

Unit R071 – How scientific ideas have an impact on our lives

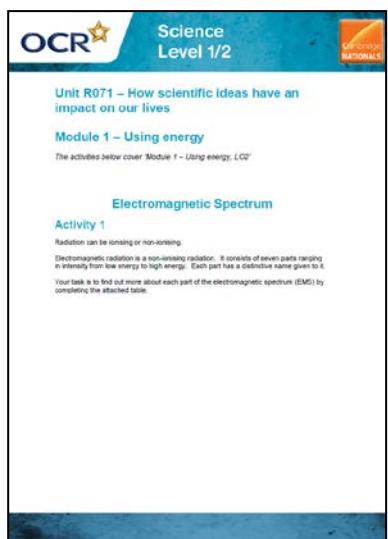
Module 1 – Using energy

Electromagnetic Spectrum

Instructions and answers for teachers

These instructions should accompany the learner tasks - OCR resource ‘Electromagnetic Spectrum’, which supports Cambridge Nationals in Science Level 1/2 Unit R071 – How scientific ideas have an impact on our lives.

The learner tasks cover ‘Module 1 – Using energy, LO2’



OCR Science Level 1/2

Unit R071 – How scientific ideas have an impact on our lives

Module 1 – Using energy

The activities below cover ‘Module 1 – Using energy, LO2’

Electromagnetic Spectrum

Activity 1

Radiation can be ionising or non-ionising.

Electromagnetic radiation is a non-ionising radiation. It consists of seven parts ranging in intensity from low energy to high energy. Each part has a distinctive name given to it.

Your task is to find out more about each part of the electromagnetic spectrum (EMS) by completing the attached table.

Associated Files:
Electromagnetic Spectrum

Expected Duration:
Activity 1 approx 1 hour

Activity 1

Learners will probably need some background information (e.g. http://www.teachersdomain.org/asset/phy03_vid_nasaspectrum/) to be able to identify the sources of different types of radiation but should be encouraged to think creatively about how radiation is used in every day life and the types of jobs that use the different types of radiation. A range of examples are included but this is by no means exhaustive and is intended to help prompt conversation.

	Radio	Microwave	Infrared	Visible	Ultraviolet	X-Ray	Gamma Ray
Write the words 'high' and 'low' at the correct ends of the arrow:							
Give an example of a source of this type of radiation:	Radio transmitters	Particular electrical equipment (e.g. on satellites, phone masts, microwave ovens)	All matter (over a wide range of temperatures, the hotter the body the more IR radiation it gives off)	The Sun, candles, light bulbs (all matter at or above 'red heat')	The Sun, UV lamps	The Sun, X-ray tubes	Radioactive elements

Give examples of how we use this type of radiation in every day life:	Radio stations, communications e.g. planes, remote control cars	Heating food, mobile phones, speed cameras, radar, motion detectors (e.g. automatic door openers)	Night-vision goggles, detection of heat sources (e.g. humans, fires etc), medical scans to detect temperature abnormalities, tv remote controls, solar panels	Communication (e.g. TVs, computer screens), lighting, high speed fibre optics, solar panels	Sun beds, detection of fake bank notes, sterilisation of medical equipment/food, curing of ink/paint in printing	Cancer therapy, medical scans, examining industrial equipment, airport security	Cancer therapy, sterilisation of medical equipment/food
Give examples of jobs which use this type of radiation:	Police, armed forces, event organisers, pilots and air safety staff	Chefs and kitchen staff, traffic police, armed forces,	Armed forces, police, fire fighters, border agencies	<i>Most jobs - an interesting discussion can be had about jobs that don't require visible light.</i>	Beauty technicians, shop assistants, bank staff, medical staff, food technicians, designers, office staff (printing) etc.	Medical staff, dentists, industrial technicians, border control agents	Medical staff, food technicians

The aim of the question about detection is to get learners to think about radiation as a ‘source - - - radiation - - - detector’ model (see http://www.iop.org/education/teacher/resources/radioactivity/page_41562.html for more details). Learners may require prompting to think about things that ‘use’ certain types of radiation as ‘detectors’. A range of examples are included but this is by no means exhaustive and is intended to help prompt conversation.

How do you think we can detect this type of radiation?	Radio antennae, walky-talkies etc.	Arial (e.g. mobile phone, radar), speakers (e.g. interference from mobile phones)	Night-vision goggles, photographic plates, thermometers	Eye, photographic plates, photo cells	Photographic plates, Fluorescence of certain chemicals (e.g. bracelets/ frisbees etc. that glow in the presence of UV) light, photocells	Photographic plates	Geiger counters, photographic plates (silver iodide)
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