



Understanding Electrical Power and Device Energy Use

KS4 PHYSICS

Ages 11-14 ⌚ 3 min read

What is Electrical Power?

Electrical power is simply a measurement of how much energy a device uses every second. It tells us how fast a device is consuming electricity. Think of it like how quickly you eat through a bag of sweets — some devices gulp electricity rapidly, while others sip it slowly.

We measure electrical power in units called **watts** (W). A device using **1 watt** of power is using energy at a certain rate. Bigger numbers mean faster energy use. Most devices show their power rating on a label — have a look at your phone charger, kettle, or laptop!

Think of it like water flowing through a pipe. **Power** is how fast the water flows out right now. Using more water faster uses more power, just like a more powerful device uses more electricity faster.

How Do We Calculate Power?

There's a simple formula physicists use: **Power = Voltage × Current**. This means electrical power depends on two things: the **voltage** (the push of electricity) and the **current** (how much electricity flows). If either one is bigger, the power goes up.

In the UK, electricity comes to our homes at **230 volts**. A device that draws more **current** (measured in amps) will use more power. This is why a kettle uses more power than a light bulb — it draws much more current.

Why Does This Matter?

Understanding power is important for two reasons. First, it tells us about **energy bills**. Devices using more watts cost more to run over time. A **100-watt** light bulb costs twice as much to run as a **50-watt** bulb left on equally long.

Second, it matters for **safety**. Plugging too many high-power devices into one socket can cause problems. That's why homes have electrical circuits with limits — they stop

too much power flowing through one wire, which could cause fires.

Think of it like a school corridor. If too many students rush through one door at once, chaos happens! Electrical circuits work the same way — they have limits on how much current can flow safely.

Common Power Ratings

Here are typical power uses: an LED light bulb uses about **10 watts**, a microwave uses around **1000 watts**, and a laptop charger uses roughly **50-65 watts**. An electric kettle might use **2000-3000 watts** — that's why it heats water so quickly!

Next time you use a device, look for its power rating. You'll see it's marked in watts. The bigger the number, the more energy it's using every second, and the more it costs to run.