Electricity In The Home

AC and DC

1. With **alternating current** (AC) the current constantly changes direction.
2. It is produced by an alternating voltage where the positive and negative ends keep alternating (changing).
3. The UK **mains** supply is **AC** at 230V and It has a frequency of **50Hz**.
4. With **direct current** (DC) the current always flows in the **same direction**.
5. **Batteries** produce a DC voltage.

Electrical Wiring

6. Most electrical appliances are connected to the mains with a three core cable (3 copper wires coated in insulating plastic):
   - 7. **Live** (brown) – Provides the alternating pd at **230V.**
   - 8. **Neutral** (blue) – Completes the circuit carrying the current out of the appliance at **0V**.
   - 9. **Earth** (green and yellow) – A safety feature. prevents the appliance becoming live if there is a fault. It does not normally carry a current and has **0V**.

Live Wire

10. If you touch the live wire a large pd is produced across your body and the current flows through you. This **electric shock** can injure or kill you.

11. A connection between the live and earth wires creates a **low resistance** path to earth and a **large current** will flow which could cause a **fire**.

Power

12. Energy in an electrical circuit is transferred by a moving charge.
13. The charge has to work against resistance, so work is done.

Work done is the same as energy transferred and depends upon power.

14 Energy transferred (J) → $E = Pt$ ← Time (s); Power (W)

15. Appliances have a power rating, the maximum operating power.
16. An appliance with a lower power rating will be cheaper to run as less energy is transferred per second.
17. A higher power rating might be less efficient than another appliance because the same or less energy is transferred to useful stores.

Charge

18. Energy is **supplied** to the charge at a **power source**, 'raising' through a potential.
19. Energy is **given up** by the charge at **components** as it falls through a **potential drop**.
20. $E = QV$ ← Potential difference (V); Charge flow (Coulombs, C)

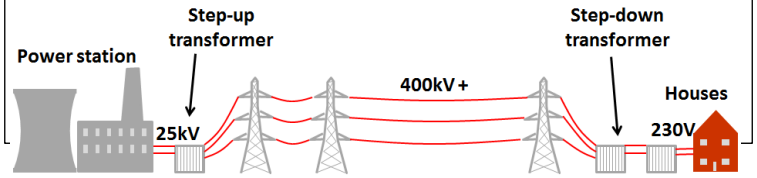
Meeting Demand

25. Power stations have to meet the **demand** for electricity, which **varies** during the day.

26. They usually run **below maximum capacity** so more electricity can be generated to meet demand, such as during big sporting events.

National Grid

21. The National Grid is network of cables that connects power stations to consumers.
22. The huge amount of power needed is achieved with a **high pd** but a **low current**.
23. It is **cheaper** to increase the pd and keep the current low for a given power output.
24. A high current would cause the wires to heat up, wasting a lot of energy.



Power Calculations

27. Power (measured in W) depends upon the potential difference and current:

$P = VI$

28. If the potential difference is not known: $P = I^2R$