ J}}$$

33)



$$W_{F_f} = \Delta E_m = E_{mf} - E_{mo}$$

$$-7,5 \cdot 10^4 = mgh - \frac{1}{2} m v_0^2$$

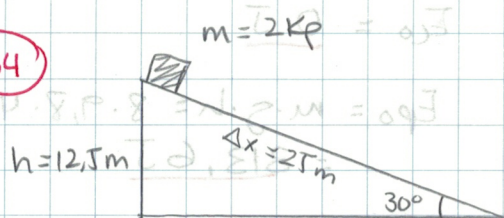
$$-7,5 \cdot 10^4 = 300 \cdot 9,8 \cdot h - \frac{1}{2} \cdot 300 \cdot (50)^2$$

$$-7,5 \cdot 10^4 = 2940h - 375000$$

$$300000 = 2940h$$

$$h = \frac{300000}{2940} = \underline{102,04 \text{ m}}$$

34



$$\Delta x = v_0 \Delta t + \frac{1}{2} a \Delta t^2$$

$$25 = \frac{1}{2} a \cdot 5^2$$

$$50 = 25a \quad a = 2 \text{ m/s}^2$$

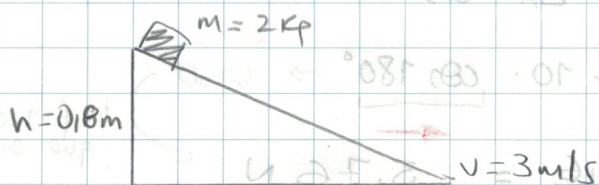
$$v = v_0 + a \Delta t$$

$$v = 2.5 = 10 \text{ m/s}$$

$$W_{Ff} = \Delta E_m = E_{mf} - E_{mo} = \frac{1}{2} m v^2 - m g h_0$$

$$W_{Ff} = \frac{1}{2} \cdot 2 \cdot 10^2 - 2 \cdot 9.8 \cdot 12.5 = 100 - 245 = \underline{-145 \text{ J}}$$

35



$$W_{Ff} = \Delta E_m$$

$$W_{Ff} = \frac{1}{2} m v^2 - m g h_0$$

$$W_{Ff} = \frac{1}{2} \cdot 2 \cdot 3^2 - 2 \cdot 9.8 \cdot 0.18$$

$$W_{Ff} = 9 - 3.528 = \underline{-6.68 \text{ J}}$$

36

37

$$T = 50^\circ\text{C}$$

$$T_0 = 19^\circ\text{C}$$

$$Q = 4407 \text{ cal}$$

$$m = 200 \text{ g}$$

$$Q = m \cdot c_e \cdot (\Delta T)$$

$$4407 = 200 \cdot c_e \cdot (50 - 19)$$

$$c_e = \frac{4407}{6200} = \underline{0.7 \text{ cal/g}^\circ\text{C}}$$

37

38

$$m = 344 \text{ g}$$

$$c_e = 0.1 \text{ cal/g}^\circ\text{C}$$

$$T_0 = 2^\circ\text{C}$$

$$T = 13^\circ\text{C}$$

$$Q = m \cdot c_e \cdot \Delta T$$

$$Q = 344 \cdot 0.1 \cdot (13 - 2)$$

$$Q = 378.4 \text{ cal}$$

$$378.4 \text{ cal} \cdot \frac{4.18 \text{ J}}{1 \text{ cal}} = \underline{1581.7 \text{ J}}$$

38

39

$$m = 1000 \text{ g}$$

$$T_0 = 20^\circ\text{C}$$

$$Q = 83600 \text{ J}$$

$$T = 40^\circ\text{C}$$

$$Q = m \cdot c_e \cdot \Delta T$$

$$83600 = 1000 \cdot c_e \cdot (40 - 20)$$

$$c_e = \frac{83600}{20000} = 4.180 \text{ J/Kg K}$$

$$\downarrow$$

$$1 \text{ cal/g}^\circ\text{C}$$