

The resistance challenge

Class: _____

Name: _____

In electronic circuits, the resistance of a resistor is identified by a colour code. This code is normally a set of four coloured bands.

The first two bands give the numbers in the resistance. The third gives the multiplier – the factor by which the figures are multiplied. The last band indicates the tolerance; that is, it shows the range in which the true value of the resistance lies.

Table 1 shows the codes for the first three bands. Table 2 shows the meaning of the fourth band.

Table 1 The colour coding for the first three bands

Colour	First band – 1st digit in resistance	Second band – 2nd digit in resistance	Third band – multiplier
Black	0	0	1
Brown	1	1	10
Red	2	2	100
Orange	3	3	1000
Yellow	4	4	10 000
Green	5	5	100 000
Blue	6	6	1 000 000
Violet	7	7	10 000 000
Grey	8	8	100 000 000
White	9	9	1 000 000 000
Gold	Not used.	Not used.	0.1
Silver	Not used.	Not used.	0.01

Table 2 The colour coding for the fourth band

Colour	Fourth band – tolerance
Gold	± 5%
Silver	± 10%
No band	± 20%

Note: 3 k Ω means 3000 Ω .

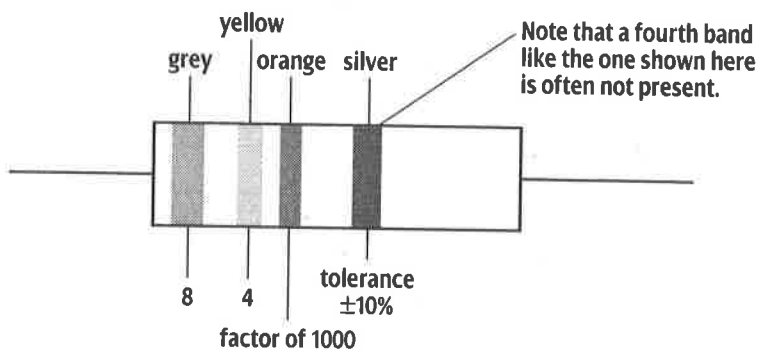
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Example

The following diagram shows an example of how a set of bands is interpreted.



↓

The resistance is $(84 \times 1000) \pm 10\%$
 $= 84\,000 \pm (10\% \text{ of } 84\,000)$
 $= 84\,000 \pm 8\,400$
 (This means the resistance is between 75 600 and 92 400.)

Questions

- Complete Table 3 by determining the unknown resistance of each mystery resistor. (In these cases we will not be concerned about the tolerance.)

Table 3 Some mystery resistors

Case	Colour of 1st band	Colour of 2nd band	Colour of 3rd band	Resistance (Ω)
A	green	red	orange	
B	violet	black	brown	
C	black	violet	green	
D	white	green	grey	
E	blue	blue	white	
F	brown	black	gold	

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2 Given the mystery resistance in Table 4, determine the colours of the first three bands on the resistor.

Table 4 The case of the missing bands

Case	Colour of 1st band	Colour of 2nd band	Colour of 3rd band	Resistance
A				74 Ω
B				2800 Ω
C				3.5 Ω
D				600 000 Ω
E				52 k Ω
F				0.84 Ω

3 Between what values will the true resistance lie if a resistor only has three bands, for which the colours are, in order, violet, grey, red?

4 Would the following set of colours be found on a resistor? Justify your answer.
black, black, orange, silver

5 A student picked up a resistor and read out the colour coding as follows:
silver, silver, yellow, red.

What possible explanation could there be for this sequence? What would the resistance of the resistor be?
