

$$1. \quad a) P = U \cdot I = 6.0 \text{ V} \cdot 6.0 \text{ A} = \underline{\underline{36 \text{ W}}}$$

$$b) I = \frac{P}{U} = \frac{18 \text{ W}}{6.0 \text{ V}} = \underline{\underline{3.0 \text{ A}}}$$

$$c) U = \frac{P}{I} = \frac{36 \text{ W}}{3.0 \text{ A}} = \underline{\underline{12 \text{ V}}}$$

$$d) I = \frac{P}{U} = \frac{100 \text{ W}}{220 \text{ V}} = \underline{\underline{0.45 \text{ A}}}$$

$$2. \quad a) I = \frac{P}{U} = \frac{75 \text{ W}}{220 \text{ V}} = \underline{\underline{0.34 \text{ A}}}$$

$$b) R = \frac{U}{I} = \frac{220 \text{ V}}{0.34 \text{ A}} = \underline{\underline{645 \Omega}}$$

$$3. \quad a) I = \frac{U}{R} \quad P = U \cdot I = U \cdot \frac{U}{R} = \frac{U^2}{R}$$

$$b) U = R \cdot I \quad P = U \cdot I = R \cdot I \cdot I = R \cdot I^2$$

$$4. \quad a) I = \frac{P}{U} = \frac{1'000 \text{ W}}{220 \text{ V}} = \underline{\underline{4.55 \text{ A}}}$$

$$b) R = \frac{U}{I} = \frac{220 \text{ V}}{4.55 \text{ A}} = \underline{\underline{48.4 \Omega}}$$

$$c) I = \frac{U}{R} = \frac{110 \text{ V}}{48.4 \Omega} = \underline{\underline{2.27 \text{ A}}}$$

$$d) P = U \cdot I = 110 \text{ V} \cdot 2.27 \text{ A} = \underline{\underline{250 \text{ W}}} \quad \text{oder: } P = \frac{U^2}{R} = \frac{(110 \text{ V})^2}{48.4 \Omega} = \underline{\underline{250 \text{ W}}}$$

$$e) I = \frac{U}{R} = \frac{440 \text{ V}}{48.4 \Omega} = \underline{\underline{9.09 \text{ A}}}$$

$$f) P = U \cdot I = 440 \text{ V} \cdot 9.09 \text{ A} = \underline{\underline{4'000 \text{ W}}} \quad \text{oder: } P = \frac{U^2}{R} = \frac{(440 \text{ V})^2}{48.4 \Omega} = \underline{\underline{4'000 \text{ W}}}$$

5.

	Spannung	Stromstärke	Widerstand	Arbeit	Zeit	Leistung
a)	$U = R \cdot I$ $= \underline{24.0 \text{ V}}$	2.00 A	12.0 Ω	$W = P \cdot t$ $= \underline{5760 \text{ J}}$	2.00 min	$P = U \cdot I$ $= \underline{48.0 \text{ W}}$
b)	150 V	6.00 A	$R = \frac{U}{I} = \underline{25 \Omega}$	$W = P \cdot t$ $= \underline{72'000 \text{ J}}$	80.0 s	$P = U \cdot I$ $= \underline{900 \text{ W}}$
c)	220 V	$I = \frac{P}{U} = \underline{0.0109 \text{ A}}$	$R = \frac{U}{I} = \underline{20.1 \text{ k}\Omega}$	13.0 kJ	1.50 h	$P = \frac{W}{t} = \underline{2.41 \text{ W}}$
d)	$U = R \cdot I$ $= \underline{6'000 \text{ V}}$	10.0 A	600 Ω	5.00 kJ	$t = \frac{W}{P} = \underline{0.0833 \text{ s}}$	$P = U \cdot I$ $= \underline{60.0 \text{ kW}}$
e)	4.00 V	$I = \frac{P}{U} = \underline{5.00 \text{ A}}$	$R = \frac{U}{I} = \underline{0.800 \Omega}$	120 J	$t = \frac{W}{P} = \underline{6.00 \text{ s}}$	20.0 W
f)	$U = \frac{P}{I} = \underline{4.50 \text{ V}}$	20.0 mA	$R = \frac{U}{I} = \underline{225 \Omega}$	$W = P \cdot t$ $= \underline{7'776 \text{ J}}$	1.00 Tag	90.0 mW

6. a) In J: $W = P \cdot t = 1500 \text{ W} \cdot 7'200 \text{ s} = \underline{10'800'000 \text{ J}} = \underline{10.8 \text{ MJ}}$

