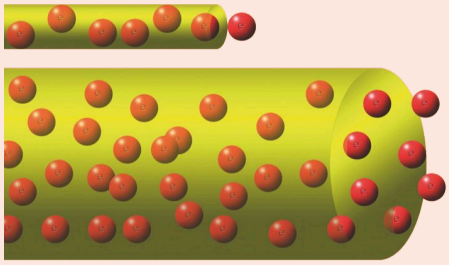
NAME _____ CLASS _____

WHAT AFFECTS RESISTANCE?

Resistance is how much a component or wire opposes the flow of current. It is measured in **ohms (Ω)**.

When current is forced through a resistance, some electrical energy is converted into **heat**. This is how a kettle element and a toaster work.



1 Predict how each change affects the resistance of a wire. Write **more** or **less**. 4 marks

CHANGE TO THE WIRE	RESISTANCE
Make the wire longer	
Make the wire thicker	
Make the wire thinner	
Make the wire shorter	

2 Use the picture above to explain why a **thin** wire has more resistance than a **thick** wire of the same material. 2 marks

THE MULTIMETER



A **multimeter** can measure voltage, current and resistance. You turn the dial to choose what to measure.

3 What symbol is used on the dial for each quantity? 3 marks

QUANTITY	UNIT	SYMBOL ON DIAL
Voltage	Volts	
Current	Amps	
Resistance	Ohms	

4 A resistor is measured with the multimeter. The display shows **0.22 kΩ**. What is this in ohms? 1 mark

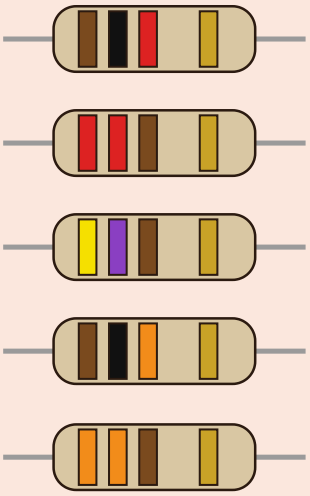
THE RESISTOR COLOUR CODE

Resistors are too small to print numbers on, so they use coloured **bands**. On a 4-band resistor, the first two bands are **digits**, the third band is the **multiplier** (how many zeros to add) and the fourth band (gold) shows the **tolerance**.

Example: **red, red, brown, gold**. Red = 2, red = 2, brown = add 1 zero. So the value is **220 Ω** – the resistor in your torch.

COLOUR	DIGIT	ZEROS
Black	0	0
Brown	1	1
Red	2	2
Orange	3	3
Yellow	4	4
Green	5	5
Blue	6	6
Violet	7	7
Grey	8	8
White	9	9

5 Work out the value of each resistor. 5 marks



brown, black, red

red, red, brown

yellow, violet, brown

brown, black, orange

orange, orange, brown

6 Write the colours of the first three bands for each resistor. 4 marks

VALUE	BAND 1	BAND 2	BAND 3 (MULTIPLIER)
100 Ω			
560 Ω			
4.7 kΩ			
22 kΩ			

7 Why does the LED in your torch need a resistor in the circuit? 2 marks

8 **CHALLENGE** Voltage, current and resistance are linked: **V = I × R**. A 9 V battery is connected across a 450 Ω resistor. Calculate the current. Rearrange: I = V ÷ R. 3 marks