

1. a) kleiner

b) grösser

$$2. \quad a) \quad W = F \cdot s = 90 \text{ N} \cdot 40 \text{ m} = \underline{\underline{3'600 \text{ J}}} \quad P = \frac{W}{t} = \frac{3600 \text{ J}}{30 \text{ s}} = \underline{\underline{120 \text{ W}}}$$

$$b) \quad W = F \cdot s = 180 \text{ N} \cdot 40 \text{ m} = \underline{\underline{7'200 \text{ J}}} \quad P = \frac{W}{t} = \frac{7200 \text{ J}}{60 \text{ s}} = \underline{\underline{120 \text{ W}}}$$

$$c) \quad W = F \cdot s = 180 \text{ N} \cdot 20 \text{ m} = \underline{\underline{3'600 \text{ J}}} \quad P = \frac{W}{t} = \frac{3600 \text{ J}}{25 \text{ s}} = \underline{\underline{144 \text{ W}}}$$

3. a) **Christine** verrichtet **Hubarbeit** an **sich selbst**.

$$b) \quad W_{\text{Hub}} = m \cdot g \cdot h = 45.7 \text{ kg} \cdot 9.81 \frac{\text{N}}{\text{kg}} \cdot 607 \text{ m} = 272'000 \text{ J} = \underline{\underline{272 \text{ kJ}}}$$

$$c) \quad P = \frac{W}{t} = \frac{272'000 \text{ J}}{3600 \text{ s}} = \underline{\underline{75.6 \text{ W}}}$$

4. a) **Der Automotor** verrichtet **Beschleunigungsarbeit** am **Auto**.

$$b) \quad W_{\text{Beschleunigung}} = \frac{1}{2} \cdot m \cdot v^2 = \frac{1}{2} \cdot 1'200 \text{ kg} \cdot (27.8 \frac{\text{m}}{\text{s}})^2 = \underline{\underline{463 \text{ kJ}}}$$

$$c) \quad P = \frac{W}{t} = \frac{463 \text{ kJ}}{10 \text{ s}} = \underline{\underline{46.3 \text{ kW}}}$$

5. a) **Ken** verrichtet **Spannarbeit** an **der Feder**.

$$b) \quad W_{\text{Spann}} = \frac{1}{2} \cdot D \cdot s^2 = \frac{1}{2} \cdot 450 \frac{\text{N}}{\text{m}} \cdot (0.024 \text{ m})^2 = \underline{\underline{0.13 \text{ J}}}$$

$$c) \quad P = \frac{W}{t} = \frac{0.13 \text{ J}}{0.2 \text{ s}} = \underline{\underline{0.65 \text{ W}}}$$

$$6. \quad P = \frac{W_{\text{Hub}}}{t} = \frac{m \cdot g \cdot h}{t} = \frac{75.0 \text{ kg} \cdot 9.81 \frac{\text{N}}{\text{kg}} \cdot 1.00 \text{ m}}{1.00 \text{ s}} = \underline{\underline{736 \text{ W}}}$$

$$7. \quad W = P \cdot t = 60 \text{ W} \cdot 3600 \text{ s} = \underline{\underline{216 \text{ kJ}}}$$

$$8. \quad a) F_L = \frac{1}{2} \cdot c_W \cdot \rho_{\text{Luft}} \cdot v^2 \cdot A = \frac{1}{2} \cdot 1 \cdot 1.29 \frac{\text{kg}}{\text{m}^3} \cdot \left(\frac{24.1}{3.6} \frac{\text{m}}{\text{s}} \right)^2 \cdot 0.50 \text{ m}^2 = 14.453 \text{ N} = \underline{\underline{14 \text{ N}}}$$

$$b) s = v \cdot t = 6.7 \frac{\text{m}}{\text{s}} \cdot 1.0 \text{ s} = \underline{\underline{6.7 \text{ m}}}$$

$$c) W = F \cdot s = 14.45 \text{ N} \cdot 6.7 \text{ m} = 96.83 \text{ J} = \underline{\underline{97 \text{ J}}}$$

$$d) P = \frac{W}{t} = \frac{96.83 \text{ J}}{1.0 \text{ s}} = 96.83 \text{ W} = \underline{\underline{97 \text{ W}}}$$

$$9. \quad t = \frac{W_{\text{Hub}}}{P} = \frac{m \cdot g \cdot h}{P} = \frac{48 \text{ kg} \cdot 9.81 \frac{\text{m}}{\text{s}^2} \cdot 8.0 \text{ m}}{320 \text{ W}} = \underline{\underline{12 \text{ s}}}$$

$$10. \quad P \cdot t = W = F \cdot s \quad \Rightarrow \quad s = \frac{P \cdot t}{F} = \frac{500 \text{ W} \cdot 3600 \text{ s}}{200 \text{ N}} = \underline{\underline{9.00 \text{ km}}}$$