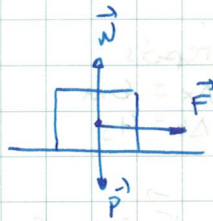


Exercis wire

(27)

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

$$\vec{F} = ?$$



$$\vec{F} = m \cdot a$$

$$\vec{F} = 200 \cdot 1,27$$

$$\vec{F} = \boxed{250 \text{ N}}$$

$$a = \frac{\Delta v}{\Delta t} = \frac{5}{4} = \boxed{1,27 \text{ m/s}^2}$$

$$\frac{18 \text{ km}}{\text{h}} \cdot \frac{1 \text{ h}}{3600 \text{ s}} \cdot \frac{1000 \text{ m}}{1 \text{ km}} = \boxed{5 \text{ m/s}}$$

(28)

$$m = 600 \text{ kg}$$

TRAM A

$$a = \frac{\Delta v}{\Delta t} = \frac{10 - 0}{4 - 0} = 2,5 \text{ m/s}^2$$

TRAM B

$$v \text{ const} \rightarrow a = 0$$

$$\vec{F} = 0$$

$$\vec{F} = m \cdot a$$

$$\vec{F} = 600 \cdot 2,5 = \boxed{1500 \text{ N}}$$

TRAM C

$$a = \frac{\Delta v}{\Delta t} = \frac{0 - 10}{14 - 6} = \frac{-10}{8} = -1,25 \text{ m/s}^2$$

$$\vec{F} = m \cdot a$$

$$\vec{F} = 600 \cdot (-1,25)$$

$$\vec{F} = \boxed{-750 \text{ N}}$$

(29)

$$m = 600 \text{ kg}$$



$$a = 0,8 \text{ m/s}^2$$

$$\vec{F} = 500 \text{ N}$$

$$\vec{P} - (\vec{T} + \vec{F}) = m \cdot a$$

$$5880 - \vec{T} - 500 = 600 \cdot 0,8$$

$$\vec{T} = 5880 - 500 - 480$$

$$\vec{T} = \boxed{4900 \text{ N}}$$

$$\vec{P} = m \cdot g = 600 \cdot 9,8 = 5880 \text{ N}$$

(30)

$$\frac{72 \text{ km}}{\text{h}} \cdot \frac{1000 \text{ m}}{1 \text{ km}} \cdot \frac{1 \text{ h}}{3600 \text{ s}} = 20 \text{ m/s}$$

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

$$\Delta x = 50 \text{ m}$$

$$\vec{F} = m \cdot a$$

$$\vec{F} = 1200 \cdot (-4) = \boxed{-4800 \text{ N}}$$

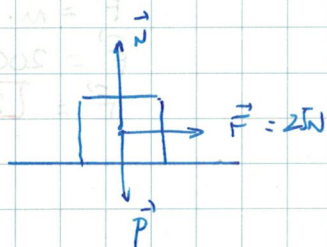
$$v^2 = v_0^2 + 2a\Delta x$$

$$0^2 = 20^2 + 2 \cdot a \cdot 50$$

$$-400 = 100a$$

$$a = -4 \text{ m/s}^2$$

31)



repos
 $\Delta x = 6 \text{ m}$
 $\Delta t = 4 \text{ s}$

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

$$6 = \frac{1}{2} a \cdot (4)^2$$

$$12 = 16a$$

$$a = \frac{12}{16} = \boxed{0,75 \text{ m/s}^2}$$

$$\vec{F} = m \cdot a$$

$$25 = m \cdot 0,75$$

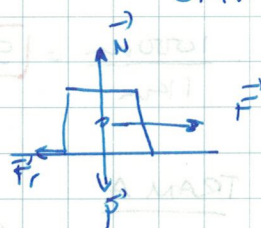
$$m = \frac{25}{0,75} = \boxed{33,3 \text{ kg}}$$

32)

repos
 $m = 800 \text{ g} = 0,8 \text{ kg}$
 $\vec{F}_r = 2 \text{ N}$

$$\Delta x = 20 \text{ m}$$

$$\Delta t = 4 \text{ s}$$



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

$$20 = \frac{1}{2} a \cdot 4^2$$

$$40 = 16a$$

$$a = \frac{40}{16} = \boxed{2,5 \text{ m/s}^2}$$

$$\vec{F} - \vec{F}_r = m \cdot a$$

$$\vec{F} - 2 = 0,8 \cdot 2,5$$

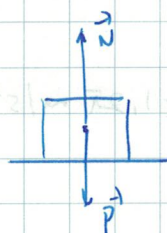
$$\vec{F} = 2 + 2 = \boxed{4 \text{ N}} \text{ vers la droite}$$

