Linking QCA Science + ICT units

Year 4

Science: QCA unit	Science PoS Pupils should be taught:	ICT: QCA unit	Learning objective	Teaching points/guidance	Possible software
4A Moving and growing	**2,4e** that humans and some other animals have skeletons and muscles to support and protect their bodies and to help them to move	**4C Branching databases**	■ that humans (and some other animals) have bones inside their bodies and raise questions about different bony skeletons ■ to make observations and comparisons of relevant features ■ that the skeleton supports the body	Use children's observations about skeletons to use a branching data base and later create one of their own. **Key skills** observing and classifying. Using the branching database look for trends and patterns in skeletons.	Branch Excel Starting Graph Information Workshop
	2,1a that the life processes common to humans (and other animals) include growth	**4D Collecting and presenting information: questionnaires and pie charts**	■ to identify a question and turn it into a form that can be tested making a prediction ■ to decide precisely what body measurement to make, and to make it ■ to use bar charts or pictograms to present measurements ■ to say what the evidence shows and whether it supports the prediction	Present data graphically from their question. For example, will people with long legs run faster, or will those with small hands have small feet? The key feature of software is to help children arrange and present their data to look for trends and patterns. Simply inputting the data is not a suitable use of the ICT tool. **Key skills:** raising questions, making predictions, devising a test, measuring, recording data, exploring trends and patterns.	Starting Graph Information Workshop
4B Habitats	**2,4a** to make and use keys **2,4b** how locally occurring animals and plants can be identified and assigned to groups	**4C Branching databases**	■ to use keys to identify local plants or animals	This unit offers the best opportunity to **use** ready made keys. Differentiation in the complexity of observation required and the number of organisms will help all children make progress. Once they have undertaken the ICT unit **4C**, **Branching databases**, they can make a simple key of a few (6) organisms with gross differences. In **6A**, **Adaptation and interdependence**, they should have the opportunity to **make** more complex keys.	Branch Excel Starting Graph Information Workshop

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4B Habitats	**2,4a** to make and use keys **2,4b** how locally occurring animals and plants can be identified and assigned to groups	**4D Collecting and presenting information: questionnaires and pie charts**	■ that different animals are found in different habitats ■ to make predictions of organisms that will be found in a habitat ■ to observe conditions in a local habitat and make a record of the animals found	The key feature of software is to help children arrange and present their data to look for trends and patterns. Simply inputting the data is not a suitable use of the ICT tool. **Key skills**: making predictions, observing, recording data, exploring trends and patterns	Starting Graph Information Workshop
4C Keeping warm	**3,1b** that some materials are better thermal insulators than others	**4D Collecting and presenting information: questionnaires and pie charts**	■ to turn an idea about how to keep things cold into a form that can be investigated ■ to decide what evidence to collect ■ to make a table and record results ■ to draw conclusions from their results	The key feature of software is to help children arrange and present their data to look for trends and patterns. Simply inputting the data is not a suitable use of the ICT tool. **Key skills**: raising questions, recording data, exploring change, exploring trends and patterns	Universal Logger *Getting to Grips with Graphs* (ASE)
			■ to turn an idea about how to keep things warm into a form that can be investigated ■ to plan a fair test deciding what to change, what to keep the same and what to measure ■ to make careful measurements of temperature at regular time intervals ■ to record results in a table and to use these to draw conclusions ■ that some materials are good thermal insulators	The key feature of software is to help children arrange and present their data to look for trends and patterns. Simply inputting the data is not a suitable use of the ICT tool. **Key skills**: raising questions, devising a test, testing, measuring, recording data, exploring change, exploring trends and patterns.	

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Year 4

Science: QCA unit	Science PoS Pupils should be taught:	ICT: QCA unit	Learning objective	Teaching points/guidance	Possible software
4D Solids, liquids and how they can be separated	**3,3b** that some solids dissolve in water to give solutions	**4D Collecting and presenting information: questionnaires and pie charts**		Collect and present information as questionnaires in the changes that occur when solids are added to water.	Excel Starting Graph Information Workshop
4E Friction	**4,2c** about friction, including air resistance, as a force that slows down moving objects and may prevent objects from starting to move	**4D Collecting and presenting information: questionnaires and pie charts**	■ to decide what evidence to collect ■ to explain conclusion in terms of the roughness and smoothness of a surface ■ to identify trends in results and draw conclusions explaining these in terms of the force between the object and the water ■ to identify a pattern in the results and to explain it in terms of air resistance	Questionnaires: force taken to move a stationery object in different surfaces, shape attributes and time taken to go through water, parachute attributes and time taken to fall.	Excel Starting Graph Information Workshop
4F Circuits and conductors	**4,1a** to construct circuits, incorporating a battery or power supply and a range of switches, to make electrical devices work	**4E Modelling effects on screen**	■ that a circuit needs a power source ■ that a complete circuit is needed for a device to work	Children must make their own circuits with real materials to understand them thoroughly. However this software enables them to use developing ideas to test theories out instantly and to fault find. **Key skills**: making predictions, devising a test and exploring trends and patterns	Crocodile Clips

