Lösungen

Thema: **Elektrische Arbeit**

1. $W = P \cdot t = 0{,}14\ \text{kW} \cdot 4{,}25\ \text{h} = 0{,}595\ \text{kWh/Tag}$

$\mathbf{W_{Mon}} = W \cdot \text{Tage} = 0{,}595\ \text{kWh/Tag} \cdot 30\ \text{Tage} = \mathbf{17{,}9\ kWh}$

2. **a)** $W = P \cdot t; \quad \mathbf{t} = \dfrac{W}{P} = \dfrac{1\ \text{kWh}}{0{,}025\ \text{kW}} = \mathbf{40\ h}$ **b)** $\mathbf{t} = \dfrac{W}{P} = \dfrac{1\ \text{kWh}}{0{,}04\ \text{kW}} = \mathbf{25\ h}$

3. **a)** $W = U \cdot I \cdot t \Rightarrow \mathbf{I} = \dfrac{W}{U \cdot t} = \dfrac{160\ \text{Wh}}{230\ \text{V} \cdot (8/60)\ \text{h}} = \mathbf{5{,}22\ A}$

b) $\mathbf{P} = U \cdot I = 230\ \text{V} \cdot 5{,}22\ \text{A} = \mathbf{1200\ W}$ **c)** $\mathbf{R} = \dfrac{U}{I} = \dfrac{230\ \text{V}}{5{,}22\ \text{A}} = \mathbf{44{,}1\ \Omega}$

4. **a)** $\mathbf{R} = \dfrac{l}{\gamma \cdot A} = \dfrac{90000\ \text{m}}{56\ \frac{\text{m}}{\Omega \cdot \text{mm}^2} \cdot 50\ \text{mm}^2} = \mathbf{32{,}1\ \Omega}$

$\mathbf{W} = P \cdot t = I^2 \cdot R \cdot t = (27\ \text{A})^2 \cdot 32{,}14\ \Omega \cdot 24\ \text{h} = 562300\ \text{Wh} = \mathbf{562\ kWh}$

b) $\Delta\mathbf{U} = R \cdot I = 32{,}14\ \Omega \cdot 27\ \text{A} = \mathbf{868\ V}$

5. **a)** $\mathbf{P} = \dfrac{U^2}{R} = \dfrac{(12\ \text{V})^2}{27\ \Omega} = \mathbf{5{,}\bar{3}\ W}$ **b)** $\mathbf{W} = P \cdot t = 5{,}\bar{3}\ \text{W} \cdot \dfrac{50}{60}\ \text{h} = \mathbf{4{,}\bar{4}\ Wh}$

c) $\mathbf{I} = \dfrac{U}{R} = \dfrac{12\ \text{V}}{27\ \Omega} = \mathbf{0{,}44\ A}$ **d)** $\mathbf{W} = \dfrac{U^2 \cdot t}{R} = \dfrac{(12\ \text{V})^2 \cdot (50/60)\ \text{h}}{39\ \Omega} = \mathbf{3{,}08\ Wh}$

Änderung: $\Delta W = 4{,}44\ \text{Wh} - 3{,}08\ \text{Wh} = 1{,}36\ \text{Wh}; \quad 1{,}36\ \text{Wh} \triangleq \dfrac{1{,}36\ \text{Wh} \cdot 100\,\%}{4{,}44\ \text{Wh}} = \mathbf{31\,\%}$