Seeing inside the body

Waves, radiation and matter

know how radiant heaters, immersion heaters, microwave ovens and storage heaters work as common electrical heating devices

- know that diffraction is the spreading out of waves as they pass through an aperture

Sound and ultrasound

know that the frequency of ultrasound is higher than that of audible sound

understand the use of ultrasound in foetal scanning

know that ultrasound is non-ionising radiation

Electromagnetic radiation

know that the electromagnetic spectrum includes: gamma-rays, X-rays, ultraviolet radiation, visible light, infra-red radiation and radio waves

know that all electromagnetic radiation travels in a vacuum at the same speed as light

know that ultra-violet radiation is present in sunlight, causes sun-burn and can cause skin-cancer

What are atoms made of?

be able to describe the structure of the atom as a nucleus with external electrons

know the relative mass and charge of protons, neutrons and electrons

know the meaning of atomic (proton) number and mass number for an element

be able to calculate the numbers of protons and neutrons in a nucleus given the atomic number (proton number) and mass number

know that isotopes differ only in the number of neutrons in the nucleus

Seeing inside the body

Radiation is all around us

know that radioactivity involves the breakdown of the nuclei of unstable atoms

- know the structure and properties of alpha and beta particles and gamma radiation

know that some nuclei break down by emitting alpha particles
know that other breakdowns release beta particles
know that gamma rays are very penetrating and thick concrete or heavy metal shielding is needed to stop them
know that gamma rays can damage tissues
understand what is meant by background radiation and that we are constantly exposed to it

- know the changes in mass number and atomic number caused by alpha or beat decay
- be able to represent radioactive decays using nuclear equations

X rays in medicine

know that the extent to which X-rays are absorbed by materials depends on the density of the material, and how this is used in hospitals

know that both gamma-rays and X-rays affect photographic film

understand how gamma-rays are used for sterilising instruments in hospitals

How long will it last?

know that ionising radiation may increase the probability of genetic mutation
know that mutations are a source of genetic variation
understand that ionising radiation can cause mutations
understand that ionising radiation can cause mutations
understand the use of gamma-radiation in cancer treatment

- know some uses of radioisotopes (smoke detection, weld checking, leak tracing, thickness measurement and food sterilisation)

understand what is meant by background radiation and that we are constantly exposed to it
know that many rocks contain radioactive elements and their products which can be used for dating the rocks
understand the meaning of half-life and be able to interpret simple activity decay data