Linking QCA Science + ICT units

Year 5

Science: QCA unit	Science PoS Pupils should be taught:	ICT: QCA unit	Learning objective	Teaching points/guidance	Possible software
5A Keeping healthy	**2,2d** about the effect of exercise on pulse rate	**5B Analysing data and asking questions using complex searches**	■ to identify factors which could affect pulse rates and make predictions about changes ■ to plan what evidence to collect including the number of measurements of pulse rate to take and the number of children to use ■ to present results as a line graph and explain what these show and whether they support the prediction made ■ to relate conclusions to understanding of the effects of exercise on heart beat.	Devise **their own** testable questions about pulse rate that can be tested, for example:- ▼ people of different age groups contrasted with tests controlled by, for example, gender or weekly exercise regime ▼ people with different amounts of weekly exercise with tests that control for size and age ▼ girls versus boys in the same age group controlled for size ▼ contrasting recovery times for individuals otherwise similar ▼ one person in different exercise circumstances Stress the importance of repeated measures. Fairness of test should be checked by, for example, having enough individuals in the sample or making sure they are fully recovered before their next exercise and pulse rate reading is taken. Use software to extrapolate tabular and graphical data to raise further testable questions.	Information Workshop Access (for more able pupils *Getting to Grips with Graphs* (ASE)
	▲ as above	**5C Evaluating information, checking accuracy and questioning plausibility**	▲ as above	Use tables, spreadsheets, line graphs to look for anomalies in data. Link to repeated measurements and why they help to moderate anomalies	▲ as above, plus Excel
	▲ as above	**5D Introduction to spreadsheets**	▲ as above	Use of spreadsheets to do calculations of, for example, average results from repeated measures from different individuals.	Excel
	2,2b about the importance of an adequate and varied diet for health	▲ as above	■ that we need an adequate and varied diet ■ to present information about diet and health	Spreadsheet analysis of types of food in a meal, in a day, week and year. More able children to quantify in k cal (beware, calorie and k cal are not the same unit) Use of spread sheet to calculate value per 100g/ typical helping using spreadsheet.	Excel

Linking QCA Science + ICT units

Year 5

Science: QCA unit	Science PoS Pupils should be taught:	ICT: QCA unit	Learning objective	Teaching points/guidance	Possible software
5D Changing state	**3,2d** about reversible changes, including (dissolving,) melting, boiling,(condensing, freezing and evaporating)	**5D Introduction to spreadsheets** **5F Monitoring environmental conditions and changes**	■ that the boiling temperature of water is 100 ºC ■ to identify patterns in data and use these to make predictions ■ to decide whether the evidence collected supports the prediction and explain what happened in terms of scientific knowledge and understanding ■ to obtain evidence by making careful observations ■ to make predictions using scientific knowledge and understanding	This is a good opportunity to use a thermistor which will generate a line graph. It fits with the Numeracy Strategy for Year 5. It also allows children to interpret data and use the information to explore change and to extrapolate and predict from data. The thermistor can be used to explore change over a longer time in the suggested mixture of water and ice at 5 minute intervals. Again the skills of exploring change and predicting/ extrapolating from data are used by the children. Spreadsheets can be used to predict results to check if temperature is changing in a regular pattern. This will help to contrast hypothetical from real data and encourage careful interpolated reading of a line graph.	Universal Logger *Getting to Grips with Graphs* (ASE) Excel
5E Earth, Sun and Moon	**4,4a** that the Sun, Earth and Moon are approximately spherical **4,4d** that the Earth orbits the Sun once each year, and that the Moon takes approximately 28 days to orbit the Earth	**5B Analysing data and asking questions using complex searches**	■ about the relative sizes of the Sun, Moon and Earth ■ that the Sun rises in the general direction of the East and sets in the general direction of the West ■ to make observations of where the Sun rises and sets and to recognise the patterns in these ■ to present times of sunrise and sunset in a graph and to recognise trends and patterns in the data ■ that the Earth takes a year to make one complete orbit of the Sun, spinning as it goes ■ that it is not always easy to gain information about phenomena, e.g. the length of a year, using first-hand experience	Use CD-ROMs to find out relative size Contrast own data with that of other schools of their observations of sunrise and sunset direction Use CD-ROMs to find out what a year is to make a class presentation	Information workshop Access (for more able pupils Excel) RM Investigate Junior Insight Internet CD-ROMs with appropriate content