33)

$$m = 35 \text{ kg}$$

$$\Delta t = 4 \text{ s}$$

$$v = 1,6 \text{ m/s}$$



a)

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

$$0 = 1,6 + a \cdot 4$$

$$a = \frac{-1,6}{4} = -0,4 \text{ m/s}^2$$

$$\vec{F}_r = m \cdot a$$

$$\vec{F}_r = 35 \cdot (-0,4)$$

$$\vec{F}_r = \boxed{-14 \text{ N}}$$

b) $\vec{F} - \vec{F}_r = m \cdot a = 0$
 ~~$\vec{F} = 35 \cdot (-0,4)$~~
 ~~$\vec{F} = -14 \text{ N}$~~

$$\vec{F} = \vec{F}_r = \boxed{14 \text{ N}}$$

34)

$$\vec{P} = 2300 \text{ N}$$

$$\vec{F}_r = 150 \text{ N}$$

$$\vec{T} = 1200 \text{ N}$$

a) $\vec{P} - (\vec{F}_r + \vec{T}) = 0$

$$2300 = (1200 + 150)$$

$$\boxed{2300 > 1350}$$

Està baixant perquè les forces contràries no s'equilibren



b) $\vec{F} = \vec{P} - (\vec{F}_r + \vec{T}) = 2300 - 150 - 1200 = 0$

$$\vec{T} = 2300 - 150 = \boxed{2150 \text{ N}}$$

35)

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

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

$$\Delta x = 25 \text{ m}$$

$$\vec{F} = m \cdot a$$

$$\vec{F} = 200 \cdot 1,28$$

$$\vec{F} = \boxed{256 \text{ N}}$$

~~xxxxxx~~

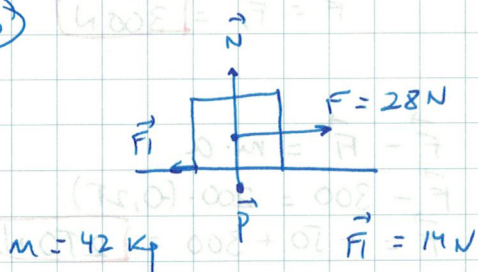
$$v^2 = v_0^2 + 2a\Delta x$$

$$8^2 = 0^2 + 2 \cdot a \cdot 25$$

$$64 = 50a$$

$$a = \frac{64}{50} = \boxed{1,28 \text{ m/s}^2}$$

36)



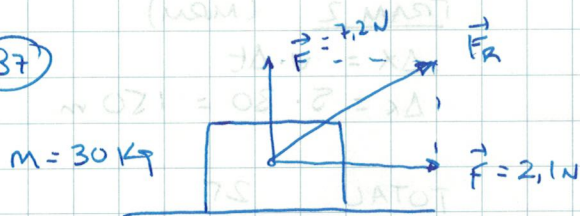
$$\vec{F} - \vec{F}_r = m \cdot a$$

$$28 - 14 = 42 \cdot a$$

$$14 = 42a$$

$$a = \frac{14}{42} = \boxed{0,33 \text{ m/s}^2}$$

37)



$$\vec{F}_R = \sqrt{(7,2)^2 + (2,1)^2} = \sqrt{56,21}$$

$$\vec{F}_R = \boxed{7,5 \text{ N}}$$

$$\vec{F} = m \cdot a$$

$$7,5 = 30 \cdot a$$

$$a = \frac{7,5}{30} = \boxed{0,25 \text{ m/s}^2}$$

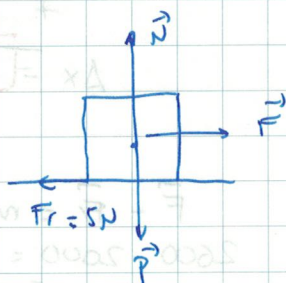
38)

