Lower Key Stage 2 – *Keeping Informed* – Theme Guide

Children understand the difference between data and information. They use sensors, data-loggers and other tools as part of their investigations. They use branching and flat-file databases to enter, organise and search data, deriving information that they present in different forms.

Learning objectives for the term
To know the difference between data and information.
To understand that data-loggers and sensors show and record changes in environmental conditions.
To understand that data-loggers and sensors and the related software can support analysis of environmental data.
To understand that digital tools such as microscopes and cameras can support investigational work. *Combine data from data-loggers and microscopes/cameras to support their investigations.*
To understand that selection is used in branching databases to sort and classify objects based on their characteristics.
To develop high-level questioning based on the key characteristics of objects.
To understand flat-file databases are structured into files, records and fields and that this supports organisation and searching.
To understand that using electronic databases can improve efficiency in organising information.
To know database records can be sorted to answer questions.
To understand that using electronic databases can improve efficiency in searching for information.
To understand database fields can be defined as different types, which can supports accurate data entry and effective querying.
To understand the need for accuracy when creating databases.
On-going Learning Objectives
To review and evaluate their work, checking for accuracy, making corrections.
To use appropriate file-name conventions and understandable folder structure to save, organise and retrieve their work.
To understand essential eSafety rules and to know what to do in the event of an incident or concern at home or school.

Vocabulary – see Glossary for definitions (for terms in blue)	
data and *information* *data-logger,* *sensor,* *selection,* *branching database,* *flat-file database*	*database terms:* • file • record • field • field content

Possible resources for this theme (further resources are suggested with the explanatory notes below. Note that these are examples and not formal recommendations.)	
'Data Sensing' Apps • Decibel X (iPad / Android) • Various Seismometer apps (iPad / Android) • Various Lux Meter apps (iPad / Android) **Data-Logging Hardware** • TTS Log-Box • EasySense Vu • LogIT Explorer	**Branching Database Software** • 2Simple® 2Question • Textease Branch • Kudlian Ask Oscar • JIT5 Branch (as part of J2E) **Flat-File Database Software** • 2Simple® 2Investigate • Information Magic / Workshop • Textease Database • J2Data (as part of J2E)

Please note that with any online platform it is essential that you review the privacy policy and terms and conditions of the service. The school is responsible for the protection of data it holds and compliance with current data protection legislation. Always assess both the data protection and safety of the service you are considering using, and ensure any necessary permissions are in place before using with pupils.

Primary Computing Scheme online materials that are referenced in this guide can be accessed from: http://www.hertsforlearning.co.uk/user/login

You will need to be logged into your school account and have a current subscription to the Primary Computing Scheme to gain access. The materials can be accessed from the *My Resources* link at the top/right of the screen, once you are logged in.

Key Learning Objectives (some objectives might be used for more than one lesson)
To know the difference between data and information.
• What is data? What is information? Think of examples of where we find each. (I.e. that when data is processed, organised, structured or presented in a given context so as to make it useful, it is called *Information*). • Understand that technology helps us to process data into information. Why do we use graphs? Use a primary-friendly graphing tool to learn about different types of graph. Compare them, where possible showing the same data as different types of graph so it is easier to assess which type of graph is best for each purpose. • What questions can each type of graph help us answer? Why choose one over the other? Which is better for specific reasons? Link to Maths / Science. • Why do we use technology to work with data and information? • What is a mind map? Why use one? (There are some good free apps available for this if you do not already have a suitable mind mapping tool.) • Link use of mind maps to English / Science etc.
To understand that data-loggers and sensors show and record changes in environmental conditions.
• How can we use technology to find out about environmental conditions? Think about thermometer, weather forecaster, heating thermostat, a photographer using a light meter etc. • Research different types of technology for sensing and recording environmental data. • Develop understanding of inputs and outputs by investigating how sensors can act as inputs to digital systems, triggering an output action. (For example a thermostat in a heating system monitors room temperature, so the heating can be triggered when a pre-set temperature is reached.) • You could use an iPad or other tablet connected to the class screen to teach the concept of input and output, with sensing apps. For example, the iPad® apps: *Too Noisy / Decibel X / Seismometers / Lux meters / Spirit Levels*. Note how the software can be controlled by different environment inputs, such as the volume of our voices or the brightness of the lights. • Use any other sensing tools available, e.g.: bath thermometer, baby monitor etc. • Link to Science / Maths
To understand that data-loggers and sensors and the related software can support analysis of environmental data.
• Learn about data-loggers and how your particular model works, and use them to carry out different types of logging. Carry out investigations using both continuous recording and capturing repeated snapshots of conditions. • Analyse the data produced and draw conclusions. • If no dedicated data-loggers are available, use iPad® or tablet apps (e.g. the examples above) to investigate the environment around the school. • E.g. where is the quietest and noisiest areas of the school? Use the graphing tools you used above to present the data gathered and draw conclusions from the graphs or charts produced. • Link to Science / Maths.
To understand that digital tools such as microscopes and cameras can support investigational work. *Combine data from data-loggers and microscopes/cameras to support their investigations.*
• How can cameras and microscopes help us investigate? • Use available tools to investigate, e.g. use a camera to show changes in weather or light across a week. Create a report (which could include graphs / charts if data has been gathered as well.) • Use a time lapse tool if available (e.g. the iPad® app *iMotion*) to show a change over time (try melting ice / oxidising apple / changes in weather). Create a report (could include graphs / charts if data has been gathered). • Link to science