Linking QCA Science + ICT units

Science: QCA unit	Science PoS Pupils should be taught:	ICT: QCA unit	Learning objective	Teaching points/guidance	Possible software
cont **5E Earth, Sun and Moon**	**4,4c** how day and night are related to the spin of the Earth on its own axis		■ that the Moon takes approximately 28 days to orbit the Earth ■ that the different appearance of the Moon over 28 days provides evidence for a 28-day cycle ■ that the Sun appears to move across the sky over the course of a day ■ that evidence may be interpreted in more than one way	Use data from CD-ROMs, newspaper websites and HMSO to look at Moon phases and the 28-day pattern	Information workshop Access (for more able pupils Excel) RM Investigate Junior Insight Internet CD-ROMs with appropriate content
	▲ as above	**5C Evaluating information, checking accuracy and questioning plausibility**	▲ as above	Use the above activities to look for accuracy and question plausibility	▲ as above
	▲ as above	**5D Introduction to spreadsheets**	■ that the Sun appears to move across the sky over the course of a day ■ that evidence may be interpreted in more than one way	Shadow stick data spreadsheets can be made to create a line graph of time and shadow stick length Extension activity could be to look at differences in daylength at different times of year. Use data in spreadsheet to calculate daylengths	Excel
	▲ as above	**5F Monitoring environmental conditions and changes**	■ that it is the Earth that moves, not the Sun, and the Earth spins on its axis once every 24 hours ■ that it is daytime in the part of the Earth facing the Sun and night-time in the part of Earth facing away from the Sun	Use light sensors to gain information about daylength at different times of year	Universal Logger
5F Changing sounds	**4,3g** that vibrations from sound sources require a medium through which to travel to the ear	**5F Monitoring environmental conditions and changes**	■ to make careful observations to identify the types of material through which sound travels ■ that some materials are effective in preventing vibrations from sound sources reaching the ear	Use sound sensor to give digital reading of which materials different sounds travel through most easily. Cover sound sensor with different materials	Universal Logger RM Investigate Junior Insight
	▲ as above	**5D Introduction to spreadsheets**	■ to make careful observations to identify the types of material through which sound travels	Calculate differences in digital readings from sound sensor	Starting Grid Excel ASE *Pack for Graphs*

Linking QCA Science + ICT units

Year 5

Science: QCA unit	Science PoS Pupils should be taught:	ICT: QCA unit	Learning objective	Teaching points/guidance	Possible software
5/6H Enquiry in environmental and technological contexts	**Sc1: Obtaining and presenting evidence** **2,5c** how (animals and) plants are suited to their environment	**5B Analysing data and asking questions using complex searches**	■ to collect data and record data appropriately ■ to identify and describe patterns in data ■ to look critically at data collected	Collate class data to ask higher order questions such as, do plants with many leaves have longer or shorter stems?	Information workshop Access (for more able pupils)
	▲ as above	**5D Introduction to spreadsheets**	▲ as above	Use the software to identify how strongly the results show a trend making particular reference to the sample size	Starting Grid Excel ASE *Pack for Graphs*
	▲ as above	**5F Monitoring environmental conditions and changes**	▲ as above	Use light sensors to give environmental data to relate to quality of plant growth	Universal Logger RM Investigate Junior Insight
	Sc1: Considering evidence and evaluating **2,5c** how (animals and) plants are suited to their environment	**5C Evaluating information, checking accuracy and questioning plausibility**	■ to try to explain their results using their scientific knowledge and understanding ■ to describe the limitation of their own and others' evidence	Use the software to identify how strongly the results show a trend making particular reference to sample size	Starting Grid Excel ASE *Pack for Graphs*
	Sc 1: Whole enquiry **4,1a** to construct circuits , incorporating a battery or power supply and a range of switches, to make electrical devices work	**5E Controlling devices**	■ to plan a suitable approach ■ to test out design making a series of observations ■ to adjust designs in systematic way in the light of evidence collected	Put pressure pad switch in a device controlled by the computer or use computer to record "story" of pressure pad use against a timeline	Universal Logger RM Investigate Junior Insight

