

	algemeen	elektrisch	mechanisch	thermisch
vermogen	$P$ in watt [W] $P = \frac{W}{t}$ met: $P$ in W $W$ in J $t$ in s	$P = U \cdot I$ met: $P$ in W $U$ in V $I$ in A	$P = F \cdot v$ met: $F$ in N $v$ in m/s nog veel gebruikt: $1 \text{ pk} = 736 \text{ W}$	
arbeid of energie	$W$ in Joule [J] $W = P \cdot t$ met: $W$ in J $P$ in W $t$ in s	$W = U \cdot I \cdot t$ met: $W$ in J $U$ in V $I$ in A $t$ in s bijzondere eenheid: $1 \text{ kWh} = 3,6 \text{ MJ}$	$W = F \cdot s$ met: $W$ in J $F$ in N $s$ in m	$W = m \cdot c \cdot \Delta T$ met: $W$ in J $m$ in kg $c$ in J/kg $^{\circ}\text{C}$ $\Delta T$ in $^{\circ}\text{C}$ bijzondere eenheid: $1 \text{ cal} = 4,2 \text{ J}$

### Toetsopgave 1

$$0.5 : 48 = 0.01046 \text{ A} = 10.46 \text{ mA} \quad I = \frac{Q}{t} = \frac{0.5 \times 3600}{48 \times 3600}$$

1.1-  $Q = I \times t \text{ (in s)} = 1 \times 300 = 300 \text{ C}$

1.2-  $t = \frac{Q}{I} = \frac{60}{3} = 20 \text{ uur}$

1.3-  $I = \frac{Q}{t} = \frac{300}{900} = \frac{1}{3} \text{ A}$

### Toetsopgave 2

4 volt

2.1- 9 cellen van 1,2 volt in serie =  $9 \times 1,2 = 10,8 \text{ V}$

2.2- 6 Volt

2.3- a) serie schakeling

b) 12 V

### Toetsopgave 3

$$I = \frac{P}{U} = \frac{100}{230} = 0,4348 \text{ A} \quad Q = I \times t \text{ (in s)} \quad Q = 0,4348 \times 1800 = 782,6 \text{ C}$$

3.1-  $I = \frac{P}{U} = \frac{60}{230} = 0,2608 \text{ A} = 260,8 \text{ mA}$

3.2-  $P = U \times I = 6 \times 0,2 = 1,2 \text{ W}$

3.3- a)  $P = U \times I = 12 \times 5 = 60 \text{ W}$

b)  $Q = I \times t = 5 \times 300 = 1500 \text{ C}$

Toetsopgave 4

- a)  $1\text{kWh} = 1000\text{W} : 11\text{W} = 90,9$  uur
- b)  $1\text{kWh} = 3,6$  MJ
- c) Van 18:00 tot 0800 uur is  $14\text{uur} \times 7$  dagen =  $98$  uur  $\times 0.011 \times 0.14$  cent = 15 cent
- d) Van 18:00 tot 0800 uur is  $14\text{uur} \times 7$  dagen =  $98$  uur  $\times 0.060 \times 0.14$  cent = 82 cent

4.1-  $W = P \times t = 180\text{W} \times 3$  uur =  $540\text{Wh} = 0,54$  kWh  $\times 3600 = 1940\text{KJ}$

4.2-  $W = P \times t = 1000\text{W} \times 0.25$  uur =  $250\text{Wh} = 0,25$  kWh  $\times 3600 = 900\text{KJ}$

4.3 a)  $800\text{W} \times 3600 \times 3 = 8,64$  Mj -  $240\text{W} \times 3600 \times 5 = 4,32$ Mj -  $400\text{W} \times 3600 \times 0,5 = 0,72\text{MJ}$  -  $40\text{W} \times 3600 \times 1 = 0,144\text{MJ}$  -  $200\text{W} \times 3600 \times 2 = 1,44\text{MJ}$

**Bij elkaar is dat 15,264 MJ**

b)  $15,264 : 3,6 = 4,24$  kWh

c)  $4,24 \times 0,13 = 0,55$  euro

Toetsopgave 5

- a)  $1\mu\text{V} = 0,000001$  V  $1 \times 10^{-6}\text{V}$
- b)  $300\text{mV} = 0,3$  V =  $0,0003$   $\mu\text{V}$   $3 \times 10^{-5}$   $\mu\text{V}$
- c)  $20\text{kV} = 20000\text{V} = 0,02\text{MV}$
- d)  $500\text{nA} = 50 \times 10^{-7}\text{A} = 5 \times 10^{-4}\text{mA}$

**TABEL 1.4 Voorvoegsels**

voorvoegsel	symbool	factor
exa	E	$10^{18}$
peta	P	$10^{15}$
tera	T	$10^{12}$
giga	G	$10^9$
mega	M	$10^6$
kilo	k	$10^3$
hecto	h	$10^2$
deca	da	$10^1$
deci	d	$10^{-1}$
centi	c	$10^{-2}$
milli	m	$10^{-3}$
micro	$\mu$	$10^{-6}$
nano	n	$10^{-9}$
pico	p	$10^{-12}$
femto	f	$10^{-15}$
atto	a	$10^{-18}$

## Toetsopgave 6

$$P_{af} = 600W \quad \eta = 85\% \quad P_{toe} = \frac{P_{af}}{\eta} = \frac{600}{0,85} = 704W \quad I = \frac{P}{U} = \frac{704}{230} = 3,06A$$

$$6.1- P_{toe} = U \times I = 230 \times 8 = 1840W \quad \eta = \frac{P_{af}}{P_{toe}} \times 100 \text{ in } \%$$

$$P_{af} = 0,9 \times 1840 = 1656W$$

$$6.2- \eta = \frac{P_{af}}{P_{toe}} \times 100 \text{ in } \% \quad \eta = \frac{215}{250} \times 100 = 86\%$$

$$6.3- P_{toe} = U \times I = 230 \times 5 = 1,15KW \quad \eta = \frac{1}{1,15} \times 100 = 87\%$$

$$6.4- P_{af} = 10KW \quad \eta = 95\% \quad 95\% \text{ van } 10KW = 9,5KW \text{ wat de generator levert.}$$

$$I = \frac{P}{U} = \frac{9500}{400} = 23,75 A$$

