Color Codes and Marking

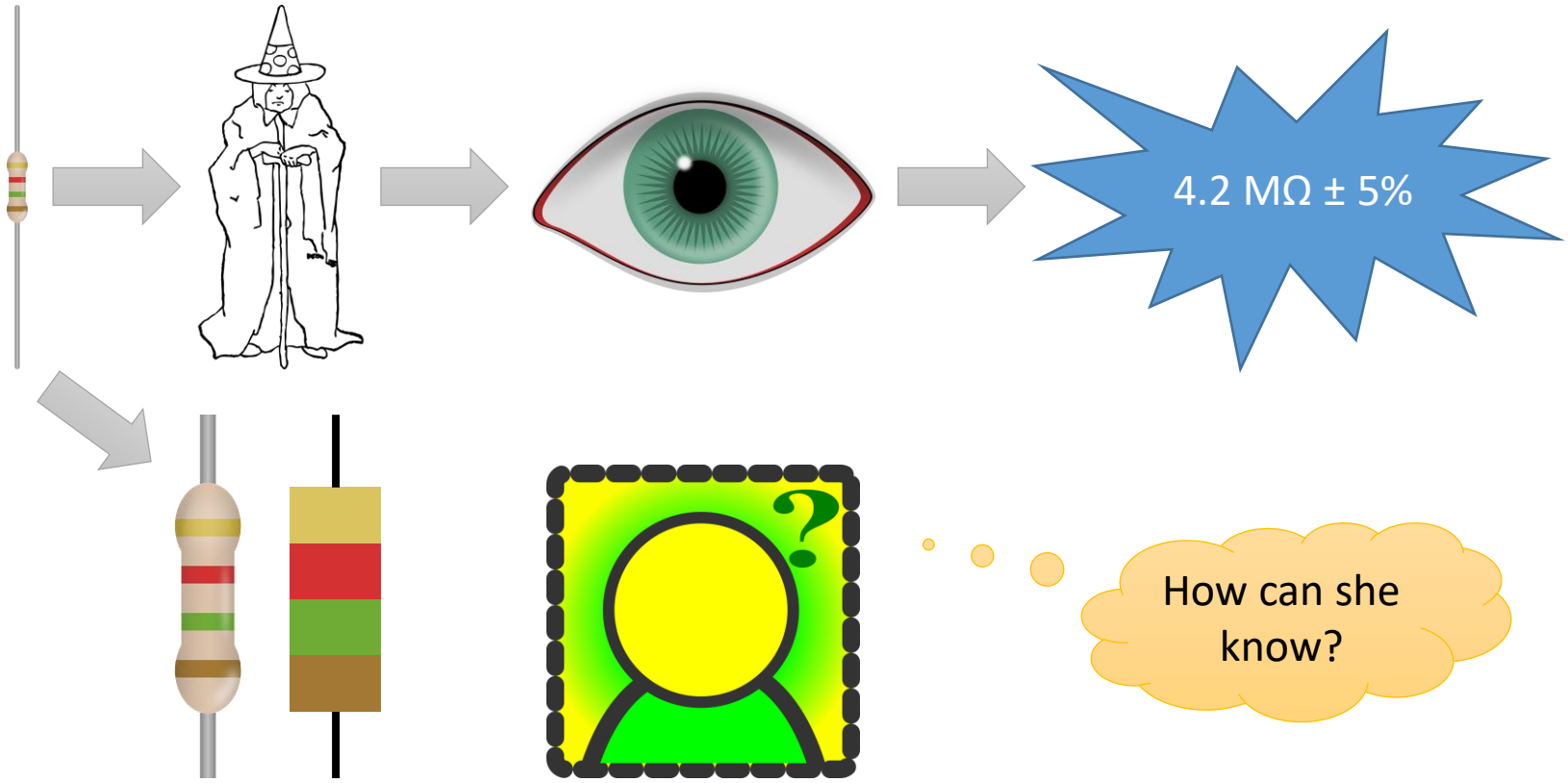
Applied Mechatronics

First Grade Level

Wolfgang Neff

