

1)

$$m_{Auto} = 1.5 \text{ t}$$

$$h_{Hartberg} = 350 \text{ m}$$

$$h_{Vorau} = 660 \text{ m}$$

$$\Delta h = h_{Vorau} - h_{Hartberg} = 660 \text{ m} - 350 \text{ m} = 310 \text{ m}$$

$$g = 9.81 \frac{\text{m}}{\text{s}^2}$$

$$F_{gAuto} = m_{Auto} \cdot g = 1.5 \text{ t} \cdot 9.81 \text{ m/s}^2 = 14715 \text{ N}$$

$$W_H = F_{gAuto} \cdot \Delta h = 14715 \text{ N} \cdot 310 \text{ m} = 4561650 \text{ J}$$

2)

$$m_{Kiste} = 10 \text{ kg}$$

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

$$g = 9.81 \frac{\text{m}}{\text{s}^2}$$

$$F = m_{Kiste} \cdot g = 10 \text{ kg} \cdot 9.81 \text{ m/s}^2 = 0.0981 \text{ kN}$$

$$W_H = F \cdot h = 0.0981 \text{ kN} \cdot 4 \text{ m} = 392.4 \text{ J}$$

3)

$$m_{Last} = 500 \text{ kg}$$

$$h = 10 \text{ m}$$

$$g = 9.81 \frac{\text{m}}{\text{s}^2}$$

$$F = m_{Last} \cdot g = 500 \text{ kg} \cdot 9.81 \text{ m/s}^2 = 4.91 \text{ kN}$$

$$W_H = F \cdot h = 4.91 \text{ kN} \cdot 10 \text{ m} = 49050 \text{ J}$$

4)

$$m_{Auto} = 1200 \text{ kg}$$

$$v = 20 \frac{\text{m}}{\text{s}}$$

$$W_B = \frac{1}{2} \cdot m_{Auto} \cdot v^2 = \frac{1}{2} \cdot 1200 \text{ kg} \cdot (20 \text{ m/s})^2 = 240000 \text{ J}$$

5)

$$\Delta x = 0.5 \text{ m}$$

$$k = 200 \frac{\text{N}}{\text{m}}$$

$$W_V = \frac{1}{2} \cdot k \cdot \Delta x^2 = \frac{1}{2} \cdot 200 \text{ N/m} \cdot (0.5 \text{ m})^2 = 25 \text{ J}$$

6)

$$F_R = 15 \text{ N}$$

$$s_{Ebene} = 5 \text{ m}$$

$$W_R = F_R \cdot s_{Ebene} = 15 \text{ N} \cdot 5 \text{ m} = 75 \text{ J}$$

7)

$$m_{Fass} = 200 \text{ kg}$$

$$h = 3 \text{ m}$$

$$g = 9.81 \frac{\text{m}}{\text{s}^2}$$

$$F_{gFass} = m_{Fass} \cdot g = 200 \text{ kg} \cdot 9.81 \text{ m/s}^2 = 1.96 \text{ kN}$$

$$W_H = F_{gFass} \cdot h = 1.96 \text{ kN} \cdot 3 \text{ m} = 5886 \text{ J}$$

8)

$$m_{Fahrrad} = 90 \text{ kg}$$

$$v_{Fahrrad} = 10 \frac{\text{m}}{\text{s}}$$

$$W_B = \frac{1}{2} \cdot m_{Fahrrad} \cdot v_{Fahrrad}^2 = \frac{1}{2} \cdot 90 \text{ kg} \cdot (10 \text{ m/s})^2 = 4500 \text{ J}$$

9)

$$k_{Feder} = 150 \frac{\text{N}}{\text{m}}$$

$$\Delta x_{Feder} = 30 \text{ cm}$$

$$W_V = \frac{1}{2} \cdot k_{Feder} \cdot \Delta x_{Feder}^2 = \frac{1}{2} \cdot 150 \text{ N/m} \cdot (30 \text{ cm})^2 = 6.75 \text{ J}$$