$$m = 2 \text{ kg}$$

epös

$$\Delta x = 12 \text{ m}$$

$$\Delta t = 4 \text{ s}$$



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

$$12 = \frac{1}{2} a \cdot 4^2$$

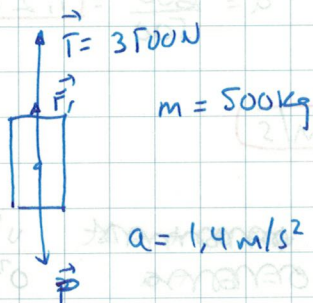
$$24 = 16a$$

$$a = \frac{24}{16} = \boxed{1,5 \text{ m/s}^2}$$

$$\vec{F} - \vec{F}_r = m \cdot a$$

$$\vec{F} = 5 + 2 \cdot 1,5 = \boxed{8 \text{ N}}$$

39)



$$\vec{F} = m \cdot g = 500 \cdot 9,8 = 4900 \text{ N}$$

$$\vec{P} - (\vec{T} + \vec{F}_r) = m \cdot a$$

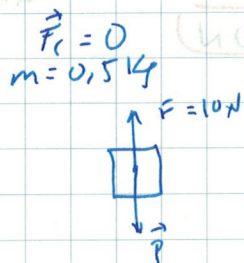
$$4900 - 3500 - \vec{F}_r = 500 \cdot 1,4$$

$$- \vec{F}_r = 700 - 4900 + 3500$$

$$- \vec{F}_r = -700 \text{ N}$$

$$\boxed{\vec{F}_r = 700 \text{ N}}$$

40)



$$\vec{F} - \vec{P} = m \cdot a$$

$$10 - 0,5 \cdot 9,8 = 0,5 \cdot a$$

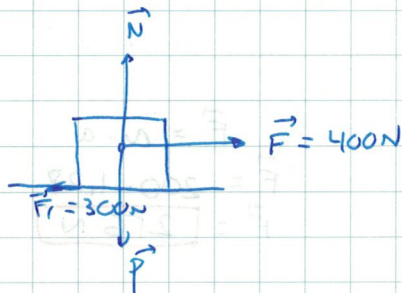
$$10 - 4,9 = 0,5a$$

$$a = \frac{5,1}{0,5} = \boxed{10,2 \text{ m/s}^2}$$

(41)

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

$$\vec{F}_i = 300 \text{ N}$$



$$a) \quad \vec{F} - \vec{F}_i = m \cdot a$$

$$400 - 300 = 200 a$$

$$100 = 200 a$$

$$a = \frac{100}{200} = \boxed{0,5 \text{ m/s}^2}$$

$$b) \quad v = v_0 + a \Delta t$$

$$v = 0,5 \cdot 10 = \boxed{5 \text{ m/s}}$$

$$c) \quad \vec{F} = \vec{F}_r = m \cdot a = 0 \quad F_i$$

$$F = \vec{F}_i = \boxed{300 \text{ N}} \quad v \text{ still}$$

$$a = 0$$

$$d) \quad a = \frac{\Delta v}{\Delta t} = \frac{0 - 5}{20} = \boxed{-0,25 \text{ m/s}^2}$$

$$\vec{F} - \vec{F}_i = m \cdot a$$

$$\vec{F} - 300 = 200 \cdot (-0,25)$$

$$\vec{F} = -50 + 300 = \boxed{250 \text{ N}}$$

e) TRAM 1 (MRWA)

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

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

TRAM 2 (MRWA)

$$\Delta x = v \cdot \Delta t$$

$$\Delta x = 5 \cdot 30 = 150 \text{ m}$$

TRAM 3 (MRWA)

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

$$\Delta x = 5 \cdot 20 + (-0,25) 20^2$$

$$\Delta x = 100 - 100 = 0 \text{ m}$$

$$\text{TOTAL} \quad 25$$

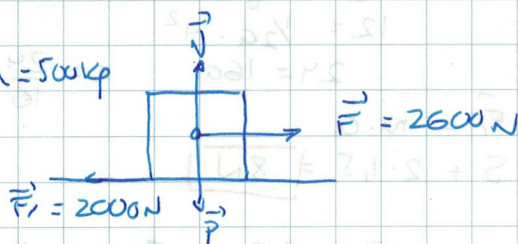
$$150$$

$$+ 50$$

$$\Delta x = \boxed{225 \text{ m}}$$

(42)

