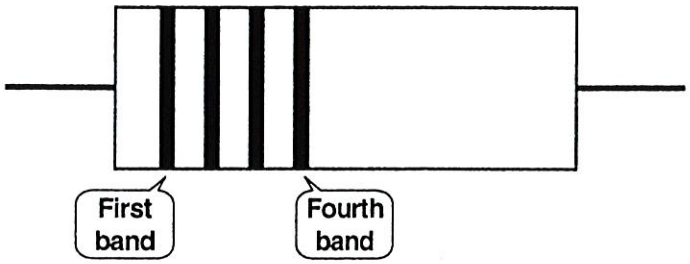
SECOND-YEAR BIOPHYSICS LABORATORY

Resistor Colour Codes

The colour code currently used on resistors consists of three or four bands around one end of the resistor. The two bands nearest the end denote a number between 10 and 99, and the third denotes the power of 10 by which this two digit number must be multiplied. The fourth band indicates the tolerance to which the resistor has been manufactured.



R value code:

0	black
1	brown
2	red
3	orange
4	yellow
5	green
6	blue
7	violet
8	grey
9	white

Tolerance code:

1%	brown
2%	red
5%	gold
10%	silver
20%	(no fourth band)

A gold or silver band in the third position indicates a multiplier of 10^{-1} or 10^{-2} respectively.

Examples:			
	Red, violet, orange, gold	27 kΩ	±5%
	Brown, black, black	10 Ω	±20%
	Green, blue, gold, silver	5.6 Ω	±10%

Resistors of 10% tolerance are manufactured in a series of standard values only, in steps of about 20%:

10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82, 100

These numbers are then multiplied by the appropriate power of 10. Resistors of 5% tolerance are made in a similar series having twice as many steps, but the additional values can be difficult to obtain. If you decide you want a 50 kΩ resistor you will have to accept either a 47 kΩ or 56 kΩ. Resistors are not normally made with values greater than 22 MΩ, and are difficult to obtain in values of less than 10 Ω.

Capacitor Codes

These take the form of either colour codes similar to those on resistors, or of number codes.

Colour codes:

A colour code used on a capacitor consists of four or five bands, typically starting on the edge away from the capacitor legs and being read down towards those legs. The first two bands denote a number between 10 and 99, and the third denotes the power of 10 by which this two digit number must be multiplied. This is the same as the resistor convention. The resulting number is the capacitance in **pF** ($=10^{-12}$ F) units. The fourth and fifth bands indicate voltage tolerances and temperature-related information which will usually not concern us.

Recall that the colour code convention is:

0	black
1	brown
2	red
3	orange
4	yellow
5	green
6	blue
7	violet
8	grey
9	white

Example: Brown, black, green ≡ 1,000,000 pF = 1 μF

Manufacturers do not leave gaps between the colour bands, which can cause confusion when successive digits are the same, requiring a double-width band of the same colour. Usually the code can be interpreted correctly with a little common sense and a knowledge of the standard numerical values normally available, i.e.

10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82, 100

Number codes:

Numbers are three digits, the first two of which, as in the colour coding, denote a number between 10 and 99. The third denotes the power of 10 by which this two digit number must be multiplied. The resulting number is the capacitance in **pF** ($=10^{-12}$ F) units.

Examples:

101	≡ 100 pF	
102	≡ 1000 pF	= 1 nF
103	≡ 10,000 pF	= 0.01 μF
104	≡ 100,000 pF	= 0.1 μF
105	≡ 1,000,000 pF	= 1 μF