What is radiation?

KS2 KS3 Ages 7-14 ⏰ 3 min read

The word "radiation" tends to make people think of nuclear disasters and hazmat suits. But radiation is actually everywhere, all the time — and most of it is completely harmless. The sun's warmth on your face is radiation. The Wi-Fi in your house is radiation. Your microwave oven works with radiation. It's a much bigger category than most people realise.

What radiation actually means

Radiation simply means energy travelling through space, either as waves or as particles. The key question isn't "is this radiation?" — it's "how much energy does this radiation carry?"

The full range of wave-based radiation is called the **electromagnetic spectrum**. At the low-energy end, you have radio waves and microwaves. A bit higher: infrared (heat), then visible light (what your eyes detect), then ultraviolet. At the high-energy end: X-rays and gamma rays.

Imagine the electromagnetic spectrum like a volume dial. Radio waves are the dial turned almost to zero — barely a whisper. Gamma rays are the dial cranked to maximum — so loud it can shake the room apart. Visible light sits somewhere in the middle, and your eyes evolved specifically to detect that particular band.

When does radiation become dangerous?

High-energy radiation — particularly ultraviolet, X-rays, and gamma rays — is called **ionising radiation**. It carries enough energy to knock electrons out of atoms inside your cells. This can damage your DNA. Enough damage can cause cells to malfunction and potentially become cancerous. This is why sunburn increases skin cancer risk, and why radiographers leave the room when you have an X-ray.

Low-energy radiation (radio waves, visible light, microwaves) is **non-ionising**. It doesn't carry nearly enough energy to break chemical bonds or damage DNA. Your phone emits non-ionising radiation. So does your LED light bulb.

Nuclear radiation

Radioactive materials emit a different type: **particle radiation**. Unstable atomic nuclei shoot out particles — alpha particles, beta particles, or gamma rays — as they break down into more stable forms. This is the kind associated with nuclear power plants and weapons, and it genuinely is dangerous in large doses because those particles can damage tissue at the cellular level.

The dose makes the poison

Even dangerous radiation is about quantity. A single chest X-ray gives you roughly the same radiation dose as a couple of hours on a long-haul flight (where you're higher up and closer to cosmic rays). The body handles small amounts easily. It's large or prolonged doses that cause real harm. Context always matters.

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