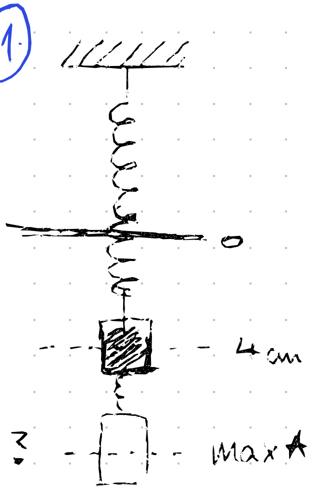
1.



$E_p = 2J$ opruga

$E_k = 1J$ uteg

$E_{p(A)} = ?$

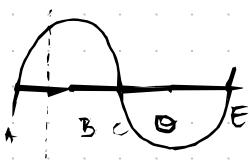
→ $E = K + U$

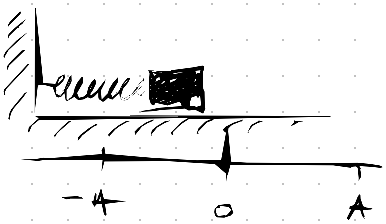
$E_{(4)} = 1J + 2J$ → $E = 3J$

↳ ali zbog zakona očuvanja energije 6J mora biti konstantno

↳ $E = E_{p(A)} = 3J$ ✓

2.

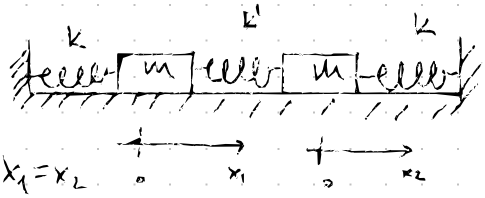




- ubrzanje ↗ raste i pomak će kada je najveća F_x jer $ma = -kx$

3. Astronaut

4.



$k = 8 N/m$ omjer f_f i f_p (faza) (protufaza)

$k' = 9 N/m$

protufaza $x_1 = -x_2$

$m\ddot{x}_1 = -kx_1 - k'(x_1 - x_2)$

$m\ddot{x}_1 = -kx_1 - 2k'x_1$

$m\ddot{x}_1 = -x_1(k+2k')$

→ $\omega^2 = \frac{k+2k'}{m}$

$x_1 = x_2$

FAZA → $2m \cdot \ddot{x}_{1,2} = -2kx_{1,2}$

$\ddot{x}_{1,2} = -\frac{kx_{12}}{m}$ ⇒ $\ddot{x}_{1,2} = -\omega^2 \cdot x$

$$\omega_A^2 = \frac{k}{m}$$

⇒ $\frac{\text{protufaza}}{\text{faza}} = \frac{\frac{k+2k'}{m}}{\frac{k}{m}} = \frac{8+18}{8} = \frac{26}{8} = 3{,}25$

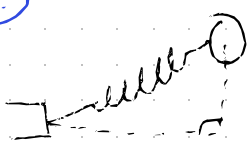
3. Astronaut

$T = \frac{2\pi}{\omega}$ $\quad \omega^2 = \frac{k}{m}$ $\quad T = \frac{2\pi}{\sqrt{\frac{k}{m}}} \rightarrow T^2 = \frac{4\pi^2}{\frac{k}{m}}$

$T^2 = \frac{4\pi^2 \cdot m}{k}$

$m = \frac{k}{4\pi^2}(T^2 - T_0^2)$! $\qquad m = \frac{T^2 k}{4\pi^2}$

7.



$m = 1{,}1\,kg$

$k = 7\,N$

$F = -b\left(\frac{dx}{dt}\right)$

$\frac{1}{4}A = A e^{\left(\frac{-bt}{2m}\right)}$

$t = -2m/b \cdot \ln\left(\frac{1}{4}\right)$

$b = 0{,}26\,kg/s$

A padne za 1/4 pa je to $A = \frac{1}{4}A_0$

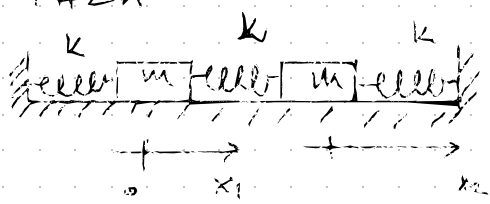
$A = A_0 e^{-\frac{bt}{2m}} \Rightarrow \frac{1}{4}A_0 = A_0 e^{-\frac{bt}{2m}} \;/ : A_0$

* $b = \frac{kg}{s} \cdot \left[\frac{t}{m}\right]$ $\qquad \frac{1}{4} = e^{-\frac{bt}{2m}} \;/\ln \Rightarrow -\frac{bt}{2m} = \ln\left(\frac{1}{4}\right)$

$t = \ln\left(\frac{1}{4}\right) \cdot \frac{2m}{-b}$

$t = 11{,}73$

4. $+A \; 2A$



→ pomak je isti

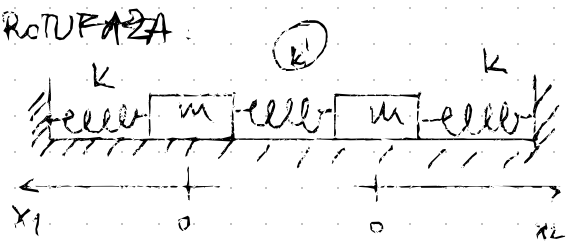
sustav:

$F = F_{x_1} + F_{x_2}$

$2m\ddot{x} = -kx_{1,2} - kx_{1,2} \Leftrightarrow 2m\ddot{x} = -2kx_{1,2}$

$\ddot{x} = -\frac{k}{m}x_{1,2} \rightarrow \frac{\ddot{x}}{-x_{1,2}} = \frac{k}{m} = \omega^2$

PROTUFAZA:



$x_1 = -x_2$ $\qquad \omega^2 = 4\pi^2 f^2$

$\sqrt{\omega_F}$! !

← gledamo

$x_1 + x_2$

$F_{x_1} = m\ddot{x}_1 = -kx_1 - k'(x_1 - x_2)$

$m\ddot{x}_1 = -kx_1 - k' \cdot 2x_1$

$m\ddot{x}_1 = -x_1(k + 2k')$

$\frac{\ddot{x}_1}{-x_1} = \frac{k + 2k'}{m} = \omega^2 \rightarrow \sqrt{\omega_p}$

$\frac{\sqrt{\omega_p}}{\sqrt{\omega_F}} = \frac{\sqrt{2k'+k}}{\sqrt{k}} = 1{,}8$