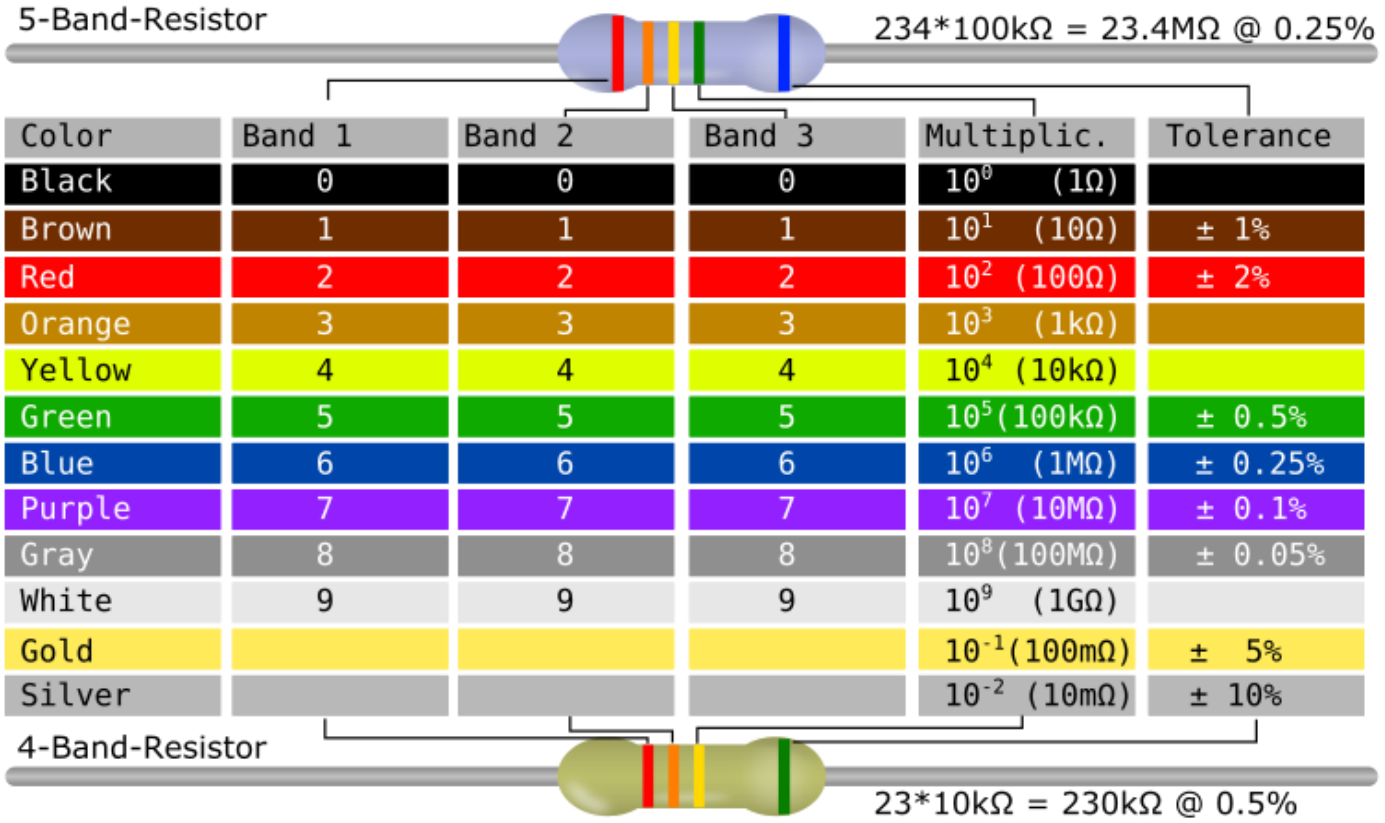
Resistor Color Codes (1)

- The oracle of resistors



Resistor Color Codes (2)

