

# Colour-coding

**You need** ★ a calculator

## TECHNOLOGY

Resistors are used to slow current to the amount required by delicate components. This “slowing” effect (resistance) is measured in ohms. Resistors can be found in almost every household appliance.

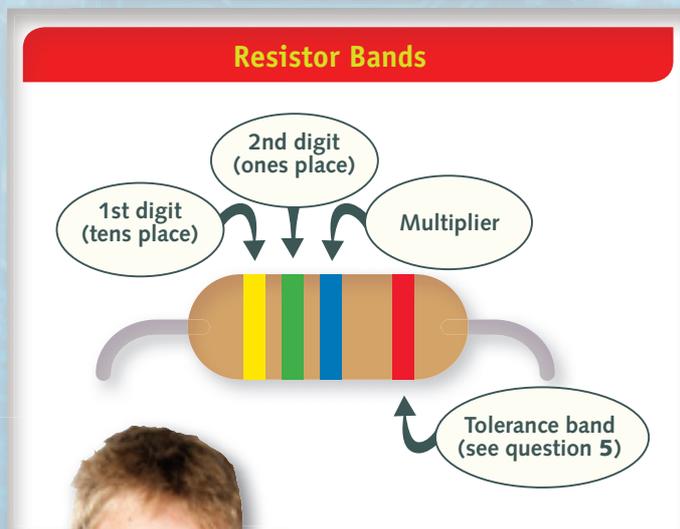
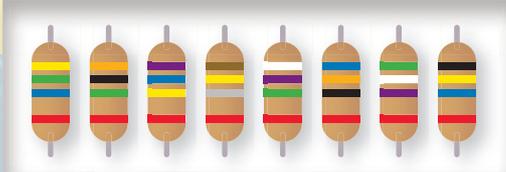
## Activity

Andrew knows that the small striped components in appliances such as clock alarms and radios are resistors.

The coloured bands around the resistors are a code.



The first three colour bands on resistors indicate the amount of the resistance, expressed in ohms. The first and second bands represent a 2-digit number that is multiplied by the value of the third band.



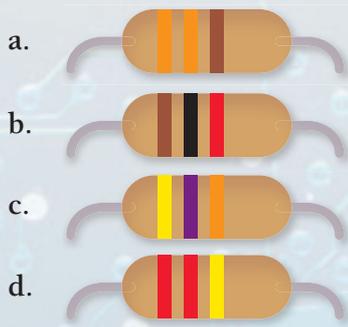
Colour	Code	Multiplier value
Black	0	1
Brown	1	10
Red	2	100
Orange	3	1 000
Yellow	4	10 000
Green	5	100 000
Blue	6	1 000 000
Purple	7	10 000 000
Grey	8	
White	9	

This one is  $45 \times 1\,000\,000 = 45\,000\,000$  ohms.

1. a. What connection can you find between each colour's code and its multiplier value?
- b. What are the multiplier values for grey and white?



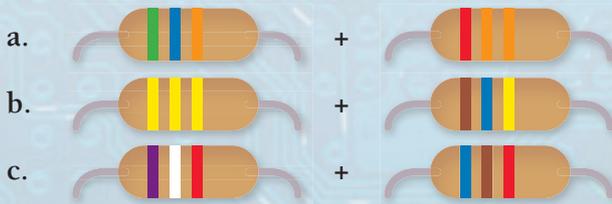
2. What is the resistance in ohms of these resistors?



3. What combination of bands would you use for:

- a. 420 ohms?
- b. 1 500 ohms?
- c. 78 000 ohms?

4. What single resistor is equivalent to each pair of resistors?



Brown grey brown + orange purple brown ...  
That's  $180 + 370 = 550$ .  
So that's green green brown.



5. Resistors are never the exact value that the codes show. The fourth band on the resistor (the tolerance band) defines the limits of accuracy.

Red	Gold	Silver	No band
2%	5%	10%	20%

For example, if the tolerance band is silver, the actual resistance could be 10 percent more or 10 percent less than the colour coding suggests. So the resistance of an 800 ohm resistor would be between 720 and 880 ohms.

- Find the resistance range for:
- a. a 32 000 ohm resistor with a silver band
  - b. a 2 400 ohm resistor with a gold band
  - c. a 600 ohm resistor with no tolerance band
  - d. a 18 000 ohm resistor with a red band.