

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

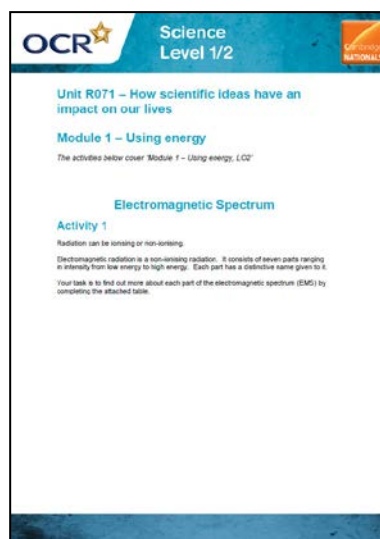
### Module 1 – Using energy

### 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, L02'*




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

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