To understand that selection is used in branching databases to sort and classify objects based on their characteristics.
• Selection uses yes/no questioning and is used in branching databases to sort and classify objects based on their characteristics. • Discuss and practice Yes / No questions. Play games such as '*Who am I*?' '*What's in the box?'* where the answer must be obtained through a series of yes/no questions. • Show how yes / no questions, presented in a tree, can identify something. Discuss and prepare yes/no questions to identify different objects. How can our questions be improved to make the process more effective? • Use ready-made branching databases. (If you have dedicated branching database software it will probably have some examples included, to explore how they work.) • As a class, write an algorithm to show the process of using yes/no questions to identify something. As each question is asked, two choices are presented. Depending on the answer (yes or no) another question is asked. This is repeated until the object is identified. • Link to science
To develop high-level questioning based on the key characteristics of objects.
• Pupils design and create their own branching database. Ideally these should be planned unplugged, as relevant software often has a 'wizard' based approach and can do a lot of the 'thinking' for you. Once the branching database has been mapped out on paper, it can then created using software, if available. • Examples of branching database software includes 2Simple® 2Question, Textease Branch, Kudlian Ask Oscar. • Test on a partner and suggest to each other how it could be improved.
To understand that flat-file databases are structured into files, records and fields and that this supports organisation and searching.
• What is a flat file database and why do we use them? Research examples of databases around us. Where are they used in school? Out of school? (We actually use databases all the time, but perhaps don't think too much about it. More or less anything we can digitally search involves a database of some sort. Online shopping, music libraries, on demand television, contacts lists etc.) • Use images of older non-digital databases such as library card databases, telephone directories, filing cabinets etc. • Use 'Top Trumps®' style games to learn about databases. A pack of cards in this type of game is a kind of database, with lots of records (cards) and each record holding different 'fields' of information. We could sort all the cards in our pack according to different criteria, for example in a pack of football players we could sort the pack by number of goals scored by each player, number of international games they've played and so on. • See the accompanying sheet: [*blank class database cards*] for an unplugged-database activity. • Teach the vocabulary for flat file databases: (File) / record / field / field name / field content.
To understand that using electronic databases can improve efficiency in organising information.
• Use a dedicated flat-file database program to explore a ready-made database. Try saving a ready-made example to a new file (so it can be modified without changing the original) and exploring: design (add a field etc.) / modify existing / add records / different views. • Examples of flat file database software include RM® Information Workshop, Textease® database, 2Simple® 2Investigate, J2E J2Data. • Explore different charts which can be displayed in the database software, and how effective they are for different fields. • Use a database to draw some conclusions.
To know that database records can be sorted to answer questions.
• Explore away from the computer using a card database and, for example, sorting the cards according to a specific criteria. You could create a card based database with the pupils on a specific topic. Or use 'Top Trump®' style games. • With card-based 'unplugged' databases, the problem is the time it takes to sort a pack (the database) according to the different criteria. By using electronic databases we can organise and search the data in seconds. • Try game activities such as sorting the class into a line by birthdate. Link to how this can help us answer questions. For example, we can ask the question, "Who is the youngest in the class?" By organising the children into a line, with the youngest at one end and the oldest at the other, we can then answer the question. We do the same in an electronic database, except it happens in seconds. • Try other game activities such as sorting class into groups by eye colour, etc. • Make a physical graph or chart from these activities.

- Use the 'sort' tools in your database software to explore an existing database.
- Explore the charts and graphs the database software is able to produce.
- What sort of questions cannot be answered using sort? (For example, sort works well with numeric information but with names it is perhaps less useful, other than sorting alphabetically.)

To understand that using electronic databases can improve efficiency in searching for information.

- Use the search tools within a prepared electronic database, turning questions into search criteria to find the required information.
- Compare the digital method of searching and sorting, to the physical methods you used above, in terms of speed, efficiency and accuracy.
- Learn about search operators: = < > etc.
- Practice different searches.

To understand that database fields can be defined as different types and that this feature can be used to support accurate data entry and effective querying.

- Discuss different types of field, e.g. numeric or alphabetic.
- As a class, design a database that contains a number of different fields. This could be information about the pupils, or a database on another topic linked to a different subject such as science or geography.
- Why have you chosen the fields you have? What sort of field have you used for each one? (E.g. for age, is it better to use a field for numbers or letters? Numbers are probably better as there is less likelihood of a spelling mistake, and therefore search and sort results are likely to be more accurate.)
- With a partner, pupils share the kinds of mistakes which the structure would help avoid.

To understand the need for accuracy when creating databases.

- In pairs, pupils can take the database designed as a class and populate their own versions of it using the flat-file database software, knowing that effective analysis depends on appropriate and correct data entry.
- Use the tools to search the database in order to be able to answer questions.
- Create and present graphs from the database.

On-going Learning Objectives

To review and evaluate their work, checking for accuracy, making corrections.

To use appropriate file-name conventions and understandable folder structure to save, organise and retrieve their work.

To understand essential eSafety rules and to know what to do in the event of an incident or concern at home or school.

Suggested independent task – any open-ended activity (2-3 sessions) enabling the children to demonstrate their computing capability around the knowledge and understanding provided in the term

- Individually research and enter data into a database around a new theme/topic (this could include data gathered using sensors).
- Use the database to answer their own and others' questions, presenting at least one of their answers as a graph.
- Comment on the structure of the database and how it helped them to find answers to questions.

Other considerations:

Does the task provide for children to work at different levels?
Is there support available for children to select if they wish?
Are there opportunities for the children to review and develop their work?
Is there an opportunity for the children to evaluate the finished task?

The teacher chooses the topic for the database, which could be linked to another area of learning.
The Pupils plan fields and field types. They then research the data needed to populate the database (eg: use data-logging tools to get some volume / light information from around school.)
Partner up to search each other's databases to answer specific questions (record these.)
Pupils write about the database, why they chose the fields they did and how these helped answer questions.