Lösungen zur Leistung

1. a) kleiner b) grösser

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

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

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

3. a) **Christine** verrichtet **Hub**arbeit an **sich selbst**.

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

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

4. a) **Der Automotor** verrichtet **Beschleunigungs**arbeit am **Auto**.

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

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

5. a) **Ken** verrichtet **Spann**arbeit an **der Feder**.

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

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

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

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

8. a) $F_L = \frac{1}{2} \cdot c_W \cdot \rho_{Luft} \cdot v^2 \cdot A = \frac{1}{2} \cdot 1 \cdot 1.29 \ \frac{kg}{m^3} \cdot \left(6.7 \frac{m}{s}\right)^2 \cdot 0.50 \ m^2 = \underline{\underline{14.8 \ N}}$

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

c) $W = F \cdot s = 14.8 \ N \cdot 6.7 = \underline{100 \ J}$

d) $P = \frac{W}{t} = \frac{100 \ J}{1.0 \ s} = \underline{\underline{100 \ W}}$

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

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