1. a) $s = 4 + 10t + 4t^2$

$m = 20\,kg$
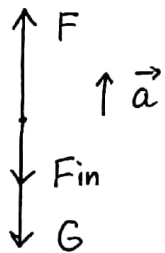
$F = ?$

$V = \dfrac{ds}{dt} = \dfrac{d(4+10t+4t^2)}{dt} = 10 + 8t$

$a = \dfrac{dV}{dt} = \dfrac{d(10+8t)}{dt} = 8\,\dfrac{m}{s^2}$

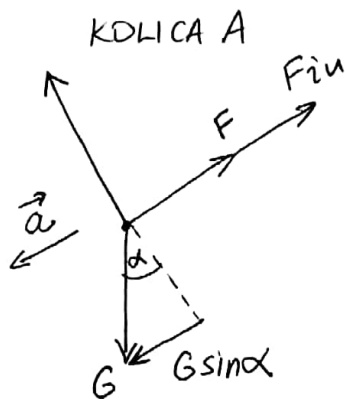$F = m \cdot a = 20 \cdot 8 = 160\ N$

b)

$F = F_{in} + G$

$F = ma + G$

$F = \dfrac{G}{g}\, a + G$

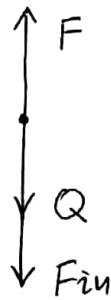$F = G\left(\dfrac{a}{g} + 1\right)$

2.

G, α, t_1, V_1

$Q = ?$

KOLICA A   TERET B

$m_A \, a + F = G \sin\alpha$

$m_B \, a + Q = F$

___

$\dfrac{G}{g} \, a + F = G \sin\alpha$

$\dfrac{Q}{g} \cdot a + Q = F$

___

Saberemo jednačine

$\dfrac{G}{g} a + F + \dfrac{Q}{g} a + Q = F + G \sin\alpha$

$\dfrac{G}{g} a + \dfrac{Q}{g} a + Q = G \sin\alpha$

$\dfrac{Q}{g} a + Q = G \sin\alpha - \dfrac{G}{g} a$
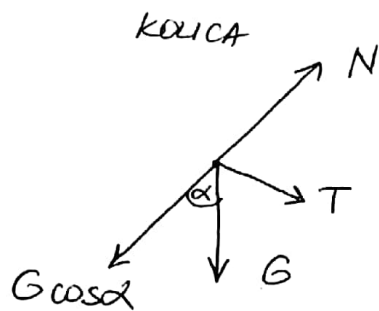
$Q + \dfrac{Q}{g} a = G \sin\alpha - \dfrac{G}{g} a$

$Q \left(1 + \dfrac{a}{g} \right) = G \left(\sin\alpha - \dfrac{a}{g} \right)$

$Q = \dfrac{G \left(\sin\alpha - \dfrac{a}{g} \right)}{1 + \dfrac{a}{g}}$

$Q = \dfrac{G \left(\sin\alpha - \dfrac{V_1}{g t_1} \right)}{1 + \dfrac{V_1}{g t_1}}$

3. G, h, α, μ

$E_{KA} = ?$

kolica

N - sila reakcije podloge, $N = G \cos \alpha$
T - sila trenja

$E_{KA} - E_{KB} = A$ $\qquad$ A - izvršen rad

$E_{KB} = 0 \rightarrow$ Kolica su mirovala u položaju B

$E_{KA} = A$

$A = \quad Gh + Ts$

$A = \quad Gh + \mu N \cdot s$ $\qquad$ s - pređeni put, $s = \dfrac{h}{\sin \alpha}$

$A = \quad Gh + \mu \cdot G \cos \alpha \cdot \dfrac{h}{\sin \alpha}$

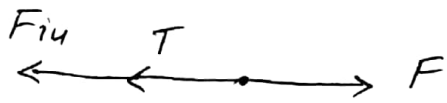$A = \quad Gh \left(1 + \mu \dfrac{\cos \alpha}{\sin \alpha} \right)$

$A = \quad Gh \left(1 + \mu \operatorname{ctg} \alpha \right)$

$E_{KA} = A$

$E_{KA} = \dfrac{1}{2} m V_A^2 = \dfrac{1}{2} \dfrac{G}{g} V_A^2 = \quad Gh \left(1 + \mu \operatorname{ctg} \alpha \right)$

4. G, F, V, t, s, μ

$$A = ?$$

Fiu

$$\xleftarrow{\quad T \quad \bullet \quad} F$$

$$F = F_{iu} + T$$

$$F = ma + T$$

$$F = \frac{G}{g} a + T$$

$$F = \frac{G}{g} a + \mu N$$

$$F = \frac{G}{g} a + \mu G$$

$$F = G\left(\frac{a}{g} + \mu\right)$$

$$F = G\left(\frac{V}{gt} + \mu\right)$$

$$A = F \cdot s$$

$$A = G \cdot s\left(\frac{V}{gt} + \mu\right)$$

5. a) m_1, m_2, V_1

$V_2 = ?$

$m_1 V_1 = m_2 V_2$

$V_2 = \dfrac{m_1 V_1}{m_2}$

b) m_1, V_1, m_2

$V_2 = ?$

$m_1 V_1 = (m_1 + m_2) V_2$

$V_2 = \dfrac{m_1 V_1}{m_1 + m_2}$