- How to read resistors



Color	Band 1	Band 2	Band 3	Multiplic.	Tolerance
Black	0	0	0	10^0 (1Ω)	
Brown	1	1	1	10^1 (10Ω)	± 1%
Red	2	2	2	10^2 (100Ω)	± 2%
Orange	3	3	3	10^3 (1kΩ)	
Yellow	4	4	4	10^4 (10kΩ)	
Green	5	5	5	10^5(100kΩ)	± 0.5%
Blue	6	6	6	10^6 (1MΩ)	± 0.25%
Purple	7	7	7	10^7 (10MΩ)	± 0.1%
Gray	8	8	8	10^8(100MΩ)	± 0.05%
White	9	9	9	10^9 (1GΩ)	
Gold				10^{-1}(100mΩ)	± 5%
Silver				10^{-2} (10mΩ)	± 10%

Resistor Color Codes (3)

- Mnemonic
  - **0** light makes everything **black**

  - My **1** cent coin is **brown**

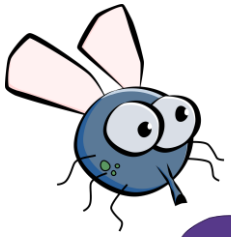
  - My girlfriend has **2 red** lips

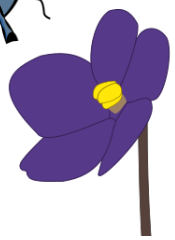
  - **3** has learned nothing and must sell **orange**s

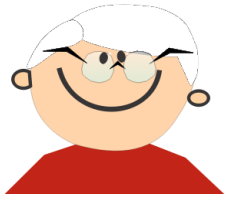
  - The **yellow** cab has **4** wheels

Resistor Color Codes (4)

- Mnemonic (continued)
  - **5 green** banknotes make me happy
    - **5**0 Stutz are **green**
    - **5** marks were **green**
  - The **blue** fly has **6** legs
  - **7 violet**s for Snow White
  - When I am **8**0 I will have **grey** hair
  - When I am **9**0 I will have **white** hair

