

1. Givet

$$\vec{r} = (20t^2 - 50t)\hat{i} + (60 - 7.0t^4)\hat{j}$$

Find

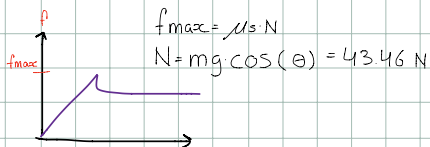
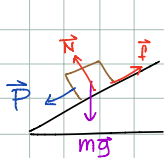
$\vec{a}$

$$\vec{a} = \frac{d^2\vec{r}}{dt^2} = 12t\hat{i} - 84t^3\hat{j}$$

$$t=2 \Rightarrow \vec{a} = 24\hat{i} - 336\hat{j}$$

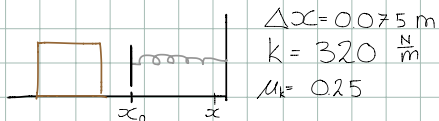
$$|\vec{a}| = \sqrt{24^2 + 336^2} \approx 337 \frac{\text{m}}{\text{s}^2}$$

2.



$$P + mg \sin(\theta) = (5 + 1164) \text{ N} \approx 17 \text{ N}$$

3.

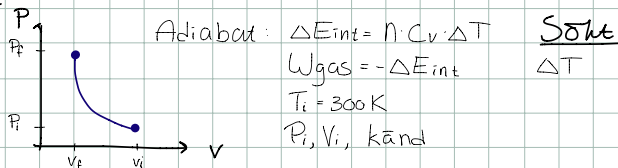


$$E_k = \frac{1}{2}mv^2 = \frac{1}{2}k\Delta x + N\mu_k\Delta x \Rightarrow v = \sqrt{385} = 19.4 \frac{\text{m}}{\text{s}}$$

4.

$$\left. \begin{aligned} Q_1 &= m \cdot L_1 \text{ (ångbildning) } = 0.51 \cdot 879 \cdot 10^3 \\ Q_2 &= m \cdot c \cdot \Delta T = 0.51 \cdot 273 \cdot 10^3 (78 - (-114)) \\ Q_3 &= m \cdot L_2 \text{ (smält) } = 0.51 \cdot 109 \cdot 10^3 \end{aligned} \right\} Q = 742 \text{ kJ}$$

5.



$$PV = nRT \Rightarrow n = 8.10 \text{ J}$$

$$P_i V_i = nRT_i \Rightarrow \text{Dividera med varandra} \Rightarrow T_f = T_i \frac{4.74.5}{200} = 446 \text{ K}$$

$$W_{\text{gas}} = -8.10 \cdot \frac{5}{2} \cdot 8.31 (446 - 300) \approx 24.5 \cdot 10^3 \text{ J}$$