Linking QCA Science + ICT units

Year 6

Science: QCA unit	Science PoS Pupils should be taught:	ICT: QCA unit	Learning objective	Teaching points/guidance	Possible software
6A Adaptation and interdependence	**2,5b** About the different plants and animals found in different habitats **2,5c** How animals and plants in two different habitats are suited to their environment	**6D Using the Internet to search large databases and to interpret information**	■ that animals and plants in a local habitat are interdependent ■ how animals and plants in a local environment are suited to their habitat	Use of other schools' data is preferable to a general search of the Internet. The Groundwork Trust at Iver maintains a current database of animals and plants to contrast with other Trusts in the country.	Internet search engine
		6A Multimedia presentation		PowerPoint presentation of findings	PowerPoint
6B Micro-organisms	**2,5f** That micro-organisms are living organisms that are often too small to be seen, and that some may be beneficial	**6B Spreadsheet modelling**	■ to make careful observations and compare these in order to draw conclusions about effect of yeast on dough	Use the spreadsheet to do calculations and graphs of water temperature/size of balloon ratios	Excel
		6C Control and monitoring. What happens when ...?	■ to make suggestions about what yeast needs to grow	Use of temperature and light sensors	Flowal; Coco; Logicator; Lego Dacta
6C More about dissolving	**3,3b** That some solids dissolve in water to give solutions but some do not	**6A Multimedia presentation**	■ to use a line graph to present results	Present line graphs of *x*-axis temperature of water, *y*-axis speed of dissolving of salt, sugar and other solids Present line graphs of *x*-axis size of grain, *y*-axis speed of dissolving of salt, sugar and other solids	PowerPoint
	▲ above	**6B Spreadsheet modelling**	■ to use a line graph to present results	Present line graphs of *x*-axis temperature of water, *y*-axis speed of dissolving of salt, sugar and other solids Present line graphs of *x*-axis size of grain, *y*-axis speed of dissolving of salt, sugar and other solids Extrapolate and predict from data	Excel
	▲ above	**6C Control and monitoring. What happens when ...?**	■ to make careful observations and measurements	Use temperature sensors to control environment	Flowal; Coco; Logicator; Lego Dacta

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Science: QCA unit	Science PoS Pupils should be taught:	ICT: QCA unit	Learning objective	Teaching points/guidance	Possible software
cont **6C More about dissolving**	**3,3b** That some solids dissolve in water to give solutions but some do not	**6B Spreadsheet modelling**	■ that several repeated measurements provide data that can be used with more confidence ■ to draw a line graph from the results ■ to evaluate a graph in terms of how well it represents experimental results	Repeat measures to produce range of graphs, extrapolate and predict from graphs	Excel
6D Reversible and irreversible changes	**3,2f** That non-reversible changes result in the formation of new materials that may be useful	**6A Multimedia presentation**	■ reviewing section at end of unit	Group presentations on all aspects suggested for concept mapping – heating, cooling, dissolving, melting, freezing, solids, evaporating, condensing, burning, change, reversible, irreversible, salt, water, clay, wood, wax, gas, new materials, steam, ice and air. Discuss outcomes as whole class, addressing any remaining misconceptions	PowerPoint
6E Forces in action	**4,2e** How to measure forces and identify the direction in which they act	**6B Spreadsheet modelling**	■ to repeat measurements to check them ■ to evaluate repeated measures ■ to make careful measurements of length ■ to represent data in a line graph and use this to identify patterns in the data	Use spreadsheets to calculate intermediate readings of weight in air and water for objects of same material but different mass Create force (*x*-axis) to length of elastic band (*y*-axis) line graphs	Excel
	4,2c About friction including air resistance, as a force that slows moving objects		■ to check measurements by repeating them ■ to interpret a line graph and use it to describe the motion of spinners	Create line graphs relating number of paper clips to rate of fall, and check against previous attempts Extrapolate and predict for data of wing sizes that they haven't been able to try	

Linking QCA Science + ICT units

Year 6

Science: QCA unit	Science PoS Pupils should be taught:	ICT: QCA unit	Learning objective	Teaching points/guidance	Possible software
6F How we see things	**4,3b** That light cannot pass through some material, and how this leads to the formation of shadows **4,3d** That we see things only when light from them enters our eyes	**6B Spreadsheet modelling**	■ to identify factors which might affect the size and position of the shadow of an object ■ to investigate how changing one factor causes a shadow to change ■ to consider trends in results and to decide whether there are results which do not fit the pattern ■ to check measurements by repeating them	Use spreadsheets to extrapolate for distances of object from screen or light source or angle of light source and dimensions of shadows	Excel
		6A Multimedia presentation	■ PowerPoint presentation		PowerPoint
6G Changing circuits	**4,1b** How changing the number or type of components (for example batteries, bulbs, wires) in a series circuit can make bulbs brighter or dimmer	**6C Control and monitoring. What happens when ...?**	■ that the brightness of bulbs, or speed of motors, in a circuit can be changed ■ that the brightness of bulbs in a circuit can be changed by changing wires in a circuit ■ to suggest a question to investigate, to decide what to do and what equipment to use to test this ■ to make fair comparisons and draw conclusions	Sensors could be used to quantify bulb brightness or motor (or buzzer/ bell) sound. Sensory information could be used to quantify effects on bulbs of changing wires, for example, is the thickness, material or length of the wire critical in changing bulb brightness? A good opportunity to highlight the choosing equipment strand of **Sc1** in an ICT context.	Crocodile Clips Flowal Coco Logicator Lego Dacta