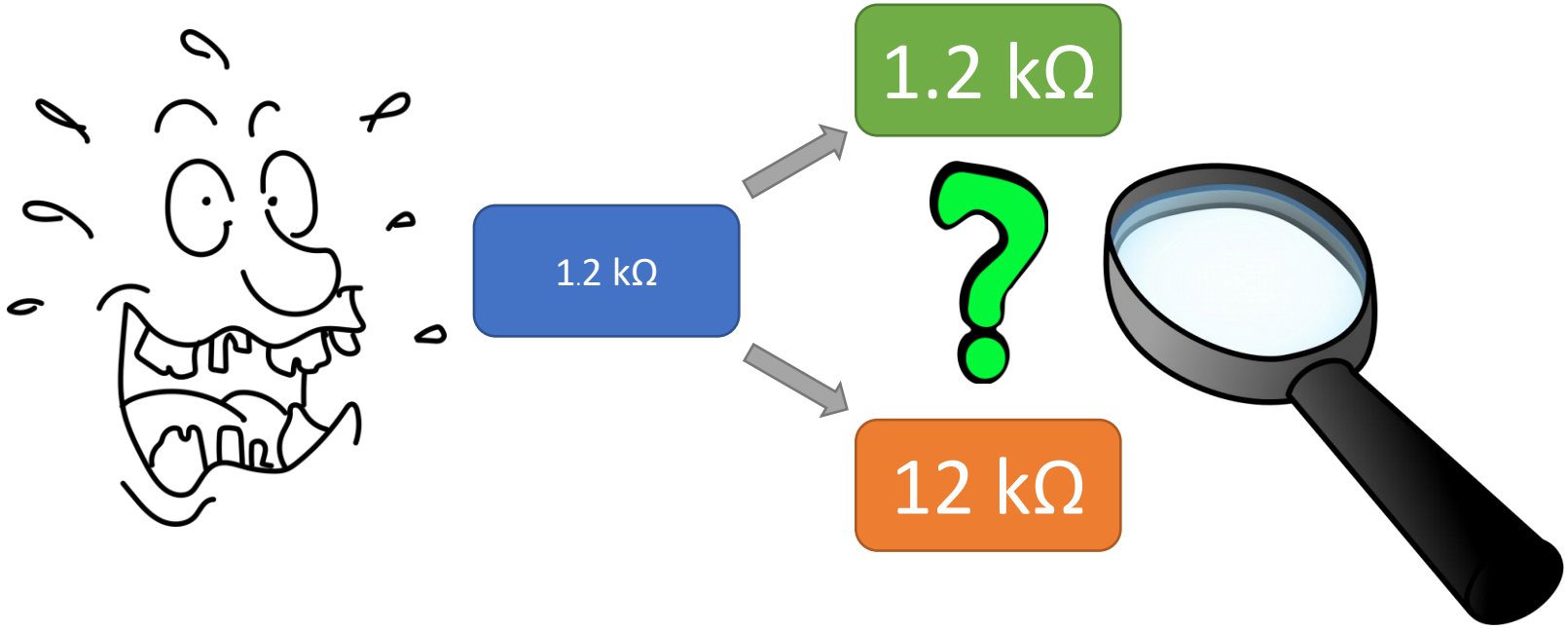






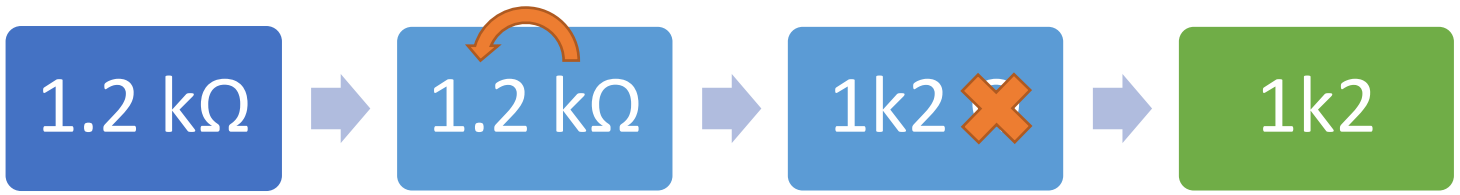
Marking of Components (1)

- Ever missed a decimal point?



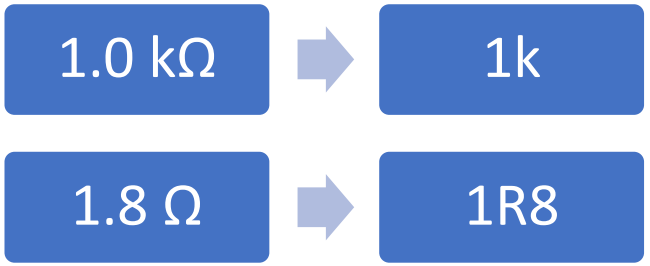
Marking of Components (2)