In kWh: $W = P \cdot t = 1.5 \text{ kW} \cdot 2.0 \text{ h} = \underline{3.0 \text{ kWh}}$ kostet $3.0 \text{ kWh} \cdot 20 \frac{\text{Rp.}}{\text{kWh}} = \underline{60 \text{ Rp.}}$

b) In J: $W = P \cdot t = 50 \text{ W} \cdot 36'000 \text{ s} = \underline{1'800'000 \text{ J}} = \underline{1.8 \text{ MJ}}$

In kWh: $W = P \cdot t = 0.050 \text{ kW} \cdot 10 \text{ h} = \underline{0.50 \text{ kWh}}$ kostet $0.50 \text{ kWh} \cdot 20 \frac{\text{Rp.}}{\text{kWh}} = \underline{10 \text{ Rp.}}$

7. a) in kWh: $W = P \cdot t = 1'020'000 \text{ W} \cdot 24 \text{ h} = \underline{24'480'000 \text{ kWh}} = \underline{2.45 \cdot 10^7 \text{ kWh}}$

in J: $W = P \cdot t = 1'020 \cdot 10^6 \text{ W} \cdot 24 \cdot 60 \cdot 60 \text{ s} = \underline{8.81 \cdot 10^{13} \text{ J}}$

b) dafür wird bezahlt: $24'480'000 \text{ kWh} \cdot 0.20 \frac{\text{Fr.}}{\text{kWh}} = \underline{4'896'000 \text{ Fr.}}$ (fast 5 Mio. Fr pro Tag!)

8. a) $Q = I \cdot t = 0.20 \text{ A} \cdot 8.0 \cdot 3'600 \text{ s} = \underline{5'760 \text{ C}}$

b) $P = U \cdot I = 4.5 \text{ V} \cdot 0.20 \text{ A} = \underline{0.90 \text{ W}}$

c) In J: $W = P \cdot t = 0.90 \text{ W} \cdot 28'800 \text{ s} = \underline{25'920 \text{ J}}$

In kWh: $W = P \cdot t = 0.00090 \text{ kW} \cdot 8.0 \text{ h} = \underline{0.0072 \text{ kWh}}$

d) 0.0072 kWh kostet 2.00 Fr. $\Rightarrow$ 1 kWh kostet $\frac{2.00 \text{ Fr}}{0.0072 \text{ kWh}} = \underline{278 \text{ Fr.}}$

e) $0.0072 \text{ kWh} \cdot \frac{20 \text{ Rp}}{\text{kWh}} = \underline{0.144 \text{ Rp}}$

9. a) $I = \frac{P}{U} = \frac{100 \text{ W}}{220 \text{ V}} = 0.455 \text{ A}$ $R = \frac{U}{I} = \frac{220 \text{ V}}{0.455 \text{ A}} = \underline{484 \Omega}$

oder: $R = \frac{U^2}{P} = \frac{(220 \text{ V})^2}{100 \text{ W}} = \underline{484 \Omega}$

b) $I = \frac{P}{U} = \frac{40 \text{ W}}{220 \text{ V}} = 0.182 \text{ A}$ $R = \frac{U}{I} = \frac{220 \text{ V}}{0.182 \text{ A}} = \underline{1'210 \Omega}$

oder: $R = \frac{U^2}{P} = \frac{(220 \text{ V})^2}{40 \text{ W}} = \underline{1'210 \Omega}$

10. $\eta = \frac{P_{\text{nutz}}}{P_{\text{auf}}} = \frac{5 \text{ W}}{100 \text{ W}} = 0.05 = \underline{5 \%}$

11. $E_{\text{auf}} = \frac{E_{\text{nutz}}}{\eta} = \frac{460 \text{ kJ}}{0.70} = \underline{657 \text{ kJ}}$

12. a) $W_{\text{Hub}} = m \cdot g \cdot h = 400 \text{ kg} \cdot 9.81 \frac{\text{m}}{\text{s}^2} \cdot 15 \text{ m} = \underline{58'860 \text{ J}} = \underline{59 \text{ kJ}}$

b) $E_{\text{nutz}} = W_{\text{Hub}} = \underline{59 \text{ kJ}}$

c) $E_{\text{auf}} = \frac{E_{\text{nutz}}}{\eta} = \frac{59 \text{ kJ}}{0.75} = \underline{78 \text{ kJ}}$

d) 78 kJ sind $\frac{78'000 \text{ J}}{3'600'000 \frac{\text{J}}{\text{kWh}}} = 0.022 \text{ kWh}$. Das kostet $0.022 \text{ kWh} \cdot \frac{20 \text{ Rp}}{\text{kWh}} = \underline{0.43 \text{ Rp}}$