$$m = 500 \text{ kg}$$



$$\vec{F} - \vec{F}_i = m \cdot a$$

$$2600 - 2000 = 500 \cdot a$$

$$600 = 500 a$$

$$a = \frac{600}{500} = \boxed{1,2 \text{ m/s}^2}$$

$$v? \quad \Delta t = 10 \text{ s}$$

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

$$v = 1,2 \cdot 10 = \boxed{12 \text{ m/s}}$$

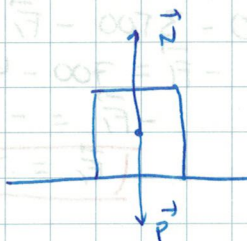
(43)

$$m = 20 \text{ kg}$$

$$v_0 = 6 \text{ m/s}$$

$$\Delta x = 4 \text{ m}$$

$$v = 0 \text{ m/s}$$

~~momentum~~
~~energy~~

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

$$0^2 = 6^2 + 2 \cdot a \cdot 4$$

$$-36 = 8a$$

$$a = \frac{-36}{8} = \boxed{-4,5 \text{ m/s}^2}$$

$$F_i = m \cdot a$$

$$F_i = 20 \cdot 4,5 = \boxed{-90 \text{ N}}$$

$$\vec{F} - \vec{F}_i = 0$$

$$\vec{F} = \vec{F}_i$$

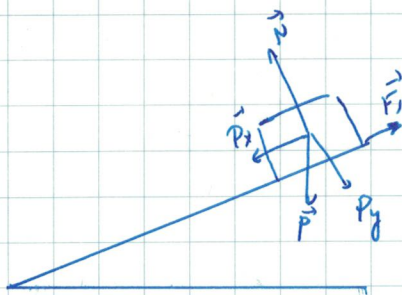
$$+90 = + \mu \cdot N$$

$$+90 = \mu \cdot mg$$

$$90 = \mu \cdot 20 \cdot 9,8$$

$$\mu = \frac{90}{196} = \boxed{0,46}$$

(44)



$$\Delta x = 30 \text{ m}$$

repòs

$$5\% \text{ pendent} \rightarrow \frac{5}{100} \cdot 90^\circ = 4,5^\circ$$

$$\mu = 0,02$$

$$v = ?$$

$$\vec{F} = 0$$

$$P_x - F_f = m \cdot a$$

$$\mu \cdot P_y - \mu \cdot P \cdot \cos \alpha = \mu \cdot a$$

$$9,8 \cdot \sin 4,5^\circ - 0,02 \cdot 9,8 \cdot \cos 4,5^\circ = a$$

$$a = 0,63 \text{ m/s}^2$$

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

$$v^2 = 0^2 + 2 \cdot 0,63 \cdot 30$$

$$v = \sqrt{37,8} = 6,15 \text{ m/s}$$

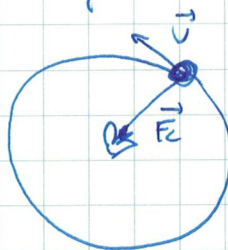
(45)

$$m = 4 \text{ kg}$$

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

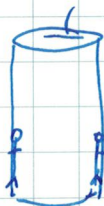
$$r = 50 \text{ cm} = 0,5 \text{ m}$$

$$F = m \cdot \frac{v^2}{r} = 4 \cdot \frac{5^2}{0,5} = 200 \text{ N}$$



$\vec{F}$ cap al centre de la circumferència

(46)



(47)

$$M_r = 6 \cdot 10^{24} \text{ kg}$$

$$M_L = 7,4 \cdot 10^{22} \text{ kg}$$

$$d = 3,8 \cdot 10^8 \text{ m}$$

$$\vec{F} = G \cdot \frac{M_r \cdot M_L}{d^2} = 6,67 \cdot 10^{-11} \cdot \frac{6 \cdot 10^{24} \cdot 7,4 \cdot 10^{22}}{(3,8 \cdot 10^8)^2}$$

$$\vec{F} = 2,05 \cdot 10^{20} \text{ N}$$

(48)

$$d = 0,3 \text{ m}$$

$$m_1 = m_2 = 7 \text{ kg}$$

$$\vec{F} = G \cdot \frac{m_1 \cdot m_2}{d^2} = 6,67 \cdot 10^{-11} \cdot \frac{7 \cdot 7}{(0,3)^2}$$

$$\vec{F} = 3,63 \cdot 10^{-8} \text{ N}$$