- Let's make it more evident



The decimal point gets replaced by the unit prefix

The unit itself gets dropped

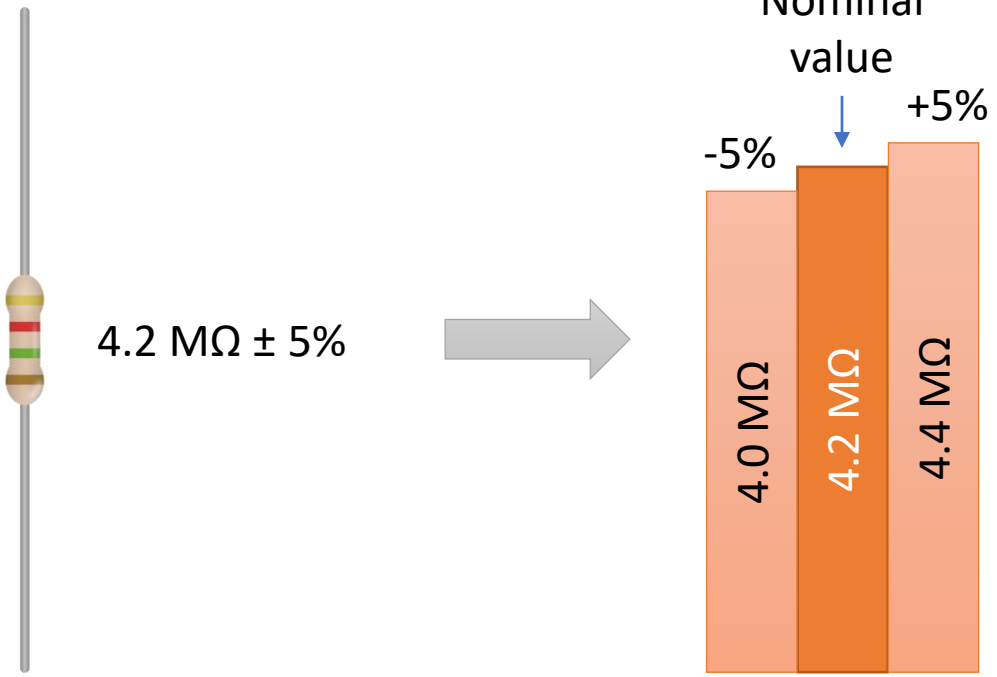


There are no trailing zeros

The symbol is used if there is no prefix

Preferred Values (1)

- Resistors have tolerances

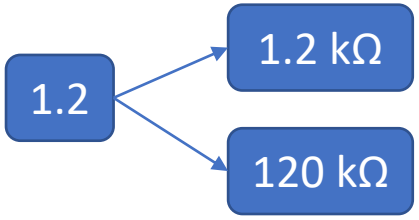


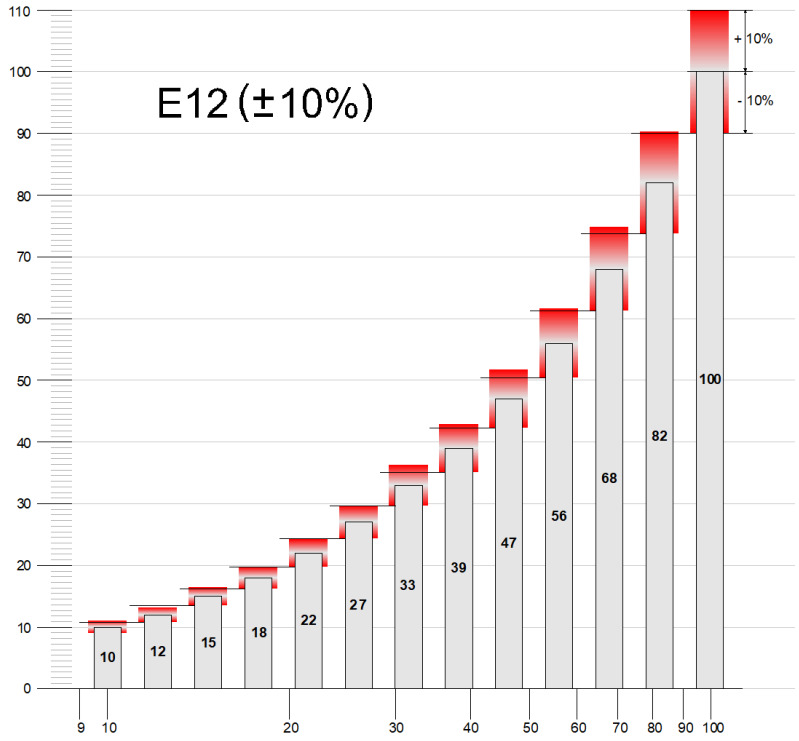
Preferred Values (2)

- Thanks to tolerance only certain values are needed

E12 Series		
1.0	1.2	1.5
1.8	2.2	2.7
3.3	3.9	4.7
5.6	6.8	8.2

These values are decades





Source: Wikimedia Commons – E12 series 10% tolerance