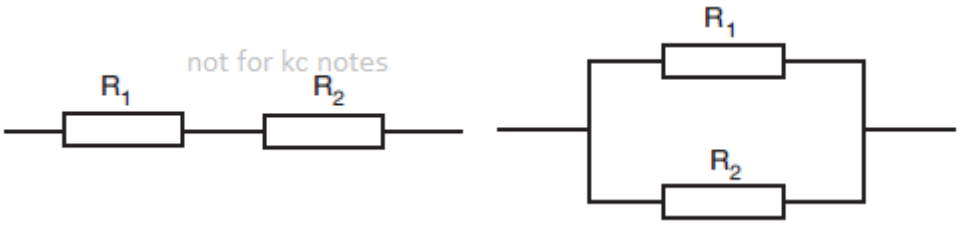
8.3.3 SERIES AND PARALLEL CIRCUITS

Series and parallel circuits serve different purposes in households

3.1 Identify the **difference** between **series and parallel circuits**

- **Series** circuits – components (resistors) arranged **in a chain with one path** for current to travel
- **Parallel** circuits – components arranged **with branches** that meet together, with **many paths**



3.2 Compare **parallel and series circuits** in terms of **voltage** across components and **current** through them

	Series	**Parallel**
Voltage (V)	**Sum** of voltage drops **equal** to voltage rise across voltage supply • $V_{supply} = V_1 + V_2 + V_3 + \ldots$	Voltage is **the same** in parallel circuits • $V_1 = V_2 = V_3 = V_{supply}$
Current (I)	The **same** current flows through a series ciruit • $I_1 = I_2 = I_3 = I$	Current **divides** between paths, and **sums** to initial current • $I = I_1 + I_2 + I_3$

3.3 Identify uses of **ammeters and voltmeters**

- **Ammeter** measures **current**, connected in series
- **Voltmeter** (not voltameter) measures **voltage**, connected in parallel

3.4 Explain why **ammeters and voltmeters** are **connected differently** in a circuit

- Connected in **series/parallel** to **prevent significant changes** in current and voltage in the circuit
- Voltmeter is attached in **parallel** and have **high resistance**
  - When voltage is constant, V=IR – a **high resistance will reduce current** passing through
  - Current divides between paths – low current **reduces significant changes**
- Ammeters are attached in **series** and have **low resistance**
  - When current is constant, I = V/R, a **low resistance will reduce voltage** drop
  - Voltage adds up to supply voltage – low voltage **reduces significant changes**

3.5 Explain why there are **different circuits** for **lighting, heating and other appliances** in a house

- Different circuits used for **different maximum currents**
- **Different currents** require **thicker wiring** to **reduce resistance and heat**

	Diameter (mm)	Maximum Current (A)
Lighting	2.5	8
Power Points (e.g. heating)	1.0	20
Stove/Oven	6.0	32

3.P1 Plan, choose equipment or resources for and perform first-hand investigations to gather data and use available evidence to **compare measurements of current and voltage in series and parallel circuits** in **computer simulations** or **hands-on equipment**

- See **Experiment 3.P1** in 8.3 Experiment Booklet

3.P2 Plan, choose equipment or resources and perform a first-hand investigation to **construct simple model household circuits** using **electrical components**

- See **Experiment 3.P2** in 8.3 Experiment Booklet